PRAXIS GROUPS

KARNATAKA KMAT

KARNATAKA MANAGEMENT APTITUDE TEST

MBA / MCA / PGDM

Inside The Book

- Verbal Ability
- Quantitative Ability
- Reasoning Ability
- Solved Papers

CHAPTERWISE STUDY GUIDE AND SOLVED PRACTICE TESTS

KARNATAKA
KMAT

(KARNATAKA MANAGEMENT APTITUDE TEST)

MBA/MCA/PGDM

CHAPTERWISE STUDY GUIDE
AND
SOLVED PRACTICE TESTS

Praxis Groups

PRAXIS GROUPS

India's First online educational material publishers

Phone: +91 40 4020 3585, +91 92468 44022

ISBN - 978-81-930685-4-0

Inside the book

SECTION – A

VERBAL ABILITY

SENTENCE

A sentence is a group of words which makes complete meaning or sense. Hence a sentence has 'sense'. Sentences are of four kinds depending on their function.

Declarative or assertive: these are sentences which make statements or assertions.

e.g.: Japan is an Island.
The Blue Whale is the largest mammal.
A huge earthquake destroyed many buildings.

Interrogative: these are sentences which ask questions.

e.g.: Where are you from?
How often do you come here?
Do you play chess?
Were you present for the last class?

Imperative: these sentences express command, request, suggestion, advice etc.

e.g.: Be quiet.
Don't pluck these flowers.
Take these tablets two times a day.

Exclamatory: these express sudden, strong feelings.

e.g.: Wow! What a great shot! Awesome!

All these sentences say something about a person or a thing. The person or thing about which the sentence says is the *subject* of the sentence. The subject of a sentence is usually a Noun or a Pronoun and may be just one word or more than one. The subject of a sentence usually comes at the beginning of a sentence

You may also notice that *'it'* is also a subject. *'It'* is called an implied subject.

1. *Suresh* is working for a reputed firm in Bangalore.
2. *This* is not my book.
3. *It* is an enchanting place.
4. *The children of this school* participate and win prizes in many competitions.
5. *The boy in the blue shirt* is my brother.

What the sentence tells about the subject is the *Predicate.* All the sentences given above have subject as well as predicates, the only exception being imperatives. Imperative sentences are usually addressed to the person in front of us and so the subject is omitted

1. The boys *are playing well***.**
2. This businessman *invests in shares*.
3. Apples *are healthy***.**
4. The Pacific Ocean *is the largest ocean on Earth***.**
5. The recent earthquake in Nepal *lead to a loss of lives and property***.**

Phrase: A Phrase is a group of words which make some sense but not complete sense. Phrases can also be classified as noun phrase, adjective phrase and adverb phrase, depending on the work they do. A phrase which does the work of a noun is a noun phrase, which does the work of an adjective an adjective phrase and an adverb an adverb phrase. For example,

I do not know his needs (what he needs)-- noun phrase.
He likes *mystery stories***. (**stories which are mysterious.) -- adjective phrase.
*On his return from the tournament***,** he was given a grand welcome. (when he returned from the tournament) adverb clause.
The bank is located *at the corner***.**
Her bangle is made *of gold***.**

These are all examples of phrases.

Phrasal Verbs: Verbs followed by adverbs or prepositions are called *phrasal verbs*. These are also called *idioms* as the combination of a verb and an adverb or preposition give a different meaning to phrase and cannot be taken literally. These expressions are peculiar to the language and play an important part in understanding the language.

e.g.: The examination was *put off***. (**to postpone)
The thieves *broke into* the bank. (entered by force)
The Union *called off* the strike.
She *broke down* on hear the news.

Clause: A clause is a group of words which contain a subject and a predicate but still does not make complete sense.

e.g.: He is the boy *who lost his bag***.**
(who – *subject*; lost his bag – *predicate*)
I believe *he is telling the truth***.**
(he – *subject*; is telling the truth- *predicate*)

Hence we see that a sentence needs a subject and a predicate to make complete sense. The other words in a sentence are also categorized according to the role or part they play in the sentence.

PARTS OF SPEECH

Parts of speech in a language mean the role or part played by a word in a sentence. This is similar to the roles we play in our lives. In one place you might be a student, in another a friend, yet in another, if you are working, you might be a boss or a subordinate. We also play different roles at home when we interact with different people. In all the roles we play, our role and interaction depends upon the relationship with the people with whom we are interacting. Similarly, words are categorized according to the role or part they play in a sentence. Seeing a word, we cannot categorize it as a noun/ pronoun/ verb/ adjective etc. In order to categorize a word, we need to know what role it plays in the sentence. Words are normally categorizes into 8 parts of speech. Here we give you the categories with some examples:

Part of Speech	Function	Example Words	Example Sentences
NOUN	Name of a person, place, thing or quality	Girl, Manchester, Gandhiji, peace, honesty	• *Gandhiji* loved peace.
PRONOUN	Words used instead of a noun	He, she, our, theirs, my ...	• *She* is *our* teacher.
ADJECTIVE	Words used to describe nouns.	Beautiful, big, tall, awesome …	• The girl is *tall*. • Gandhi was a *great* leader.
VERB	Words which tell the state of a thing, possession and action.	Be verbs, have verbs and do verbs, am, Is, are, was, were, have, has, had Do, does, did work, talk, walk …	• She *is* my friend. • He *paints* well. • She *works* meticulously.
ADVERB	Words which tell us where, when and how an action takes place, as well as to what degree an action takes place…..	fast, very, sincerely, properly, quite …..	• She works *fast.* • This train is *quite fast*.
PREPOSITION	Words which tell us the position or relationship between two nouns in a sentence.	In, on, between, under, for, near, by, with …	• There's a park *near* my house. • Your pen has fallen *under* the chair.
CONJUNCTION	Words which join other words or sentences to make language more concise	And, but, or, neither…nor, either…or, so when, while, who whom…….	• Bread *and* butter is taken by many for breakfast. • He started early *but* could not reach on time.
INTERJECTION	Words used to express sudden feelings and expressions.	Wow! Great! Spectacular! Awesome!	• *Wow!* What a great shot! • What a *spectacular* performance!

NOTE:

THIS IS A **SAMPLE PDF**

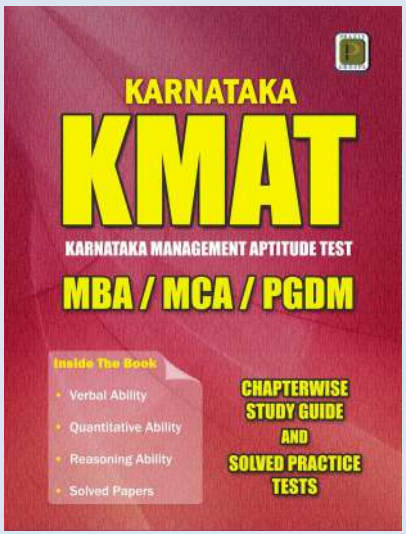
ONLY **135** OUT OF **340** PAGES ARE GIVEN FOR THIS DEMO

DETAILS TO GET THE FULL BOOK IS GIVEN INSIDE

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

REPORTED SPEECH

When somebody says something to us, there are two ways of reporting it. We may quote the actual words, which is called *Direct Speech***.**

e.g. : Rajesh said, "I am going to class now."

Another way of reporting this would be to say what he said, in our own way without quoting his exact words. This is called *Indirect or Reported Speech***.**

e.g.: Rajesh said that he was going to class then.

When we quote the exact words of the speaker, we place the words of the speaker within inverted commas. Further changes are also necessary when we report what a person has said in our own words. The changes that have taken place are:

1. *'I'* has become *'he'*.

2. The conjunction 'that' is used before the indirect statement.

3. Present continuous tense is changed to past continuous as there is a time lapse between when it was said and when it was reported.

4. *'Now'* has changed to *'then'*.

General rules for changing from direct speech to reported speech:

1. When the reporting verb is in present tense, there is no change of tense in the reported speech.

e.g.: The watchman says, "The gates close at 10:00 pm".

The watchman says that the gates close at 10:00 pm

This is normally used for universal truths, instructions etc.

2. Apart from the above rule, there is always a change of tense whenever something is reported. The change in tense occurs as follows:

TENSE	CHANGES TO
Simple present	Simple past
Present continuous	Past continuous
Present perfect	Past perfect
Present perfect continuous	Past perfect continuous
Simple past	Simple past/ Past perfect
Can, may, will	Could, might, would

3. Pronouns in first and second person change to third person.

4. In statements, the reported verb is usually said or told.

e.g.: He said, "I will come tomorrow".

He said that he would come the next day.

This brings us to another point. Words expressing nearness in time or places, change into words expressing distance.

e.g.:

Now	Then
Here	There
Ago	Before
Today	That day
Tomorrow	The next day
Yesterday	The day before
Last night	The night before

5. Interrogatives with '*yes*'/ '*no'* are introduced by '*if*' or '*whether*'.

e.g.: Smitha asked Rani, "Are you coming tomorrow?"

Smitha asked Rani if she was coming the next day.

Smitha asked Rani whether she was coming the next day.

6. Questions starting with '*WH*' do not require a reporting verb. Since these are indirect questions, attention must be paid to the sentence structure.

e.g.: The teacher asked Arun, "Why are you late"?

The teacher asked Arun why he was late.

7. In imperative sentences, the reporting verb indicates the mood of the speaker. Words like *ordered*, *requested*, *pleaded*, *inquired*, *urged* etc are used.

e.g.: The policeman said to the motorcyclist, "Stop!"

The policeman ordered the motorcyclist to stop.

8. While reporting exclamations, greetings or wishes, some verb expressing exclamation or wish is used.

e.g.: The student told the teacher, "Good Morning".

The student greeted the teacher.

The other common expressions for exclamations are, *exclaimed*, *congratulated*, *apologized*, *applauded* etc.

SENTENCE CORRECTION / SPOTTING ERRORS

CONCEPTS

Sentence correction questions are designed to test your ability to identify written English that is grammatically correct. They also test your ability to understand the essential message conveyed in that sentence. Therefore, understanding the essential and discarding the unimportant or non-essential is the key point to be focused while attending to these type of questions.

Questions on spotting errors/ sentence correction are usually based different grammatical rules. We have different types of grammatical errors. You have to concentrate chiefly on the following kinds of errors.

1) Errors of Subject Verb Agreement.
2) Errors based on the wrong usage words.
3) Errors in the use of Nouns and Pronouns, Adjectives, Adverbs, Conjunctions, Prepositions etc.
4) Errors in the use of Tenses.
5) Errors on active and passive voice.
6) Errors in the usage of Articles
7) Errors in the usage of Reported Speech.

All the above topics are discussed in the previous chapters.

Types of sentence correction questions:

Spotting the Errors:

In this type of question, a sentence is given with certain parts have been underlined or marked a, b, c and d. one of these underlined or marked parts may contain and error or may not be acceptable in standard written communication. You have to find which part has an error.

Choosing the grammatically correct sentences:

In this type of question, four sentences are given and we are asked to choose the grammatically correct sentence. There is no underlined part so you have to observe the entire sentence for its accuracy and grammar.

Choosing the best alternative:

This is a different type of question where a part of the sentence is high-lighted or underlined. You have to choose the best alternative from among the four given sentences.

Inappropriate usage:

Here, the different usages of a word/ phrases are tested. You have to choose the option in which the usage is inappropriate or incorrect.

• To score well in the above sections, you need to know Standard English Grammar. You must be able to recognize the various Parts of Speech and identify the way they are used incorrectly in test question.

• Mainly, your attention should be focused on tenses of verbs, word order, word form, and agreement of the verb with the subject, difference between principal verb and Auxiliary verb, proper usage of preposition. You must also have a solid understanding of the different idiomatic phrases and the link between one clause and the other. *i.e.* principal clause and sub-ordinate clause.

• Strategies to solve questions on choosing grammatically correct sentences.

a) The first thing to do is to go through all the four sentences carefully. Sometimes there may be multiple errors in a sentence. Therefore while choosing the correct sentence; you have to be careful.

b) While reading the options you may find one or two sentences with glaring grammatical mistakes.

Obviously, what you should do is to short list your options. Then closely concentrate on the one or two short listed options out of the four given.

c) Do not look for spelling errors or errors in the use of capital letters and punctuation marks.

EXERCISE-I

Each of the questions given below consists of four sentences on a topic numbered a to d. There may be an error in any one part of the sentence. Read the sentence and Identify the part which has the error and write it as the answer. If there is no error, mark the answer as (e).

1. (a) If he worked hard **/(b)** he would have **/(c)** got through the exam **/(d)** which he wrote recently.

2. (a) She told me /**(b)** that she will meet me /**(c)** the next day **/(d)** if she had time.

3. (a) He usually /**(b)** goes to college /**(c)** by walk /**(d)** because he stays close by.

4. (a) After he returned back /**(b)** from U.S **/(c)** he has started /**(d)** his own factory.

5.(a) The students /**(b)** work /**(c)** meticulously throughout the year /**(d)** doesn't they.

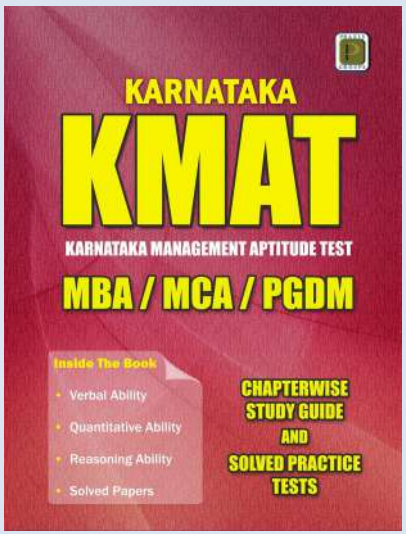
6. (a) She could not give the exam **/(b)** since she lacked **/(c)** the requisite attendance **/(d)** required by the University.

7. (a) He hoped /**(b)** to top the exam /**(c)** but could not be able to do so **/(d)** because of ill-health.

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

14) Pose

a) The spectator wanted the chief guest to pose for a photo.
b) Pollution poses a serious threat to the environment.
c) An observer asked if he might be permitted to pose a question.
d) The revised syllabus poses a heavy burden on the students.

15) Know

a) We have known each other since 1994.
b) They were whisked off in a car before they knew where they were.
c) He knows of one factory where they have never had a strike for 40 years.
d) He is from Chennai, as you can know from his accent.

16) Control

a) The crowd was too big for police to control.
b) A new advance has been made in the control of danger
c) We want to passport control into the departure lounge
d) I took my car to the garage and asked them to control the steering.

17) Need

a) You needn't to pay for emergency calls in England
b) Everybody needs to rest sometime.
c) The boss seemed as if he was in need of a little friendly advice.
d) There is a growing need for trained soft skills trainer in Singapore.

18) Street

a) My friend lives in the house just across the street.
b) The street out of our village goes up a steep hill.
c) this job seems right up your street.
d) Ours is a country that is streets ahead in the production of tea.

19) Watch

a)We got into a fight yesterday evening while we were watching a cricket match.
b) Have you ever watched series "The Great Predator"
c) The cat was on the wall, watching for rats.
d) The cashiers were asked to watch out for forged bank noted.

20) Descend:

a) Calm descended to the crowd.
b) He should never descend to that sort of behavior.
c) According to the theory of evolution human beings descended from apes.
d) Night descends quickly in the tropics.

21) Too

a) He puts down the bag because it was too heavy.
b) They said "Let's forget this too difficult problem".
c) He too did not come to my rescue.
d) Accidents like this happen all too often.

22) Take

a) This is a nice hotel thanks for taking me here.
b) The strumming pills were taken off the market.
c) My friend has taken after his grand father.
d) Re writers took down every words & his speech.

23) Large

a) It was a large house situated near the river.
b) Everything about her appears larger than life.
c) By neglecting his health he was making a large mistake.
d) The escaped terrorist is still at large.

24) Fit

a) The times of India did not seems fit to publish my article.
b) The lift was so small that only 5 men could fit in.
c) The dress fits him like a glove.
d) Red and yellow are colors that fit her very well.

25) Indulge

a) When they won the match they indulged themselves with a bottle of champagne.
b) Fewer young people indulge in smoking these days.
c) There seems to be an increasing tendency among demonstration to indulge in violence.
d) She indulges her husband's every to him.

26) Raise

a) There were a lot of raised eyebrows when he arrived at the party without his children and wife.
b)The principals sudden out burst raised the temperature of the discussion.
c) My neighbor raised the alarm whom he saw unsocial elements around.
d) The minister asked permission from the speaker to raise a discussion on this mater without delay.

VOCABULARY

CONCEPTS

There is no exaggeration in saying that 'English is a Passport to Success', especially for the students that are preparing for competitive exams – may it be national level or international level exams. When it comes to campus recruitment tests, the role of English language is very significant. For the companies are very particular about the language skills of the students rather than the subject expertise as the former cannot be taught in the companies. Companies can train the students in regard to their projects, but not in regard to language skills, hence the emphasis. It is said that once an employee of a big company sent a following leave letter to his manager- "*sir, as I need to go to my native place to dispose of the ancestral property along with my wife, I may kindly be granted four days leave*." (both are the employees of the same company) Meaning–wise the above sentence is a blunder which is created due to a simple change of structure. Just a slight change in the sentence structure will give the desired meaning- the phrase *'along with'* should be placed after *'native place'*- "*sir, as I ….my native place along with my wife to ...*" would be an appropriate sentence. Simple mistakes may mar the entire meaning and create many problems.

Then the question is how to develop English language skills? Knowledge of a language implies–the knowledge of Listening, Speaking, Reading and Writing. It is only through Listening, the other skills will develop; a child learns the language through listening only. Now–a–days, there are ample opportunities to enhance one's listening skills through watching different news channels. Listening and Speaking are two sides of the same coin and these will pave way to Reading and Writing.

For all the four skills that we have discussed, two most important ingredients are Vocabulary and Grammar. Indeed, vocabulary is like 'bricks' and Grammar is like 'cement'- the more number of bricks you have, the larger will be the building. And it is the 'grammar' that keeps the bricks in a beautiful manner. If a student has only a limited range of vocabulary, he will not have greater fluency and variety. Since language is 'a dress of thought' to express one's thoughts, one requires variety of expressions, based on the situations. For example, to express one's feeling of happiness, there are a bunch of words – *joy*, *blithe*, *cheerful*, *elated*, *glad*, *delightful*, *hilarious*, *exultant*, *ecstatic* and *blissful* – all these indicates one's happy state of mind only. But certainly, these are not the 'same' words, but only 'similar' words. No two words in a language give the same level of meaning. They are used at different degrees of intensity of feeling. So also, to express the feeling of unhappiness, there are a bunch of words –*miserable*, *depressed*, *distressed*, *gloomy*, *dejected*, *wretched*, *despondent*, *forlorn*, *sorrowful*, *melancholy*, *poignant* and *heart breaking*. If a student can understand the 'weight' of a word, then he will be able to use it in accordance with the situation. If a student is selected for an MNC, with a very attractive package, to express his feelings, he just can't say - *'I am very happy'* but he must say *'I am ecstatic or blissful'* since that is one of the most joyful moments of life. It is only through an appropriate usage of words, a speaker can convey his feelings effectively.

Most students have a strong feeling of fear that 'developing vocabulary' or 'word power' is a very difficult task. In fact, it is certainly difficult, if a student tries to learn it in a monotonous manner of mugging words. It would be interesting and entertaining if vocabulary is developed in a systematic manner, i.e. through *'Root words'*, *'Prefixes'* and *'Suffixes'*. Every language has its roots. If we can understand at least a few root words, we can not only remember the words easily, but also guess the meaning of some unknown words also.

In this chapter, let us learn a few Root Words-

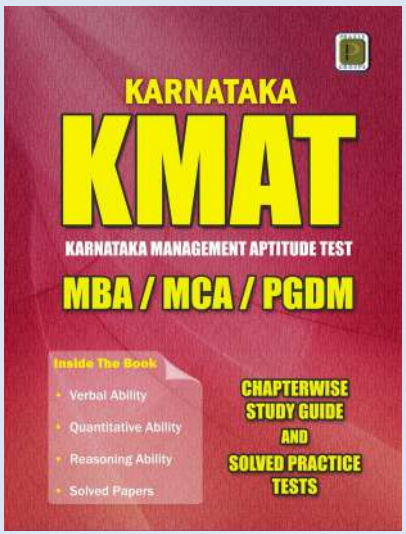
For example- the word *'Dictionary'* is a combination of two words- (*diction* + *ary*); *'Diction'* means – choice of words; - Dictionary is a book of words. The root word *'dic'* or *'dict'* means to say, to speak; from this only the words- *'dictate'*, *'predict'*, *'verdict'*, *'contradict'*, *'benediction'*, *'malediction'*- have been derived.

• The prefix *'pre'* means - before and the root word, *'dict'* means to say; *Predict* is to say before something happens; the root word *'ver'* means – true (*veracity* is reality, accuracy; *verify* = to confirm ; *verity* = truth) *'verdict'* is a judgment, a result, a decree. The prefix *'contra'* is opposite or against; hence *contradict* means- disagree with what someone says. So also the words – *contravene* and *controversy. Ben/ Bon* means – good or kind. (example: *benefit*, *benign*, *bonafide*). The word, *'Benediction'*, indeed, means a good word; hence the

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

ant, ent, er, or	one who	▪ vigilant ▪ competent ▪ teacher ▪ creator	▪ one who is very alert ▪ one who efficient and capable ▪ one who teaches ▪ one who creates
ar, ary	connected with, related to	▪ literary ▪ military	▪ related to writing ▪ related to soldiers
ence	state of, quality of, act of	▪ absence ▪ existence	▪ the state of being away ▪ the act of existing or being
ful	full of	▪ fearful ▪ cheerful	▪ full of fear ▪ full of happy
ic, ac, il, ile	relating to, pertaining to, characterized by	▪ cardiac ▪ civil ▪ volatile ▪ organic	▪ pertaining to the heart ▪ pertaining to citizens ▪ pertaining to change ▪ relating to living matter
ion	act of, process of, condition of	▪ navigation	▪ the process of following the route
ism	state or quality of, the practice of, support of	▪ exorcism ▪ patriotism	▪ the act of driving out an evil spirit ▪ support of one's country
ist	one who makes, does	▪ humanist	▪ one who is interested in human values
ity, ty, y	the state of, condition of, character of	▪ dignity ▪ honesty ▪ ecstasy	▪ the state of being worthy ▪ character of being honest ▪ the state of intense joy
ive	having the nature of, tending to	▪ active ▪ aggressive	▪ having the nature of moving ▪ nature of pushing oneself forward
less	lacking, without	▪ weightless ▪ heartless	▪ without weight ▪ without a heart
logy	the study of	▪ biology	▪ the study of life processes
ment	the act of, the state of, result of	▪ retirement ▪ alignment	▪ state of being retired ▪ result of setting in line
ness	the quality of	▪ eagerness	▪ the quality of being eager
ory	having the nature of, a place or thing for, relating to	▪ laboratory ▪ armory	▪ a place where work is done ▪ a place where arms are kept
ous, ose	full of, having	▪ humorous ▪ verbose	▪ having or showing a sense of humor ▪ full of words, or wordy
ship	the art or skill of, the ability to	▪ leadership	▪ the ability to lead
some	full of, like	▪ troublesome ▪ quarrelsome	▪ full of trouble ▪ characterized by quarreling.
tude	the state of quality of, the ability to	▪ aptitude ▪ gratitude	▪ the ability to do ▪ state of being grateful; thankfulness
y	full of, somewhat, somewhat like	▪ chilly ▪ musty ▪ willowy	▪ somewhat cold ▪ having a stale smell ▪ like a willow

SENTENCE COMPLETION

EXERCISE – I

NOUNS AND ADJECTIVES

1) The error committed by him was ____. It could not be overlooked.
a) Trivial b) blatant c) modest d) inconspicuous
2) The directors decided to have a _____ meeting to discuss their new marketing strategy. Even their secretaries were not aware of it.
a) forthright b) open c) public d) clandestine
3) First time offenders were glad to be tried by this judge because he was noted for his _____ .
a) Sternness b) cruelty c) clemency d) punishment
4) It took nearly two months to clear the _____ left behind by the typhoon.
a) Calamity b) disaster c) catastrophe d) chaos
5) Kumar is an _____ learner. He is always interested in learning new things.
a) Slow b) apathetic c) ardent d) impartial
6) She is cool and _____ even in times of adversity.
a)Agitated b) worried c) eager d) composed
7) This is a very _____ hotel. The amenities here are the best.
a) Cheap b) inferior c) posh d) quiet
8) You will not get proper results because these equipment are _____
a) Obsolete b) modern c) new d) fast
9) Handle the vase carefully it is _____ . It may break easily.
a) Sturdy b) old c) new d) fragile
10) No one can live in that house. It is in ruins and ___ .
a) Dilapidated b) decayed c) new d) old
11) The workers refused to resume work until their _____ were addressed.
a) Rewards b) praise c) grievances d) bonus
12) In spite of his mediocre performance, he seems very _____ .
a) Worried b) depressed c) complacent d) sad
13) The manager could convince the workers with his speech as he is very _____ .
a) Loud b) slow c) articulate d) rude
14) The__atmosphere helped in his quick recovery.
a) congenial b) clean c) quiet d) polluted
15) His ____ was appreciated by the management and they gave him the best employee award.
a) Competence b) generosity
c) intelligent d) hardworking
16) The _____ were evicted by the police and promised some other places to settle down.
a) Employees b) students c) women d) squatters
17) About one 10 crores worth goods were lost in the _____ which was caused by short circuit.
a) Conflagration b) flood c) typhoon d) hurricane
18) The two _____ celebrated after having won the game for their country.
a) Friends c) rivals c) enemies d) compatriots
19) He endured his illness with great ____, though he suffered for a long time.
a) Pain b) patience c) courage d) fortitude
20) She doesn't think before taking any decision. She does everything on _____ .
a) Consciously b) impulse c) clever d) intelligence
21) This is not worth taking as the remuneration is not _____ with the effort needed.
a) Commensurate b) compare c) more d) less
22) You cannot convince him to invest in your project. It is a _____ attempt.
a) Profitable b) futile c) helpful d) good
23) Unable to tolerate the _____ behavior of her subordinate, she asked him to resign.
a) Insolent b) cheerful c) loud d) friendly
24) His intelligence was _____ by his shy nature. He did not get the merit he deserved.
a) obscured b) lost c) shown d) revealed
25) The _____ speech of Malala Yousafzai impressed everyone at the un general assembly.
a) fast b) great c) slow d) eloquent
26) In order to _____ for premier Institutions one should have a consistently good academic record.
a) Qualify b) enter c) write d)sell
27) This _____ blooms once in twelve years and is found only on the hillsides.
a) Common b) colorful c) sweet smelling d) exotic
28) This leather is not___Don't spend so much on it
a) New b) second hand c) genuine d) good
29) The speech of the Minister was so _____ that the audience didn't need any further explanation.
a) Short b) long c) interesting d) concise
30) After committing the crime the _____ was caught but the mastermind escaped.
a) Robber b) accomplice c) thief d) police
31) Soon after the accident, a _____ was set up to stop ongoing traffic.
a) Banister b) blockade c) fence d) wall

6)c; Though *training, nurturing, attracting* are important for a company but not the mottoes. But *motivating* is the motto for any company. Similarly employees can get the opportunities only on *learning.*

7)b; We know 'learning' is blended with 'notion' not with 'principle, concept, or merit'. 'Learning' is a notional fact. Therefore it becomes complicated to pin down any definitions. So we cannot say 'learning' becomes 'obvious, or easy'.

8)d; *Impart* means make known. *Imparter* is the one who imparts. The *imparter* of education has a higher moral responsibility to positively *influence* the student generation

9)a; *Conjure up* means bring to mind. And *clanking* means to make a sharp sound, as metal in a collision. *Imbibes,* which means drink alcohol is irrelevant in the present context. Option-c, *staggering* which means to walk unsteadily, is not an appropriate choice in the second blank.

10)c; *Summit* means meeting between head of government. Hence option-c is correct.

11)a; The meanings of option-b, c, d are irrelevant in the context of the sentence. *Docile* means obedient. *Mundane* means worldly related matters. *Garrulous* means talkative. Option-a is the appropriate choice.

12)d; We can not say 'modern times'. But we say 'recent times'. Hence, option-d is correct choice.

13)c; *Findings* means information discovered as the result of an inquiry or investigation. *Prevail* means to be powerful. *The informal research has* ***found*** *that children learn best from among their peers, if academic atmosphere is made to be powerful.*

14)c; *Vexed* means much debated or problematic. All other options are not the best choice when compared to option-c. The question of quotas in educational institutions is troubling us. *Haunt* means to trouble or distress. So the word *'haunt'* to be picked up.

15)c; The conjunction *whereas* says there is comparison. Here the comparison is between two doctrines. The Marxists *extol* the inevitability *whereas* the Socialists *extol* the idea of liberty *inherent* in social change.

16)b; Here if we choose the option-d then *'Antarctica adventure'* is somehow meaningful but *'serious nearing'* is meaningless. Option-a and c both does not fit with its preceding proper noun and adjective respectively. *Expedition* means a journey undertaken by a group of people for the purpose of research or exploring something. *Voyage* also means a journey involving travel by sea. But the purpose of voyage may not be a research or an exploration.

17)c; As the given sentence is a disciplinary exaggeration regarding '*science*', you should have an idea before selecting the option that the author must adopt figurative words to express his exaggeration. So the related meaning sticks only in the option-c.

18)b; In the second blank the words *'____ and skilled'* is used. *Intricate* which means very complicated, is the correct choice. No other word is relevant for this blank from among the given options. *Incessant* means never ending. *Exorbitant* means excessive.

19)a; *Proposal* means presentation for an action. So, it is the appropriate choice for the first blank. *Blueprint* means a plan or model or design. It is the correct choice for the second blank.

20)b; *Driving force* means motivation. All other options are not the best choices.

21)d; *Blend* means combination of; *Synthesis* also means combining. But the word *arena* does not fit for the second blank. *Expectations* is the correct choice for second blank.

22)c; The word *accessible* only makes sense in the first blank. *Immerse* means involve oneself deeply in a particular activity.

23)b; The sentence speaks about the *free press.* Hence, *democratic* is the correct choice for second blank. The word *democratic* gives a sense of free or freedom.

24)c; You may confuse between option c and d. *Intrigued* means attracted. But as the sentence is speaking about the president, *humility* is the most appropriate word than *simplicity. Humility* means humbleness, not proud or arrogant.

25)d; *Strange* behavior is the correct usage. All other options are irrelevant in the present context.

26)a; The sentence has negativeness therefore we have to pick up the words with negative sense. Only one option-a has negative sense. Hence is the correct choice.

27)d; *Deprive* means lacking a specified benefit. *Performance* of people is effected by the lack of sleep.

28)d; *Depicts* means to describe. And *predicament* means unpleasant. These two words are the appropriate choices. *Delineates* also means to describe. But the word *changing* is not the best choice in the context.

29)d; *Distance education* is the correct usage than *individualized education* or *remote education*.

30)c; The first blank should take V_3 form because the sentence is in passive voice. Only option-c and d have V_3 form. The word '*succumbed*' diverts the theme of the sentence. So, only option-c is correct.

ANTONYMS

CONCEPTS

Antonyms are words that have the opposite meaning of a given word. In this section, you are given a word and asked to choose a word, or phrase, which is most opposite in meaning to that word. When you are doing the antonym portion of the Campus recruitment tests, keep in mind the prefixes, suffixes, and roots that you learned while developing your vocabulary. While testing your ability on questions pertaining to Antonyms, the first thing to be observed is your ability to grasp the meaning of the given word and to distinguish between the fine shades of meaning. Unless you know the meaning of the given words, you will not be able to find out or choose the exact antonym from the options given.

Strategies to Solve Questions Based on Antonyms:

1. Check if the question word and the words given under the options are in the same parts of speech.

2. You should have an idea of the roots of the words and know their meanings. For example, in the word *benefactor*, if you know the meaning of *bene* you will be able to guess the meaning of the word, and opt for the best antonym.

3. Look for the best answer and not for the ideal. Eliminate two or three of the options if they are nowhere related to the given word.

4. Do not go for an antonym which is too limited or too broad to be an opposite.

5. When you get confused about the antonym to be chosen, try to think of how you have heard the word used before. You may discover a suitable context to guess the exact antonym.

1. DILAPIDATED

a) ruined b) condemned c) renovated
d) destroyed e) shabby

Explanation: *Dilapidated* means 'falling apart';
Therefore options-*a* and *d* can be eliminated as they show intentional actions. The only word which means making good to look as new is *'Renovated'*. It standout as the best antonym. Option-b means 'to disapprove' so that is also not suitable.

2. MELODIOUS

a) mellifluous b) unpleasant c) spiritual
d) comfort e) indefinite

Explanation: In this example, the word *'Melodious'* means 'Mellifluous', means pleasant in sound. The options-*c, d* and *e* are irrelevant in this context. The only antonym is option-*b*–Unpleasant.

3. PROFUSION

a) deficiency b) certainty c) proliferation
d) largeness e) maximum

Explanation:*'Profusion'* means excess, surplus, fullness. So, options-*c, d* and *e* can be eliminated. Certainty, generally means confidence. *Deficiency* means lack or shortage. Hence, option-*a* is correct choice.

CONCEPTUAL EXAMPLES

1) ABUNDANCE

a) Sufficiency b) Plenty c) Resign
d) Decrease e) Dearth

Explanation: *Abundance* means plentiful or in great quantity. Option-*a* and *b* synonymous to *abundance*. Option-*c, d* are irrelevant in the present context. *Dearth,* which means scarcity or lack of something, is the antonym of the given word. Hence, option-*e* is correct.

2) ABDUCT

a) Release b) Abbreviate c) Degrade
d) Give Up e) Kidnap

Explanation: The prefix *'ab'* generally denotes 'away from' or 'off'. For example *absent*, *abnormal*, *aversion* etc. The suffix *'duct'* generally means 'to lead'. For example *conduct*, *induct* etc. *Abduct* means 'to carry off by force' or 'lead away by force' or 'kidnap'. Opposite of *abduct* is to release, to let go, to give etc. Option-*d* is not an appropriate antonym of *abduct*. Hence, option-*a* is the best choice.

3) ABANDON

a) Continue b) Steal c) Restoration
d) Desert e) Abnormal

Explanation: The root word *'don'* gives meaning as 'to give' or 'to gift' (e.g., *pardon*, *donation)*. *Abandon* means 'to give up the control of', 'discontinue' or 'withdraw from'. Opposite is to continue or take control of. Hence, option-*a* is the correct choice.

4) BOLD

a) Bald b) Hairless c) Brave d)Timid e) Thick

Explanation: *Bold* means confident and courageous. Option-*a, b* and *e* are completely irrelevant. Option-*c* is synonym of *bold. Timid* means lack of courage or confidence. Hence, it is the correct choice.

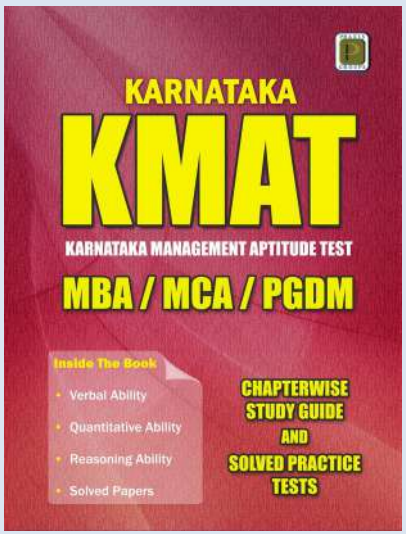
5) BARBAROUS

a) Sharp b) Naked c) Rough
d) Cruel e) Civilized

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

repulsion. The perfix *'ab'* means away from or apart. And the root word,*'hor'* give meanings as hatred, shock or tremble. *Abhorrence* means a feeling of extreme aversion. *Loathing* means strong dislike. *Captivate* means loving, admiration or *fondness.*

20)e; *Solace* means comfort or peace. Options *a*, *b*, *c* and *d* are synonyms of *solace. Embarrassment* means not feeling comfortable. Hence, option-*e* is correct choice.

21)b; *Flattery* means excessive or insincere praise. *Adulation* and *sycophancy* means over enthusiastic praise. *Incense* which means fragrant smoke, is irrelevant in the present context. *Detraction* means saying something bad about someone to make him/her less valuable. Hence, option-b is correct.

22)d; *Memory* means to remember something or to recollect something of the past. The root word *'oblivi'* means to forget. For example, *obliviate*, *oblivion*, *oblivious* etc. Option-*a*, *c* and *e* are synonymous with *memory. Oblivious* means unaware or ignorant.

23)b; *Plaintiff* or *accuser* or *litigant* or *complainant* is a person who brings a case against another in a court of law. *Defendant* is a person who is accused in a court of law. Hence, option-*b* is correct choice.

24)a; The words *scrib-*, *script-*, *-scribe*, *-scription* means write or record. *Inscribe* means to write something. Opposite is *erase* or *forget.*

25)e; *Cautious* means careful, alert, guarded, vigilant. *Reckless* means careless, without caution.

26)e; *Listless, languid, lethargic, apathetic* means without energy, dull, lazy, showing no interest etc. Opposite is energetic, lively, *active.*

27)c; *Comity* means friendly or polite behavior. So, the opposite is *impolite behavior.*

28)e; The roots *'cred-'*, *'credit-'* means belief, faith, confidence trust. *Credulity* means believe or faith. The opposite of faith is faithlessness which means *want of faith*.

29)e; *Assemble* means to come together. Opposite is to separate, spread, *disperse* etc.

30)e; The prefix *'turb'* means disorder, agitation, confusion. *Turbulence* means a state of violent disturbance or disorder. So the opposite is calm, peaceful. Therefore, *tranquility* which means coolness, peacefulness is the antonym of *turbulence.*

31)e; *Hoodwink* means to trick, to deceive, to cheat etc. *Delude* means to mislead. *Defraud* means illegally obtain money from someone. *Play fair* means to behave reasonably and properly. Hence option-*e* is correct.

32)e; *Emaciated* means to become very weak and thin. Hence the opposite is chubby, fat, overweight or obese (obesity). *Haggard* means looking exhausted, unwell.

33)e; *Warm* means moderately hot. *Tepid* means lukewarm Option-*a*, *b* and *d* are synonyms of *warm.* The antonym of *warm* is *hot* which means very high in temperature. Hence, option-*e* is correct.

34)e; *Fool* means stupid or ridiculous person. *Vainglory* means excessive in pride. *Pompous* means arrogant or egoistic. *Brag* means talk boastingly. Option-*a* and *b* are synonymous to the given word. Option-*c* and *d* are irrelevant. *Modest* means limited, ordinary, humble etc. Hence, is the antonym of *Fool.*

35)e; *Succulent* means delicious, tasty etc. So, options-*a*, *b*, *c*, *d* are not the correct choices. Because they are synonyms of *succulent. Insipid* means tasteless, unflavoured etc. Hence, option-*e* is correct choice.

36)d; *Sequel* means consequence, aftermath, continuation. *Precedence* means that which comes before another or previous. Options-*a*, *b*, *c* and *e* are similar in meaning to that of *sequel.* Hence, option-*d* is correct

37)e; *Unlettered* means not educated, illiterate or ignorant. So the opposite should be educated, literate or lettered. Options–*a*, *b*, *c* have same meaning as uneducated. Option-*d* is irrelevant. Hence, option - *e* - *scholarly* which means intellectual, educated or learned, is the correct choice.

38)c; *Encomium* or *eulogy* means high praise or complement. *Condolence,* which means sympathy, is irrelevant in the present context. The opposite of praise or complement is criticism, blame or condemnation. *Belittle* means criticize, depreciate. Hence, option-c is correct choice.

39)d; *Appropriate* means fit, suitable, correct, applicable etc. options-*a*, *b*, *c*, *e* also give the same meaning. The opposite of appropriate is *irrelevant.*

40)e; *Pester* means to disturb, to trouble, to bother or harass etc. *Vex* also means to bother. Opposite is to make happy, delight or *cheer up.*

41)b; *Elate* means to make very happy, inspire or encourage. Opposite is to discourage or depress. The prefix *'de'* means downward and *'ject'* means throw. *Deject* means to downcast, discourage or depress.

42)e; *Fastens* means to join together, affix, tighten etc. So the opposite is, loosen, release or *detach.*

43)e; The suffixes *'-cede'*, *'-ceed'*, *'-cess'*, *'-cease'* means to go away from, to withdraw etc. *Recede* means to move back from previous position. Opposite is forward, continue, grow, *progress* etc.

44)a; *Severity* means being severe. Opposite is to be *gentle.*

VERBAL ANALOGY

CONCEPTS

In verbal analogies, the student is given one pair of related words. The student must find a pair words from the given choices that has the same relationship to the word as the first pair. Analogy questions test your ability to recognize relationships between words or ideas and to know when these relationships are parallel.

How to Read Analogies: The symbol (:) means *'is to'* and the symbol (: :) means *'as'*.

Thus, the analogy, *key* : *lock* :: *spoon* : *stir* should be read as *key* ***is to*** *lock* ***as*** *spoon* ***is to*** *stir.*

It means the relationship between *key* and *lock* is the same as the relationship between *spoon* and *stir.*

Tips for doing Analogies:

1. Try to create a logical relationship between the given pair of words.

2. Eliminate the options that do not have a clear relationship to main word.

3. Don't assume any answer until you've read all of the choices.

4. If the meaning of the given pair of words is unknown then try to recollect the context in which you have come across those words.

5. Though you don't know the meanings of given pair of words, you can still have a chance to find the correct answer using parts of speech.

e.g: falling (*v*) : gravitation (*n*) :: collapse (*v*) : pressure (*n*)

Sometimes more than one answer choice will have same parts of speech. You need to be very careful because even though the parts of speech of more than one pair remains same, the words may have different meaning.

6. Eliminate the word pairs that expresses the same relationship as the given question but in the opposite order.

e.g.: eye : see : : hear : ear (*incorrect*)

eye : see : : ear : hear (*correct*)

The analogy is an area where, with practice, you can achieve a very good score. First, you must find the relationship between the original pair of words. To help you, listed below are some common types of analogies.

Some Common Types of Analogies:

1. Part to Whole:

e.g.: *poem* : *stanzas* :: *play* : *acts*

2. Cause and Effect:

e.g.: *joke* : *laughter* :: *tragedy* : *sadness*

3. Sameness or Synonyms

e.g.: *system* : *method* :: *faith* : *trust*

4. Oppositeness or Antonyms

e.g.: *negligence* : *careful* :: *bravery* : *cowardice*

5. Measure

e.g.: *fahrenheit* : *temperature* :: *decibel* : *sound*

6. Variation in Degree:

e.g.: *chukle* : *laugh* :: *whimper* : *cry*

7. Thing and what it lacks:

e.g.: *atheist* : *belief* :: *indigent* : *money*

8. Study of entity

e.g.: *linguistic* : *language* :: *human* : *anthropology -*

9: Function/purpose/use:

e.g.: *knife* : *cut* :: *shovel* : *dig*

10. Person and skill /tools/ work place:

e.g.:*author* : *write* : : *chef* : *cook*

11. Qualities or Characteristics:

e.g.: *president* : *leads* :: *captain* : *directs*

Make a Sentence: Creating a sentence to show the connection between the two words is essential.

• The key issue in analogy problems is picking the proper relationship sentence. With analogies, you are looking for similar relationships, not similar meanings. To answer analogy questions, you must first figure out the relationship between the two words in the given question. Then look for the pair of words among the answer choices that has the same relationship.

• You can also create your own analogies using the list of common types given above. Creating your own list has the advantage of forcing you to think analogously.

You should keep in mind that there must be a reasonable and necessary connection between given two words. The connection must be valid, otherwise there would be no point in making the analogy.

For example, what type of reasonable connection could be there between *Bird* : *Algebra* ? (no relation)

On the other hand, there is a reasonable connection between *Fish* : *Salmon* since *salmon* is a type of *fish*.

• All analogies will have connections that are reasonable (logical, valid) and necessary or inevitable. Any choices that fail to meet these criteria should be rejected. Even if you cannot figure out the connection between the original pair of words, you can improve your chances of picking the correct answer by eliminating choices that do not confirm the above rule.

READING COMPREHENSION

CONCEPTS

SQ3R method is used to answer reading comprehension questions.

• **Scanning** the passage provides a rapid overview to understand the subject matter.

• **Questioning** is a natural, instinctive, second step that is noted as a short list to be answered through reading. The questioning procedure helps the reader stay focused.

• Determine main idea from the title, the first paragraph, and the last paragraph.

• Determine if a large subject is divided into smaller subjects with some outlining scheme.

• Underline key words or take notes to the side what the purpose of the paragraph is. i.e. cause, effect, reason, example, definition, instructions, background info, etc.

• **Read** for identifying the primary purpose.

• Don't over read. Skip examples, dates, lengthy names, any details which can be referred in case something is asked explicitly.

• Don't go for choices which hold true only for one part of the author's argument.

• **Review** as often as necessary to keep focused.

• **Recite** the question and answer together to make sure they fit in.

TIPS

1**.** Spend a few minutes a day reading at a faster than comfortable rate (about 2 to 3 times faster than your normal speed).

2. Fast readers usually take in 3-4 words in each movement that their eye makes. Avoid focusing every word, rather look at groups of 2 to 3 words.

e.g.: The above sentence could be read as: Avoid focusing/ every word,/ rather look at/ groups of /2 to 3 words.

3. Read regularly! 15 min a day of reading at an average speed equals 18 books a year.

EXERCISE

A) From a vantage point in space, an observer could see that the Earth is engaged in a variety of motions. First, there is its rotation on its own axis, causing the alternation of day and night. This rotation, however, is not altogether steady. Primarily because of the Moon's gravitational action, the Earth's axis wobbles like that of an ill-spun top. In this motion, called 'precession', the North and South Poles each traces out the base off a cone in space, completing a circle every, 25800 years. In addition as the Sun and the Moon change their positions with respect to the Earth, their changing gravitational effects result in a slight 'nodding' of the earth's axis, called 'nutation', which is superimposed on precession. The Earth completes one of these 'nods' every 18.6 years.

The earth also, of course, revolves around the Sun, in a 6-million mile journey that takes 365.25 days. The shape of this orbit is an ellipse, but it is not the center of the Earth that follows the elliptical path. Earth and Moon behave like an asymmetrical dumb-bell, and it is the center of mass of this dumb-bell that traces the ellipse around the sun. The center of the Earth-Moon mass lies about 3000 miles away from the center of the Earth, and the Earth thus moves in an S-curve that crosses and re-crosses its orbital path. Then too, the Earth accompanies the sun in the sun's movements; first, through its local star cloud, and second, in a great sweep around the hub of its galaxy, the Milky Way that takes 200 million years to complete.

1. Which of the following best describes the main subject of the passage?

a) The various types of the Earth's motions

b) Past changes in the Earth's position

c) The moon's gravitational effect on the earth

d) Oddities of the Earth's rotation on its axis.

2. The passage is most likely directed toward an audience of:

a) geologists b) astronauts

c) meteorologists interested in weather prediction.

d) persons with little technical knowledge of astronomy

3. Which of the following technique does the author use in order to make the descriptions of motion clear?

(I) Comparison with familiar objects

(II) Reference to geometric forms

(III) Allusions to the works of other authors

a) (I) only b) (II) only

c) (I) and (II) only d) (II) and (III) only

4. The passage indicates that a single cycle of which of the following motions is completed in the shortest period of time?

a) nutation b) precession

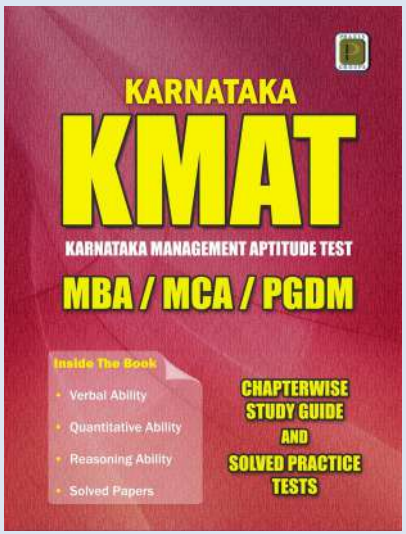
c) The Earth's rotation on its axis

d) The movement of the dumb-bell formed by the center of mass of Earth-Moon.

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

situations.
24)c; a cheerless room without humans.
25)b; they have taken over every walk of life, even teaching and music.
26)d; In the 6th line the author tells us that the constant need to know leads to emotional stagnation.
27)a; this cycle has robbed us of our ability to appreciate and enjoy the present.
28)c; Instead of looking forward we seem to be looking at the past signified here by tombstones.
29)b; instead of accepting life as it is if one is buried in the past, internal stress occurs.
30)b; As the name suggest, it is the compulsive need to know the reason behind everything.
31)a; the story of the Chinese emperor trying to purify water under a tea tree tells us that it was an accidental discovery.
32)c ; it is a sacred ritual for the Japanese.
33)b; The English made it an iconic ritual linking it with the time of the day.
34)c; The passage does not mention the types of tea.
35)c; Tea drinking became a tradition.
36)c; In the 2nd paragraph the author says' our main problem is not to curb science but to stop war.
37)a; In the 2nd para the author says 'the weapons do not cause war, they make war terrible..... it has brought us to the doorstep of doom
38)a; Anarchy means lawlessness, so the phrase opposite to it is law and order.
39)d; It is intolerance and misunderstanding that leads to wars, hence 4 is the correct answer.
40)d; The real enemy is war as the weapons invented by science make war more destructive.
41)c; the 4 and 5 sentences in the first paragraph say this.
42)a; the answer is given in lines 3 and 4 in the first para. He says 'I feared ....
43)a; the writer says 'going mad with delight..'
44)c; the last line illustrates this.
45)d; All these answers are directly from the text.
46)b; Free movement is the meaning of the word.
47)c; Apart from the other social evils the criminal gangs were also discovered.
48)a; The more the prosperity, the more the evil.
49)a; the first sentence of the passage says this.
50)d; the number of criminals punished cannot be found.

CLOZE TEST

CONCEPTS

A cloze/close test, consisting of a portion of text with certain words removed, where the student is asked to replace the missing words from among the given choices. The sentence completion section tests your vocabulary skills as well as your reading ability. The question contains a paragraph or a sentence expressing a complete idea that can be understood without any additional information. Each blank need to be filled up appropriately retaining the meaning of the sentence and the syntax.

Strategies to solve questions on *Sentence Completion*.

First, slowly read all the text without filling any of the gaps. Read it until you got a clear understanding of what the text is about.

1) First, complete the gaps you are absolutely sure of.

2) Next try and find out what the missing words in the remaining gaps are. See which ***part of speech*** may fit in each gap (article?, pronoun?, noun?, adverb?, adjective?, preposition?, conjunction?, verb?) and pay attention to the ***grammar*** in each sentence.

3. Read the sentence once again after choosing the words to fill up the blanks.

4. To solve the sentence completion section, you must have a through understanding of the sentence given. This understanding is possible only if you develop your knowledge of the root words, synonyms, antonyms, analogies, idioms, phrases etc.

5. In many cases, several options may fit in but you must select the one that gives the meaning of the sentence most precisely.

6. Understand the message of the sentence by analyzing the principal clause(s) and the sub-ordinate clause(s). Briefly speaking, analyze whether the sentence is a simple sentence or compound sentence or complex sentence.

7. Observe the subject of the sentence, the keywords or the signal words. For example the key words like, '*therefore*', '*so*', '*because*', '*although*', '*in addition to*', '*further more*' etc can help you to make the right option from the options given.

8. Understand the author's tone. It means whether the author is positive or negative in his/her approach to the idea he has presented. Look for negative words like *'no'* or *'not'*. Negative words can change the direction of the sentence.

9. If you don't spot any signal words or keywords and if you don't know the meaning of the option words, read once again and choose the one that sounds the best, eliminating one or two choices.

Example: __(1)__ of his reputation as a comedian, the director of the film __(2)__ Mr. Bean from acting a very serious role of a priest in his new movie.

Options:

1. a) Since b) Due to c) Because d) As

2. a) Encouraged b) Discouraged c) Supported d) Boosted

Explanation: Among the given choices, *'because'* is the only word that can go with *'of'*. Similarly, we can understand that it is difficult for a comedian to act as a priest. So it is natural that the director of the movie *'discouraged'* him.

EXERCISE-I

(A) A blog is a web page made up of brief, frequently updated entries that are arranged __(1)__ like a journal. The purpose of blogs __(2)__ greatly from links to news, photos, even fiction. Blog posts are __(3)__ to instant messages to the web. Many blogs are __(4)__ "what's on my mind" type musings others are collaborative efforts based on a __(5)__ topic or area of mutual interest.

1. a) symmetrically b) chronologically c) interestingly d) passionately

2. a) depend b) shift c) vary d) change

3. a) familiar b) similar c) unique d) superior

4. a) personal b) ephemeral c) temporal d) local

5. a) vague b) specific c) controversial d) contemporary

(B) My final year at MIT was a year of __(6)__. A new wave of thought __(7)__ through the country in those years. The popular view in those days was that a belief in scientific methods was the only __(8)__ approach to knowledge. If so, I wondered, what about spiritual __(9)__? I had been taught from my early childhood that knowledge could be __(10)__ only through the inner experience.

6. a) achievement b) transition c) tribulations d) accomplishment

7. a) brimmed b) erupted c) swept d) encapsulated

8. a) valid b) pragmatic c) tangible d) lucrative

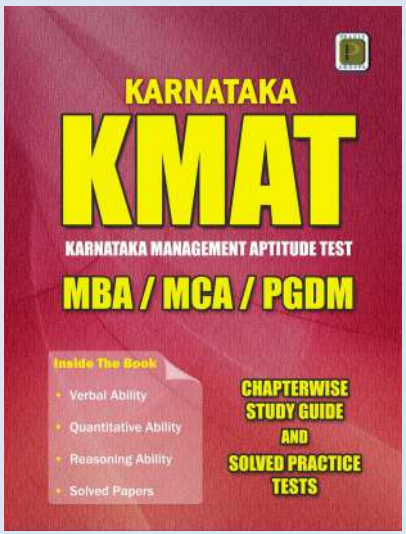
9. a) justification b) association c) amalgamation d) hibernation

10. a) evolved b) preserved c) obtain d) assessed

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

IDIOMS AND PHRASES

PHRASAL VERBS

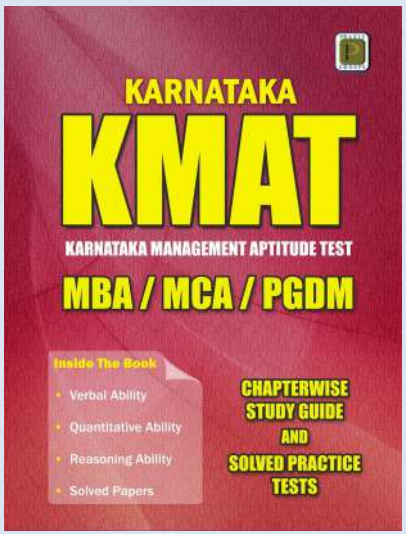
As mentioned earlier phrases play an important role in all languages. Since the meaning of phrases cannot be literal or straight forward, it is essential to know what a phrase means and how it is used. Many verbs when followed by various prepositions, or adverbs, acquire an idiomatic sense. Here is a list of common phrasal verbs followed by some idiomatic expressions.

Blow over = disappear slowly.
The present crisis will soon blow over.
Back out = withdraw from. *She backed out of the deal.*
Back up = support.
We will back up this man's claim for the property.
Break out = to begin or happen.
The war broke out between Palestine and Israel.
Break down = stop working.
On the way my car broke down.
Bring about = to become a reason for something.
Nepotism and arrogance brought about his ruin.
Bring Round = to change one's mind.
It is very difficult to bring him round to our proposal.
Hit upon = find out or discover.
Rajesh has hit upon a good plan to watch the match.
Bear with = have patience.
She could not bear with her frequent migraines.
Break into = rob, steal.
Two raiders broke into their home.
Bring about = cause success, to accomplish, cause.
This habit brought about a great change in his life.
Bring out = emphasize, highlight, publish.
They are bringing out a edition of this book next year.
Call for = **d**emand
The protesting students called for a meeting with the C.M.
Call on = pay a visit to someone, go and see.
The foreign minister of Afghanistan called on the P.M.
Carry away = lose control
He was carried away when he saw her talking rubbish.
Carry out = to perform a duty/ to execute.
They agreed to carry out the orders issued by the Director.
Clear off = to go away, to leave.
He got angry and asked the servant to clean off.
Clear up = become brighter, explain, resolve.
The sky will clear up soon.
Cut in = interrupt. *Don't cut in when some one speaks.*
Cut down = reduce.
She Cut down her domestic expenditure.
Do away = abolish.
They have decided to do away with the old lighting system.
Doing up = to renovate, to fasten.
This house requires doing up.
Fall through = fail
The scheme fell through due to lack of support.
Fall off = decline, lessen.
The sale of books has fallen off this summer.
Fall out = argue, quarrel.
He had fallen out with his family.
Get off = escape a punishment.
The industrialist got off with a light punishment.
Get though = to pass.
He got through the examination.
Give up = to stop. *Mr. Prasad gave up smoking.*
Hold up = remain strong or vigorous.
The Labour vote held up well.
Lay down = to give up, to surrender.
The rebels laid down their arms in front of the IG of Police.
Look after = take care of.
The child was looked after by his grandparents.
Look into = investigate.
I will look into it and let you know.
Look down = despise / condemn.
We should not look down upon poor people.
Pick up = select.*He was picked out of nearly* 5000 *students.*
Pull through = recover.
The doctor is hopeful that the patient will pull through.
Put up with = endure, tolerate.
He could not put up with the harassment of his boss.
Pull up = stop, halt.
The car pulled up in front of the hotel.
See through = detect.
You can't fool me any more. I can see through all your tricks.
Strike off = remove, erase.
His name was struck off from the rolls.
Take after = resemble. *He takes after his father.*
Throw out = reject, discard.
His suggestion was thrown out by the members of the board.
Turn up = come, arrive, appear.
We waited for him for two hours but he didn't turn up.
Turn out = prove.
She turned out to be more efficient than we expected.
Turn down : refuse, reject.
She turned down my request.
Work out = to solve, to accomplish.
You must work out this problem.

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

SECTION – B

QUANTITATIVE ABILITY

NUMBER SYSTEM

CONCEPTS

In Hindu–Arabic system we use ten symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 called digits to represent any number. This is the decimal system where we use the digits 0 to 9. Here 0 is called *insignificant digit* where as 1, ... , 9 are called *significant digits*.

• Classification of Numbers:

Natural Numbers: The numbers 1, 2, 3, 4, 5, 6, ... which we use in counting are known as *natural numbers.* The set of all *natural numbers* can be represented by N = {1, 2, 3, 4, 5, ...}

Whole Numbers: If we include 0 among the natural numbers then the numbers 0, 1, 2, 3, 4, 5, ... are called *whole numbers.* Hence, every natural number is a whole number. The set of *whole numbers* is represented by W.

Integers: All counting numbers and their negatives including zero are known as *integers*.

The set of integers can be represented by *Z* or I.

Z = {. . . . . – 4, – 3, – 2, – 1, 0, 1, 2, 3, 4, ...}

Every *natural number* is an *integer* but every *integer* is not *natural number.*

Positive Integers: The set I + = {1, 2, 3, 4, ...} is the set of all positive integers. Positive integers and Natural numbers are synonyms.

Negative Integers: The set I – = {. . . , –3, –2, –1} is the set of all negative integers.

0 (zero) is neither positive nor negative.

Non Negative Integers: The set {0, 1, 2, 3, . . . } is the set of all non negative integers.

Rational Numbers: The numbers of the form $\frac{p}{q}$, where *p* and *q* are integers, *p* is not divisible by *q* and $q \neq 0$, are known as *rational numbers.*

(or) Any number that can be written in fraction form is a *rational number*. This includes *integers*, *terminating decimals*, and *repeating decimals* as well as *fractions.*

e.g.: $\frac{3}{7}, \frac{5}{2}, -\frac{5}{9}, \frac{1}{2}, -\frac{3}{5}$ etc

The set of rational numbers is denoted by *Q.*

Irrational Numbers: Any real number that cannot be written in fraction form is an *irrational number.* Numbers which are both *non-terminating as well as non-repeating decimals* are called irrational numbers.

e.g.: Absolute value of $\frac{10}{3}, \frac{22}{7}, \sqrt{2}, \sqrt{3}, \sqrt{10} \ldots$

Note: A *terminating decimal* will have a finite number of digits after the decimal point.

e.g.: $\frac{3}{4} = 0.75, \frac{5}{4} = 1.25, \frac{25}{16} = 1.5625.$

Repeating Decimals: A decimal number that has digits that repeat forever.

e.g.: $\frac{1}{3} = 0.333\ldots.(\text{here, 3 repeats forever.})$

Non–Repeating Decimal: A decimal that neither *terminates* nor *repeats*.

e.g.: $\sqrt{2} = 1.4142135623\ldots.$

Real Numbers: The rational and irrational numbers together are called *real numbers.*

e.g.: $\frac{13}{21}, \frac{2}{5}, \frac{-3}{7}, \frac{+4}{2}$ etc are real numbers.

The set of real numbers is denoted by *R.*

Even Numbers: Any integer that can be divided exactly by 2**.**

e.g.: 2, 6, 0, -8, -10, ... are even numbers.

Odd Numbers: An integer that cannot be divided exactly by 2 is an Odd number.

e.g.: 1, 3, -5, -7, ... are odd numbers.

Prime Numbers: A Prime Number can be divided evenly only by 1, or itself. And it must be a whole number greater than 1.

e.g.: Numbers 2, 3, 5, 7, 11, 13, 17, ... are prime.

All primes which are greater than 3 are of the form (6*n*+1) or (6*n*–1).

Note:

• 1 is not a prime number.

• 2 is the least and only even prime number.

• 3 is the least odd prime number.

• Prime numbers up to 100 are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83,89,97.

There are 25 prime numbers up to 100.

Composite Number: Natural numbers greater than 1 which are not prime, are known as *composite numbers.* The number 1 is neither *prime* nor *composite.*

Co-prime Numbers: Two numbers are co-prime to each other if they have '*no common factor except* 1'.

e.g.: 3 and 5 are co primes.

Note:

Natural Numbers = 1 + Prime + Composite Numbers.

Whole Numbers = 0 (Zero) + Natural Numbers.

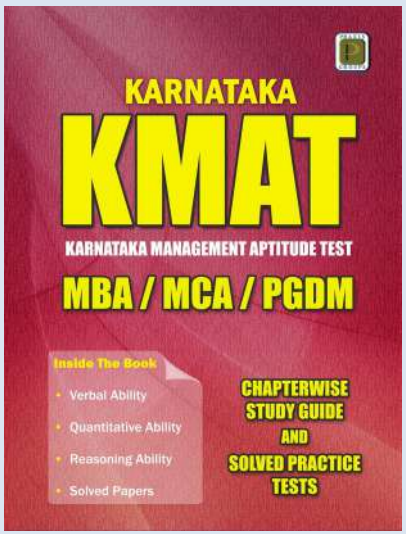
Integers = Negative Integers + 0 + Positive Integers.

Real Numbers = Rational + Irrational Numbers.

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

7)4; LCM of 4, 6, 8, 10, 12 = 120.
120 can be written as 2×2×2×3×5
To make it a perfect square, you have to multiply by 2×3×5. If you can see in the factors that 2×2×2×3×5 = 120 can not make a perfect square until we multiply it by 2 to make 2×2×2×2 and by 3 to make 3×3 and by 5 to make 5×5. Now all the numbers are squares.
i.e. $4^2 \times 3^2 \times 5^2 = (4\times3\times5)^2 = 60^2 = 3600$.

8)2; Let x be the number of students so that each contributed x paise.
Contribution of the students = 49 – 13 = ₹36 = 3600 paise. $\Rightarrow x^2 = 3600 \Rightarrow x = 60$.
$\therefore$ Number of students in the class is 60.

9)1; Let the number be x & y , it is required to find $x\times y$
$x^2 + y^2 = 80$ and $(x-y)^2 = 36$
Now $(x-y)^2 = (x^2+y^2) - 2xy$
$2xy = (x^2+y^2) - (x-y)^2 = 80 - 36 = 44$ then $xy = 22$.

10)2; Required number = HCF (148–4),(246–6),(623–11)
= HCF of 144, 240 and 612 = 12.

11)3; Since (36 – 25) = (48 – 37) = (64 – 53) = 11
$\therefore$ Required smallest number = (LCM of 36, 48, 64)–11
= 576 – 11 = 565.

12)2; $\sqrt{3\sqrt{3\sqrt{3\sqrt{3\sqrt{3}}}}} \Rightarrow \sqrt{3\sqrt{3\sqrt{3\sqrt{3.3^{\frac{1}{2}}}}}}$
$\Rightarrow \sqrt{3\sqrt{3\sqrt{3\sqrt{3^{\frac{3}{2}}}}}} \Rightarrow \sqrt{3\sqrt{3\sqrt{3.3^{\frac{3}{2}\times\frac{1}{2}}}}} \Rightarrow \sqrt{3\sqrt{3\sqrt{3.3^{\frac{3}{4}}}}}$
$\Rightarrow \sqrt{3\sqrt{3\sqrt{3^{\frac{7}{4}}}}} \Rightarrow \sqrt{3\sqrt{3.3^{\frac{7}{8}}}} \Rightarrow \sqrt{3\sqrt{3^{\frac{15}{8}}}} \Rightarrow \sqrt{3.3^{\frac{15}{16}}}$
$\Rightarrow \sqrt{3^{\frac{31}{16}}} \Rightarrow 3^{\frac{31}{32}}$

13)2; Product of numbers = HCF × LCM
$32 \times K = 16 \times 160 \Rightarrow K = 80$.

14)4; 5 meters 44 *cm* = 544 *cm*;
3 meters 74 *cm* = 374 *cm*
The side of the square slab = HCF of 544, 374 = 34.

15)4; Divide 8492 by 72, the remainder is 68.
$\therefore$ Least number to be added = 72 – 68 = 4.

16)2; $\frac{\text{HCF}\times\text{LCM}}{\text{Given number}} = \frac{65\times1950}{195} = 650$

17)3; The capacity of the largest possible box =
HCF (378, 434, 582) = 2.

18)4; GCM × LCM = Product of the two numbers
$$\text{GCM} = \frac{211428}{3356} = 63$$

19)4; 5046 = 6 × 29 × 29.
Hence 5046 must be multiplied or divided by 6 to make it a perfect square. If you multiply by 6 it becomes $(6\times29)^2$ which is a perfect square (or) if you divide by 6 it becomes $(29)^2$ which is also a perfect square.

20)2;

2	10, 12, 14
	5, 6, 7

$\therefore$ LCM = 2 × 5 × 6 × 7 = 420 *sec* = 7 minutes
i.e. They ring together again at 11 hours 7 *min*.

21)2; Let the 4 consecutive numbers divisible by 5 are x, x+5, x+10, x+15.
$\therefore\ x + (x+5) + (x+10) + (x+15) = 130 \Rightarrow x = 25$
Largest number = (x+15) = 25 + 15 = 40.

22)4; ₹ 1 + ₹ 2 + ₹ 3 + ... + ₹ n = 36
$\frac{n(n+1)}{2} = 36 \Rightarrow n^2+n = 72 \Rightarrow n^2+n-72 = 0$
$n^2+9n-8n-72 = 0 \Rightarrow (n+9)(n-8) = 0$
$n = -9 (\text{or}) n = 8$
Days cannot be negative, hence n = 8**.**

RATIO – PROPORTION AND VARIATION

CONCEPTS

Ratio: A ratio is the relation between two quantities which is expressed by a fraction.

• The ratio of the number *'a'* to the number *'b'* is written as $\frac{a}{b}$ (or) $a : b$ or a to b

e.g.: The ratio of 5 hours to 3 hours can be written as $\frac{5}{3}(\text{or})5:3.$

• The ratio is always a comparison between the quantities of same kind or of same units.

For example, you cannot form the ratio between 5 hours and 3 days. Because the two numbers are expressed in different units. Hence, convert 3 days to hours.

i.e. 3 days = 72 hours. Thus the proper form of this ratio is $\frac{5}{72}$ (or) $5:72.$

• Two quantities which are being compared ($a : b$) are called its terms. The first term (a) is called *antecedent* and second term (b) is called *consequent.*

• The ratio of two quantities is always an abstract number (without any units).

• If the terms of a ratio are multiplied or divided by the same quantity the value of the ratio remains unaltered.

e.g.: The ratio $a : b$ is same as Ma : Mb.

Proportion: Equality of two ratios is called proportion.

Consider the two ratios, $a : b$ and $c : d$, then proportion is written as, $a : b :: c : d$ (or) $a : b = c : d$ (or) $\frac{a}{b}=\frac{c}{d}$

Here a, b, c, d are called *Terms.* a, d are called *Extremes* (end terms) and b, c are called *Means* (middle terms).

e.g.: Since the ratio $4:20(\text{or})\ \frac{4}{20}$ is equal to the ratio $1:5(\text{or})\ \frac{1}{5}$ we may write the proportion as

4 : 20 :: 1 : 5 or 4 : 20 = 1 : 5 or $\frac{4}{20}=\frac{1}{5}$

• In a proportion, product of *means* (middle terms) is equal to product of *extremes* (end terms).

i.e. $ad=bc$ or $\frac{a}{b}=\frac{c}{d}$.

Key Notes: If a and b are two quantities, then

1) Duplicate ratio of $a:b=a^2:b^2$

2) Sub-duplicate ratio of $a:b=\sqrt{a}:\sqrt{b}$

3) Triplicate ratio of $a:b=a^3:b^3$

4) Sub-triplicate ratio $a:b=\sqrt[3]{a}:\sqrt[3]{b}$

5) Inverse or reciprocal ratio of $a:b=\frac{1}{a}:\frac{1}{b}$

6) The third proportional of two numbers a and b is defined to be that number c such that $a : b = b : c$. So, if you want to find a number c such that 12 : 18 = 18 : c. That number, c is $\frac{18^2}{12}=27$

7) If $a : b = x : y$ and $b : c = p : q$, then

a) $a:c=\frac{x\times p}{y\times q}$

b) $a : b : c = px : py : qy$

8) Compound Ratio of $(a : b),(c : d),(e : f)$ is $\frac{a}{b}\times\frac{c}{d}\times\frac{e}{f}$

9) The ratio in which two kinds of substances must be mixed together one at Rs. x per kg and another at Rs. y per kg, so that the mixture may cost Rs. n per kg. The ratio is $\frac{n-y}{x-n}$.

10) Let the incomes of two persons be in the ratio of a : b and their expenditure be in the ratio of x : y and if the savings of each person is Rs. n then income of each is ₹$\frac{an(y-x)}{ay-bx}$ and ₹$\frac{bn(y-x)}{ay-bx}$ respectively.

11) In a mixture the ratio of milk and water is a : b. In this mixture another n liters of water is added, then the ratio of milk and water in the resulting mixture became a : m. Then, the quantity of milk in the original mixture $=\frac{an}{m-b}$ and the quantity of water in the original mixture $=\frac{bn}{m-b}$

12) In a mixture of n liters, the ratio of milk and water is x : y. If another m liters of water is added to the mixture, the ratio of milk and water in the resulting mixture = $xn:(yn+mx+my)$

13) If four numbers a, b, c and d are given then

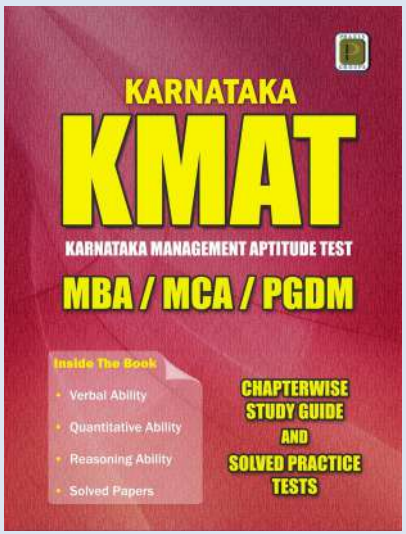
a) $\frac{ad-bc}{(b+c)-(a+d)}$ should be added to each of these numbers so that the resulting numbers may be proportional.

b) $\frac{ad-bc}{(a+d)-(b+c)}$ should be subtracted from each of these numbers so that the resulting numbers may be proportional.

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

19)1; The value of 15 one rupee coins, 23 two rupee coins and 16 five rupee coins = 15×1 + 23×2 + 16×5.

= 15 + 46 + 80 = Rs. 141.

But the total value of all the coins is given as Rs. 1128.

So, 1128÷141 = 8.

i.e. Number of 5 rupee coins = 8 × 16 = 128.

20)2; Let the numbers = $4x$, $5x$ and $6x$

Given, $(4x)^3 + (5x)^3 + (6x)^3 = 3240$

$64x^3 + 125x^3 + 216x^3 = 3240$

$$405x^3 = 3240 \Rightarrow x^3 = \frac{3240}{405} \Rightarrow x^3 = 8 \Rightarrow x = 2$$

The numbers = $4x$, $5x$, $6x$ = 4×2, 5×2, 6×2 = 8, 10, 12.

21)4; Let, previous salaries of Vinod and Vivek = $4x$, $7x$.

Ratio of increased salaries of Vinod and Vivek = 2 : 3.

i.e. $\frac{4x+4000}{7x+5000} = \frac{2}{3} \Rightarrow 12x + 12000 = 14x + 10000$

$\Rightarrow 2x = 2000 \Rightarrow x = 1000$.

Then previous salaries of Vinod, Vivek = Rs. 4000, Rs. 7000.

22)3; P : Q = 6 : 7 and Q : R = 5 : 6

Make Q part equal in both ratios. then P:Q:R = 30:35: 42

$\therefore$ Share of R in Rs. 2140 = $\frac{42}{30+35+42} \times 2140 = ₹\,840$

23)1; Let initially the seats of EEE, ECE and CSE are $11x$, $12x$, $13x$.

$\therefore$ Seats of ECE after increasing = 276

i.e. 115% of $12x$ = 276 $\Rightarrow \frac{115}{100} \times 12x = 276 \Rightarrow x = 20$

Initially seats of EEE = $11x$ = 11×20 = 220.

Seats of EEE are increased by 10% = 110% of 220.

$= \frac{110}{100} \times 220 = 242$

Initially seats of CSE = $13x$ =13×20 = 260.

Seats of CSE after increasing 20% = 120% of 260

$= \frac{120}{100} \times 260 = 312$

Total seats of all the three branches available after increasing = 242 + 276 + 312 = 830.

24)3; $\frac{5}{9} = 0.55$; $\frac{13}{17} = 0.76$; $\frac{3}{7} = 0.42$; $\frac{21}{25} = 0.84$; $\frac{1}{5} = 0.2$

$\therefore$ 21 : 25 is greatest.

Alternate Method: $5 \times 13 \Rightarrow 85 : 117$ (5 : 9 and 13 : 17)

Since 117 > 85, the ratio 13 : 17 is greater than 5 : 9.

Now compare 13 : 17 with 3 : 7.

13×3, 17×7 $\Rightarrow$ 91 : 51

Since 91 > 51, the ratio 13 : 17 is greater than 3 : 7

Similarly, compare 13 : 17 with 21 : 25.

13×21, 17×25 $\Rightarrow$ 325 : 357

Since, 357 > 325, the ratio 21 : 25 is greater than 13 : 17.

Now compare 21 : 25 with 1 : 5.

21×1, 25×5 $\Rightarrow$ 105 : 25

Since, 105 > 25, the ratio 21 : 25 is greater than 1 : 5.

25)2; Here the time period of investment is not same. *Hence the ratio = (investment × time).*

(12000×12 months):(15000×9months):(18000×10 months)

= 144 : 135 : 180 $\Rightarrow$ 16 : 15 : 20

The share of A in the profit = $\frac{16}{51} \times 20400 = ₹\,6400$

The share of B in the profit = $\frac{15}{51} \times 20400 = ₹\,6000$

The share of C in the profit = $\frac{20}{51} \times 20400 = ₹\,8000$

26)3; Let the share values of SBI, Andhra Bank, ICICI Bank be $7x$, $4x$ and $3x$.

$\therefore$ Share value of (6 SBI + 7 Andhra Bank + 12 ICICI) = $(6\times7x) + (7\times4x) + (12\times3x) = 5300 \Rightarrow 42x + 28x + 36x = 5300$

$$106x = 5300 \Rightarrow x = \frac{5300}{106} = 50$$

Share values of SBI, Andhra Bank, ICICI = $7x$, $4x$, $3x$

$\Rightarrow$ 7×50, 4×50, 3×50 = Rs. 350, Rs. 200, Rs. 150

27)4; Let, prices of the car after increase and before increase = $26x$, $23x$.

Hike in the price $\Rightarrow 26x - 23x = 24150$

$$3x = 24150 \Rightarrow x = \frac{24150}{3} = 8050$$

Increased price of car = $26x$ = 26×8050 = Rs. 209300.

28)1; Ratio of 3 persons = $\frac{1}{2} : \frac{1}{3} : \frac{1}{4}$

LCM of 2, 3, 4 = 12 (LCM is taken to remove the denominators in the numbers)

$$\therefore \left(\frac{1}{2}\times12\right) : \left(\frac{1}{3}\times12\right) : \left(\frac{1}{4}\times12\right) = 6:4:3$$

Money that 3rd person will get = $\frac{3}{13} \times 10400 = ₹\,2400$

29)2; Let the boys and girls are $5x$: $6x$.

If 11 boys are added to the hall, ratio will get reversed.

i.e. $\frac{5x+11}{6x} = \frac{6}{5} \Rightarrow (25x + 55) = 36x \Rightarrow 11x = 55 \Rightarrow x = 5$

$\therefore$ Number of girls = $6x$ = 6×5 = 30.

30)1; Let the two numbers be 25, x.

Sum = x+25; Difference = x – 25.

Sum : Differences = 6 : 1. *i.e.* $x + 25 : x - 25 = 6 : 1$

$\Rightarrow$ x+25 = 6x-150 $\Rightarrow$ 5x = 175 $\Rightarrow$ x = 35

PERCENTAGES

CONCEPTS

A percentage is a way of expressing a number as a fraction of 100. The word 'per cent' or 'percentage' means for every one hundred. In other words, it gives rate of a parameter per hundred. It is denoted by the symbol %.

e.g.: 30% means 30 out of one hundred or $\frac{30}{100}$.

Key Notes:

• To convert a percent into a fraction, divide by 100.

e.g.: $20\% = \frac{20}{100} = \frac{1}{5}$

• To convert a fraction into a percent, multiply by 100.

e.g.: $\frac{3}{4} = \frac{3}{4} \times 100 = 75\%$

• To write a decimal as a percent we move the decimal point two places to the right and put the % sign.

e.g.: $0.35 = \frac{35}{100} = 35\%$

• Conversely to write a percent as a decimal, we drop the % sign and insert or move the decimal point two places to the left.

e.g.: 43% = 0.43; 12% = 0.12.

Calculating a Percentage:

$$Percentage = \left(\frac{Value}{Total}\right) \times 100.$$

For example, if you obtained 18 marks out of 25 marks, what was your percentage of marks?

Explanation: Total marks = 25. Marks obtained = 18.

$\therefore$ Percentage of marks obtained = $\frac{18}{25} \times 100 = 72\%$.

Calculating Percentage Increase or Decrease:

• % Increase :

New value = (1+ Increase %) × (Original Value)

• % Decrease :

New value = (1−Decrease %) × (Original Value)

e.g.: What is the discounted cost of a Rs. 80 book offered at 30% discount?

Explanation:

New Amount = $\left(1 - \frac{30}{100}\right) \times 80 = 0.70 \times 80 = 56$

• Calculating Percent Change:

Percentage change refers to the relative percent change of an increase or decrease in the original amount.

$$Percent = \frac{Change}{Original\,Value} \times 100$$

e.g.: What is the discount percentage of a Rs. 80 book sold for Rs. 64?

Explanation: Change = 80–64 = 16. Original Value = 80.

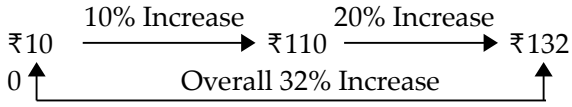
Discount Percentage = $\frac{16}{80} \times 100 = \frac{1}{5} \times 100 = 20\%$

Calculating Successive Percentages:

• If a number is successively increased by x% and y% then a single equivalent increase in that number will be $\left(x + y + \frac{xy}{100}\right)\%$.

e.g.: The price of an article is successively increased by 10% and 20%. What is the overall percent increase in the price of the article.

Explanation:



(or) By using formula:

$= \left(x + y + \frac{xy}{100}\right)\% = \left(10 + 20 + \frac{(10)(20)}{100}\right)\% = 30 + 2 = 32\%.$

• If there's an increase and a decrease, in that case, the decrease will be considered a negative value.

e.g.: If there is an increase of 20% and then a decrease of 10% on the price of a commodity, the successive percentage will be

$20 + (-10) + \frac{20 \times (-10)}{100} = 20 - 10 - 2 = 8\%$ increase.

• In case of discounts, the value of discount percentages will be considered negative.

e.g.: If a shop keeper give 20% and 10% discounts on a festival day, the final discount given by shopkeeper is

$(-20) + (-10) + \frac{(-20)(-10)}{100} = -100 + 25 = 75\%$ *discount*

• If there are three discounts as x%, y% and z% then first find the total discount of x% and y% and using it find the total discount with z%.

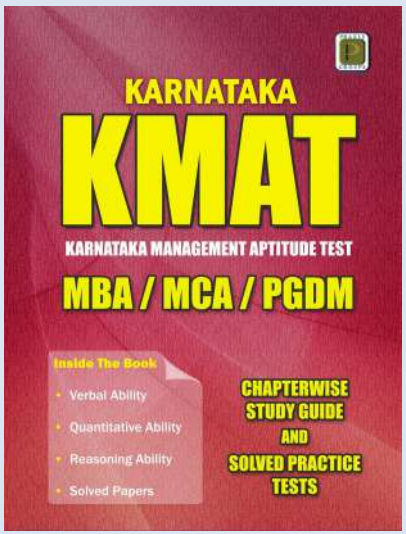
• If the price of commodity increases by x%, the percentage should a family reduce its consumption so as not to increase the expenditure on the commodity = $\frac{x}{100 + x} \times 100$.

• If the price of commodity decreases by x %, the percentage should a family increase its consumption so as not to decrease the expenditure on the commodity =

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

(iii)4; Set A → common difference = 1

Set B → common difference = 100

$\therefore \frac{1}{100}\times 100 = 1\%.$

16)2; Total hours = 24; Percentage = $\frac{6}{24}\times 100 \Rightarrow 25\%$

17)1; Let, price = ₹100

$20\%\text{ increase} = 100 + \frac{20}{100}\times(100) = 120$

$20\%\text{ decrease} = 120 - \frac{20}{100}\times(120) = 96$

$\therefore$ Loss = 100 – 96 = 4%

18)3; Height on 18th birthday = 159 *cm*. Growth = 6%

Let, previous year height = x.

$\therefore$ During the year he grown 6% =

$x + \frac{6}{100}(x) = 159 \;=\; x\times\frac{106}{100} = 159 \Rightarrow x = 150\,cm$

19)(i)3; Failed by 20 marks.

i.e. Pass marks =100+20 =120

120 marks = 40% then total marks = $120\times\frac{100}{40} = 300$

(ii)2; Passing marks = 80 *i.e.* 80 = 40%

then 100 = x % $\Rightarrow x = \frac{100\times 40}{80} = 50\%$.

(iii)2; 40% of 400 = 160 = Passing marks.

$\therefore$ Marks he need = 160 – 100 = 60.

20)2; 40% solution means it contains 40% acid.

$\therefore$ 40% of 16 = $16\times\left(\frac{40}{100}\right)$ = 6.4 liters.

21)2; $\frac{\left(\frac{48}{7}\right)}{\left(\frac{7}{48}\right)}\times 100 = \frac{48\times 48}{7\times 7}\times 100 = 4700\%.$

22)3; 12.5% of 400 = $\frac{12.5}{100}\times 400 = 50$

5% of 80 = $\frac{5}{100}\times 80 = 4$ $\therefore$ Total = 50 + 4 = 54

23)2; 40% of number is 100.

90% of number is x.

$\therefore x \times 40\% = 100 \times 90\%$

$x = 100\times\left(\frac{90}{40}\right) = 225.$

24)2; Decreased at 10% per annum for 2 years.

i.e. $\frac{100}{100-10} = \frac{100}{90}$ for 2 years

$\therefore\; 810\times\left(\frac{100}{90}\right)\times\left(\frac{100}{90}\right) = 1000$

25)2; Let number of students be x.

Number of students below 9 years of age = 20% of x.

Number of students of 9 years of age = 96.

No. of students above 9 years of age = $\frac{2}{3}(96) = 64.$

Total number of students = $\frac{20}{100}x + 96 + 64 = x$

$\frac{x}{5} + 160 = x \;\Rightarrow\; \frac{4x}{5} = 160 \;\Rightarrow\; x = 200.$

INTERESTS AND DISCOUNTS

CONCEPTS

• The money borrowed or lent out for a certain period is called the *principal* or the *sum*.

• *Interest* is the money paid for the use of borrowed money *i.e.* extra money paid for using others money is called *interest.*

• Sum of *interest* and *principal* is called *amount.*

Amount = Principal + Interest

• **Simple Interest:** For a certain period, if the interest on a certain sum borrowed is reckoned uniformly, then it is called *simple interest.* Denoted by $\text{S.I}=\frac{\text{P}\times\text{R}\times\text{T}}{100}$.

Amount = Principal + Simple Interest.

P = Principal; S.I = Simple Interest

T = Time (in years) R = Rate percent per annum

• Time must be expressed in the same units used for time in the Rate.

e.g.: IfRs. 1000 is borrowed for 3 years at 10% simple interest, what is the total amount after 3 years?

Explanation:

Year	Principal	Interest (10%)	Amount
1st	1000	100	1100
2nd	1100	100	1200
3rd	1200	100	**1300**

(or) $\text{S.I}=\frac{\text{PRT}}{100}=\frac{1000\times10\times3}{100}=300$

Amount = Principal + Interest = 1000 + 300 = 1300

e.g.: If Rs. 1500 is invested at 15% simple annual interest, how much interest is earned after 9 months?

Explanation: Here time is in terms of months but interest is in terms of years. So, Time must be expressed in the same units used for time in the Rate.

i.e. 9 months = $\frac{9}{12}$ years.

Now, S.I = $\frac{1500\times15\times9}{12\times100}=168.75$.

• Key Notes on Simple Interest

2) A sum of money becomes n times of itself in T years at simple interest, then the rate of interest is,

Rate = $\frac{100(n-1)}{T}\%$

3) If a sum of money at simple interest becomes n times of itself in T years then in how many years it will become m times of itself.

Required time = $\frac{(m-1)\times T}{(n-1)}$ *years*

4) If simple interest on a sum of money is $\frac{1}{x}th$ of the principal and the time T is equal to the rate percent R then Rate = Time $\sqrt{100\frac{1}{x}}$.

5) A certain sum is at simple interest at a certain rate for T years. If it had been put at R_1% higher rate, then it would fetch Rs. x more.

Then the Principal = $\frac{x\times100}{T\times R_1}$.

6) Let the rate of interest for first t_1 years is r_1% per annum. r_2% per annum for next t_2 years and r_3% for the period beyond that. Suppose all together the simple interest for t_3 years is 'SI'

Then, Principal = $\frac{100\times\text{SI}}{t_1r_1+t_2r_2+(t_3-t_1-t_2)r_3}$.

7) The simple interest on a certain sum of money at r_1% per annum for t_1 years = Rs. m. The interest on the same sum for t_2 years at r_2% per annum =Rs. n. Then the sum = $\frac{(m-n)\times100}{r_1t_1-r_2t_2}$.

• **Compound Interest:** If interest as it becomes due and is not paid to the lender but is added on to the principal, then the money is said to be lent at compound interest.

And the total sum owed after a given time is called the amount at compound interest for that time.

$\text{CI}=\text{P}\left[\left(1+\frac{\text{R}}{100}\right)^{\text{T}}-1\right]$; $\text{Amount}=\text{P}\left(1+\frac{\text{R}}{\text{C}\times100}\right)^{\text{T}\times\text{C}}$

Where T = Number of years and

C = Number of times compounded annually.

e.g.: If Rs. 1000 is borrowed for 3 years at 10% per annum CI, then what is the total amount after 3 years?

Explanation:

Year	Principal	Interest (10%)	Amount
1st	1000	100	1100
2nd	1100	110	1210
3rd	1210	121	**1331**

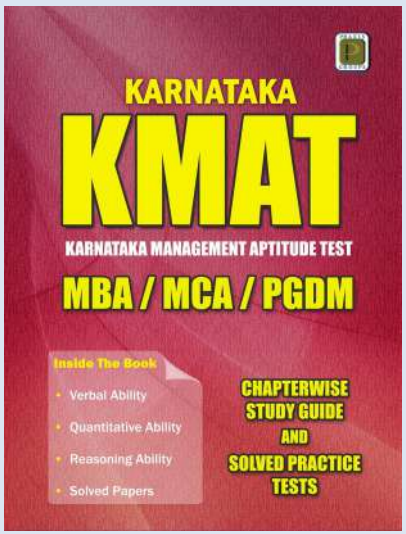
(or) Amount = $\text{A}=\text{P}\left(1+\frac{r}{CX100}\right)^{nXC}$

$\Rightarrow1000\left(1+\frac{10}{1\times100}\right)^{3\times1}$ = Rs.1331

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

11)2; In Compound Interest, Amount = $P\left[1+\frac{R}{100}\right]^T$

$\Rightarrow 6800=6400\left[1+\frac{R}{100}\right]^1 \Rightarrow 1+\frac{R}{100}=\frac{17}{16}$

$\Rightarrow \frac{R}{100}=\frac{1}{16} \Rightarrow R=6\frac{1}{4}\%$.

12)3; Here P =8000, R = $\frac{5}{2}\%$, n = 3, A = ?

Using the formula, $A=P\left(1+\frac{R}{100}\right)^n$,

we get, $A=8000\left(1+\frac{5}{2\times 100}\right)^3$

$A=8000\left(\frac{205}{200}\right)^3=\frac{8000\times 205\times 205\times 205}{200\times 200\times 200}\approx \text{Rs. } 8615$

13)3; Since the difference of interest in the two cases is100. For 2 years, x = 100 and R = 5%.

$\therefore$ Sum = $x\times\left(\frac{100}{R}\right)^2=100\times\left(\frac{100}{5}\right)^2$ =40000.

14)4; Simple Interest on 10000 for 2 years at 8% p.a = 11600 and Compound Interest = 11664.
Difference = 64.

15)3; Simple Interest on 3000 for 2 years at 10% p.a = 3600 and Compound Interest = 3630.
Difference = 30.

16)2; P =Rs. 8000, R = 6%, T = 4 years

$\therefore$ C.I = $8000\left(\left(1+\frac{6}{100}\right)^4-1\right)=2099.8$

17)2; If population of a city or town is increasing at a certain rate, then

Population after a fixed time =

$Present\ population\times\left(1+\frac{Rate\ of\ increase}{100}\right)^{time}$

$12000=Population\ of\ the\ village\ 4\ years\ ago\times\left(1+\frac{10}{100}\right)^4$

$\therefore$ Population of the village 4 years ago =

$=\frac{12000}{\left(\frac{14641}{10000}\right)}=8196\,(aprx)$

18)3; Suppose the rate percent *p.a* = x%
C.I for $(n+1)^{th}$ year = C.I for n^{th} year + S.I for 1 year on the C.I for n^{th} year

$\therefore$ 15600 = 12000 + x% of 12000

$\Rightarrow 3600=\frac{x}{100}\times 12000 \Rightarrow x = 30\%$

Hence, the rate of interest is 30%.

19)4; Here, P =Rs. 12400, R = 10% *p.a* = 5% half yearly.
i.e. Time = 1 year = 2 half years $\Rightarrow n = 2$.

$\Rightarrow A=12,400\left(1+\frac{5}{100}\right)^2$

$\Rightarrow A=\frac{124}{4}\times 21\times 21=\text{Rs. } 13671$

20)2; $A=P\left(1+\frac{r_1}{100}\right)\left(1+\frac{r_2}{100}\right)\left(1+\frac{r_3}{100}\right)$

$=10000\left(1+\frac{10}{100}\right)\left(1+\frac{15}{100}\right)\left(1+\frac{20}{100}\right)$

$=10000\times\frac{11}{10}\times\frac{115}{100}\times\frac{6}{5}=15180$

PROFIT AND LOSS

CONCEPTS

Cost Price (CP) is the price at which an article is bought.

Selling Price (SP) is the price at which an article is sold.

Marked Price (MP) or List Price is the price marked on the article. For example, a vendor buys 1kg of mangoes for Rs. 50. He labeled the price as Rs. 80. But sold for Rs. 70. Here CP = Rs. 50, MP = Rs. 80, SP = Rs. 70.

The expenses incurred on transportation, maintenance, packaging, advertisement etc. are considered as *overhead*. These *overheads* and the *profit* when added to the *cost price* determine the *selling price.*

Profit or Gain: Profit is made when the selling price is greater than the cost price.

Profit = SP – CP ; $\quad$ **Profit %** $= \dfrac{\text{Profit}}{\text{Cost Price}} \times 100$

Considering the same example given above,

Profit = 70–50 = Rs. 20. $\quad$ Profit % $= \dfrac{20}{50} \times 100 = 40\,\%$

Loss: Loss is made when the cost price is greater than the selling price.

Loss = CP – SP ; $\quad$ **Loss %** $= \dfrac{\text{Loss}}{\text{Cost Price}} \times 100$

• Profit or Loss is calculated on cost price only.

Discount is always calculated on the marked price.

Discount = MP–SP; $\quad$ **Discount%** $= \dfrac{\text{Discount}}{\text{MP}} \times 100$

Consider the same example given above,

Discount = 80–70 =10; $\quad$ Discount% $= \dfrac{10}{80} \times 100 = 12.5\,\%$

• To calculate Gain, Loss, Selling Price and Cost Price directly use the formula,

$$\text{SP} = \frac{(100 \pm \text{Gain or Loss}) \times \text{CP}}{100}$$

Use + sign for profit and – sign for loss.

Example: Cost Price of an article is Rs. 70. At what price it should be sold in order to gain 20%?

$$\text{SP} = \frac{(100+20)\times 70}{100} = \frac{120\times 70}{100} = 12\times 7 = 84$$

• If a man purchased m articles for Rs. p and sold n articles for Rs. q. Then how much profit or loss does he make?

m — ₹ p ; n — ₹ q $\quad$ Profit or Loss % $= \dfrac{mq-np}{np} \times 100$

Example: A merchant purchased 7 watches for Rs. 500 and sold 5 watches for Rs. 400. What is loss or gain percent?

Explanation:

$$\frac{7\times 400 - 5\times 500}{5\times 500} \times 100 = \frac{2800-2500}{2500} \times 100 = \frac{300}{25} = 12$$

• By selling an article for Rs. P, a merchant would gain or loss x%. The price at which he sell it to gain or loss y % is $\text{SP} = \text{P}\left(\dfrac{100 \pm y}{100 \pm x}\right)$. (+ sign for gain; − sign for loss)

Example: By selling a furniture for Rs. 180 a merchant will loss 10%. At what price must he sell to gain 20%.

Explanation: $\text{SP} = 180 \times \left(\dfrac{100+20}{100-10}\right) = 240$

• When a man buys two things on equal price each and in those things one is sold at a profit of x% and another is sold at a loss of x%, then there will be no loss or no gain percent.

Example: A merchant purchased a watch and a bag for Rs. 100 each. But he sold the watch at a profit of 20% and bag at a loss of 20%. What is his loss or gain percentage?

Explanation:

	CP		**SP**
Watch -	Rs. 100	+ 20% Profit =	Rs. 120
Bag -	Rs. 100	– 20% Loss =	Rs. 80
	Rs. 200		Rs. 200

Cost price = Selling Price. Hence, no gain or no loss.

• By selling two articles at the same price a merchant incurs x% loss on the first article and x% gain on the second article. In such a case there is always a loss.

$$\text{Loss} = \frac{2\times \text{SP}}{\left(\dfrac{100}{x}\right)^2 - 1}$$

Example: By selling a watch and a bag at Rs. 100 each a merchant incurred a loss of 20% on watch and gain of 20% on bag. What is his loss or gain percentage?

Explanation:

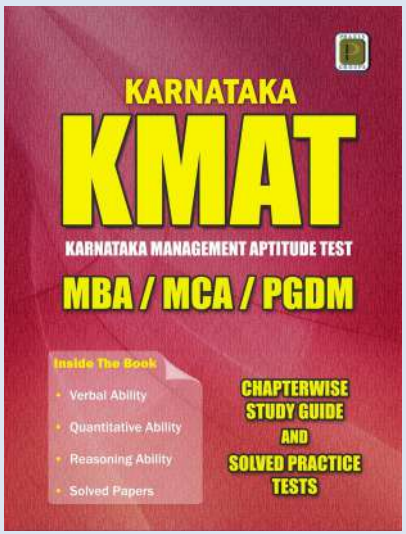
	SP	**CP**
Watch	Rs. 100 (20% Loss on CP) =	Rs. 125
Bag	Rs. 100 (20% Profit on CP) =	Rs. 83.33
	Rs. 200	Rs. 208.33

Here, CP > SP. Hence, Loss $= \dfrac{8.33}{208.33} \times 100 = 3.9\,\%$

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

12)4; Let, he bought the mobile phone at Rs. x.

Then $x-\frac{1}{6}x=7500$ (By losing $\frac{1}{6}^{th}$ on buying cost)

$\therefore \frac{5}{6}x=7500\Rightarrow x=9000$

13)2; For Rs. 30000, the man loses 25%.

$x-\frac{25}{100}x=30000 \Rightarrow x = 40000.$

Now, the man wants gain of 25%.

$\therefore 40000\times\left(\frac{125}{100}\right)=50000$

Alternate Method: Using Formula.

$\text{SP}=30000\left[\frac{100+25}{100-25}\right]$

$\Rightarrow 30000\left[\frac{5}{3}\right]=50000$

14)4; Let the price of the article is Rs. x.

A sold to B at 8% Profit = $x+\frac{8}{100}x=\frac{108}{100}x$

B sold to C at 12% Profit = $\frac{108}{100}\times\frac{112}{100}x$

Ratio of the selling prices = $\frac{108}{100}x:\frac{108}{100}\times\frac{112}{100}x$

$= 1:\frac{28}{25}=25:28.$

15)4; Difference between selling prices = Rs. 3

In the above explanation, ratio of selling prices = 25:28.

The difference of these two (25 and 28) is also 3.

So, one of the selling prices can be either Rs. 25 or Rs. 28.

Option-4 is correct choice.

16)2; Checking from options.

Calculating profit percentages.

Option-(1): Profit percentage = $\left(\frac{5}{50}\right)\times100=10\%$

Option-(2): Profit percentage = $\left(\frac{3}{20}\right)\times100=15\%$

Option-(3): Profit percentage = $\left(\frac{6}{60}\right)\times100=10\%$

Option-(4): Profit percentage = $\left(\frac{5}{40}\right)\times100=12.5\%$

$\therefore$ Option-(2) is best, as percentage is highest.

17)2; Let, SP = x and CP = y;

$\therefore 6\times x=8\times y\Rightarrow\frac{x}{y}=\frac{4}{3}$

Gain% = $\frac{x-y}{y}\times100=\left(\frac{4}{3}-1\right)\times100=\frac{100}{3}=33.33$

Alternate Method: Using formula.

Let cost of 8 articles is Rs. 1.

8 ₹ 1

6 ₹ 1

Profit= $\frac{8-6}{6}\times100=\frac{1}{3}\times100=33.33\%.$

18) 2; He sells 0.9 *mt* pipe at rate of 1 *mt* pipe.

$\therefore$ SP of 0.9 *mt* = CP of 1 *mt*

Let, CP of 1 *mt* = Rs. 100

$\therefore$ If SP of 0.9 *mt* = Rs. 100,

then SP of 1 *mt* = $\frac{1\times100}{0.9}=111.11$

$\therefore$ Profit = $\frac{111.11-100}{100}\times100=11.11\%$

Alternate Method: Using direct formula.

100 meters Rs. 10

90 meters Rs. 10

$\frac{100\times100-100\times90}{100\times90}\times100=\frac{100}{9}=11.11\%$

19)1; Let, SP = 100 ; Then, loss = 20

$\therefore$ CP = (100 + 20) = 120

$\therefore$ Loss % = $\frac{20}{120}\times100\%=16.66\%$

PARTNERSHIPS

CONCEPTS

When two or more than two persons agree to invest money to run a business jointly, this association or deal is called partnership and those who invest money are called partners. The total investment is called the capital.

Kind of partners: There are two kinds of partners.

• **Working or Active Partner:** When a partner devotes his time for the business in addition to invest his money, he is called a working partner. With mutual agreement, the active partners get some fixed percentage of profit
as working allowance.

• **Sleeping or Non Active Partner:**

A partner who simply invests money, but does not attend to the business is called a sleeping partner.

Kinds of Partnership:

• **Simple Partnership:**

If the capitals of several partners are invested for the same period. It is called a simple partnership.

• **Compound or Complex Partnership:**

If the capitals of the partners are invested for different intervals of time, this partnership is called compound or complex partnership.

Ratio of Divisions of Gains:

I. When investments of all the partners are for the same time, the gain or loss is distributed among the partners in the ratio of their investments. Suppose A and B invest Rs.x and Rs.y respectively for a year in a business, then at the end of the year:

(A's share of profit) : (B's share of profit) = x : y.

II. When investments are for different time periods, then equivalent capitals are calculated for a unit of time by taking (capital x number of units of time). Now gain or loss is divided in the ratio of these capitals.

A invests Rs. x for 'p' months and B invests Rs. y for 'q' months then,

(A's share of profit) : (B's share of profit) = xp : yq

• The share of profit to partner is dependent on

(i) investment

(ii) working hours of partners

Share α (working hours of partner)

$$\text{Share} \alpha \frac{1}{\text{Investment}}$$

CONCEPTUAL EXAMPLES

1) X and Y starts a business with the investment of Share Rs. 8000 and Rs. 5000 respectively. Y is an active partner and therefore he gets 10% of the profit separately for supervision of the trade. If total profit of the business is Rs. 3240, what will be the profit of Y.

1) 324 2) 1215 3) 1445 4) 1944

Explanation: Separate Profit of 'Y' for supervision of the business is 10% *i.e.* Rs. 324/-.

Remaining profit =Rs. 2916

$$\text{Y's share} = \frac{5000}{13000} \times 2916 = 1121$$

$\Rightarrow Y$'s share in the profit

= 324 + 1121

= Rs. 1445

2) Aruna, Amulya and Alekhya started a business in partnership. Aruna invested $\frac{1}{4}^{\text{th}}$ of the total capital and Amulya invested amount equal to the investment of Aruna and Alekhya. If Annual profit of the business is Rs. 1280. What will be the profit of Amulya?

1) 320 2) 480 3) 560 d) 640

Explanation: Aruna's investment = $\frac{1}{4}^{th}$ *of total capital*

$$\Rightarrow \text{Profit of Aruna} = \frac{1}{4} \times 1280 = \text{Rs.}320$$

Amulya's capital = Aruna's capital + Alekhya's capital

$\Rightarrow$ Amulya's profit = Aruna's profit + Alekhya's profit

Profit of Aruna + Amulya + Alekhya = Rs. 1280

2(Aruna+ Alekhya) = 1280

$\Rightarrow$ Aruna+ Amulya = 640

i.e. Amulya's profit = Rs. 640.

Alternate Method:

Investment of Aruna = 25%

Amulya = Aruna + Alekhya

Amulya – Aruna – Alekhya = 0 % … (1)

Amulya + Aruna + Alekhya = 100% … (2)

Solving (1) and (2),

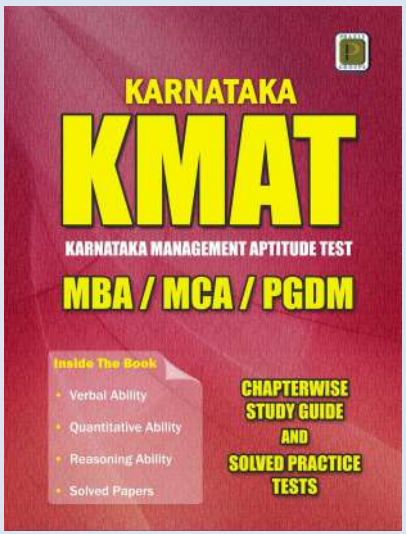
Amulya = 50 %

i.e. 50% of 1280 = Rs. 640

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

TIME AND WORK

CONCEPTS

1) If a person completes a piece of work in *'n'* days, then work done by that person in one day $= \frac{1}{n}^{th}$ part of the work.

2) If a person completes $\frac{1}{n}^{th}$ part of the work in one day, then the person will take *'n'* days to complete the work.

3) The total work to be done is usually considered as one unit.

4) If M_1 persons can do W_1 work in D_1 days and M_2 persons can do W_2 work in D_2 days then

$$M_1 D_1 W_2 = M_2 D_2 W_1.$$

5) If M_1 persons can do W_1 work in D_1 days working T_1 hours per day and M_2 persons can do W_2 work in D_2 days working T_2 hours per day then

$$M_1 D_1 T_1 W_2 = M_2 D_2 T_2 W_1.$$

6) If A can do a piece of work in *'x'* days and *B* can do it in *'y'* days then A and *B* working together will do the same work in $\frac{xy}{(x+y)}$ days.

7) If A, *B* and *C* can do a piece of work in *x*, *y* and *z* days respectively then all of them working together can finish the work in $\frac{xyz}{(xy+yz+zx)}$ days.

8) If A is thrice as good a workman as *B* then,

Ratio of work done by A and *B* = 3 : 1.

Ratio of time taken by A and *B* to finish a work =1 : 3.

9) If A is *'k'* times efficient than *B* and is therefore able to finish a work in *'n'* days less than *B*, then

a) A and *B* working together can finish the work in $\frac{kn}{k^2-1}$ days.

b) A working alone can finish the work in $\frac{n}{k-1}$ *days.*

c) *B* working alone can finish the work in $\frac{kn}{k-1}$ *days.*

10) If A, working alone takes a days more than A and B working together. B alone takes *b* days more than A and B working together. Then the number of days taken by A and B working together to finish the job is $\sqrt{ab}$.

CONCEPTUAL EXAMPLES

1) A is twice as good a workman as *B* and takes 10 days less to do a piece of work than *B* takes. Find the time in which *B* alone can complete the work.

1) 22 days 2) 25 days 3) 23 days 4) 20 days

Explanation: Let *B* alone takes *'x'* days to complete the work. A is twice as good workman as *B.*

It means A takes $\frac{x}{2}$ days to complete the work.

From the given information we can write $x - \frac{x}{2} = 10$

$$\Rightarrow \frac{2x-x}{2} = 10 \Rightarrow \frac{x}{2} = 10 \Rightarrow x = 20.$$

Alternate Method: Using Formula.

Here, $k = 2$ and $n = 10$

$\therefore$ Time taken by *B* working alone to complete the work= $\frac{kn}{k-1}$ days $\Rightarrow \frac{2\times 10}{2-1} = 20$ days.

2) 25 men can reap a field in 20 days. When should 15 men leave the work, if the whole field is to be reaped in 37½ days after they leave the work.

1) 5 days 2) 4 days 3) 3 days 4) 4½ days

Explanation: 25 men can reap the field in 20 days.

$\Rightarrow$ 1 man can reap that field in 25×20 ***i.e.*** 500 days.

Let 15 men leave the work after *x* days so that remaining 10 men can complete the work in 37½ days.

It means 25 men have worked for *x* days and 10 men have worked for 37½ days.

$$\therefore 25x + 10 \times 37\frac{1}{2} = 500 \Rightarrow 25x = 500 - 375 = 125 (\text{or}) x = 5$$

$\therefore$ 15 men must leave the work after 5 days.

3) A man is paid Rs. 30 for each day he works, and forfeits Rs. 5 for each day he is idle. At the end of 60 days he gets Rs. 50. Then, he was idle for _____ days.

1) 20 2) 25 3) 30 4) 50

Explanation: Suppose, the man was idle for *x* days.

$\therefore 30(60 - x) - 5x = 50 \Rightarrow x = 50$

4) 12 men or 15 women can do a work in 20 days. In how many days 7 men and 5 women would complete the work?

1) 21.8 2) 22.8 3) 25.3 4) 29

Explanation: ***or*** refers either only men are working or only women are working.

and refers to both men and women working simultaneously.

TIME, SPEED AND DISTANCE

CONCEPTS

1) If a man walks a distance 6 km in each hour, we say that his speed is 6 km per hour. Thus, the speed of a body is the rate at which it is moving.

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$x\ km/hr = x \times \frac{5}{18}\ meters/sec$$

$$x\ meters/sec = x \times \frac{18}{5}\ km/hr$$

2) If the speed of a body is changed in the ratio $m : n$ then the ratio of the time taken will change in the ratio $n : m$.

3) Average Speed: When certain distance is covered by a body in parts at different speeds, then the average speed $= \frac{\text{Total distance covered by a body}}{\text{Total time taken}}$.

Note: (Average Speed) ≠ (Average of different speeds)

i.e. Average Speed $\neq \frac{\text{Sum of the Speeds}}{\text{Number of different Speeds}}$

There are two different cases when an average speed is required.

Case I: When time remains constant and speed varies: If a man travels at the rate of 'x' *kmph* for 't' hours and again at the rate of 'y' *kmph* for another 't' hours, then for the whole journey, the average speed of man is

$$\text{Average Speed} = \frac{\text{Total Distance}}{\text{Total time taken}}$$

$$= \frac{xt + yt}{t + t} = \frac{x + y}{2}\ kmph$$

Case-II: When the distance covered remains same and the speeds vary: When a man covers a certain distance at speed of 'x' *kmph* and another equal distance at the rate of 'y' *kmph*. Then for the whole journey,

$$\text{Average speed} = \frac{2xy}{x + y}\ kmph$$

4) Relative Speed:

• When two bodies are moving in the opposite direction at a speed of V1 and V2 respectively, then the relative speed is $Vr = V1 + V2$.

• When two bodies are moving in the same direction at speed V1 and V2 respectively, then the relative speed is $Vr = |V1 - V2|$.

Key Notes to Solve Problems:

1) A man covers a certain distance at *'x' km/hr* by car and the same distance at *'y' km/hr* by bicycle. If the time taken by him for the whole journey is by *'t'* hours, then total distance covered by him $= \frac{2(t)(x)(y)}{x + y}\ km$.

2) A boy walks from his house at 'x' *km/hr* and reaches the school *'t_1'* minutes late. If he walks at 'y' *km/hr* he reaches *'t_2'* minutes earlier. Then, distance between the school and house $= \frac{xy}{(x - y)}\left(\frac{t_1 + t_2}{60}\right) km$.

3) If a man walks at x/y of his usual speed he takes *'t'* hours more to cover certain distance. Then the time taken to cover the same distance when he walks with his usual speed is $\frac{xt}{y - x}$ hours.

4) If two persons *A* and *B* start at the same time in opposite directions from the points and after passing each other they complete the journeys in 'x' and 'y' hours respectively, then

$$\text{A's speed : B's speed} = \sqrt{y} : \sqrt{x}$$

5) If the speed is $\frac{a}{b}$ of the original speed, then the change in time taken to cover the same distance $= \left(\frac{b}{a} - 1\right) \times \text{Original Time}$.

BOATS - STREAMS

• If the boat moves against the stream, then it is called 'Upstream'.

• If the boat moves along with the stream, then it is called 'Downstream'.

• If the speed of the boat is *x kmph* and speed of the stream is *y kmph*, then

Speed of the boat against the stream or upstream = (*x*–*y*) *kmph*.

Speed of the boat along with the stream or downstream = (*x*+*y*) *kmph*.

• If the speed of the downstream is *'a' kmph* and speed upstream is *'b' kmph*, then

$$\text{Speed of the boat in still water} = \frac{(a + b)}{2}\ kmph$$

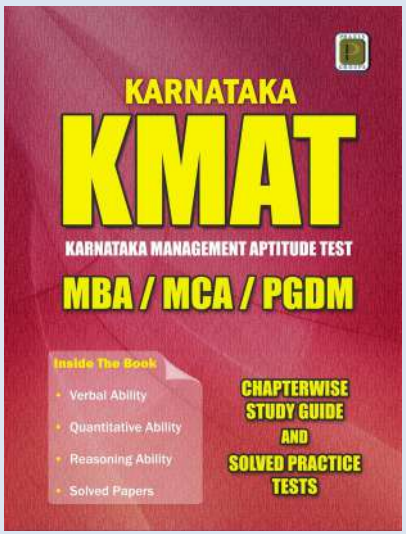
$$\text{Rate of the stream are current} = \frac{(a - b)}{2}\ kmph$$

• Speed of boat or swimmer means the speed of the boat or swimmer *in still water*.

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

29) A train running at 72 *kmph* takes 15 *sec* to cross a platform of length 100 *m*. Find the length of the train?
1) 200 *m* 2) 250 *m* 3) 300 *m* 4) 350 *m*

30) Two trains of length 100 *m* and 80 *m* respectively run on parallel tracks. When running in the same direction the faster train passes the slower one in 18 *sec* but when they are in opposite directions with the same speeds as earlier, they pass each other in 9 seconds. Find the speeds of each train?
1)20*m/s*,5*m/s* 2)25*m/s*,5*m/s*
3)15*m/s*,5*m/s* 4)30*m/s*,5*m/s*

31) Two trains are moving in the same direction 70 *kmph* and 90 *kmph.* The faster train crosses man sitting in the slower train in 36secs. Find the length of the faster train?
1) 100 *m* 2) 200 *m* 3) 300 *m* 4) 400 *m*

32) A train 120 *m* in length passes a pole in 12 *sec* and another train of same length traveling in opposite direction in 20 *sec*. Find the speed of the second train.
1) 6.2 *kmph* 2) 6.4 *kmph* 3) 7.2 *kmph* d) 7.4 *kmph*

33) Two stations A and B are 110 *km* apart on a straight line. One train starts from A at 7 *am* and travels towards B at 20 *kmph*. Another train starts from B at 8 *am* and travel towards A at a speed of 25 *kmph*. At what time will they meet?
1) 10 *am* 2) 10 *pm* 3) 11 *am* 4)11 *pm*

34) A railway passenger covers the poles on the line as he passes them. If they are 50 *m* apart and the train is moving at 48 *kmph*. How many poles will he pass per minute?
1) 21 poles 2) 19 poles 3) 15 poles 4) 17 poles

35) Two stations A and B are 110 km a part on a straight line. One train starts at 8 am from A and travel towards B at 40 *kmph*. Another train starts from B at 10 a*m* and travel towards A at 50 *kmph*. At what time will they meet?
1) 11.20 *am* 2) 10.20 *am* 3) 10.40 *am* 4) 11.40 *am*

36) A train running at 25 *kmph* takes 18 *sec* to pass a platform. Next it takes 12 *sec* to pass a man walking at 5 *kmph* in the opposite direction. Find the difference in the length of the train and that of the platform?
1) 25 *m* 2) 30 *m* 3) 35 *m* 4) 20 *m*

37) A train running at 72 *kmph* takes 15 seconds to cross a pole near one track. Find the length of the train?
1) 300 *m* 2) 250 *m* 3) 200 *m* 4) 350 *m*

38) A train 100 *m* in length passes a pole in 10 *sec* and another train of the same length traveling in opposite direction in 8 *sec.* Find the speed of the second train?
1) 51 *kmph* 2) 52 *kmph* 3) 50 *kmph* 4) 54 *kmph*

39) A train overtakes two persons who are walking in the same direction in which the train is going, at the rate of 2 *kmph* and 4 *kmph* respectively and passes them completely in 9 and 10 *sec.* Then length of the train is?
1) 50 *m* 2) 60 *m* 3) 70 *m* 4) 80 *m*

40) A train 110 m in length travels at 60 *kmph*. In what time will it pass a man who is walking at 6 *kmph*
- Against it
- In the same direction

1) 6 *sec*, 7 *sec*
2) 6 sec, 7⅓ sec
3) 5 *sec*, 7⅓ *sec*
4) 5 *sec*, 6 *sec*

41) A man completes a journey in 8 hours. He travels first half time of the journey at the rate of 24 *kmph* and second half time at the rate of 32 *kmph.* Find the total journey in *km.*
1) 224 *km* 2) 216 *km* 3) 232 *km* 4) 244 *km*

42) The speed of boat in upstream is 50 *km/hr* and that in downstream is 30 *km/hr*. Find the velocity of stream
1) 5 *kmph* 2) 10 *kmph* 3) 15 *kmph* 4) 20 *kmph*

43) A runs 20% faster than B and is able to give him a start of 6 meters to end the race in dead heat. What is the length of the race?
1) 35 *m* 2) 36 *m* 3) 42 *m* 4) cannot be determined

44) A farmer traveled a distance of 31 *km* in 9 *hours*. He traveled partly on foot at 3 *kmph* and partly on bicycle at 5 *kmph*. The distance traveled on foot is,
1) 10 *km* 2) 21 *km* 3) 35 *km* 4) 14 *km*

45) Walking at $\left(\frac{3}{4}\right)^{th}$ of his usual speed a man is late by 2.5 hours. What is the usual time?
1) 5 *hours* 2) 6 *hours* 3) 7.5 *hours* 4) 9.5 *hours*

46) A man completes a journey in 8 hours. He travels first half of the journey at the rate of 24 kmph and second half at the rate of 32 kmph. Find the total journey in km.
1) 224 *Km* 2) 216 *Km* 3) 219 *Km* 4) 244 *Km*

EXPLANATIONS

1)4; 80 *Km/hr* = $\left(80\times\frac{5}{18}\right)m/sec$

$\therefore$ Required comparison is $80\times\frac{5}{18}:10 = 20:9$

2)2; Let speed of athlete and the car be x *Km/hr* and y *Km/hr* respectively.

Then, $\frac{12/1000}{x}=\frac{24/1000}{y}\Rightarrow\frac{x}{y}=\frac{1}{2}$

3)1; Length of the train is the distance covered by the train in 9 *sec* at a speed of 54 *Kmph*= $9\times\left(54\times\frac{5}{18}\right)m=135\,m$

4)2; Relative speed of two train (45+75)*Km/hr*=120K*m/hr*

Time $=(1280\div120)=10\frac{2}{3}$ *hours*

5)1; Distance traveled by the first man

$= 4\frac{3}{4}\times3\frac{1}{4}km=\frac{19}{4}\times\frac{13}{4}km$

Distance traveled by the second man (both ways)

$= 2\times\frac{19}{4}\times\frac{13}{4}kms$

Time taken by the second man = $2\times\frac{19}{4}\times\frac{13}{4}\div\frac{19}{6}h$

$= 2\times\frac{19}{4}\times\frac{13}{4}\times\frac{6}{19}hours=9\frac{3}{4}hours$

6)1; The train has to cover its own length while passing a man. So it covers a distance of 110 *m* in 3 seconds.

$\therefore$ In 15 seconds, it covers a length = $\frac{15}{3}\times110\,m=550\,m$

550 *m* = length of the train + length of the platform.

$\therefore$ Length of the platform = 440m

7)4; Average speed = $\frac{\text{Total distance travelled}}{\text{Total time taken}}$

$= \frac{3}{\frac{1}{5}+\frac{1}{4}+\frac{1}{6}}=4\frac{32}{37}kmph$

8)3; Distance traveled from 2 *pm* to 3:30 *pm*

In $1\frac{1}{2}hours$ at $70\,km/hr=\left(70\times\frac{3}{2}\right)km$ = 105 *km*

Relative speed of two trains = (85–70) *km/hr* =15 *km/hr.*

Thus the time in which later train can meet the first train = $\frac{105}{15}hours=7\,hours.$

Time to meet = 7 *hours* + 3:30 *pm* = 10:30 *pm.*

9)3; Total distance to be covered = (121+165) *m* = 286 *m*.

Relative speed = (80 + 64) *km/hr* = 144 *km/hr*

Required Time $=\frac{286}{\left(144\times\frac{5}{18}\right)}sec=7.15\,sec$

10)1; Speed of the train = $\left(\frac{400}{45}\times\frac{18}{5}\right)kmph=32\,kmph$

11)1; Distance in downstream = $(18+14)\times\frac{18}{60}=8\,km$

12)3; Let the speed upstream = *u kmph*

and speed downstream = *v kmph*

$Time=\frac{Distance}{Speed}$

From the question, $6=\frac{24}{u}+\frac{36}{v}$ and $6.5=\frac{36}{u}+\frac{24}{v}$

Add both the equations.

$12.5=60\left[\frac{1}{u}+\frac{1}{v}\right]\Rightarrow\left[\frac{1}{u}+\frac{1}{v}\right]=\frac{5}{24}$ ------- (1)

Subtract both the equations.

$0.5=12\left[\frac{1}{u}-\frac{1}{v}\right]\Rightarrow\left[\frac{1}{u}-\frac{1}{v}\right]=\frac{1}{24}$ ------- (2)

Solving (1) and (2), we get, u = 8 *kmph* and v = 12 *kmph.*

Now, velocity of the current = $\frac{(v-u)}{2}$

$\Rightarrow\frac{(12-8)}{2}=2\,kmph$

Formula Method:

Upstream	Downstream	Time
24	36	6
36	24	6.5

Upstream speed of boat = $\frac{24\times24-36\times36}{24\times6-36\times6.5}=8\,kmph$

Downstream speed of boat

$\frac{24\times24-36\times36}{24\times6.5-36\times6}=12$kmph

Now, velocity of the current = $\frac{(12-8)}{2}=2kmph$

13)2; Speed going upstream = (6 – 1.5) = 4.5 *kmph*

Speed going downstream = (6+1.5) = 7.5 *kmph*

Total time taken = $\frac{22.5}{4.5}+\frac{22.5}{7.5}=8\,hours$

14)4; Let the speed in still water be 'x' *kmph* then

$\frac{35}{x-1}+\frac{35}{x+1}=12\Rightarrow35\,(2x)=12(x^2-1)$

$\Rightarrow12x^2-70$

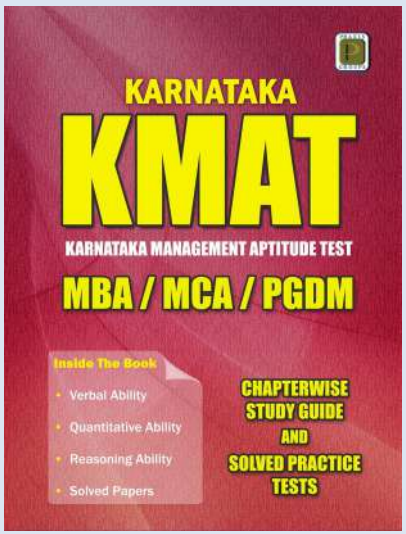
$x-12=0$

$\Rightarrow(x-6)\,(12x+12)=0\Rightarrow x=6$ *kmph*

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

40)2; (I) Relative Speed = $60+6=66\,kmph=66\times\frac{5}{18}$

Relative speed = 60 + 6 = 66 *kmph* = $66\times\frac{5}{18}=\frac{55}{3}\,mps$

Required time = $\frac{110}{55}\times3=6\,sec$

(II) Relative speed = 66–6 = 54 *kmph*= $54\times\frac{5}{18}=15\,mps$

Required time = $\frac{110}{15}\Rightarrow7\frac{1}{3}\,sec$

41)1; Total hours = 8; First half *i.e.* 4 *hours* @ 24 *kmph*

∴ Distance traveled in first half = 4×24 = 96 *km*

Second half *i.e.* 4 *hours* @ 32 *kmph*

∴ Distance traveled in second half = 4×32 = 128 *km*

∴ Total distance = 96 + 128 = 224 *km*

42)2; Velocity of boat = U, Velocity of stream = V

∴ In upstream, U – V = 50 ———————— (1)

In downstream, U + V = 30 ----———— (2)

Solving (1) and (2), U = 40 , V = 10

43)2; A runs 20% faster than B *i.e.* if B runs 100 *m* then A runs 120 *m.* In other way, if A runs 6 *m* then B runs 5 *m.*

∴ If the length of race is 6 m, then A can give B a start of 1 *m* so that they finish the race in dead heat.

∴ From the question, for the start of 6 *m* the length of race = 6 × 6 = 36 *m.*

44)2; Let, total distance traveled by foot = *x*

∴ Distance traveled on bicycle = 31 – *x*

So, $\frac{x}{3}+\frac{31-x}{5}=9\ \therefore x=21$

∴ Total distance traveled by foot = 21 *km*

45)3; Let, usual speed = *s* and usual time =*t*, distance =*d*

∴ New speed = $\frac{3}{4}s$ and New time = $\frac{4}{3}t$

∴ $\frac{4}{3}t-t=2.5\ \Rightarrow t=7.5$ hours

46)3; Let 2x be the total distance travelled;

First half i.e. x Km @ 24 kmph

∴ Time required for first half = x/24 h

Second half i.e. x Km @ 32 kmph

∴ Time required for second half = x/32 h

∴ Total time = 8 = x/24 +x/32

=> x= 768/7 Km

Total distance = 2x = 219.43 Km = 219 Km (rounded)

PIPES AND CISTERNS

CONCEPTS

1) If a pipe can fill a tank in $'x'$ hours, then a part of the tank filled in 1 hour is $\frac{1}{x}$.

2) If a pipe can empty a tank in $'y'$ hours, then a part of the full tank emptied in 1 hour is $\frac{1}{y}$.

3) If two pipes can fill a tank in $'x'$ and $'y'$ hours respectively and both the pipes are opened simultaneously then time taken to fill the tank = $\frac{xy}{x+y}$ hours.

4) If a tap fills a cistern in $'x'$ hours and another empties it in $'y'$ hours. If both the taps kept open then the amount of cistern filled in 1 hour = $\frac{1}{x}-\frac{1}{y}$.

5) A tap fills a cistern in $'x'$ hours and the other can empty the cistern in $'y'$ hours. If both the taps are opened simultaneously then time taken to fill the tank = $\frac{xy}{y-x}$ hours.

6) If two taps A and B together can fill a tank in $'x'$ hours and only tap A can fill the tank in y hours then the time taken by B alone to fill the tank is $\frac{xy}{y-x}$ hours.

7) Two pipes can fill a cistern in $'x'$ and $'y'$ hours respectively. After how much time second pipe should be turned off so that the cistern is filled in $'z'$ hours, if both the pipes are opened.

Required time = $\frac{y(x-z)}{x}$ hours.

8) Three taps A, B and C can fill a tank in x, y and z hours respectively. If all the three taps are opened simultaneously, then time taken to fill the tank is $\frac{xyz}{xy+yz+zx}$ hours.

9) Two pipes A and B can fill a cistern in $'x'$ hours and $'y'$ hours respectively. The third pipe C can empty the cistern in $'z'$ hours. If all the three pipes are opened at the same time, then time taken to completely fill the cistern = $\frac{xyz}{zx+zy-xy}$ hours.

CONCEPTUAL EXAMPLES

1) A pipe can fill a cistern in 8 minutes where as the cistern when full can be emptied by a leak in 16 minutes. When both pipes are opened, find the time taken for cistern be full.

1) 48 *min* b) 32 *min* 3) 16 *min* 4) 20 *min*

Explanation:

Work done by the first pipe in 1 *min* = $\frac{1}{8}$

Work done by the leak in 1 *min* = $\frac{1}{16}$

Here, both the pipes are opened. So, work done by both the pipes in 1 *min* is $\frac{1}{8}-\frac{1}{16}=\frac{1}{16}$.

$\therefore$ Total time required to fill the cistern is 16 *min.*

(or) Using the formula: $\frac{xy}{y-x}$

Cistern will be full in $\frac{8\times16}{16-8}=16$ *min.*

Alternate Method:

Fill in 1 *min* = Inflow in 1 *min* – Outflow in 1 *min*

Let, capacity of cistern = 16 *lit* (Since it the common factor of 8 and 16).

Inflow takes 8 *min* $\Rightarrow$ Speed = 2 *lit per min*

Outflow takes 16 *min* $\Rightarrow$ Speed = 1 *lit per min.*

$\therefore$ Fill in 1 *min* = 2–1 = 1 *lit*

$\therefore$ 16 *lit* fill requires 16 *min* at speed of 1 *lit per min.*

2) A tank is usually filled by a tap in $3\frac{1}{2}$ hours. Due to a leak in the bottom of the tank, it takes half an hour longer to fill the tank. If the tank is full how long will the leak take to empty it.

1) 7 hours b) 8 hours 3) 14 hours 4) 28 hours

Explanation:

Let the time taken by the leak to empty = x hours.

Then, work done in 1 hour = $\frac{2}{7}-\frac{1}{x}=\frac{1}{4}\Rightarrow\frac{1}{x}=\frac{1}{28}\Rightarrow x=28$

Alternate Method: Let, capacity is 7 lit.

then 1 hour fill by tap = 2 lit and half an hour fill = 1 lit

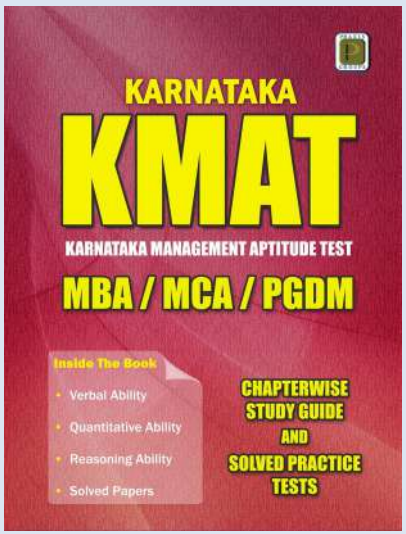
As half an hour extra required. So, 4 hours leak will outflow 1 lit. Therefore, for 7 lit, 4 × 7 = 28 lit.

Hint: Calculate the speed of outflow.

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

DATA INTERPRETATION

CONCEPTS

The information related to any event given in the form of graphs, tables, charts etc is termed as data. The methodology of interpreting data to get the information is known as data interpretation.

Mathematical identities which we use in data interpretation are given below.

To solve the problems on data interpretation, you need to be thorough in 'Percentages', 'Ratios' and 'Averages' chapters.

e.g.: If the ratio of boys to total number of students in a college is $\frac{1015}{4060}$. This can be written in a percentage form as $\frac{1015}{4060}\times 100 = 25\%$.

To find by how much percent *'x'* is more or less than *y* (or over *y*) when compared to *y* is given as

$$\text{Required Percentage} = \frac{\text{Value of X} - \text{Value of Y}}{\text{Value of Y}} \times 100$$

Observe that the denominator contains the value with which the comparison is made.

In the above formula, if numerator is positive, then there is percentage growth. If numerator is negative, then there is a decline in the percentage.

Ratio: In the simplest possible form, ratio is a quotient or the numerical quantity obtained by dividing one figure by the other figure of same units.

TABULAR DATA INTERPRETATION

In this type of questions a table with data as well as a set of questions on the same data is given to you. You need to analyze the table data and answer the given questions.

Example: Study the following table carefully and answer the questions that follow.

Table: Percentage of marks scored by students in SSC

Marks percentage	Girls	Boys
>75	25	12
60-75	15	12
50-59	10	23
35-49	5	2
< 35	3	1

1) Give the total percentage of Girls who wrote SSC examination from that School.

a) 25% b) 54% c) 23% d) 58%

2) Give the percentage of students who scored distinction (> 75).

a) 43% b) 34.25% c) 24.85% d) 40%

3) Give fail percentage of students in SSC examination.

a) 1% b) 2% c) 4% d) 8%

4) Give pass percentage of boys in SSC examination.

a) 90% b) 88% c) 98% d) 99%

5) Give the percentage of students who scored more than 60% in the SSC examination.

a) 25% b) 59.3% c) 22.2% d) 50%

Explanation:

1)b; Total no.of girls appeared for SSC Examination = 25 + 15 + 10 + 5 + 3 = 58.

Total no.of students appeared for SSC examination = 58 + 50 = 108.

$\therefore$ Percentage of girls who wrote SSC Examination = $\frac{58}{108}\times 100 = 53.7 = 54\%$ (approximately)

2)b; No.of students who scored distinction = 25 +12 =37.

$\therefore$ Percentage of students who scored distinction = $\frac{37}{108}\times 100 = 34.25\%$

3)c; Total no.of students failed in SSC examination = 4.

$\therefore$ Fail % = $\frac{4}{108}\times 100 = 3.7 = 4\%$ (approximately)

4)c; No.of boys passed in the examination = 49.

$\therefore$ Boys pass percentage = $\frac{49}{50}\times 100 = 98\%$

5)b; No.of students who scored more than 60% = 64.

$\therefore$ Percentage of students who scored more than 60% = $\frac{64}{108}\times 100 = 59.26\% = 59.3\%$ (approximately)

Example: Production of cars by different companies in the span of 1980-2005 given. Interpret the data to answer the questions given below.

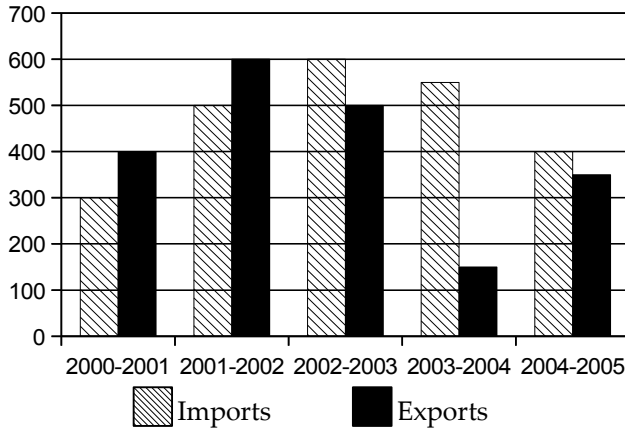
Company	Production of cars in thousands				
	1980-85	1985-90	1990-95	1995-00	2000- 05
Maruthi	12.5	15.0	16.2	18.0	22
Hindustan Motors	10.4	11.1	11.5	11.5	12
Hyundai Motors	12	14.3	16.2	17.8	18.9
Ford	14.4	14.1	13.2	18.1	25.3
General Motors	19.2	13.8	13.5	14.1	15.8

BAR GRAPHS

CONCEPTS

Bar graphs normally comprise X-axis, Y-axis and bars. X and Y-axes represent the data. And bars represent the trend of data with respect X and Y-axes. In this type of questions, data is given in the form of bar graphs. You need to analyze the bars with respect to X and Y-axes to answer the given questions.

Example: Imports and exports of a country from 2000 - 2001 to 2004 -2005.



1) In which of the following year the gap between import and export was maximum.

a) 2001-02 b) 2002-03 c) 2003-04 d) 2004-05

2) In which of the following year the gap between imports and exports was minimum.

a) 2002-2003 b) 2003-2004 c) 2004-2005 d) none

3) Exports in 2001–2002 was approximately how many times that of the year 2003–2004.

a) 2 b) 3 c) 4 d) 5

4) Give the ratio between the number of years in which exports is greater than imports and import is greater than exports.

a) 3 : 2 b) 2 : 3 c) 3 : 1 d) 1 : 3

5. Difference between average of imports and exports is

a) 100 b) 90 c) 80 d) 70

Explanations:

1)c; From the graph, gap between import and export was maximum in 2003-2004.

2)c; From the graph, gap between imports and exports is minimum in 2004-2005 = 400–350 = 50 crore.

3)c; Exports of the year 2001–2002 = 600

Exports of the year 2003–2004 = 150

∴ Exports of 2001–2002 is 4 times greater than that of 2003–2004.

4)b; In 2 years *i.e.* 2000-2001 and 2001-2002 exports are greater than imports.

In 3 years *i.e.* 2002-2003, 2003-2004, 2004-2005 imports are greater than exports.

5)d; Average of imports during 2000-2005 =

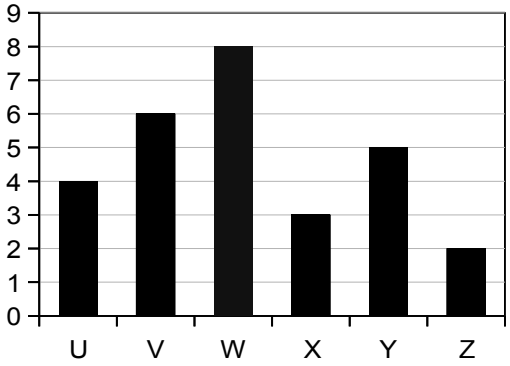
$$\frac{300+500+600+550+400}{5}=\frac{2350}{5}=470$$

Average of exports during 2000-2005 =

$$\frac{400+600+500+150+350}{5}=\frac{2000}{5}=400$$

∴ Difference = 470 – 400 = 70.

Example: Turnover in crores of six companies (U, V, W, X, Y and Z) are given.



1) Which company's turn over is highest?

a) U b) V c) W d) X

2) What is the percentage of turn over of the company-X over the turn over of the company-V?

a) 25% b) 50% c) 75% d) 100%

3) Give the difference of average turnovers of first three companies and last three companies.

a) 3.33 b) 6.66 c) 2.67 d) 1.85

4) Give the percentage contribution of turnover of W in the overall turnover of all the companies.

a) 12% b) 50% c) 40% d) 29%

5) Difference of average percentage contribution of turnovers of companies U, V and X, Y is.

a) 1% b) 2% c) 3% d) 4%

Explanations:

1)c; It is clear from the graph that turn over of company W is highest *i.e.* 8 crores.

2)b; Turnover of company X = 3 crores

Turnover of company V = 6 crores

$\therefore$ Percentage of turn over of X over V= $\frac{3}{6}\times 100=50\%$

3)a; Average turn over of first three companies

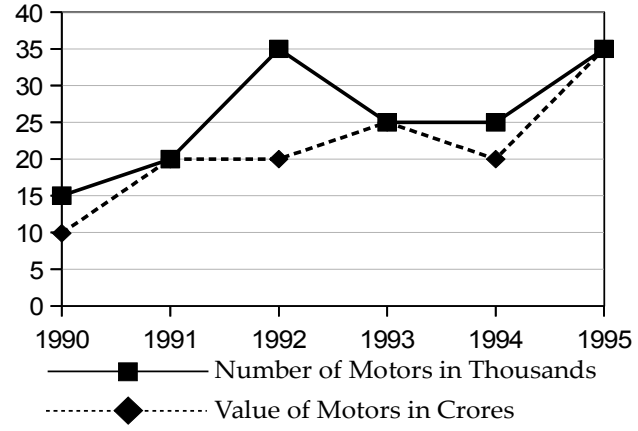
$$\frac{4+6+8}{3}=\frac{18}{3}=6$$

LINE GRAPHS

CONCEPTS

Line graphs normally comprise X-axis , Y-axis and lines. X-axis and Y-axis represent the data and lines represent the trend of data with respect to X and Y-axis. In this type of questions the data is given in the form of line graphs. You need to analyze the peaks and depth of the line graphs to answer the questions.

Example: Production of motors by a company.



1) What was the value of each motor in 1995?

a) Rs. 50000 b) Rs. 35000 c) Rs. 10000 d) Rs. 15000

2) What was the percentage hike in production of number of motors from 1991 to 1992?

a) 25 b) 50 c) 75 d) 100

3) What was the difference in revenue from the motors sold in 1993 and 1994?

a) 2 crore b) 5 crore c) 4 crore d) 3 crore

4) What was the difference in the value per motor between the years 1990 and 1991?

a) 1282 b) 2228 c) 3333 d) 4456

Explanations:

1)c; Value of each motor in 1995

$$\frac{\text{Total value in 1995}}{\text{Number of motors in 1995}} = \frac{35\times10^7}{35\times10^3} = 10^4 = \text{Rs. } 10000$$

2)c; Percentage hike in the production of motors from 1991 to 1992= $\frac{35-20}{20}\times100$ =75%.

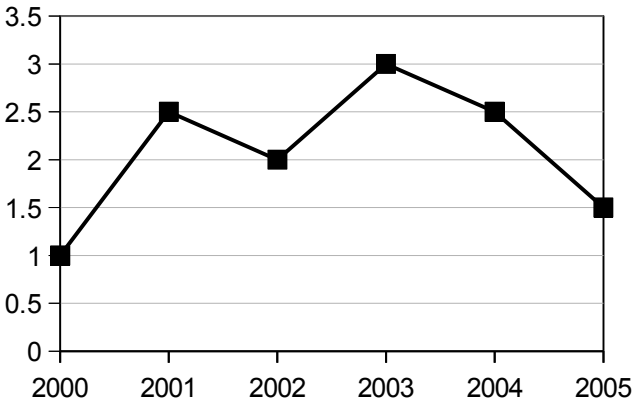
3)b; Difference in revenue from the motors sold in 1993 and 1994 = (25–20) in crores = 5 crores

4)c; Value of each motor in 1990 = 6666.66 = Rs.6667

Value of each motor in 1991 = Rs. 10000.

∴ Difference in the value per motor between the years 1990 and 1991 = 10000 - 6667 = Rs. 3333.

Example: Financial report of a company from 2000-2005; On Y axis - Ratio of income to expenditure.



1) If the income in 2003 was Rs. 200000 lakhs then give the expenditure of that year.

a) 150000 b) 33333 c) 66666 d) 800000

2) Find percentage decrease in income from 2001 to 2002.

a) 25 b) 50 c) 75 d) Data inadequate

3) Give the ratio between ratios of income expenditure of 2003 and 2004.

a) 2 : 3 b) 3 : 2 c) 5 : 6 d) 6 : 5

4) In how many years the expenditure shows a positive growth with respect to income.

a) 3 b) 2 c) 5 d) Data Inadequate

5) If the expenditure of company in 2004 is Rs. 10 lakh then give the income of that company in that year.

a) Rs.10 lakhs b) Rs.25 lakhs c) Rs.30 lakhs d) None

Explanations:

1)c; In 2003, $\frac{\text{Income}}{\text{Expenditure}} = 3$

$$\text{Expenditure} = \frac{\text{Income}}{3} = \frac{2}{3}\text{ lakhs} = \frac{200000}{3} = \text{Rs. } 66666$$

2) From the graph we cannot depict the absolute values of income and expenditure. Hence, data is inadequate.

3)d; Ratio of income to expenditure in 2003 is 3.

Ratio of income to expenditure in 2004 is 2.5.

∴ Ratio between these ratios = 3 : 2.5 = 6 : 5.

4)a; The expenditure increase as the income decrease. Hence the downward slope of the graph indicates expenditure showing a positive growth (*i.e.* in 2001-02, 2003-04 and 2004-05 = three years).

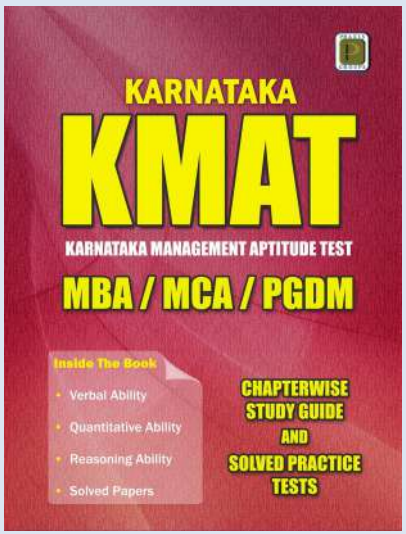
5)b; In 2004 = $\frac{\text{Income}}{\text{Expenditure}} = 2.5$

income = 2.5× expenditure = 2.5×10 = 25 lakhs.

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

PIE CHART

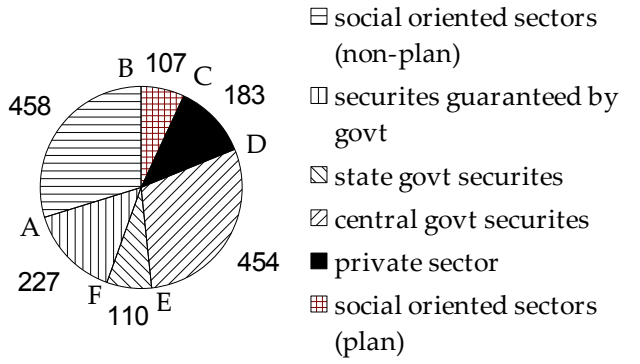
CONCEPTS

In this type of data interpretation, the data is distributed over 360° across the circle.

In this type of questions the data is given in the form of Pie graphs. You need to analyze the pie graph to answer the given questions.

The value of various elements can be depicted in pie chart in degrees such that 100% = 360°⇒ 1% = 3.6°

e.g.: The gross investments of Life Insurance Corporation of India(in crores of rupees)in different sectors are shown in the Pie Chart given below.



1) The percentage of gross investments in State Government Securities is nearly

a) 7.1% b) 7.8% c) 8.6% d) 9.2%

2) The magnitude of the acute ∠BOC is nearly

a) 25° b) 40° c) 50° d) 60°

3) The investment in socially oriented sectors (Plan and Non-plan) is_____ than the investment in Government Securities (Central and State) by_____?

a) more, 4 crore b) more, 1 crore

c) more, 111 crore d) more, 106 crore

4) The investment in private sector is nearly __ percent higher than the investment in State Government Securities.

a) 66 b) 54 c) 46 d) 40

5) The ratio of the area of the sector CDEF to the area of the sector CBAF is nearly.

a) 1 b) 0.75 c) 0.50 d) 0.25

Explanations:

1)a; Total gross investments = 458 + 107 + 183 + 454 + 110 + 227 = Rs.1539 crores.

Percentage in State Government Securities =

$\frac{110}{1539}\times 100 = 7.1\%$ *(approx)*

2)a; $\frac{107}{1539}\times 360 = 25^0$ *(approx)*

3)b; Investment in Socially Oriented Sectors (Plan and Non plan) = 458 + 107 = Rs. 565 crores.

Investment in State Government Securities (Center and State) = 110 + 454 = Rs. 564 crores.

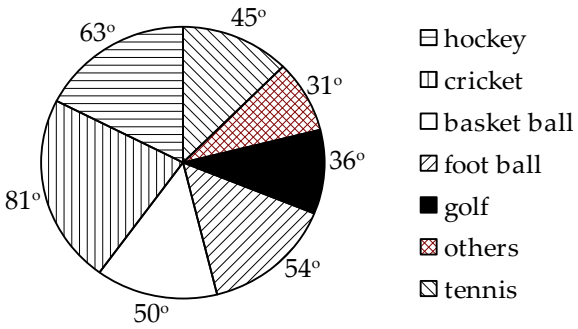
4) Investment in State Government Securities = Rs. 110 crore and in Private Sector = Rs. 183 crore.

∴ Investment in private sector is more by Rs. 73 crore,

i.e. $\frac{183-110}{110}\times 100 = 66\%$ (approx)

5)a; $\frac{\text{Area of CDEF}}{\text{Area of CBEF}} = \frac{183+454+110}{107+458+227} = \frac{747}{792} \cong 1.$

Example: A circular graph is given below showing the spending of a country on various sports during a particular year.



1) How much percent of the total spending is spent on cricket.

a) 40% b) 12.5% c) 22.5% d) 28%

2) How much percent less is spent on golf than that on hockey.

a) 22.55 b) 43% c) 52% d) 63%

3) How much percent more is spent on football than that of tennis.

a)16.6% b) 20% c) 30% d) 40%

4) If the total amount spent on sport during the year was Rs. 6 crores, then the amount spent on Basket ball and football in crores is

a) 1.62 b) 1.26 c) 1.74 d) 2.81

5) If the total amount spent on cricket is Rs. 10 lakhs then find the amount spent on Hockey (*approximately*).

a) 6.8 lakhs b) 7.8 lakhs c) 8.8 lakhs d) 9.8 lakhs

Explanations:

1)c; We know that 1% = 3.6° then $81^\circ = \frac{81}{3.6} = 22.5\%$

2) Percentage of amount spent on golf= $\frac{36}{3.6} = 10\%$

Percentage of amount spent on hockey= $\frac{63}{3.6} = 17.5\%$

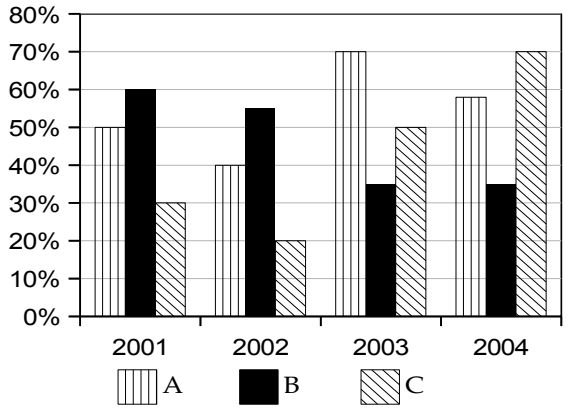
MIXED DIAGRAMS

In this type of data interpretation, data will be given in the form of two or more diagrams. The combination of the diagrams can be a bar diagram and a pie chart (or) a line graph and a table diagram (or) a pie chart and line graph.

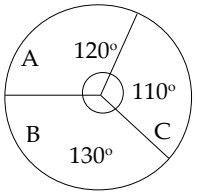
EXERCISE

A) Study the following graphs carefully to answer the questions given below it.

Readers of newspapers in percentages in 3 different cities A, B and C over the years.



Total population of 3 crores in 3 cities is represented in the following diagram.



1) In 2002 in the city B how many people were reading a news paper in lakhs ?

a) 108.333 b) 59.5883 c) 48.7499 d) 38.9421

2) According to the data in city B what is the difference between minimum number of newspaper readers in a particular year and maximum number of newspaper readers in a particular year (*approximately*)?

a) 34 b) 31 c) 29 d) 27

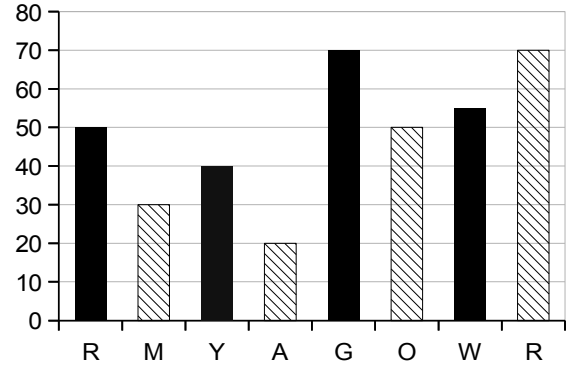
3) What is the sum of populations of city A those who don't read any newspapers in all the 4 years (in lakhs)?

a) 220 b) 200 c) 180 d) 160

4) In the 2 years in which same and maximum percentage of readership is maintained in the cities A and C. What is the decrease in readership in the city A?

a) 5 lakhs b) 10 lakhs c) 20 lakhs d) 30 lakhs

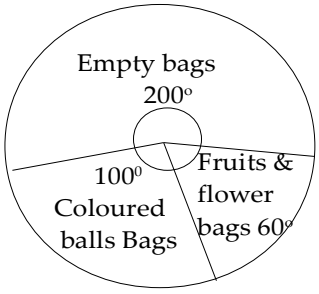
B) Study the following graphs carefully to answer the questions given below it. (Use most approximate figures, if necessary).



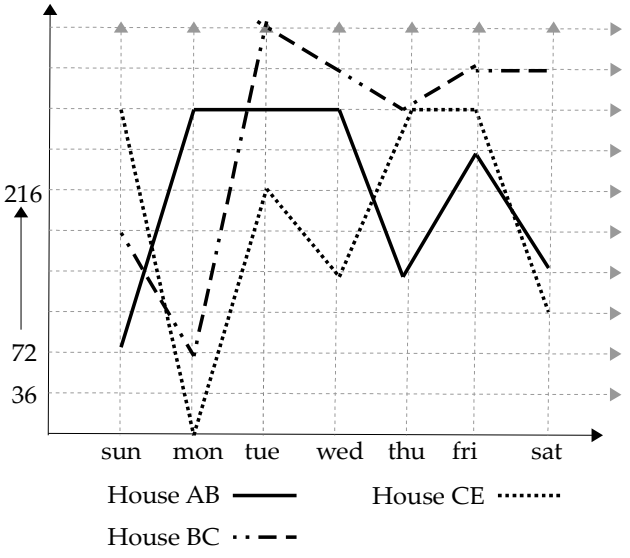
Different Bags containing colored (red, yellow, green, white) balls ■

Different Bags containing fruits and Flowers (Mango, Apple, Orange, Rose) ▨

Percentage of bags (empty, fruits and Flowers, colored balls) available in every house is given in the following Pie chart.



There are 3 go-downs namely AB, BC, CE which have *n* bags in different days of the week as shown below.



MISSED DATA TABLES

CONCEPTS

In missed data tables, a tabular data is given with some data missing. There are two types of missed data tables

1) A missing tabular data is given with clues and conditions by which table has formed. Here you have to fill the missed data using the clues and conditions thereafter answer the questions.

2) Only missing tabular data is given and question are asked on the missed data.

To solve this you have to understand how the table has been plotted by which you can fill the missed data. Thereafter you can answer the given questions.

EXERCISE

A) In a school considering 6 students from 10^{th} class we tabulate the marks obtained by them in 5 subjects out of 100. Having a keen observation on the table answer the questions followed by it.

Students	English	Telugu	Maths	Science	Social
A	70	89	48	72	71
B	-	64	64	68	-
C	92	74	-	64	60
D	84	86	64	-	81
E	69	72	70	41	35
F	82	-	-	78	79

1) If C has got 70% in all the 5 subjects together and percentage obtained in Maths by all the 6 students together is 63%. Then how many marks F obtained in Maths?

a) 80 b) 72 c) 66 d) 52

2) If F gets 65% in all the subjects together and if D gets 65 marks more than what F got then how many marks D got in science?

a) 62 b) 71 c) 75 d) 82

3) In English if all the students together produce 75% and in social if all the students together produce 65% then what is overall percentage of B in all the 5 subjects.

a) 82.4 b) 75.5 c) 69.8 d) 62.6

4) If 35% is the cut off in each subject then what is the ratio between number of passed and failed students with respect to the assumptions made in the previous problem.

a) 5:1 b) 2:1 c) 1:1 d) None

5) What is the percentage of marks obtained by all the students in all the subjects.

a) 75.6 b) 72.4 c) 67.2 d) 58.9

B) Annual production of Bikes in 6 companies A, B, C, D, E, F in the years 2000 to 2006 in thousands.

	A	B	C	D	E	F
2000	245	185	50	80	100	100
2001	-	200	60	90	-	80
2002	-	220	-	100	180	60
2003	125	-	100	110	220	70
2004	85	180	120	120	260	90
2005	45	220	140	130	280	120
2006	5	240	-	160	300	200

6) Average annual production of Bikes in six companies in 2001 is 111.43 (*apprx*) and annual production of bikes in company-A and company-E in that year is in the ratio 3:2. Then calculate the annual production of bikes in company-A in that year.

a) 80 b) 143 c) 210 d) None

7) Average annual production of company-B from 2000-2006 is 215 and production of Company-A in 2002 is 63.46% of the production of Company-B in 2003. Then calculate production of company-A in 2002

a) 125 b) 165 c) 185 d) 215

8) The average annual production of company-C from 2000 to 2006 is 100 and difference in its production in 2006 and 2002 is 80. Then calculate annual production of company-C in 2006.

a) 160 b) 80 c) 155 d) 75

9) Which of the following company has got least average annual production from 2000 to 2006?

a) F b) C c) D d) A

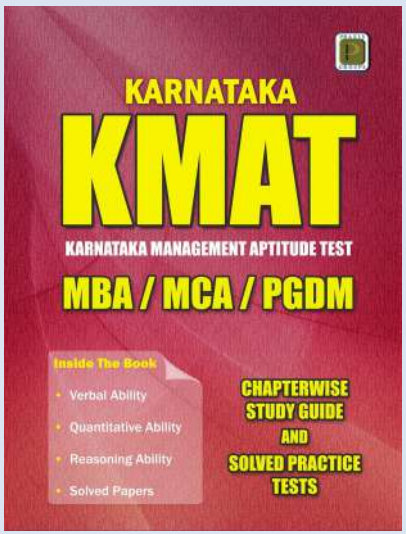
10) What is average annual production of six companies from 2000-2006 (Use the data given in questions 6-8 and do the calculations up to two decimals).

a) 89.42 b) 102.84 c) 136.72 d) 141.97

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

7) $\frac{(185+200+220+x+180+220+240)}{7}=215 \Rightarrow x = 260$

Annual production of company-A in 2002 = 165

8) $\frac{(50+60+x+100+120+140+y)}{7}=100$

$470 + x + y = 700 \Rightarrow x + y = 230$

Given that, $x - y = 80$.

Solving these two equations, we get, $x = 75$ and $y = 155$.

9) Average annual production of A = 116.14

Average annual production of B = 215

Average annual production of C = 100

Average annual production of D = 112.86

Average annual production of E = 205

Average annual production of F = 102.86

Least average annual production is for company-C.

Hence, option-b is correct.

10) Average annual production of six companies from 2000 – 2006 =

$\frac{116.14+215+100+112.86+205+102.86}{6}=141.9$

11) Total cloth = Total number of shirts × Cloth required per shirt = (20 + 30 + 30 + 10 + 10)1000 × 1.5 = 150000 m.

12) Total quantity of high quality cloth consumed by A shirts = (80% of 20000)×1.5 = $\left(\frac{4}{5}\right)\times 30000=24000 \text{ m}.$

13) Required Ratio = $\frac{(40\% of\ 30000)}{(60\% of\ 10000)}=2:1$

14) Total low quality cloth consumed =

$1.5\left[\left(\frac{3}{10}\times 60\right)+\left(\frac{2}{5}\times 10\right)+\left(\frac{9}{10}\times 10\right)\right]\times 1000=46500 m$

15) The required ratio cannot be determined.

16) Food related exports in 1984-85 = ((Food related exports in 1985 to 86) – (1006 crores)) =

$\left(\frac{23}{100}\times 25800\right)-1006=4928$ crores.

$\text{Percentage of Food related exports}=\left(\frac{4928}{22400}\right)\times 100=22\%.$

17) From statement-a in question, value of manufactured articles is double that of value of raw materials. *i.e.* If value of raw materials = y.

Then, value of manufactured articles = $2y$.

$2y + y + 4928 = 22400 \Rightarrow 3y = 17472$

$\Rightarrow y = 5824$ (Value Raw Material)

$\Rightarrow 2y = 11648$ (Value of Manufactured Articles)

$\Rightarrow$ (Raw Material) – (Food) = 5824 – 4928 = 896 crores.

18) In 1985-86, Expenditure of raw material = 33%

and Export of manufactured goods = 44%

So the second column percents are 23%, 44% and 33%.

So the values of second column are 5934, 8514, 11352.

Similarly for first column, values are 4928, 11648, 5824.

So, percent less= $100-\left(\frac{5824}{8514}\right)\times 100=31.6\%(\text{approx})$

19) Value of manufactured articles in 1984-85 = 11648.

Value of manufactured articles in 1985-86 = 11352.

Change in Value = 11648 – 11352 = 296 crore.

20) GPA of Preeti=3.2, *i.e.* (Q+P+X+P+Y)/5=3.2

X+Y=12. So only combination possible is M, M.

So, Preeti obtained 'M' grade in statistics.

21) Tara's grade: $4 + 3x + y = 2.4\times5$ (Using statement-c);

Hence $3x + y = 8$. The possible values of x and y are x = 0, 1, 2 and corresponding values of y = 8, 5, 2.

None of these values are possible because we are given that Tara gets the same grade in exactly 3 subjects. Hence he can get BBBFF. We see that Manab also gets B in Operations;

22) In statement-b,

Fazal gets B in Strategy ($2 + 0+4+x+2= 12 \Rightarrow x = 4$).

Hence Utkal gets B in Marketing. For Utkarsh, we have: $x+4+0+3+6=15 \Rightarrow x=2$. Hence he gets D in Finance.

23) Gowri gets: $3+3+6+x+4=19$; Hence she gets 3 and her grade is C. She can thus be higher only from Hari.

POLYNOMIALS AND QUADRATIC EQUATIONS

CONCEPTS

A Polynomial over the real numbers is a function f(x) of the form

$f(x) = A_0 + A_1 x + A_2 x^2 + ...+A_n x^n$

where, A_i is the coefficient andn is the power.

The exponent of the highest power term of the polynomial it is called the **degree** of the polynomial: e.g. The degree of the polynomial $1 – 2x+3x^2+ 5x^6$ is 6., as the exponent of the highest power term ($5x^6$) is 6

The Sum and difference of two given polynomials is found out by grouping like powers, retaining their signs and adding the coefficents of like powers.

Let, $f_1(x) = x^3 – 3x^2 + 6x – 4$

$f_2(x) = x^2 – x + 4$

Hence, the **sum = $f_1(x) + f_2(x)$**

$= x^3 + (–3x^2 + x^2) + (6x – x) + (– 4 + 4) = x^3 – 2x^2 + 5x$

And the **difference = $f_1(x) – f_2(x)$**

$= x^3 – (–3x^2 - x^2) + (6x – (-x)) – (– 4 – 4) = x^3 – 4x^2 + 7x – 8$

The Product of two polynomials is found by applying the distributive law for the product of algebraic expressions and then grouping like powers to add or subtract as the case may be.

Polynomial Function: If a_0, a_1, a_2 … a_n, are real and 'n' is a positive integer, then $f(x)= a_0+a_1x+a_2x^2+.....+a_nx^n$ is called a polynomial function in x.

Polynomial Equation: If a_0, a_1, a_2 … a_n, are real and 'n' is a positive integer, then $f(x)= a_0+a_1x+a_2x^2+.....+a_nx^n=0$ is called polynomial equation in 'x' with real coefficients.

Degree of the Polynomial: The highest power of 'x' for which the coefficient is nonzero in a polynomial function, is called the degree of the function.

Zero Polynomial: If the coefficients of a polynomial are all zeros, then that polynomial is called zero polynomial. Zero polynomial has no degree.

The domain of a zero polynomial is R.

Polynomial equations of degrees 1, 2, 3 and 4 are called as linear, quadratic, cubic and biquadratic equations respectively.

Root of an equation: The value of x which satisfies f(x) =0 is called root of the equation f(x) =0. If f(a)=0, then x=a is a root of equation f(x)=0. Also (x–a) is a factor of the polynomial f(x).

QUADRATIC EQUATIONS

Definition: An equation of the form $ax^2+bx+c = 0$ where a, b, c belong to the real numbers and $a\neq0$ is a quadratic equation.

If $a = 0$ then the equation becomes a linear equation.

If $ax^2 + bx + c = 0$ is a quadratic equation given then the quantity $b^2 – 4ac$ is known as Discriminant. And is denoted by 'D'. The roots of a quadratic equation $ax^2+ bx+ c= 0$ are $\alpha=\frac{-b+\sqrt{b^2-4ac}}{2a}$, $\beta=\frac{-b-\sqrt{b^2-4ac}}{2a}$

The roots are of the form $p+\sqrt{q}$ if D is not a perfect square. If 'D' is a perfect square then both the roots are rational numbers

Nature of the Roots:

1) If $D > 0$, the roots are real and distinct.

2) If $D = 0$, the roots are real and equal.

3)If $D < 0$, the roots are complex with non zero imaginary.

4) If a, b, c are rational and if 'D' is a perfect square then the roots are rational.

5) If a=1 and b, c belongs to integers and the roots are rational numbers then the roots must be integers.

6) In the quadratic equation $ax^2+bx+c=0$, if $a=b=c=0$ then it has infinitely many roots because it is an identity in x. Let us have an example for this

e.g.: The number of values of *'a'* for which $(a^2–3a+2)x^2+(a^2–5a+6)x+a^2–4=0$ is an identity in x.

Explanation: It is an identity in x if $a^2–3a+2=0$, $a^2–5a+6=0$, $a^2–4=0$. Solving these equations, a = 1, 2 and a = 2,3 and a = 2,-2. Therefore, the equation is an identity if a=2 which is common in all the three.

7) If the roots are α and β then the quadratic equation is $x^2–(\alpha+\beta)x+\alpha\beta =0$.

Transformation of Equations:

If α,β are the roots of quadratic equation $ax^2+bx+c=0$, $a\neq0$, then,

1. Sum of roots $\alpha+\beta=-\frac{b}{a}=-\frac{\text{coefficient of } x}{\text{coefficient of } x^2}$

2. Product of roots $\alpha\beta=\frac{c}{a}=\frac{\text{constant term}}{\text{coeffiecient of } x^2}$

3. The equation whose roots are reciprocals

i.e. $\frac{1}{\alpha},\frac{1}{\beta}$ is $f\left(\frac{1}{x}\right)=0$.

4. The equation whose roots are K times of given roots

i.e. $K\alpha$, $K\beta$ is $f=\left(\frac{x}{k}\right)=0$

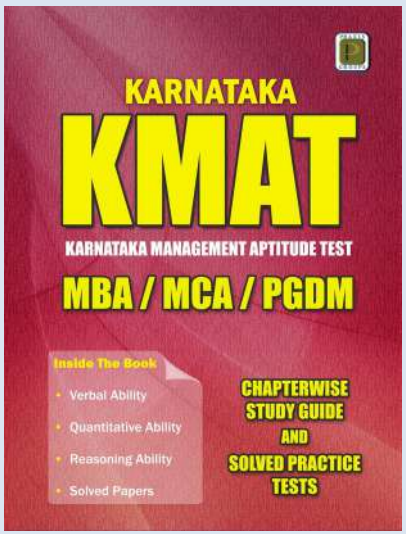
5. The equation whose roots are $\alpha+k$, $\beta+k$ *is* $f(x–k) =0$.

6. An expression in α , β is called a symmetric function if the function is not affected by interchanging α and β

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

22)a; Given that (x-30), is a factor of f(x).
$\therefore f(30) = 0$
$6x^2 - 24 = 30 \Rightarrow x^2 = 9 \Rightarrow x = 3, -3$
$\therefore$ From the given options, (x-3) is a factor of $f(6x^2 - 24)$.
23)b; Let $f(x) = 7x^3 - 3x^2 + 5x - 3$ is divided by 3x-2
To get the remainder when f(x) is divided by 3x-2, we calculate f(2/3), if f(2/3) is zero 3x-2 is a factor of f(x) else the value obtained is the remainder.

$$\therefore f\left(\frac{2}{3}\right) = 7\left(\frac{2}{3}\right)^3 - 3\left(\frac{2}{3}\right)^2 + 5\left(\frac{2}{3}\right) - 3 \quad f\left(\frac{2}{3}\right) = \frac{29}{27}$$

24)c; Let $f(x) = x^5 - ax + b$ and f(x) is divided by $x^2 - 4 = (x+2)(x-2)$.
$\therefore f(2) = (2)^5 - a(2) + b \Rightarrow 32 - 2a + b = 0 \Rightarrow -2a + b = -32$
$f(-2) = (-2)^5 - a(-2) + b \Rightarrow -32 + 2a + b = 0 \Rightarrow 2a + b = 32$
$\therefore a = 16$ and $b = 0$
$\therefore (a, b) = (16, 0)$
Hence, the required answer is (16,0).
25)d; Let $f(x) = 2x^2 - kx + 2$ divided by (x-2) with remainder 4.
$\therefore f(2) = 2(2)^2 - k(2) + 2 = 4$
$= 8 - 2k + 2 = 4 \Rightarrow k = 3$
26)a; Let $f(x) = 3x^2 + mx + 4$
Since x-1 is a factor of the polynomial,
$f(1) = 3(1)^2 + m(1) + 4 \quad m = -7$
27)b; The roots of f(x) are 3,5,2 and -2. the roots factors of f(x) are (x-3) , (x-5) , (x-2) and (x+2)
$\therefore f(x) = (x-3)(x-5)(x-2)(x+2)$
$= (x^2 - 8x + 15)(x^2 - 4)$
$f(x) = x^4 - 8x^3 + 11x^2 + 32x - 60$
28)d; Given roots of required polynomial are 3,5 and 6.
$\therefore f(x) = (x-3)(x-5)(x-6)$
$= (x^2 - 8x + 15)(x-6)$
$f(x) = x^3 - 24x^2 + 63x - 90$
29) a; From the given polynomial, $27x^2 - 33x + 10$,
$a = 27$, $b = -33$ and $c = 10$.

$$\text{Product of roots} = \frac{c}{a} = \frac{10}{27}$$

30)c; From the given polynomial $27x^2 - 33x + 10$,
$a = 27$, $b = -33$ and $c = 10$.

$$\text{Sum of roots} = \frac{-b}{a} = \frac{-(-33)}{27} = \frac{11}{9}$$

31)b; If α, β are root of a polynomial, then the polynomial $= x^2 - (\alpha+\beta)x + \alpha\beta$
$= x^2 - (\sqrt{3} - \sqrt{3})x + (\sqrt{3})(-\sqrt{3})$
Required polynomial $f(x) = x^2 - 3$
32)d; From the given polynomial $5x^2 - 7x + 3$,
$a = 5$, $b = -7$ and $c = 3$.
Discriminant $= b^2 - 4ac \Rightarrow 49 - 60 = -11$
33)a; $\alpha + \beta = 9$ and $\alpha\beta = 18$ $\quad \frac{\alpha\beta}{\alpha+\beta} = 2$
34)a; Given polynomial $72x^2 - 102x + 35$.

$$\alpha + \beta = \frac{102}{72} \text{ and } \alpha\beta = \frac{35}{72}$$

$$\frac{\alpha\beta}{\alpha+\beta} = \frac{\frac{35}{72}}{\frac{102}{72}} = \frac{35}{102}$$

LINEAR EQUATIONS AND EQUATIONS OF LINES

CONCEPTS

1) General form of a linear equation in two variables is $ax + by + c = 0$.

2) A single linear equation in two variables has infinite number of solution.

3) Two linear equations in two variables of the form $a_1x + b_1y + c_1 = 0$, $a_2x + b_2y + c_2 = 0$, are called a system of linear equations in two variables (or Simultaneous equation). An ordered pair of two numbers which satisfies both the equations simultaneously is called a solution to the system of equations.

4)a) A system of two linear equations in two variables has a unique solution if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$. Such a system is called **consistent**. The graph consists of two intersecting lines.

b) If $\frac{a_1}{a2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$, then there is no solution to the system. It is called **inconsistent**. The graph consists of two parallel lines.

c) If $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$, then there are infinite number of solutions. It is called **dependent**. The graph consists of two coincident lines.

5) A system of equations is solved either by:

a) Elimination is done by equating the coefficients of a variable to find the value of the other variable.

b) Substitution is done by obtaining the value of one variable in the form of another variable.

c) Cross Multiplication Formula

$$\frac{x}{b_1c_2 - b_2c_1} = \frac{y}{c_1a_2 - c_2a_1} = \frac{1}{a_1b_2 - a_2b_1}$$

Equations of a Line

1) Slope-intercept: $y = mx + b$

m is the slope and b is the y-intercept.

2) One-Point form: $y - y_1 = m(x - x_1)$

(x_1, y_1) is a point on the line.

3) Two-Point form: $\frac{y - y_1}{y_2 - y_1} = \frac{x - x_1}{x_2 - x_1}$

(x_1, y_1) and (x_2, y_2) are the two points on the line.

4) Standard form: $Ax + By + C = 0$

A, B and C are co-primes

5) Two-intercept form: $\frac{x}{a} + \frac{y}{b} = 1$

Used when both the x-intercept and the y-intercept are available.

6) Slope (m) of a line $ax + by + c = 0$

$= \tan\theta = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-a}{b}$

θ is the angle between the x-axis and the line x-axis.

7) Two Parallel lines are of the form $ax + by + c_1 = 0$ and $ax + by + c_2 = 0$ and have equal slopes ($m_1 = m_2 = m$).

8) Two perpendicular lines are of the form $ax + by + c_1 = 0$ and $-bx + ay + c_2 = 0$ and the product of their slopes is -1. $m_1.m_2 = -1$

9) Distance between two points on a line

$= \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2}$

10) Mid point (x, y) between 2 points (x_1, y_1) and (x_2, y_2)

$= \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

11) If a point (x, y) divides the line joining 2 points (x_1, y_1) and (x_2, y_2) in the ratio $m : n$ internally,

$$(x, y) = \left(\frac{mx_2 + nx_1}{m + n}, \frac{my_2 + ny_1}{m + n}\right)$$

12) If a point (x, y) divides the line joining 2 points (x_1, y_1) and (x_2, y_2) in the ratio $m : n$ externally,

$$(x, y) = \left(\frac{mx_2 - nx_1}{m - n}, \frac{my_2 - ny_1}{m - n}\right)$$

Note: If the ratio obtained when a point divides a line segment is negative, the point is present externally to the line segment.

13) The centroid of a triangle with points (x_1, y_1), (x_2, y_2) and (x_3, y_3) is given by the equation

$$(x, y) = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

14) The mid point of a rectangle with points (x_1, y_1), (x_2, y_2), (x_3, y_3) and (x_4, y_4) is given by the equation

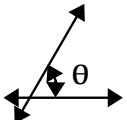
$$(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_2 + y_3}{2}\right)$$

Note: The above formula can be adjusted to any 3 adjacent points on the rectangle.

PLANE GEOMETRY

CONCEPTS

Angle: When two non-parallel and co-planar lines (lines in the same plane) intersect, at the point of intersection the measure of rotational displacement is called an angle.



Types of Angles: If θ is an angle such that

1) If $\theta = 0^o$ then θ is *zero angle.*
2) If $0^o < \theta < 90^o$ then θ is called an *acute angle.*
3) If $\theta = 90^o$ then θ is *right angle.*
4) If $\theta > 90^0$ then θ is *obtuse angle.*
5) If $\theta = 180^o$ then θ is called a *straight angle.*
6) If $180^o < \theta < 360^o$ then θ is called *reflex angle*.
7) If $\theta = 360^o$ then θ is called *complete angle*.

Parallel and Non-Parallel lines:

1) Two lines are said to be parallel lines if they are co-planar (in the same plane) and non intersecting.

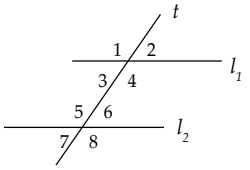
The point of intersection of parallel lines is at infinite places which is not real.

2) The angle between parallel lines is undefined, or it can be either 0^o or 180^o or any multiple of 180^o.

3) Two lines are said to be non parallel (inclined lines) if they are co-planar and intersect at a real point.

The point of intersection of inclined lines is real.

Transversal: A line that intersects two parallel lines is called a *transversal.* Suppose l_1 , l_2 are two parallel lines and '*t*' is a transversal, then we will have eight angles as shown in figure.



•**Vertical Opposite Angles:** The angles ∠1∠4, ∠2∠3, ∠5∠8, ∠6∠7 pair wise are called pairs of *vertical angles.* The corresponding pairs of vertical angles are always equal *i.e.* ∠1=∠4, ∠2=∠3, ∠5=∠8, ∠6=∠7.

•**Corresponding Angles:** The angles ∠1∠5, ∠2∠6, ∠3∠7, ∠4∠8 pair wise are called *corresponding angles.* The pairs of corresponding angles are always equal. *i.e.* ∠1=∠5, ∠2=∠6, ∠3=∠7, ∠4=∠8.

•**Alternate Interior Angles:** The angles ∠3∠6, ∠4∠5 are called pairs of *alternate interior angles.*
The corresponding pairs of alternate angles are equal.
i.e. ∠3=∠6, ∠4=∠5

•**Alternate Exterior Angles:** The angles ∠1∠8,∠2∠7 are called pairs of *alternate exterior angles*. ∠1=∠8,∠2=∠7

•**Complementary Angles:** Two angles whose sum is 90^o are called *complementary angles*.

•**Supplementary Angles:** Two angles whose sum is 180^o are called *supplementary angles.*

POLYGONS

•A closed plane figure made up of several line segments that are joined together is called a Polygon.

•If all the sides of a polygon are equal then it is called Regular Polygon.

Regular polygons are both equiangular and equilateral.
Equiangular = all angles are equal.
Equilateral = all sides are the same length.

Exterior angle: The angle subtended by a side of the regular polygon at the vertex outside.

Sum of the exterior angles of any polygon = 360^o.

Each exterior angle (regular polygon) = $\frac{360}{n}$.

(where *'n'* is the number of sides in a polygon).

Interior angle:

Sum of the interior angles of a polygon = $(n-2)\times 180°$.

Each interior angle of a regular polygon = $\frac{180(n-2)}{n}$.

• The number of diagonals in a polygon = $\frac{n(n-3)}{2}$.

• The number of triangles (when you draw all the diagonals from one vertex) in a polygon = $(n-2)$.

Polygon Names:

Sides	Name
3	Triangle
4	Quadrilateral
5	Pentagon
6	Hexagon
7	Heptagon
8	Octagon
10	Decagon

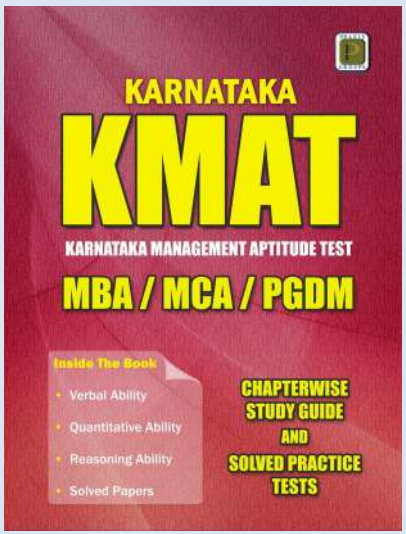
Special Triangles: Equilateral, Isosceles, Scalene, Right Angled, Acute, Obtuse.

Special Quadrilateral: Square, Rhombus, Parallelogram, Rectangle, Trapezium and Trapezoid.

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

11)3; Area of regular hexagon= $\frac{6\sqrt{3}}{4}a^2$; $Side(a)=4\sqrt{3}$

$\therefore \text{Area}=\frac{6\sqrt{3}}{4}(4\sqrt{3})^2 \Rightarrow \frac{6\sqrt{3}\times 4\sqrt{3}\times 4\sqrt{3}}{4} \Rightarrow 72\sqrt{3}$ sq.units

12)2; Since XY||BC, $\Delta AXY \sim \Delta ABC$

$\Rightarrow \frac{\Delta AXY}{\Delta ABC}=\frac{AX^2}{AB^2}=\frac{4}{9}$

The ratio of the areas of two similar triangles is equal to ratio the of the square of their corresponding sides.

13)3; Here ΔABC is a right angled triangle at 'A'.

$\therefore y^2 = 5x$ and $AC^2 = DC\times BC \Rightarrow 300 = x(x+5) \Rightarrow x=15$

(From 'similarity in right angle triangles' concept)

14)2; From the diagram, $\Delta EBA \sim \Delta EDC$.

So, ratio of the corresponding sides are equal.

$\Rightarrow \frac{AB}{CD}=\frac{AE}{CE}=\frac{4}{6}\Rightarrow\frac{2}{3}$

15)2; Number of diagonals of polygon with sides *'n'*

$= \frac{n(n-3)}{2} \Rightarrow 14=\frac{n(n-3)}{2}$

$n(n–3) = 28 \Rightarrow n^2 – 3n – 28 = 0 \Rightarrow n^2 – 7n + 4n – 28 = 0$

$\Rightarrow (n–7)(n+4) = 0 \Rightarrow n = 7$ (or) $n = -4$

Sides cannot be negative.

$\therefore n = 7$

16)1; The interior angle of regular polygon

$= 180^0 - \frac{360^0}{n} = 180^0 - \frac{360^0}{6} = 180^0 – 60^0 = 120^0.$

17)2; ABCD is a cycle quadrilateral.

$\therefore \angle B + \angle D = 180^0 \Rightarrow 70^0 + \angle D = 180^0 \Rightarrow \angle D = 110^0.$

18)3; Given, $d_1 = d_2$;

Area of rhombus $= \frac{1}{2}d_1 d_2 = \frac{1}{2}d_1 d_1$

$32=\frac{1}{2}d_1^2 \Rightarrow d_1^2 = 64 \Rightarrow d_1 = \pm 8$

Length of the diagonal cannot be negative.

$\therefore\ d_1 = 8\ cm$

19)4; Radius of in-circle of a triangle of area (a), and semi–Perimeter (s) = $\frac{a}{s}=\frac{60}{2}=30$

$\therefore$ Radius = $\frac{50}{30}=\frac{5}{3}cm.$

20)1; $h=\frac{1}{5}\times a=\frac{1}{5}\times 10=2\ cm$

$\therefore$ Area of trapezium =

$\frac{1}{2}(a+b)h=\frac{1}{2}(10+8)2=18\ sq.cm.$

21)4; If *'h'* is height and *'a'* is side, then

$h=\frac{\sqrt{3}}{2}a=\frac{\sqrt{3}}{2}.4\sqrt{3}$ = (2)(3) = 6 units.

22)3; In rhombus PQRS, $4PQ^2 = PR^2+QS^2 = 9+5^2 = 9+25 = 34$

$\therefore PQ^2 = \frac{34}{4} \Rightarrow PQ = \frac{\sqrt{34}}{2}$

23)2; By the properties of circle,

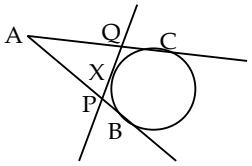
$\angle POR = 2\angle PQR$ ..... (1)

Given, $\angle PQR + \angle POR = 120^0$

$\angle PQR + 2\angle PQR = 120^0$ (from(1))

$3\angle PQR = 120^0 \Rightarrow \angle PQR = 40^0$

24)2; Let us observe the diagram.



Since AB and AC are the tangents from the same point

$\therefore$ AB = AC = 5 cm. Similarly BP = PX and XQ = QC.

Perimeter of ΔAPQ = AP + AQ + PQ.

= AP +AQ +(PX+XQ) $\Rightarrow$ (AP + PX) + (AQ + XQ)

= (AP + PB) + (AQ + QC) $\Rightarrow$AB + AC $\Rightarrow$ 5 + 5 = 10 cm

25)1; Here, OA = 2 × Radius = 2 × 8 = 16 *cm*

OB = Radius = 8 *cm*

$\therefore OA^2 = OB^2 + AB^2$ (hypotenuse property)

$16^2 = 8^2 + AB^2 \Rightarrow AB^2 = 16^2 – 8^2 = 256–64 = 192$

$AB = \sqrt{192} = 2\sqrt{48}$

26)3; If two chords PQ and ST intersect internally then, PR × RQ = SR×RT. But PR = RQ.

$\therefore$ PR × PR = SR×RT $\Rightarrow PR^2 = 5\times 6 = 30 \Rightarrow PR = \sqrt{30}\,cm$

CO-ORDINATE GEOMETRY

CONCEPTS

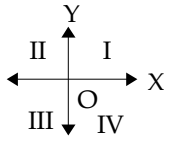
•Cartesian Plane:

1) The plane in which x-axis and y-axis, two mutually perpendicular lines intersect at origin O is called x-y plane or Cartesian plane.

2) These lines divide the plane into 4 quadrants. Any point in this plane is represented by P(x, y).

3) Here $|x|$ = distance of the point from y-axis (abscissa of the point).

4) $|y|$ = Distance of the point from x-axis (ordinate of the point).



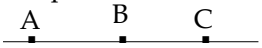
Quadrant-I: (x, y)
Quadrant-II : ($-x$, y)
Quadrant-III : ($-x$, $-y$)
Quadrant-IV : (x, $-y$)

•Distance Between two points:

The distance between two points A(x_1, y_1) and B(x_2, y_2) is AB = $\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$.

•Condition for Collinearity of Three Point:

If 3 points A(x_1, y_1), B(x_2, y_2), C(x_3, y_3) are collinear, then area of $\Delta ABC=0$. (Because you cannot make a triangle using collinear points as shown below).



Collinear

(or) write the equation of straight line using any two points and check whether third point satisfies it or not.

•Section Formula:

1) If P(x, y) divides the line joining A(x_1, y_1), B(x_2, y_2) in the ratio m : n then

$x=\frac{mx_2+nx_1}{m+n}; y=\frac{my_2+ny_1}{m+n}$ (internally)

$x=\frac{mx_2-nx_1}{m-n}; y=\frac{my_2-ny_1}{m-n}$ (externally)

2) If P(x, y) lies in the line joining A(x_1, y_1), B(x_2, y_2) then P divides AB in the ratio $(x_1-x) : (x-x_2)$ (or)$(y_1-y):(y-y_2)$.

3) X-axis divides the line segment joining (x_1, y_1), (x_2, y_2) in the ratio $y_1 : y_2$.

4) Y-axis divides the line segment joining (x_1, y_1), (x_2, y_2) in the ratio $x_1 : x_2$.

•Centroid: The point of intersection of the medians is called centroid of triangle. This point divides each median in the ratio 2 : 1. Its coordinates are

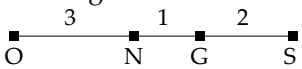
$\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$.

where$(x_1,y_1),(x_2,y_2),(x_3,y_3)$ are the vertices of the triangle

•Incentre: If the three vertices of triangle ABC are located at $(x_a,y_a),(x_b,y_b),(x_c,y_c)$ and the sides opposite to these vertices are a,b *and* c, then the incentre is locatted at $\left(\frac{ax_a+bx_b+cx_c}{a+b+c}, \frac{ax_a+bx_b+cx_c}{a+b+c}\right)$

$=\frac{a(x_a,y_a)+b(x_b,y_b)+c(x_c,y_c)}{a+b+c}$

•Observe the following.



N divides O and G in the ratio 3 : 1 internally
G divides O and S in the ratio 2 : 1 internally
S divides O and G in the ratio 3 : 1 externally
G divides N and S in the ratio 1 : 2 internally
N divides O and S in the ratio 1 : 1 internally

•Straight Line: Equation of the line, $y = mx + c$.

*h*ere, m = slope, c = intercept.

If line passes through the points $A(x_1, y_1)$ and $B(x_2, y_2)$ then $m=\frac{y_2-y_1}{x_2-x_1}, (x_1\neq x_2)$

1) The equation of a straight line passing through two points (x_1, y_1), (x_2, y_2) is $(y-y_1)=\left(\frac{y_2-y_1}{x_2-x_1}\right)(x-x_1)$.

2) Equation of a straight line whose x intercept and y intercept are a, b respectively is $\frac{x}{a}+\frac{y}{b}=1$.

3) The general equation of a straight line is $ax + by + c=0$

4) The area of the triangle formed by the line $ax + by + c = 0$ with the coordinate axes is $\frac{c^2}{2|ab|}$

5) If $a_r x+b_r y+c_r=0$, (r = 1, 2, 3) are the vertices of a triangle, then the area is $=\frac{1}{2}\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$

6) Area of Triangle with vertices A(x_1 , y_1), B(x_2 , y_2), C(x_3, y_3) $\frac{1}{2}\left|\left[x_1(y_2-y_3)+x_2(y_3-y_1)+x_3(y_1-y_2)\right]\right|$

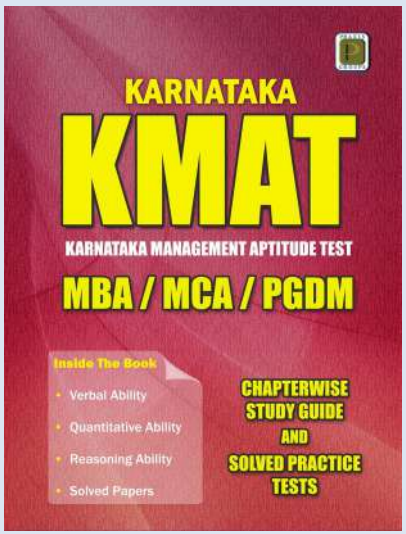
Translation of Axes: A point P in the plane has two sets of coordinates: (x, y) in the original system and (x^1, y^1) in the translated system. If the coordinates of the origin of the translated system are (h, k) relative to the original system, then the old and new coordinates are given as : Old Coordinates: $x = x^1 + h$; $y = y^1 + k$

New Coordinates: $x^1 = x - h$; $y^1 = y - k$

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

6)3; Mid-point of AB is D(-1, -1)

CD = $\sqrt{6^2+49}=\sqrt{85}$

7)2; Determinant = 0 *i.e.* points are collinear.

Collinear points lies on straight line.

8)3; Divide by 5 on both sides. $\therefore \frac{3x}{5}+\frac{4y}{5}=\frac{1}{5}$

9)2; Set of lines passes through intersection point of $x-2y+1=0$ and $x+y=0$ which is $\left(-\frac{1}{3},\frac{1}{3}\right)$.

10)1; Since diagonals in parallelogram bisect each other $\Rightarrow \frac{2+a}{2}=\frac{5+1}{2}$ and $\frac{3+b}{2}=\frac{2+7}{2} \Rightarrow a=4, b=6$.

11)1; Here we have to find the new coordinates.

i.e. $(x^1, y^1) = (x-h, y-k) \Rightarrow (4-7, 5+4) = (-3, 9)$

12)2; Mid point joining the points (x_1, y_1) and (x_2, y_2) is given by $\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$.

$\therefore x_{mid}=\frac{2-10}{2}=\frac{-8}{2}=-4; y_{mid}=\frac{-4+4}{2}=0$

$\therefore$ (-4, 0) is mid point

13)2; We must find slope of all four sides. So that we will check the slope of opposite sides. Hence, we need to check slope of two pairs of opposite sides.

14)3; Let center = (a, b) and radius = 'r'.

Then equation is given by, $(x-a)^2+(y-b)^2=r^2$

$(x-4)^2+(y-3)^2=r^2 \Rightarrow x^2-8x+16+y^2-6y+9=r^2$

$x^2+y^2-8x-6y+25=r^2 \Rightarrow x^2+y^2-8x-6y+25=4^2$

$\therefore\ x^2+y^2-8x-6y+9=0$

15)1; Slope of AB = $\frac{y_2-y_1}{x_2-x_1}=\frac{6-(-2)}{3-(-2)}=\frac{8}{5}$

Slope of AC = $\frac{y_3-y_1}{x_3-x_1}=\frac{2-(-2)}{8-(-2)}=\frac{4}{10}$

$\therefore$ Ratio of slope = $\frac{\overline{AB}}{\overline{AC}}=\frac{8/5}{4/10}=\frac{8\times10}{4\times5}=\frac{4}{1}$

16)1; X–intercept = 3, Y–intercept = 4

$\therefore$ By equation of line, $y = mx + c$

Here, $(x_1, y_1) = (3, 0)$; $(x_2, y_2) = (0, 4)$

Slope = $m = \frac{y_2-y_1}{x_2-x_1}=\frac{4-0}{0-3}=-\frac{4}{3}$

$\therefore y=\frac{-4}{3}x+c$

Substitute$(x_1,y_1)=(3,0)$ in

$y=\frac{-4}{3}(x)+c \Rightarrow 0=-4+c \Rightarrow c=4$

$\therefore y=\frac{-4}{3}x+4$

$\Rightarrow 3y+4x=12$

17)2; Area of triangle = $\frac{1}{2}\times b\times h$

height = |1-(-3)| = 4

$\therefore 6=\frac{1}{2}\times base\times 4$

$\Rightarrow$ base×2 = 6 $\Rightarrow$ base = 3

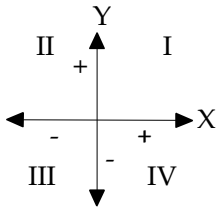
$\therefore$ R is 3 units from Q.

$\therefore$ x of R = 1+3 = 4 y of R = y of Q = -3

$\therefore$ (4, -3) is the coordinate

18)2; Abscissa refers to the horizontal co-ordinate of a point in two-dimensional structure *i.e.* x–axis.

Ordinate refers to the vertical co-ordinate of a point in two-dimensional structure *i.e.* y-axis.



$\therefore$ In third quadrant, from the above figure both abscissa and ordinate is negative *i.e.* (-, -).

19)4; $(a, b) = (1, 1)$; $r = 15$

$\therefore (x-a)^2+(y-b)^2 = 15^2$

$(x-1)^2+(y-1)^2 = 15^2$

$x^2-2x+1+y^2-2y+1 = 225$

$x^2+y^2-2x-2y = 223$

20)2; Radius $=\frac{1}{2}\times$ Diameter

$\therefore$ If we find the distance between these two points and divide by 2, we have radius.

$\therefore$ Distance = $\sqrt{(12-4)^2+(-6-(-2)^2)}$

$=\sqrt{8^2+4^2}=\sqrt{64+16}=2\sqrt{20}$

$\therefore$ Radius $=\frac{2\sqrt{20}}{2}=\sqrt{20}$

21)3; Slope of given line $y+3x = 12$

$y = -3x+12$

$\Rightarrow y = mx+c \Rightarrow m = -3$

Slope of perpendicular lines, *i.e.* $m_1 \times m_2 = -1$.

$-3 \times m_2 = -1 \Rightarrow m_2 = \frac{1}{3}$

22)2; Distance between (x_2, y_2) and (x_1, y_1) is

$\sqrt{\left(x_2-x_1\right)^2+\left(y_2-y_1\right)^2}$

$5=\sqrt{\left(4-a\right)^2+\left(2-(-3)\right)^2}$

$5=\sqrt{\left(4-a\right)^2+5^2}$

By squaring on both side,

$25 = (4-a)^2+25 \Rightarrow (4-a)^2 = 0$

$\therefore a = 4$

MENSURATION

CONCEPTS

Solids:

a) Solids figures have 3 dimensions

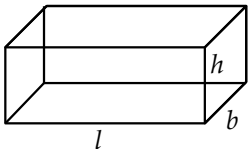
b) When plane surfaces are forming a solid, they are called it Faces and the solid is called a polyhedron.

c) The lines which bind the faces of a solid figure (or solid) are called its Edges.

d) The volume of a solid figure is the amount of space enclosed by its binding surfaces.

e) The area of the whole surface is equal to the sum of the areas of its binding surfaces.

• **Cuboid:** It is a figure bounded by six rectangular faces which are perpendicular to each other. The opposite faces of a cuboid are equal rectangles lying in parallel planes.



l = length b = breadth h = height

a) Total number of faces = 6

b) Rectangular side face = 4

c) Top and bottom rectangular faces = 2

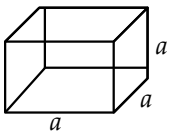
d) Curved surface area or Lateral surface area = $2(bh+lh)$

e) Total surface area = $2(bh + lh + lb)$

f) Volume = $l \times b \times h$

g) Diagonal of cuboid = $\sqrt{l^2+b^2h^2}$

•**Cube:** It is a solid figure bound by 6 equal dimensional faces which are perpendicular to each other.



a) Curved surface area or Lateral surface area = $4a^2$

b) Total surface area = $6a^2$

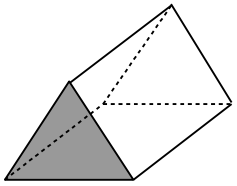
c) Volume = a^3

d) If the total surface area of a cube be *'s'*, then its volume = $\left(\sqrt{\frac{s}{6}}\right)^3$

• **Prism:** It is a solid whose sides are parallelograms and whose both ends lie on parallel planes. The end on which a prism may be supposed to stand is called the base and the perpendicular distance between both the ends of a prism is called the height of a prism.

A prism is called a Right Prism when its edges formed by side faces adjacent to one another are perpendicular to its ends. Otherwise it is said to be an Oblique Prism. When the ends of a prism are parallelograms, the prism is called a parallelepiped.

• **Right Prism:**

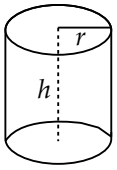


a) Base Polygon (may be triangle rectangle, etc.)

b) Curved surface area or Lateral surface area = (Base Perimeter) × (Height).

c) Volume = Base Area × Height

• **Cylinder :**



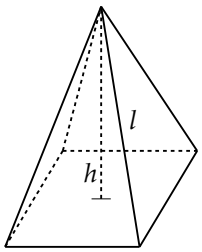
r = radius of base; h = height;

a) Curved surface area or Lateral surface area = Base Perimeter × (Height) = $2\pi\, r\, h$.

b) Total surface area = $2\pi\, r\, (h + r)$

c) Volume = $\pi\, r^2 h$

• **Pyramid:** It is a solid whose sides are triangles, having a common vertex and whose base is a plane rectilinear figure. The perpendicular drawn from the vertex of a pyramid to its base is called the height of the pyramid. The straight line joining the vertex to the middle point of the base is called the axis of the pyramid and if this axis is perpendicular to the base, then the pyramid will be a Right Pyramid.



l = slant height; h= altitude;

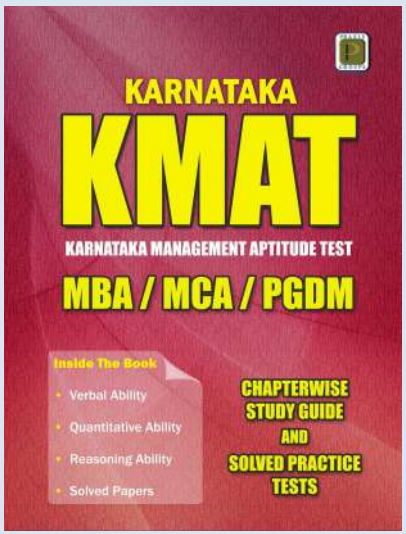
a) Surface is of triangles

b) Base is a Polygon

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

11) Given, Surface area $= 3\pi r^2 = 462 \Rightarrow \pi r^2 = 154$
Curved surface area $= 2\pi r^2 = 2\times154 = 308$ cm^2

12) Initial vol. $(v_1) = \pi r^2 h = \pi(3r)^2\left(\frac{h}{2}\right) = \pi r^2 h\left(\frac{9}{2}\right) = \frac{9v_1}{2}$
Ratio of initial vol. to new vol. $= v_1 : (9v_1/2)$
Hence, required ratio = 2 : 9

13) Per copy area covered $= \frac{75}{100}\times\frac{50}{100}\times4$
$\therefore$ Area covered by 12000 copies
$= 12000\times\frac{75}{100}\times\frac{50}{100}\times4 = 18000$ sq.m = 18 hectare.

14) Volume of Cylinder $= \pi r^2 h$
Ratio of their volumes $= \frac{\pi\times(3)^2\times h}{\pi\times\left(\frac{3}{2}\right)^2\times h} = 4$
(Since velocity and length of the pipe is same)

15) Let height be x, by Pythagoras theorem,
$13^2 = 5^2 + x^2 \Rightarrow x^2 = 144 \Rightarrow x = 12$
$\therefore$ Area $= \frac{1}{2}\times b\times h \Rightarrow \frac{1}{2}\times5\times12 = 5\times6 = 30$

16) Area $= \frac{\sqrt{3}}{4}a^2 \Rightarrow \sqrt{3} = \frac{\sqrt{3}}{4}a^2 \Rightarrow a^2 = 4 \Rightarrow a = 2\ cm.$

17) $AB^2 = AP^2 + BP^2 = 3^2 + \left(\frac{8}{2}\right)^2 = 3^2 + 4^2 = 25$; AB = 5
In isosceles triangle, AB = AC
$\therefore$ Perimeter = AB + AC + BC = 5 + 5 + 8 = 18 units

18) Let $\angle A = x$; $\angle B = 2x$; $\angle C = 3x$; $\angle D = 4x$
Also, in quadrilateral, $\angle A+\angle B+\angle C+\angle D = 360^0$
$\Rightarrow x + 2x + 3x + 4x = 360^0 \Rightarrow 10x = 360^0 \Rightarrow x = 36^0$
$\angle B = 2x = 2\times36 = 72^0$

19) By given condition, inner radius $= 6 \times w$
i.e. $3 = 6 \times w \Rightarrow w = 0.5\ cm$
(Area of outer circle) – (Area inner circle) $= \pi R^2 - \pi r^2$
$= \pi(3.5)^2 - \pi(3)^2 = \pi(12.25 - 9) = 3.25\pi\ sq.cm$

20) Given, $l = 8\ cm,\ b = 11\ cm,\ h = \frac{1}{2}\times l = \frac{1}{2}\times8 = 4\ cm$
Diagonal of cuboid $= \sqrt{l^2+b^2+h^2} = \sqrt{8^2+11^2+4^2}$
$= \sqrt{64+121+16} = \sqrt{201}\ cm$

21) If edge of cube is increased by 20%, then whole surface of the cube is increased by $\left[2a+\left(\frac{a}{10}\right)^2\right]\%$
Here, $a = 20\%$. $\therefore \left[2(20)+\left(\frac{20}{10}\right)^2\right]\% = (40 + 2^2)\% = 44\%$.

22) If the height of two cylinders are equal then
Ratio of volumes = (Ratio of radii)^2 ; $\frac{V_1}{V_2} = \frac{r_1^2}{r_2^2} = \frac{2^2}{5^2} = \frac{4}{25}$

23) Total surface area $= \pi r\ (l + r)$
where l = slant height; here, $l = r$
$\therefore$ Total surface area $= \pi r\ (r + r) = \pi r\ (2r)$. here, $r = \pi$
$\therefore$ Total surface area $= \pi(\pi)(2\pi) = 2\pi^3$

24) Radius of larger sphere = R = 16 *m*.
Radius of smaller sphere $= \frac{\text{diameter}}{2} = r = \frac{4}{2} = 2\ cm$
If a sphere of radius R is melted to form smaller spheres each of radius r, then number of smaller spheres $= \left(\frac{R}{r}\right)^3$. By this formula, $n = \left(\frac{16}{2}\right)^3 = 8^3 = 512$.

25) Coloring should be done on total surface area.
$\therefore$ Total surface area of sphere $= 4\pi r^2$
$\Rightarrow 4\pi6^2 = 144\pi\ cm^2$ $\therefore$ Cost $= \frac{144\times3.14}{3} \approx$ ₹150

TRIGONOMETRY

CONCEPTS

Measures of angles

Trigonometry is the study of the relationship between the sides and angles of right angled triangles. Angles are measured in degrees or radians.

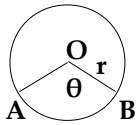
360^o measured in terms of radians will be 2π radians.

Therefore,

Π radians $= 180^o$, $\frac{\Pi}{2}$ radians $= 90^0$, $\frac{\Pi}{6}$ radians $= 30^o$ and $\frac{3\Pi}{2} = 270^o$

Note: 1 degree = 60 min.

Length of an arc and area of a sector:



The length of arc = θr. (where θ is the central angle in radians).

Area of sector OAB = $\frac{1}{2} r^2 \theta$ or $\frac{1}{2} \times 1(arc\,AB) \times$ radius r

Illustrative Example 1

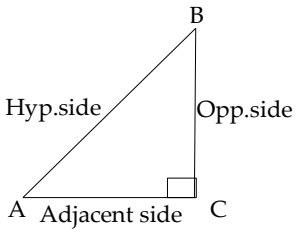
What is the length of the arc of a circle subtending an angle of 30^0 if the circumference of the circle is 12π ?

Circumference of the circle = $2\pi r = 12\pi \Rightarrow r = 6$ units.

Therefore, length of the arc = $r * \theta = 6 \times \frac{\pi}{6} = 6$ units.

Trigonometric ratios and relationship to the sides of Right angle or right angled triangle.

In ABC, $\angle C = 90^0$



$\sin A = \frac{\text{Opposite side}}{\text{hypotenuse}}$

$\cos A = \frac{\text{Adjacent side}}{\text{hypotenuse}}$

$\tan A = \frac{\text{Opposite side}}{\text{hypotenuse}}$

Their reciprocal ratios are

$\frac{1}{\sin A} = cosec\,A$; $\frac{1}{\cos A} = sec\,A$; $\frac{1}{\tan} A = \cot A$

Trigonometric ratios of certain common angles in degrees.

	0^0	30^0	45^0	60^0	90^0
sin	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
tan	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	undefined

Note: The values of sin ratios are the square roots of the fractions $\frac{0}{4}, \frac{1}{4}, \frac{2}{4}, \frac{3}{4}, \frac{4}{4}$.

The values of cos ratios are written in the reverse order and the values of tan ratios are got by dividing sine ratios by cos ratios for acute angles.

	120^0	135^0	150^0	180^0	270^0	360^0
sin	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0	-1	0
cos	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	$-\frac{\sqrt{3}}{2}$	-1	0	1
Tan	$-\sqrt{3}$	-1	$-\frac{1}{\sqrt{3}}$	0	undefined	0

Ratios and Quadrants

In the first quadrant (0 to 90^0) all the ratios are positive

In the second quadrant (90^0 to 180^0) sin and cosec are positive. The remaining four ratios are negative.

In the third quadrant (180^0 to 270^0) tan and cot are positive. The remaining four ratios are negative.

In the fourth quadrant (270^0 to 360^0) cos and sec are positive. The remaining four ratios are negative.

This is usually remembered using the mnemonic – All silver Tea Cups to denote A (Q I), S (Q II), T(Q III) and C (Q IV).

	X	**sinX**	**cosX**	**tanX**
Q-I	360+A	sinA	cosA	tanA
	90-A	cosA	sinA	cotA
Q-II	90+A	cosA	-sinA	-cotA
	180-A	sinA	-cosA	-tanA
Q-III	180+A	-sinA	-cosA	tanA
	270-A	-cosA	-sinA	cotA
Q-IV	270+A	-cosA	sinA	-cotA
	360-A	-sinA	cosA	-tanA

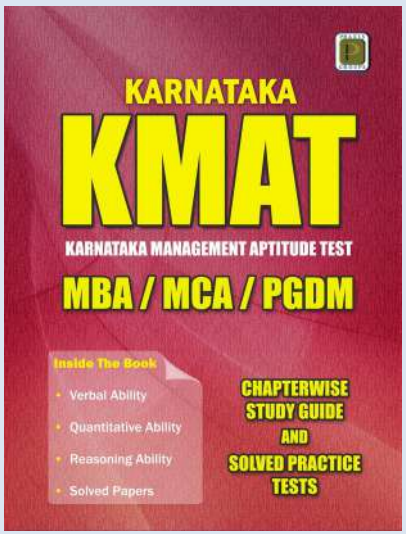
Important Results

1. $\sin^2\theta + \cos^2\theta = 1$
2. $1 + \tan^2\theta = \sec^2\theta$
3. $1 + \cot^2\theta = \text{cosec}^2\theta$
4. $\sin(A + B) = \sin A \cos B + \cos A \sin B$

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

43) (c) $\tan(A+B)=\frac{tanA+tanB}{1-tanA.tanB}$

$\tan(65+70)^o=\tan-135^o=-1=\frac{\tan65^o+tan70^o}{1-tan65^o.tan70^o}$

$\tan65^o.\tan70^o - 1 = \tan65^o + \tan70^o$

$= \tan65^o + \tan70^o + 1 = \tan65^o.\tan70^o$

$\Rightarrow 1 + \tan65^o + \tan B - \tan \tan65^o.\tan70^o$

$= \tan65^o.\tan70^o - \tan65^o.\tan70^o = 0$

$\cos^2\frac{\pi}{4}+\cos^2\frac{3\pi}{4}+\cos^2\frac{5\pi}{4}+\cos^2\frac{7\pi}{4}$

44)(a) $=\left(\frac{1}{\sqrt{2}}\right)^2+\left(\frac{-1}{\sqrt{2}}\right)^2+\left(\frac{-1}{\sqrt{2}}\right)^2+\left(\frac{1}{\sqrt{2}}\right)^2$

$=\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}=2$

45)(a) $\cos^2-\frac{1}{2}=0$; $\cos^2\theta=\frac{1}{2}$; $cos\theta=\frac{1}{\sqrt{2}}$

$\cos\theta = \cos45^0 \Rightarrow \theta = 45^0$

46)(b) We know that

$\sin\theta = \frac{2\tan\theta/2}{1+\tan^2\theta/2}$ and $\cos\theta = \frac{1-\tan^2\theta/2}{1+\tan^2\theta/2}$

$\Rightarrow 2\left[\left(\frac{2\tan\theta/2}{1+\tan^2\theta/2}\right)\left(\frac{1-\tan^2\theta/2}{1+\tan^2\theta/2}\right)\right]=2\sin\theta\,cos\theta=sin2\theta$

Since $\theta = 15^0$, $\sin2\theta = \sin30^0 = \frac{1}{2}$

47)(b) $\tan15^o = \tan(45^0 - 30^0) = \frac{tan45^0-tan30^0}{1+tan45^0tan30^0}$

$\frac{1-\frac{1}{\sqrt{3}}}{1+1\left(\frac{1}{\sqrt{3}}\right)}=\frac{\frac{\sqrt{3}-1}{\sqrt{3}}}{\frac{\sqrt{3}+1}{\sqrt{3}}}$ $\tan15^0 = \frac{\sqrt{3}-1}{\sqrt{3}+1}$

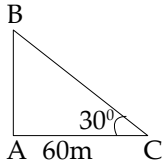
48)(a) $\tan18^o\ \tan72^0\ \tan24^0\tan66^0\tan32^0\tan58^0$

$= \tan18^0\ \cot18^0\ \tan24^0\cot24^0\tan32^0\cot32^0 = 1$

49)(a) $\theta = 30^0$ AC = 60m

$\tan30^0 = \frac{AB}{AC}\ \frac{1}{\sqrt{3}}=\frac{AB}{60}$

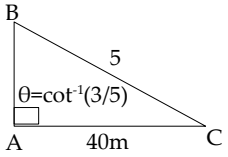
$AB = \frac{60}{\sqrt{3}}=\frac{20\times\sqrt{3}\times\sqrt{3}}{\sqrt{3}}=20\sqrt{3}\,m$



50)(a) $\theta = \cot^{-1}\left(\frac{3}{5}\right)$ $\cot\theta = \frac{3}{5}$

From the diagram $\cot\theta = \frac{40}{AB}$

$\therefore \frac{3}{5}=\frac{40}{AB}$ $AB = \frac{200}{3}\,m$



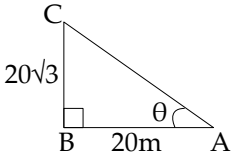
AB is the Tower.

51)(a) AB = shadow = 20 *m*

BC = height of the pole

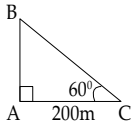
$\tan\theta = \frac{20\sqrt{3}}{20}=\sqrt{3}=tan60^o$

$\theta = 60^o$



52)(b) AB = height of the church

$\tan60^o=\frac{AB}{200}\Rightarrow\sqrt{3}=\frac{AB}{200}\Rightarrow AB=200\sqrt{3}\,m$

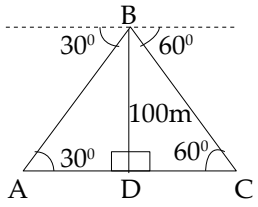


53)(c) BD is the tower and AC is the required distance.

From ΔABD,

$\tan30^0 = \frac{100}{AD}\Rightarrow\frac{1}{\sqrt{3}}=\frac{100}{AD}$

$100\sqrt{3}$ = AD



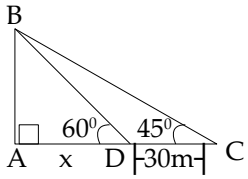
From ΔBCD, $\tan60^o=\frac{BD}{CD}\Rightarrow\sqrt{3}=\frac{100}{CD}\Rightarrow CD=\frac{100}{\sqrt{3}}$

AC = AD + DC = $100\sqrt{3}+\frac{100}{\sqrt{3}}\Rightarrow\frac{300+100}{\sqrt{3}}=\frac{400}{\sqrt{3}}\,m$

54)(c) AB is the tower.

$\tan45^0=\frac{AB}{AC}\Rightarrow x+30=AB$

$\tan60^0=\frac{AB}{x}\Rightarrow\sqrt{3}=\frac{x+30}{x}$



$\sqrt{3}\,x=x+30$; x = $\frac{30}{\sqrt{3}-1}=\frac{30}{\sqrt{3}-1}$

$\therefore$ height of the tower = x + 30= $\frac{30\sqrt{3}}{(\sqrt{3}-1)}\,m$

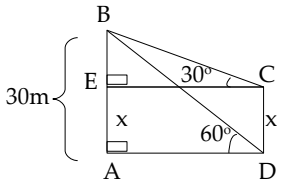
55)(b) CD = height of the pole ='x'

AECD is a rectangle.

$\therefore$ AE = 'x'

From ΔABD, $\tan60^o = \frac{30}{AD}$

$\sqrt{3}\,\frac{30}{AD}\Rightarrow AD=\frac{30}{\sqrt{3}}=10\sqrt{3}\,m$



Since AD=CE, $\tan30^o = \frac{BE}{CE}\Rightarrow\frac{1}{\sqrt{3}}=\frac{30-x}{10\sqrt{3}}$

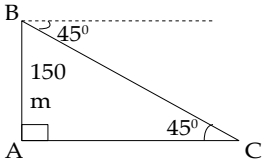
30 – *x* = 10 or x = 20 *m*

56)(c) Required Dist. = AC

AB = Height of the ship mast.

'C' is the position of the boat.

$\tan45^0 = \frac{150}{AC}$ AC = 150m



PERMUTATIONS AND COMBINATIONS

CONCEPTS

• **Fundamental Principal of Multiplication:**

In general if some procedure can be performed in n_1 different ways, and if, following this procedure, a second procedure can be performed in n_2 different ways, and if, following this second procedure, a third procedure can be performed in n_3 different ways, and so fourth then the number of ways the procedure can be performed in the order indicated is the product of $n_1 . n_2 . n_3 \ldots\ldots\ldots$

e.g.: A letter lock consists of 5 rings each marked with 10 different letters. What is the maximum number of unsuccessful attempts to open the lock.

Explanation: Each ring is marked with 10 different letters. Hence each ring has 10 positions.

Thus, the total number of attempts that can be made to open the lock is $10 \times 10 \times 10 \times 10 \times 10 = 10^5$.

Out of these, there must be one attempt in which the lock will open.

$\therefore$ Total number of unsuccessful attempts = $10^5 - 1$.

•**Fundamental Addition Principle:** If two operations can be performed independently in m and n ways respectively, then either of the two operations can be performed in $(m+n)$ ways.

•**Factorial:** The product of first 'n' natural numbers is called the 'n'-factorial and is denoted by $n!$

$n! = 1.2.3.4 \ldots\ldots\ldots\ldots\ldots (n-2).(n-1).n$

Example: $4! = 1.2.3.4 = 24$, $5! = 1.2.3.4.5 = 120$,

$5! = 5.4! = 5.24 = 120$, $6! = 6.5! = 6.120 = 720$.

Note: 1) $0! = 1$

2) The product of 'r' consecutive positive integers is divisible by $r!$

3) $(kn)!$ is divisible by $(n!)k$ for all k is a positive constant.

4) The product of $2n!$ consecutive positive integers is equal to $2(n!)$.

PERMUTATIONS

•**Permutation:** An arrangement of any $r \le n$ of these objects in a given order is called an r–permutation or a permutation of the 'n' objects taken 'r' at a time.

Example: Consider the set of letters a, b, c, and d. Then

(i) *bdca, dcba* and *acdb* are permutations of the 4 letters taken all at time.

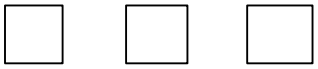
(ii) *bad, adb, cbd* and *bca* are permutations of the 4 letters taken 3 at a time.

(iii) *ad, cb, da* and *bd* are permutations of the 4 letters taken 2 at a time.

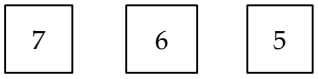
The number of permutations of 'n' objects taken 'r' at a time will be denoted by $P(n, r)$.

Before we derive the general formula for $P(n, r)$ we consider a special case. Find the number of permutations of 7 objects, say a, b, c, d, e, f, g taken three at a time. In other words, find the number of 'three letter words' with distinct letters that can be formed from the above seven letters.

Let the general three letters word be represented by three boxes.



Now the first letter can be chosen in 7 different ways; following this, the second letter can be chosen in 6 different ways; and, the last letter can be chosen in 5 different ways. Write each number in its appropriate box as follows:



Thus by the fundamental principle of counting there are 7.6.5=210 possible three letter words without repetitions from the seven letters. (or) There are 210 permutations of 7 objects taken 3 at a time.

i.e. $P(7, 3) = 210$.

The derivation of the formula for $P(n, r)$ follows the procedure in the preceding example:

The first element in an r-permutation of n-objects can be chosen in 'n' different ways; following this, the second element in the permutation can be chosen in $(n-1)$ ways; and, the third element in the permutation can be chosen in $(n-2)$ ways. Continuing in this manner, we have that the r^{th} (last) element in the r–permutation can be chosen in $n-(r-1) = n-r+1$ ways.

Thus $P(n, r) = n(n-1)(n-2) \ldots (n-r+1) = \dfrac{n!}{(n-r)!}$

The second part of the formula follows from the fact that $n(n-1)(n-2) \ldots\ldots .(n-r+1) =$

$$\frac{n(n-1)(n-2)\cdots\cdots(n-r+1)\cdot(n-r)!}{(n-r!)} = \frac{n!}{(n-r)!}$$

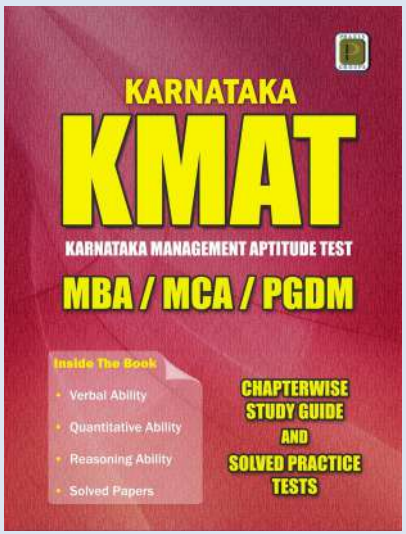
$\therefore$ A formula for the number of possible permutations of 'r' objects from a set of 'n' is $P(n, r)$ or ${}^{n}p_{r} = \dfrac{\boldsymbol{n!}}{\boldsymbol{(n-r)!}}$

In the special case that $r = n$, we have $P(n, n) = n(n-1)(n-2). \ldots\ldots 3.2.1 = \boldsymbol{n!}$ (in other words there are $n!$ permutations of 'n' objects taken all at a time).

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

17) Here 5 cards are selected from 52 without regard to order. This is a combination problem.

Number of hands ${}^{52}c_5 = \frac{52!}{(52-5)5!} \Rightarrow \frac{52!}{47!5!} = 2598960.$

18) There are ten digits (0, 1, 2, 3, ...9). For a telephone number the order of digits is important. Hence the total number of possible telephone numbers in which no digit is repeated is: ${}^{10}p_6 = \frac{10!}{(10-6)!} = \frac{10!}{4!} = 151200.$

19) We must choose from 9 digits.

The number of ways = ${}^{9}c_4 = \frac{9\times8\times7\times6}{4!} = 126$

20) If the O's were different there would be 7! arrangements. But the O's can be permuted without changing the arrangement.

Hence there are $\frac{7!}{2!} = 2520$ arrangements.

21) The men can be picked in ${}^{15}c_3 = 455$ ways

The women can be picked in ${}^{9}c_2 = 36$ ways

Therefore the total number of possible teams = $455\times36 = 16380$.

22) The 2 thrillers can be picked in ${}^{10}C_2$

The 2 science fiction can be picked in ${}^{18}C_2$

The borrower select 2 of each books in ${}^{10}c_2 \times {}^{18}c_2$ ways.

23) 'FORMULA' contains 7 different letters.

Total number of arrangements is ${}^{7}p_7 = 7! = 5040$.

The required number = ${}^{7}p_7 = 7!$

24) Each number must contain 4 digits (Since any number from 1000 to 9999 all are four digit numbers)

The required number = ${}^{6}p_4 = 6\times5\times4\times3 = 360$

25) Total number of arrangement ${}^{5}p_5 = 5! = 120$

To find those which begin with AS, place AS in the first two places in 1 way. Then the remaining 3 letters can be arranged in ${}^{3}p_3 = 3!$ ways = 6 ways

$\therefore$ The number of arrangements begins with AS $= 1\times6 = 6$

$\therefore$ The number of arrangements which do not begin with AS = 120 – 6 = 114

26) ${}^{n}c_{n-4} = 15$

$\therefore {}^{n}c_4 = 15 = \frac{n(n-1)(n-2)(n-3)}{4!} = 15$

$\therefore n(n-1)(n-2)(n-3) = 15\times4! = 6\times5\times4\times3$

$\therefore n = 6$

27) $\frac{{}^{n}p_r}{r!} = {}^{n}c_r$

$\therefore \frac{720}{r!} = 120, \quad r! = 6 = 3!$

$\therefore {}^{n}p_3 = 720. \quad n(n-1)(n-2) = 10\times9\times8$

$\therefore n = 10$

28) A decagon has 10 sides. The number of lines joining any two version is ${}^{10}c_2 = \frac{10\times9}{2!} = 45$

This includes 10 sides.

$\therefore$ The number of diagonals = 45 – 10 = 35.

29) The required number of ways = ${}^{5}c_3 \times {}^{10}c_2 = \frac{5\times4\times3}{3!\times2!} \times \left(\frac{10\times9}{2!}\right) = 450$

30) Select the largest digits. Then 9 digits are left from which we must select.

The number of ways = ${}^{9}c_3 = \frac{9\times8\times7}{3!} = 84$

PROBABILITY

CONCEPTS

•**Random Experiment:** Probability is the study of random or non deterministic experiments. If the dice is tossed in the air, then it is certain that the dice will come down, but is not certain that, say a 3 will appear.

Definition: A *random experiment* is an experiment whose result would not be predicted but the list of possible outcomes are known. The non predicted outcomes cannot be taken under random experiments. The result of random experiments may not be predicted exactly but the result must be with in the list of predicted outputs.

Example:

1) Tossing a fair coin.

2) Rolling a dice is a random experiment, since its results could not be predicted in any trial.

3) Selection of a plastic component and verification of its compliance.

4) Life time of a computer.

5) Number of calls to a communication system during a fixed length interval of time.

•**Outcome:** The result of a random experiment will be called an outcome.

Example:

1) Tossing a coin. The result is either Head(H) or Tail(T).

2) In an experiment of throwing a six-faced dice. The possible outcomes are 1, 2, 3, 4, 5 and 6.

•**Sample Space:** The set of all possible outcomes of some given experiment is called *sample space.* A particular outcome, *i.e.* an element in that set is called a *sample point* or *sample*.

Example:

1) Toss a dice and observe the number that appears on top. Then the sample space consists of the six possible numbers: S = {1, 2, 3, 4, 5, 6}

2) Toss a coin 2 times and observe the sequence of heads (H) and tails (T) that appears. Then the sample space S consists of four elements: S = {HH, HT, TH, TT}

Note: Shortcut: Tossing a coin 2 times is same as tossing 2 coins at a time.

S = {H, T} × {H, T}

S = {HH, HT, TH, TT}

3) Toss a coin until a head appears and then count the number of times the coin was tossed. The sample space of this experiment is S = {1, 2, 3, ... ∞}. Here ∞ refers to the case when a head never appears and so the coin is tossed an infinite number of times. This is an example of a sample space which is countably infinite.

•**Events:** An event A is a set of outcomes or, in other words, a subset of the sample space S.

Example: If A random experiment is associated with what is the day today. It may be from Sunday to Saturday. If today is Friday and Friday belongs to the sample space S = {Sun, Mon, Tue, Wed, Thu, Fri, Sat}.

Different Types of Events:

•**Simple or Elementary Events:** An event with only one sample point is called *simple* or *elementary event.*

In an experiment of tossing three coins at a time, the event 'A' is that all coins turns up with heads consists of only one point HHH. Then 'A' is a simple event.

As a matter of fact each outcome of an experiment is a simple event.

•**Complimentary Event:** An event $\bar{A}$ (or A^1) is said to be *complementary* to an event 'A' in sample space 'S' consists of all those points which are not in 'A'.

Example: In tossing a coin three times, sample space S consists of eight points.

S = {HHH, HHT, HTH, THH, HTT, TTH, THT, TTT}

The event 'A' is such that there should be no heads in the sample point is {TTT}. Then the event $\bar{A}$ (or A^1) complementary to 'A' is that there exists at least one head in the sample space *i.e.* (HHH), (HHT), (HTH), (THH), (HTT), (TTH), (THT).

•**Equal Events:** Two events A and B are said to be *equal* if A ⊂ B and B ⊂ A. This statement implies that all the points of A are also the points of B and vice-versa.

Example: Let sample space S = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}.

Let A be the event defined as *'even number'* and event B is defined as *'multiplies of* 2*'*.

Then A = {2, 4, 6, 8, 10}; B = {2, 4, 6, 8, 10} here every point in A is also a point in B and vice-versa. Therefore events A and B are said to be equal events.

•**Transitivity of events:** If A, B and C are 3 events such that A ⊂ B and B ⊂ C it implies that A ⊂ C such a property of events is known s *transitivity* of events.

Let the sample space S = {1, 2,. . . . , 100}.

Event A be the *'even numbers'*: A = {2, 4, 6, 8,.....,100}

Event B be the *'multiples of* 4*'* : B = {4, 8, 12,.....,100}

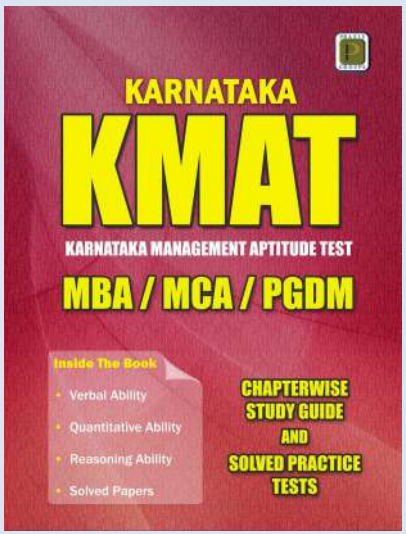
Event C be the *'multiples of* 8*'*: C = {8, 16, 24,.....,100}

Event point in C is also point in B and event point in B is also point in A but not vice–versa *i.e.* A⊂B⊂C.

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

P(she is late) = $\left(\frac{1}{6}\times\frac{1}{5}\right)+\left(\frac{1}{3}\times\frac{1}{4}\right)+\left(\frac{1}{2}\times\frac{1}{20}\right)=\frac{17}{120}$

Now, let us find the probability that she comes late and she comes by bus.

i.e. P(she comes by bus | she arrives late)

$$P(A\mid B)=\frac{P(A\cap B)}{P(B)}=\frac{\frac{1}{6}\cdot\frac{1}{5}}{\frac{17}{120}}=\frac{4}{17}$$

46) Given P(A) = 0.4, P(B) = 0.3, $P(A\mid B)=0.5$

$P(A\mid B)=\frac{P(A\cap B)}{P(B)}=P(A\mid B)P(B)=P(A\cap B)$

= (0.5).(0.3) = $P(A\cap B)=0.15$

47) $P(W\mid T)=\frac{P(W\cap T)}{P(T)}$

$$=\frac{\left(\frac{2}{3}\right)\times\left(\frac{7}{10}\right)}{\left(\frac{2}{3}\right)\times\left(\frac{7}{10}\right)+\left(\frac{1}{3}\right)\times\left(\frac{8}{10}\right)}=\frac{\frac{7}{15}}{\frac{7}{15}+\frac{4}{15}}=\frac{7}{11}$$

48) The probability of failing are 0.1 and 0.05.
The probability of not failing are (1 – 0.1) and (1 – 0.05) = 0.9 and 0.95. Since they are independent, the probability that neither circuit fails is (0.9)×(0.95)
= 0.855.

49) $P(C\mid A)=\frac{P(C\cap A)}{\left(\frac{4}{10}\times\frac{1}{500}\right)+\left(\frac{5}{10}\times\frac{1}{50}\right)+\left(\frac{1}{10}\times\frac{1}{10}\right)}$

$$\frac{\left(\frac{5}{10}\right)\times\left(\frac{1}{50}\right)}{\frac{4}{5000}+\frac{5}{500}+\frac{1}{100}}=\frac{\frac{1}{100}}{\frac{4+50+50}{5000}}=\left(\frac{1}{100}\right)\times\left(\frac{5000}{104}\right)=\frac{50}{104}$$

50) The total possible out comes is 6×6 = 36
The sum 7 is given by {(3,4),(4,3),(1,6),(6,1),(2,5),(5,2)}=6
Then the required probability = $\frac{6}{36}$

51) P(A) = 0.4, P(B) = 0.3, P(A∩B) = 0.25

$P(B\mid A)=\frac{P(B\cap A)}{P(A)}=\frac{0.25}{0.4}=0.625$

52) P(A) = $\frac{1}{4}$, P(B) = $\frac{1}{3}$, P(AUB) = $\frac{5}{12}$

$P(A\mid B)=\frac{P(A\cap B)}{P(B)}=\frac{P(A)+P(B)-P(A\cup B)}{P(B)}$

$$=\frac{\frac{1}{4}+\frac{1}{3}-\frac{5}{12}}{\frac{1}{3}}=\frac{\frac{3}{12}+\frac{4}{12}-\frac{5}{12}}{\frac{1}{3}}=\frac{1}{2}$$

53) $P(A\mid B)=\frac{P(A\cap B)}{P(B)}=\frac{P(A)\cdot P(B)}{P(B)}$

(Since they are independent) = P(A) = 0.2

54) Given P(A) = 0.3, P(B) = 0.5;

$P(A^1) = 1 - P(A) = 1 - 0.3 = 0.7$

$P(A^1\cap B) = P(A^1)\,P(B)$ [Since they are independent]

$P(A^1\cap B)=(0.7)(0.5)=\left(\frac{7}{10}\right)\times\left(\frac{5}{10}\right)=\frac{35}{100}=0.35$

55) $P(A\cap B)$ = P(A)+P(B)–P(A U B)= 0.7+0.4 –0.8= 0.3

56) $P(S^1\cup T^1)=P(S^1)+P(T^1)-P(S^1\cap T^1)$

= [1 – P(S)] + [1 – P(T)] – 0.5

= [1 – 0.6] + [1 – 0.4] – 0.5

Since S and T are mutually exclusive events.

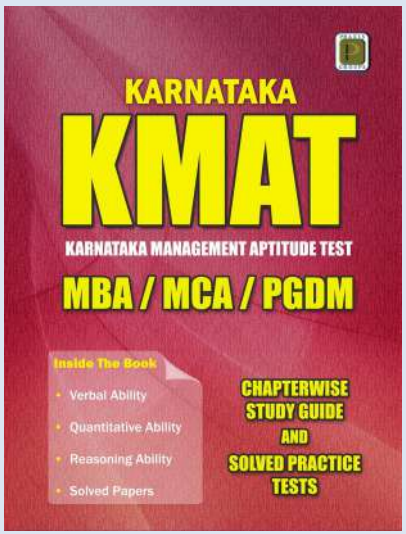
P(S) + P(T) = 1

P(S) = 1 – P(T) = 0.4 + 0.6 – 0.5 = 0.5

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

SECTION – C

LOGICAL REASONING

SEATING ARRANGEMENT

CONCEPTS

In this type of questions, information about the seating arrangement of the persons or things is given in the form of a puzzle. You have to arrange the things in proper seating order by understanding the given logical statements and answer the question that follow.

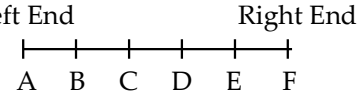
Problems on seating arrangement are mainly two types. They are

1) Linear arrangement

2) Circular arrangement

1) Linear arrangement: In this type, there exists left end and right end of the seating. This arrangement looks like a row or a line.

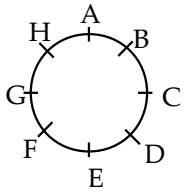
Example:



Here, right side of 'A' are B, C, D, E, F and left side of 'A' is no one.

2) Circular Arrangement: In this type, it is not possible

Example:



to say what is right end and left end (or) starting or ending points.

Tips to solve:

1) Read the given information and find an initial clue which is origin of the information.

2) If a statement does not give any clue to arrange, then note it down for further use. Use that information whenever it is required for proper arrangement.

3) Do not assume any condition on your own while solving the problem.

4) Be careful while choosing the correct clue to start.

5) If you see the word like *who* or *which* then consider the second person in place of *who/ which.*

Example: Consider the statement, *'G sits exactly opposite to B* ***who*** *is immediate right of H'*.

In this statement, the word *who* refers to B.

6) If you see the word *and/ is/ but* then consider first person in place of these words.

Example: Consider the statement, *'A is opposite to B and is sitting on the left of C'*.

In this statement, the word *and* refers to A.

CONCEPTUAL EXAMPLES

(I) 5 friends namely A, B, C, D, E are sitting in a row but not in the same order. D is not the neighbor of either A or E. E is not at the center. B sits at one end and third to the right of E (All are facing North).

1) Who sits exactly in the middle of the row?

1) E 2) D 3) B 4) C

2) Who sits at extreme ends?

1) AB 2) EC 3) DC 4) EB

3) What is the position of D with reference to A?

1) 4^{th} right 2) 4^{th} left 3) 3^{rd} left 4) 3^{rd} right

4) In which of the following pairs, first person sits immediate right of second person?

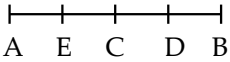
1) AE 2) EC 3) CD 4) BD

5) Who are the neighbors of C?

1) AE 2) ED 3) BD 4) CD

Explanation: In the given information, last point gives us a clue. *i.e. B sits at one end and third to the right of E*.

B cannot be at left end because E should be left of B which is not possible. So, B sits at right end. D is not the neighbor of either A or E. So, D should sit at immediate left of B. C should sit at the center. Finally A sits at left end.



1)d; C sits in the middle of the row.

2)a; A and B sits at extreme ends.

3)a; The position of 'D' with reference to 'A' is 4^{th} right.

4)d; In the given pairs only B sits immediate right of D.

5)b; The neighbor of 'C' are E and D.

(II) Six persons of a family, P, Q, R, S, T, U are sitting around a circular table to have dinner but not in the same order. P sits opposite to Q and immediate right of R. T is not the neighbor either P or U. Q sits second to the right of S and immediate left of U. S sits between T and P.

1) Who sits to the immediate left of Q?

1) T 2) U 3) R 4) S

2) Who are neighbors of U?

1) SP 2) TS 3) QR 4) PR

3) In which of the following pair, second person sits immediate right of first person?

1) QU 2) RU 3) QT 4) TS

4) In which of the following pairs, first person sits between second and third person?

1) SPR 2) TSQ 3) QUR 4) TSP

DATA SUFFICIENCY

CONCEPTS

Purpose of Data sufficiency:

Here the examiners intention is to check the student's capability in decision making. One can agree that the decision making is the sense of checking whether the data is sufficient or not.

Nature of Questions: You will be given a question followed with the two statements.

You don't need to solve the question. You just have to judge whether given two statements have enough information to solve the question.

CONCEPTUAL EXAMPLES

Each of the questions below consist of a question and two statements numbered I and II. You have to decide whether the data provided in the statements are sufficient to answer the given question. Read both the statements and give answer as

a: If the data in statement-I alone is sufficient and the data in statement-II alone is not sufficient to answer the question.

b: If the data in statement-II alone is sufficient and the data in statement-I alone is not sufficient to answer the question.

c: If the data either in statement-I or in statement-II alone are sufficient to answer the question.

d: If the data either in statement-I and II together are not sufficient to answer the questions. And some more data needed.

e: If the data in both statement-I and II together are necessary to answer the question.

1) What is the average of p, q and r?

I. r is 25. **II.** $p + q$ is 20.

Explanation: To find the average, we need values of p, q, r. From the given two statements values of p, q, r are known. Hence, we require both the statement-I and II to answer the given question. Hence, option-*e* is correct.

2) Who is youngest among Raju, Vamsi and Rajni?

I. Raju is one year elder to Vamsi.

II. Vamsi age is average age of Raju and Rajni.

Explanation:

From statement-II, Vamsi's age is between the ages of Raju and Rajni.

From statement-I, Raju is one year elder to Vamsi. It means Rajni will be one year younger to Vamsi.

$\therefore$ From both the statements, we can say, Rajni is youngest among the three. Hence, option-*e* is correct.

3) What is the value of x?

I. $x^2+2x-3=0$ **II.** $x^2+4x-5=0$

Explanation: From statement-I, $x^2 + 2x - 3 = 0$

$x^2 + 3x - x - 3 = 0 \Rightarrow x(x + 3) - 1(x + 3) = 0 \Rightarrow x = 1$ or -3

$\therefore$ From statement-I alone we can't say exact value of x.

From statement-II, $x^2 + 4x - 5 = 0 \Rightarrow x^2 + 5x - x - 5 = 0$

$x(x + 5) - 1(x + 5)=0$ *i.e.* $x = 1$ or -5.

$\therefore$ From statement-I and II, we conclude, $x = 1$.

As both the statements together are required to answer the given question, option-e is correct.

4) Find the area of the square?

I. The side of the square is 7 cm

II. The circumference of the square is 28 cm

Explanation: $Area = (side)^2$

From statement-I, we know the value of *side.* Therefore *area* can be found.

From statement-II, circumference *i.e.* $4(side)=28$.

From this we can find the value of *side.* As a result *area* can also be found.

Here, either of the statements-I or II alone are sufficient to answer the given question. Hence, option-c is correct.

5) What is the cost price of the chair?

I. The selling price of the chair is ₹324 at profit of 8%.

II. The profit is 12%.

Explanation:

From statement-I, $CP = \frac{100}{100+8} \times 324 = ₹300$

$\therefore$ Statement-I alone is sufficient to answer.

Statement-II does not have the enough information to solve the given question. Hence, option-a is correct.

6) Who is tallest?

I. C is eldest.

II. A is shortest and B is youngest but taller than C.

Explanation:

Statement-I alone is not sufficient to answer.

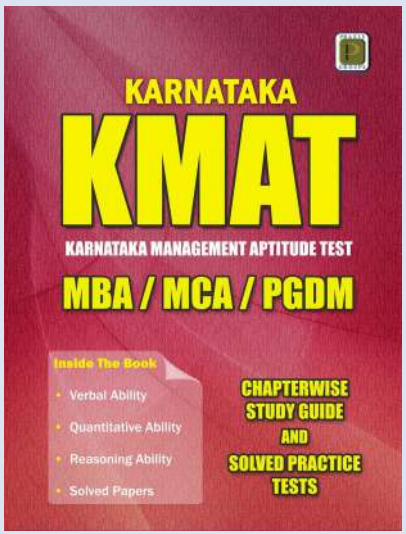
From statement-II, A is shortest. And B is taller than C. It means B is taller than A and C. *i.e.* only statement -II is sufficient to answer the question.

Hence, option-b is correct.

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

17) I → m = 999999, n = 100000 = 999999 – 100000 ÷ 37
⇒ 999999 – 2702.70 = 997293.30
II → m - n is known but the value of 'n' is not known. So we cannot find the value of $m - n \div 37$ by this statement, here VBODMAS rule voids, which says that ÷ (divided by) has more priority then – (minus).
Hence, option-a is correct

18) From statement-I we can determine the ages of father and mother at the time of marriage only

From II $\Rightarrow \frac{M-4}{F-4}=\frac{12}{13}\Rightarrow 13M-52=12F-48$

$\Rightarrow 13M=12\times 30-48+52=364 \quad \therefore M = 28 Years$

Hence the only statement-II alone is sufficient.
Hence, option-b is correct.

19) From statement-II, Principal = 1000, and Time = 2 years. With this information we can find the rate of interest (R). Then it will be possible to find the compound interest on the principal after 3 years.
Hence, statement-II alone is sufficient.

20) From statement-I, Rate of interest = $\frac{SI\times 100}{P\times T}$

= $\frac{2400\times 100}{6000\times 4}$ = 10% per annum.

In statements-II, time of deposit is not given so we cannot find the solution. Hence, option-a is correct.

21)b; From statement-II, $x-\frac{3x}{4}=34 \Rightarrow x = 136$

From statement-I, 25% of any number is one-fourth of the number. It does not give any particular value.
Hence, option-b is correct.

22) Both statements together also can't give the answer.

23) From statement-I, If (x) × odd number = even number then x is definitely an even number. Hence, from statement-I we can say whether x is an odd or not. *i.e. x is not an odd number.* So, statement-I alone is sufficient to answer the given question.
From statement-II, x is divisible by 2. Then x should definitely be an even number. Therefore, from statement-II also we can answer whether x is odd or not.
Hence, statement-II is also sufficient to answer to answer the given question. Hence, option-c correct.

24) From the given data, we can have the values of u, v, w, z. But y value is not given. Hence, it is not possible to find the value of x, even from the data given in both the statements. Hence, option-e is correct.

25) From statement-I, 5(CP) = 4(SP) then

Cost price of one watch = $\frac{12675\times 4}{5}=10140$

Profit = 12675 – 10140 = 2535. *i.e.* data in statement-I alone is sufficient to answer the question.
From statement-II, we have profit%, so it is possible to find profit.

Profit% = 25% then profit = $\frac{12675\times 25}{125}=2535$

i.e. statement-II is also sufficient to answer the question.
Hence, option-d is correct.

26) Let the age of Ramesh = $6x$ and that of Suresh = $5x$.
From statement-I, it is not possible to find the age of Ramesh. From statement-II, we have, $6x$+5 : $5x$+5 = 7 : 6
$36x + 30 = 35x + 35 \Rightarrow x = 5$
So, Ramesh age is $6x = 6\times 5 = 30$ years.
Hence, statement-II alone is sufficient to answer the given question.

27) Total salary of A, B, C, D and E = 5 × 65970 = 329850
From statement-I, total salary of B and C = 84625
From statement-II, total salary of D and E = 58040
Salary of A = 329850 – (84625 + 58040) = 187185.
Hence, option-c is correct.

28) The relation between either men and women or men and children is not given in the question. Therefore, both the statements are not sufficient to answer the given question. Hence, option-e is correct.

29) From statement-I, $x-\frac{3x}{5}=90\Rightarrow\frac{2x}{5}=90\Rightarrow x=225$

i.e. statement-I alone is sufficient to answer the given question. And statement-II is not sufficient to answer the given question. Hence, option-a is correct.

CODING – DECODING

CONCEPTS

A code is a system of words, letters or signs which is used to represent a message in secret form. The student is expected to identify the rule interpreted and decode the given message.

Approach to solve the questions:

1. You will be given two messages, one is original message and another one is coded message.
2. You have to compare each element of the original message with corresponding element of coded message. Thereafter try to identify the rule in which coded message is formed.
3. Using the identified rule you can easily answer the question asked.

Tips to solve easily:

1) Remember English alphabets from A to Z with their position values *i.e.* A–1, B–2, C–3, ..., Z–26.

2) Remember reverse order of English alphabets. *i.e.* Z to A with their position values *i.e.* Z–1, Y–2, ... , A–26.

3) Remember the corresponding opposite letter of each alphabet with their position values. The following table will give the opposite letter of each alphabet.

1	2	3	4	5	6	7	8	9	10	11	12	13
A Z	B Y	C X	D W	E V	F U	G T	H S	I R	J Q	K P	L O	M N
26	25	24	23	22	21	20	19	18	17	16	15	14

To find out the opposite letter of a particular letter, we can use the below formula.

Sum of the position numbers of a letter and it's opposite letter is always 27.

Position number of a letter + Position number of its opposite letter = 27.

e.g.: The opposite letter of 'H' is 'S'.

Because, H–8, S–19. H+S = 27 ⇒ 8+19=27.

Types of Coding-Decoding:

(I) <u>Letter Coding:</u> In this type of coding, the original alphabets of the given word are replaced by certain other alphabets based on specific rule to form its code. You have to detect the hidden rule and answer the questions accordingly.

Examples: (1) In a certain code language,'COLLEGE' is written as 'GSPPIKI' then how will 'GROUPS' be written in that code?

Explanation: Each letter of the word is moved four steps forward to obtain the code. So, GROUPS will be coded as KVSYTW.

2) 'ZYXW' as coded as 'ABCD' then 'STUV' is coded as.

Explanation: Here each letter is coded with its opposite letter. *i.e.* Z – A, Y – B, X – C, W – D.

Similarly, S – H, T – G, U – F, V – E.

3) *'bcd'* is coded as *'def'* then *'true'* is coded as.

Explanation: Here every letter is moved two steps forward. *i.e. b* (+2) → *d* , *c* (+2) → *e*, *d* (+2) → *f* .

Similarly, *t* → *v*, *r* → *t*, *u* → *w*, *e* → *g*.

So, the answer is *'vtwg'*.

4) *'Hyderabad'* is coded as *'ixedszcze'* then *'chennai'* is coded as?

Explanation:

Here the letters are alternatively increasing and decreasing by 1.

h(+1) → *i* , *y*(-1) → *x* , *d*(+1) → *e* , *e*(-1) → *d*, *r*(+1) → *s*,

a(-1) → *z*, *b*(+1) → *c*, *a*(-1) → *z*, *d*(+1) → *e*.

So, *chennai* will be coded as *dgfmozj*.

(II) <u>Number Coding:</u> In this type of coding, alphabets are assigned to the numbers or numerical code values are assigned to a word or alphabets. You have to compare the given codes to answer the questions.

Example:

1) If READ is coded as 7421 and BOOK is coded as 8335, then how would you encode BOARD?

Explanation: The alphabets are coded as follows.

R	E	A	D		B	O	O	K
7	4	2	1		8	3	3	5

From the above codes, we can say, B is coded as 8, O is coded as 3, A is coded as 2, R is coded as 7, D is coded as 1. Hence, BOARD is coded as 83271.

(III) <u>Substitution:</u> In this type, the names of objects are substituted with different names. We should carefully trace the substitution to answer the questions.

Example:

1) In a certain code language, *'book'* is coded as *'pencil'*, *'pencil'* is coded as *'mirror'*, *'mirror'* is coded as *'board'*. Then what is useful to write on a paper?

Explanation: We use *pencil* to write on a paper but here *pencil* is coded as *mirror.* So, the answer is *mirror.*

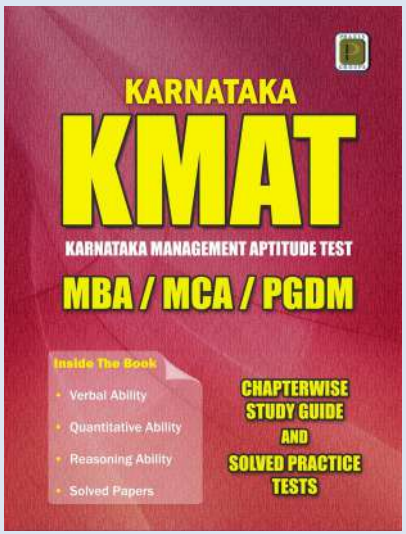
2) In a certain language, *'man'* is called as *'woman'*, *'woman'* is called as *'girl'*, *'girl'* is called as *'boy'*, *'boy'* is called as *'worker'*. Then in the same language what does a 6 year old female is called?

Explanation: In general language, 6 years old female is called as *girl*. But in the given coded language *'girl'* is called as *'boy'*. So, the answer is *'boy'*.

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

NOTE Every letter the given word is coded as '-1' with English alphabet for Questions **28 to 37**.

The coding chart is as below:

l: character c: coded character

l	A	B	C	D	E	F	G	H	I	J	K	L	M
c	Z	A	B	C	D	E	F	G	H	I	J	K	L
l	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
c	M	N	O	P	Q	R	S	T	U	V	W	X	Y

28)a; 29)b; 30)b; 31)c; 32)d; 33)d; 34)a; 35)b; 36)c; 37)a;

Coding chart for questions **38 - 47** is as below:

l: character

f: character shifted forward by 2 place values

b: character shifted backward by 2 place values.

l	A	B	C	D	E	F	G	H	I	J	K	L	M
f	C	D	E	F	G	H	I	J	K	L	M	N	O
b	Y	Z	A	B	C	D	E	F	G	H	I	J	K
l	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
f	P	Q	R	S	T	U	V	W	X	Y	Z	A	B
b	L	M	N	O	P	Q	R	S	T	U	V	W	X

38**)d;** n = No. of letters in the word. MADRAS = 6, which is even. ∴ The first $\frac{n}{2}$ = 3 letters should be shifted forward by 2 places. M → O, A → C, D → F.

And last $\frac{n}{2}$ = 3 letters should be shifted backward by 2 places. R → P, A → Y, S → Q.

Hence, the code for MADRAS is OCFPYQ.

39)b; Here n = 6, i.e even.

∴ The code word for KERALA is MGTYJY

40)c; Here n = 5, $\frac{n-1}{2}$ = 2 letters are forwarded by 2 places. E → G, N → P, middle letter 'J' remains same. O → M, Y → W

∴ The code word for Enjoy is GPJMW

41)a; Here, n = 7, $\frac{n-1}{2}$ = 3 letters are forwarded by 2 places. W → Y, E → G, B → D middle letter 'S' is fixed. Last 3 letters are shifted backward by 2 places.

I → G, T → R, E → C.

∴ The required code word for WEBSITE is YGDSGRC

42)a; Here, n=d; even

∴ The code E X A M

↓ ↓ ↓ ↓

G Z Y K

43)d; Here, n=5; odd.

∴ The code M U S I C

↓ ↓ ↓ ↓ ↓

O W S G A

44)c; Here, n=6; even, ∴ The code for the given word is

T E M P L E

↓ ↓ ↓ ↓ ↓ ↓

V G O N J C

45)c; Here, n=8; even, ∴ The code for the given word is

S O F T W A R E

↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓

U Q H V U Y P C

46)a; Here, n=6; even, ∴ The code for the given word is

S C H O O L

↓ ↓ ↓ ↓ ↓ ↓

U E J M M J

47)d; Here, n=5; odd, ∴ The code for the given word is

H O U S E

↓ ↓ ↓ ↓ ↓

J Q U Q C

The coding chart for questions 21-30 is as below:

l: character c: coded character

l	A	B	C	D	E	F	G	H	I	J	K	L	M
c	I	F	G	H	O	J	K	L	U	M	N	P	Q
l	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
c	R	A	S	T	V	W	X	E	Y	Z	B	C	D

48)a; 49)b; 50)c; 51)d; 52)d; 53)b; 54)a; 55)b; 56)c; 57)d;

The code sheet for the questions 58 - 67 is as below

l = character; n = Place Value;

r = Rem(n/26); c = coded character;

l	A	B	C	D	E	F	G	H	I	J	K	L	M
n	1	2	3	4	5	6	7	8	9	10	11	12	13
r	9	14	19	24	3	8	13	18	23	2	7	12	17
c	I	N	S	X	C	H	M	R	W	B	G	L	Q
l	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
n	14	15	16	17	18	19	20	21	22	23	24	25	26
r	22	1	6	11	16	21	26	5	10	15	20	25	4
c	V	A	F	K	P	U	Z	E	J	O	T	Y	D

58)a; 59)b; 60)c; 61)a; 62)b; 63)c; 64)d; 65)a; 66)b; 67)c;

BLOOD RELATIONS

CONCEPTS

Blood relations mean persons connected by some relation like mother–father, daughter–son, sister–brother, aunt–uncle, niece–nephew, sister in law–brother in law etc. Blood relations questions are based on the family tree concept. Questions are asked based on the variety of relationships in the family. To remember easily, we classify them as paternal side relations and maternal side relations.

Paternal side Relations

Father's father	Grandfather
Father's mother	Grandmother
Father's brother	Uncle
Father's sister	Aunt
Father's daughter	Sister
Father's son	Brother
Father's only son (said by a boy)	Himself
Father's only daughter (said by a girl)	Herself
Uncle's wife	Aunt
Aunt's husband	Uncle
Uncle's children	Cousin
Aunt's children	Cousin
Brother's wife	Sister–in–law
Sister's husband	Brother–in–law
Brother's daughter	Niece
Brother's son	Nephew
Son's wife	Daughter–in–law
Daughter's husband	Son–in–law
Grandson or Granddaughter's daughter	Great Granddaughter

Maternal Side Relations:

Mother's father	(Maternal) grandfather
Mother's mother	(Maternal) grandmother
Mother's brother	(Maternal) uncle
Mother's sister	(Maternal) aunt
Children of maternal uncle	Cousin
Wife of maternal uncle	(Maternal) aunt

Tips for Solving Questions on Relationships:

1) Drawing family tree.

2) Properly indicate the nature of relationships between the persons.

3) Understanding the relationship between which two persons is exactly required to be found.

Drawing Family Tree:

If A is male: **A+ ,** A(+)

If B is female: **B – ,** B(-)

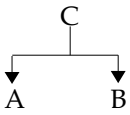
If C's gender is not given in question or irrelevant to solving the question: **C,** C

If A and B are siblings: A ⟷ B

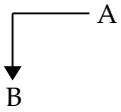
If A and B are married to each other: A = B.

If A is the only child of B:

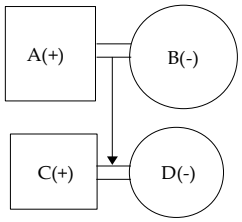
If A and B children of C:



If A is uncle / aunt of B:

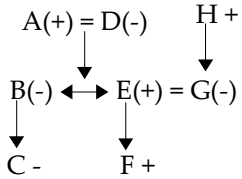


If A and B are parents of either C or D (C and D are a couple):



Example: A is the father of B but B is not his son. C is the daughter of B. D is the spouse of A. E is the brother of B. F is the son of E. G is the spouse of E. H is the father of G. Who is the grand daughter of A?

Explanation:



From the above diagram, C is the daughter of B and A

ALPHABET TEST

CONCEPTS

In Alphabet Test questions, some words are given where you have to arrange them in the dictionary order and then state which word will come in the desired place. There are 5 types of problems in alphabet test.

1) Alphabetical order of words
2) Letter–Word Problems
3) Rule–Detection
4) Alphabetical Quibble
5) Word Formation

1) Alphabetical order of words: To solve these type of problems, you should have basic knowledge of dictionary order or alphabetical order of the words and their usage. Some words are given below which are arranged in the dictionary order (or) alphabetical order.

Absolute	*Acceptable*	*Bank*	*Cable*
Absorb	*Adapt*	*Book*	*Cafe*
Abuse	*Balance*	*Believe*	*Camel*

Arrangement of the words in Alphabetical order:

Step-1: Consider all the given words. Observe the first letter of each word and then arrange the words according to first letter like as they appear in the dictionary.

Example: *Apple, Shop, Royal, Forest, Tour.*

The first letters of these words are A, S, R, F, T.

Alphabetical or dictionary order of these words is

A, F, R, S, T.

So, the correct alphabetical order of these words is :

Apple, Forest, Royal, Shop, Tour.

Step-2: If two or more words begin with the same letter, then arrange them in the order of 2nd letters in the English alphabet.

Example: Arrange the below words in dictionary order.

Dress, Door, Function, Hall, Wedding.

The words *Dress* and *Door* have their first letter *D.*

So, you have to consider their second letters *i.e. r* and *o*.

In the dictionary order *'o'* comes before '*r*'. Hence the word *Door* comes before the word *Dress*.

Hence, the correct order of given words is

Door, Dress, Function, Hall, Wedding.

Step-3: If both the 1st and 2nd letters of two or more words are same, then consider third letter and so on.

2) Letter–Word Problems: In this type of problems, one word is given, the candidate is required to find the number of pairs of letters from the word which has as many letters between them as in the English alphabet.

Example: How many pairs of letters are there in the word 'ABSENT' which have as many letters between them in the word as in the English alphabet?

Explanation: Clearly, such pair is A and B. In the word ABSENT there are no letters between A and B.

In alphabets also A and B has no letters between them. So, the number of pairs is only one.

3) Rule–Detection: In this type of problems, a rule is given followed by a series, you have to find out the word which follows the given rule.

Example: Number of letters skipped in between adjacent letters in the series are increased by one. Which of the following alternative observes this rule ?

a) IJKOT b) HJMQT c) DFIJK d) KMPTY

Explanation: Considering the given options. From option-d, we have, the letters skipped between adjacent letters in the series are increased by 1. *i.e.*

K L **M** N O **P** Q R S **T** U V W X **Y**

1 2 3 4

4) Alphabetical Quibble: In this type of questions, the alphabets from *A* to *Z* are given. The position of a particular letter is given in the form of a puzzle. And you have to find the required letter accordingly. Some times it is also required to find out how many occurrences of a particular letter satisfies the given condition in the series.

Example: In the below given series of letters, which letter is 7th to the right of 13th letter from your left ?

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Explanation.: Counting from left (*i.e.* from A), 13th letter is M. Count from M towards right, the 7th letter is T.

Example: If the series is arranged in reverse order, which letter will be 8th letter to the left of 7th letter counting from the right end?

Explanation: The reverse of the above series is,

Z Y X W V U T S R Q P O N M L K J I H G F E D C B A.

8th letter to the left of G (7th letter from right) is O.

5) Word Formation: In this type of questions, one word is given along with some rules. You are required to find out the number of meaningful words from the given word following the rules given in the question.

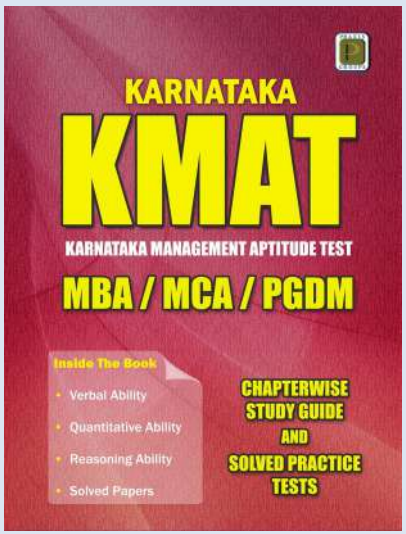
Example: A meaningful word is formed by taking 1st, 4th, 5th, 7th, 10th, 11th, 12th letters of the word 'FELICITATIONS'. Which of the following will be the 5th letter of that word from the right end?

a) C b) N c) C d) I e) None of these

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

21) If it is possible to make a meaningful word out of the 2nd, 4th, 5th and 8th letters of the word 'ILLOGICAL' then which of the following will be the third letter of the so formed word? If more than one word can be formed, then given X as your answer. If no meaningful word can be formed, then give Z as your answer.

a) A b) G c) O d) X e) Z

EXPLANATIONS

1)c; The correct alphabetical order of given words is: *Place, Plain, Plane, Player, Plenty.* So, option-c is correct.

2)b; The correct alphabetical order of given words is: *Laxity*(3), *Laxmi*(2), *Laziness*(5), *Luxuriant*(4), *Luxury*(1).

3)b; Dictionary order of the given words is: a, c, b, d, e. Hence, the middle word is option-d *i.e. refutation.*

4)a; The alphabetical order of the given words is: *wrath, wretch, wriggle, wrinkle, writhe.*

So, the second word from right end is: *wrinkle.*

5)a;

Letters in the word	**Letters in the alphabet**
C C E	C D E

∴ There is only one pair.

6)e;

Letters in the word	**Letters in the alphabet**
E X C H	E F G H
C H A N G	C D E F G
C H A	C B A
E X C H A	E D C B A
E X C	E D C

∴ The total pairs are five. *i.e.* more than four.

7)c; The words formed are AS, TO, UNDER.

8)b; The new letter sequence is OCPMNAOIANET. The 5th letter from the right is 'I'.

9)a; From option-a,

(C) D **(E)** F G H I **(J)** K L M N O P Q R S **(T)**

1 (1^2) 4 (2^2) 9 (3^2)

Hence, the answer is 'CEJT'.

10)b; From option-b, **(F)** G H (2) **(I)** J K (2) **(L)** M N (2) **(O)**

Hence, the required series is '*FILO*'.

11)a; From option-a,

(A) BC (2) **(D)** E (1) **(F)** GH (2) **(I)** J (1) **(K)** LM (2) **(N)**

So, the correct series sequence is: ADFIKN.

12)c; The new alphabet series is:
A B C D F H J L N P R T V X Z
The 10th letter from the right end is H.

13)e; The sequence after reversing the first half is
M L K J I H G F E D C B A N O P Q R S T U V W K Y Z
11th letter from the right = P.
10th letter to the left of P = H.

14)d; The new alphabet series is:
B A D C F E H G J I L K N M P O R Q T S V U X W Z Y
The 16th letter from left is O.

15)c; The new series is: A 3 C 5 E 7 G 9 I 11 K 13 M 15 O 17 Q 19 S 21 U 23 W 25 Y 27
Counting from the right, the 9th character is 19.
And the 3rd character to the left of 19 is O.

16)d; The new series is as follows.
A B C D P O N M L K J I H G F E Q R S T U V W X Y Z
16th letter from left is E. 9th letter to the right of E is Y.

17)c; The meaningful word is 'ACTION'.

18)b; Meaningful word that can be formed with the given letters is: 'TRIUMPH'. So, option-b is correct.

19)a; The meaningful word is 'MOTHER'.

20)d; The word is *'substitution'.*

21)c; The 2nd, 4th, 5th, 8th letters of the word ILLOGICAL are L, O, G, A respectively. The word formed is GOAL.

CALENDARS

CONCEPTS

In day sequence, questions will be asked on calendars to find a particular day of the week (or) a particular day of the given date. In order to solve these problems easily, you should have knowledge on calendar *i.e.* leap year, odd days etc.

• **Leap year:** If the last two digits of a given year is perfectly divisible by 4 then that year is a *leap year.*

Example: 2016 is a leap year because last 2 digits *i.e.* 16 is perfectly divisible by 4.

But a century year is not a leap year *i.e.* 100, 200, 300,.... But every 4th century year is a leap year. *i.e.* 400, 800, 1200, 1600, 2000 etc.

A leap year has 366 days.

Examples:

(i) Each of the years 1764, 1028, 1948, 1676, 2004 etc is a leap year.

(ii) Each of the years 400, 800, 1200, 1600, 2000, 2400 etc is a leap year.

(iii) The years 2001, 2002, 2003, 2005, 1900, 2100 are not leap years.

• **Ordinary year:** The year that is not a leap year is called an *ordinary year*. An ordinary year has 365 days.

In order to solve the questions on calendars, we use a concept called *'odd days'*.

• **Odd day:** The number of days more than a complete week are called *odd days* in a given period.

Lets discuss how to count the odd days in a given period.

• **Counting of odd days:**

To find the number of odd days in a given period, we divide the total number of days with 7. The remainder obtained is the total number of *odd days*.

Examples:

1) How many odd days are there in 10 days.

Explanation:
```
7) 10 (1
   7
   3 = Remainder → 3 odd days.
```

2) How many odd days are there in 100 days.

Explanation:
```
7) 100 (14
   98
    2 → odd days
```

3) How many odd days are there in an ordinary year?

Explanation: An ordinary year has 365 days. So,
```
7) 365 (52
   364
    1 → odd day
```

• Hence, in an **ordinary year** there are 52 perfect weeks and **1 odd day**. [365 days = 52 weeks + 1 day]

4) How many odd days are there in a leap year?

Explanation: As we know, a leap year has 366 days. So,
```
7) 366 (52
   364
    2 → odd days
```

• Hence, in a **leap year**, there are 52 perfect week and **2 odd days**. [366 days = 52 weeks + 2 days]

Note: Total number of odd days can be from **0 to 6** only.

• Counting odd days for century years:

1) 100 years = 76 ordinary years + 24 leap years.
= (76×1 + 24×2) odd days = 124 odd days

(Here 1 and 2 indicates number of odd days in *an ordinary year* and *a leap year* respectively)

124 odd days = 17 weeks + 5 days = 5 odd days.

∴ Number of odd days in **100** years = **5**.

2) Number of odd days in **200** years = (5×2) = **3**.

3) Number of odd days in **300** years = (5×3) = **1**.

4) Number of odd days in **400** years = (5×4+1) = **0**.

Similarly, each set of 800, 1200, 1600, 2000 year etc has 0 (zero) odd days as they are multiples of 400.

• Some Important points to remember:

1) In every *normal / ordinary year* the first day (1st January) and the last day (31st December) are always same. For example, if January 1st is *Monday* then December 31st is also *Monday.*

2) In every leap year if the first day (January 1st) is *Sunday*, then last day (December 31st) will be it's next day *i.e. Monday.*

3) In every year, the calendar for the months *April* and *July* are always same.

4) For every 400 years, the day repeats.

For example, if 14-April-1604 is *Saturday*, then 14-April-2004 will also be *Saturday.*

5) The last day of a century cannot be either *Tuesday* or *Thursday* or *Saturday.*

Questions on day sequence / calendar are mainly 5 types.

1) Problems based on Total Day–Particular Day.

2) Problems based on Leap Year.

3) Problems based on Particular Date–Day.

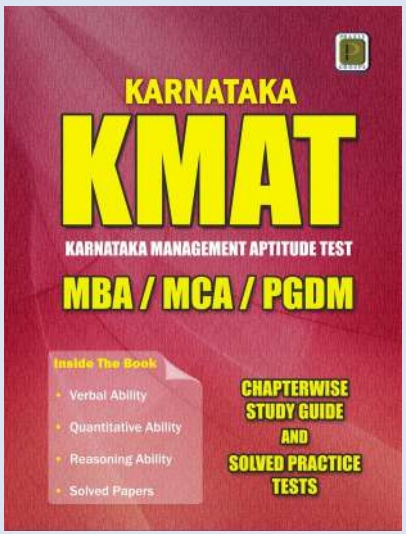
4) Problems based on Same Calendar Year.

5) Problems based on Same Day–Date of the Month.

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

18)2; Odd day from 2024 to 2030 is

2024, 2025, 2026, 2027, 2028, 2029, 2030

2 1 1 1 2 1

Number of Odd days = 2 + 1 + 1 + 1 + 2 + 1 = 8

Required Day = Given day + $remainder\left(\frac{8}{7}\right)$

= *Tuesday* + 1 = *Wednesday*

∴ The day on 01-Jan 2030 is *Wednesday.*

19)1; Here 600 is a century year. So, It should be divisible by 400 to become a leap year. But it is not divisible by 400. So, 600 is not a leap year. Remaining all are leap years, because 2076 and 2084 are divisible by '4' and 2000 is divisible by 400.

20)4; Given date 08–May–1986. (*Check with Type*-3)

Required day $=\frac{08+2+85+21+0}{7}=remainder\left(\frac{116}{7}\right)=4$ ∴ From day codes table 4 = *Thursday.*

21)3; Sahithya born 2 years, 2 months 2 days after Alekhya born. *i.e.*, Sahithya born exactly 2 years, 2 months and 2nd day from Alekhay's birthday.

i.e., Sahithya born on: 06 – October – 1994.

Required day $=\frac{06+1+93+22+0}{7}=\frac{122}{7}=3(remainder)$

∴ From day codes table, 3 = Wednes*day.*

22)1; In order to solve this, we should know the date of first Sunday of January 2014. For this we have to find the day of the 01-January-2014.

i.e. $\frac{01+1+13+3+6}{7}=remainder\left(\frac{24}{7}\right)=3=Wednesday$

01-Jan-2014 is *Wednesday.*

∴ So, first *Sunday* will be on 05-Jan. And *Sundays* fall on 5th, 12th, 19th and 26th of January 2014.

23)3;From the concepts, we know 100 years=5 odd days

Day after 100 years = *Sunday* + 5 = *Friday.*

24)1; Since, 2020 is a leap year, add 28 to get same calendar year *i.e.* 2020 + 28 = 2048.

25)4; 1998 is not a leap year. So, write up to leap year before and after the given year including 1998.

i.e. 1996 1997 1998 1999 2000

Now eliminate leap years. *i.e.* 1997, 1998, 1999.

Add the code (6) (11) (11).

1997 1998 1999

6 11 11

2009

The sum corresponding to the given year is the answer.

∴ The year 2009 will have the same calendar year 1998.

26)1; Since, 2016 is a leap year. So, there are 2 odd days.

∴ Required day = *Sunday* + 2 = *Tuesday.*

27)2; No.of odd days from 26-Mar-2013 to 14-Oct-2013=

= 5 + 2 + 3 + 2 + 3 + 3 + 2 + 14 = $remainder\left(\frac{34}{7}\right)=6$.

So, 6 days after *Tuesday* is *Monday.*

28)3; If today is *Monday,* then day after tomorrow will be *Wednesday.* We have to find the day 126 days ago of Wednesday.

∴ Required day = Wednesday – $remainder\left(\frac{126}{7}\right)$

= Wednesday – 0

∴ The required day is *Wednesday* itself.

CLOCKS

CONCEPTS

1) 60 minute space traces an angle of 360^0 for minute hand. $\therefore$ 1 minute space traverses an angle of 6^0.

2) In 1 hour:

Minute hand traverses 60 minute space or 360^0.

Hour hand traverses 5 minute space or 30^0.

3) The minute hand travels 90^0 in 15 minutes.

4) The hands of the clock are in straight line when they coincide (or) when they are opposite to each other.

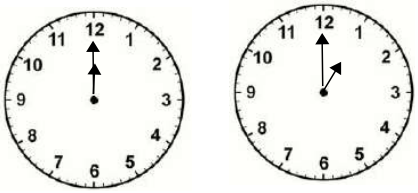
5) The hands of the clock are perpendicular to each other for 22 times in 12 hours and for 44 times in day.

6) The hands of the clock are opposite to each other for 11 times in 12 hours and 22 times in a day.

7) The hands of the clock coincides with each other for 11 times in 12 hours and 22 times per day.

8) The hands of the clock are 44 times in a straight line per day.

9) 55 minute spaces are gained by minute hand in 60 minutes period.



To find how many minute spaces it has actually gained, let us assume a standard point where the both minute hand and hour hand coincides. After 60 minutes, minute hand moves 60 minute spaces and hour hand moves 5 minute spaces. Now there are 55 minute spaces between minute hand and hour hand. So we can say in 60 minutes of time, minute hand leads/gains hours hand by 55 minute spaces.

Angle traversed by the hands of the clock

Hand of clock	Second (S)	Minute (M)	Hour (H)
1 s	6^0	$\left(\frac{1}{10}\right)^0$	$\left(\frac{1}{120}\right)^0$
1 m = 60s	360^0	6^0	$\left(\frac{1}{2}\right)^0$
1 h = 60m = 3600s	21600^0	360^0	30^0
12 h	259200^0	4320^0	360^0

Angle of hands with respect to 12-Marking on clock when hour, minute and seconds are given,

$$\theta_H=\left[30\mathrm{H}+\frac{M}{2}+\frac{\mathrm{S}}{120}\right]^0$$

$$\theta_M=\left[6\mathrm{M}+\frac{\mathrm{S}}{10}\right]^0 \;;\; \theta_S=6\mathrm{S}^0$$

Example: At what time between 2 O'clock and 3 O'clock the hands of the clock be together.

Explanation: At 2 O'clock the minute hand is at 12 and hour hand is at 2. They are 10 minute spaces apart. To be together, minute hand must gain 10 minute spaces over hour hand. 55 minutes are gained in 60 minutes.

10 minutes are gained in x minutes.

i.e. $x=\frac{10\times60}{55}=10\frac{10}{11}$ minutes after 2 O'clock the two hands of a clock will be together.

Alternate Method: Hands of the clock are together. It means the angle between minute hand and hour hand is zero. $\theta=\left|\theta_M-\theta_H\right|=\frac{11}{2}m-30\mathrm{h}\Rightarrow\frac{11}{2}m-(30\times2)=0$

$$\Rightarrow\frac{11}{2}m=60m=\frac{120}{11}=10\frac{10}{11}$$

Example: What is the angular difference between the Hours hand and Seconds hand at 4:25:40.

Explanation:

$$\theta=\left|\theta_S-\theta_H\right|=\left|6\mathrm{S}-\left(30\mathrm{H}+\frac{M}{2}+\frac{S}{120}\right)\right|$$

$$=\left|\frac{119\mathrm{S}}{120}-30\mathrm{H}-\frac{M}{2}\right|$$

$$=\left|\frac{119*40}{120}-30*4-\frac{30}{2}\right|$$

$$=\left(120+15-\frac{119}{3}\right)^0=\left(\frac{286}{3}\right)^0$$

Example: What is the angular difference between the Minute hand and Seconds hand at 4:25:40.

Explanation:

$$\theta=\left|\theta_S-\theta_M\right|=\left|6\mathrm{S}-\left(6\mathrm{M}+\frac{S}{10}\right)\right|$$

$$=\left|\frac{9\mathrm{S}}{10}-6\mathrm{M}\right|=\left|\frac{9*40}{10}-6*25\right|$$

$$=\left(150-36\right)^0=114^0$$

Example: At what time between 2 O'clock and 3 O'clock the hands of the clock are opposite to each other.

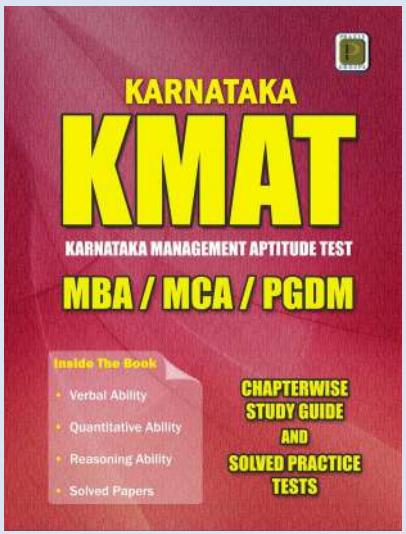
1) $3\left(\frac{6}{11}\right)$ 2) $43\left(\frac{7}{11}\right)$ past 2 O'clock

3) $56\left(\frac{8}{11}\right)$ past 2 O'clock 4) $64\left(\frac{9}{11}\right)$ past 2 O'clock

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

6)2; At 9 O'clock the minute hand is 45 *min* behind the hour hand. To be straight, it has to gain 15 *min*.
55 minutes are gained in 60 minutes.

15 minutes are gained in $15\times\frac{12}{11}16\left(\frac{4}{11}\right)\text{min}$

Required Time = $16\left(\frac{4}{11}\right)$ min past 9

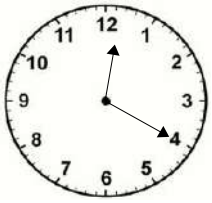
Alternate Method:

$\theta=\frac{11}{2}m-30h\Rightarrow 180=\frac{11}{2}m-(30\times 9)\ \Rightarrow\frac{11}{2}m=270-180$

$\frac{11}{2}m=90\ \Rightarrow m=16\frac{4}{11}$

7)4; At 5:25, the minute hand is at 5. So we have to find the angle made by the hour hand in $25\,min=12\frac{1}{2}^{o}$

8)2; Angle between 12th and 4th position = 120°.



Angle made by the hour hand in 20 minutes = 10°
Required angle = 120°- 10° = 110°.

9)4; At 3 O'clock the minute hand is behind the hour hand by 15 *min.* To go 7 *min* ahead the hour hand, it has to gain (15+7) *min*. *i.e.* 22 *min*.

To gain 22 *min* it has to move $22\times\frac{12}{11}min$

i.e. 24 *min.*

∴ Required Time = 24 *min* past 3.

Alternate Method: $\theta=\frac{11}{2}m-30h$

The minutes hand should be 7 minutes ahead of the hour hand *i.e.* 42°. (1 minute space = 6°).

So, $42=\frac{11}{2}m-(30\times 3)\Rightarrow m=24\ min.$

10)1; $\theta=\frac{11}{2}m-30h\Rightarrow\left(\frac{11}{2}\times 12\right)-(30\times 5)=150-66=84^{0}$

11)3 My watch is gaining 5 minutes for every 60 minutes. It means when the original time is moved 60 minute spaces, my watch has moved 65 minute spaces.
Similarly, when the original time is moved 1 minute, my watch has moved $\frac{13}{12}$ minutes.

1 minute = 360° then $\frac{13}{12}\,minutes=\frac{13}{12}\times 360=390^{o}$.

12)3; Hour hand traces 360^{0} in 12 hours.
∴ Hours from 10 *am* to 2:20 *pm* = 4 hours 20 *min*

$\because\ 4+\frac{20}{60}=4+\frac{1}{3}=\frac{13}{3}\text{hours}$

Now, 12 hours = 360^{0}

$\frac{13}{3}\text{hours}=x$

By cross multiplication,

$12\times x=360\times\frac{13}{3}$

$\therefore\ x=\frac{360\times 13}{12\times 3}=130^{0}$

13)2; Minute hand has to gain 25 minute spaces.
55 minute spaces are gained in 60 *min*.
∴ 25 minute space will be gained in *x min*.

$\therefore\ x=\frac{60\times 25}{55}=\frac{300}{11}=27\frac{3}{11}\,min$ past 5 O'clock.

14)2; $\theta=\frac{11}{2}m-30h=\left(\frac{11}{2}\times 20\right)-30\times 2=50^{0}$

ANALOGY - CLASSIFICATION

CONCEPTS

Analogy is comparison between things which have similar features (*i.e.* similarity or correspondence).

Analogy plays a significant role in problem solving such as creativity, memory, perception, emotion, decision making, explanation and communication.

Types of Analogy: Analogy questions are two types. They are, a) Number Analogy,

b) Alphabet Analogy.

Analogy involve critical thinking and involve little bit of secret language. In this type of problems, a rule or a logic will lie behind the given items, based on that the candidate is required to find the similar item/pair.

A simple analogy is as follows.

Word-1: Word-2 : : Word-3 : Word-4

Here ':' reads as *"is to"* and '::' reads *"as"*.

Steps for Analogy problem solving:

Step-1: Observe the first pair of given analogy and then find out the relation between them. Be sure to look all parts of the relationship between them.

Step-2: Once you find the correct relationship between the first analogy pair, apply the same relation to given options. If any of the option pair has the same relation as first pair then that option is the required answer. If more than one option has same relation as the first pair, then find out some other relationship between the first pair and apply it to the options.

a) <u>Number Analogy:</u> In this type of analogy, you are required to find similar pair or single number based hidden relation in then given pair(*s*).

Examples: 1) 2 : 7 :: 5 : ?

a) 15 b) 16 c) 18 d) 20 e) 14

Explanation:

The relation between 2 and 7 is, 2×3 +1=7.

5 × 3 + 1 = 16 is the answer.

2) 3 : 28 : : ?

a) 2: 9 b) 3: 29 c) 4: 64 d) 5: 125 e) none of these

Explanation: Here only 1st pair is given, we have to find the 2nd analogy pair.

The relation between 1st pair is : $3 \rightarrow 3^3 + 1 = 28$.

From option-*a*, $2 \rightarrow 2^3 + 1 = 9$.

b) <u>Alphabet Analogy:</u> In this method, a group of alphabet pairs or an individual alphabet will be given. You need to find out the similar relationship from the options which correctly matches to the question analogy pair.

Examples: 1) A : E : : T : ?

Explanation: The relation in the first pair is $A + 4 = E$. In the same way $T+4 = X$.

2) KP : LO : : BY : ?

Explanation: In first pair K, P are opposite letters.

L is next to K. Opposite of L is O.

In the same way, letter next to B is C. Opposite letter of C is X. Answer is CX.

3) ABC : GHI : : MNO : ?

Explanation: In the first pair, the last letter of the first part is C and the first letter of the 2nd part is G. The relation between C and G is C + 4 = G.

In the same way, in the second pair, last letter of the first part (MNO) is O. So, O + 4 = S.

Hence, answer is 'STU'.

Complex Expressions: Sometimes the hidden relation between the given numbers could be any complex expression. For example, 6 : 19 : : 8 : ?

a) 34 b) 30 c) 38 d) 33 e) 39

Explanation: The hidden relation in the first pair is $n:\left(\frac{n^2}{2}+1\right)$ So, $8:\left(\frac{8^2}{2}+1\right) \Rightarrow \frac{64}{2}+1=33$

CONCEPTUAL EXAMPLES

1) 5 : 1 : : 6 : ?

a) 3 b) 1 c) 0 d) 7 e) none

Explanation: $\frac{5}{5}=1$; $\frac{6}{6}=1$

Second number is produced by dividing the first number by itself.

2) 36 : 6 : : ?

a) 4 : 1 b) 8 : 4 c) 225 : 15 d) 625 : 26 e) none

Explanation: Here the second number is the square root of the first number. From option-c, $\sqrt{225}=15$.

3) 18 : 342 : : 6 : ?

a) 40 b) 36 c) 48 d) 42 e) none

Explanation: The relation in the first pair is $n : n^2+n$.

$\therefore 6 : 6^2+6 = 42$. *i.e.* option-d.

4) 1331 : 11 : : ?

a) 8 : 4 b) 14 : 2 c) 9261 : 21 d) 9260 : 20 e) None

Explanation: The relation hidden in the first pair of given analogy is $\sqrt[3]{n} : n$ *i.e.* $\sqrt[3]{1331}=11$.

Similarly $\sqrt[3]{9261}=21$.

SERIES

CONCEPTS

NUMBER SERIES

In number series questions, a series of numbers is given with one term missing. You need to identify the pattern and find the next number or the missing number. Any number series is formed by the combination of operator and operand. Operators are +, -, ×, ÷. Operand is the factor between two numbers in the sequence.

Example: 3, 7, 11, 15, 19, *x*. Find the value of *'x'*?

Explanation: Here, if we observe first two numbers, *i.e.* 3 and 7. The operator is + (addition) and the operand is 4. If we observe the entire series, we can easily identify the operator and the operand, they are + and 4 respectively. So, '*x*' will replace with 23.

► **Guidelines to identify the pattern:**

Step-1: Generally the pattern follows a mathematical operation from first term to next term and so on.

Step-2: If the given number series is increasing or decreasing in a small amount, then there must be addition or subtraction between the numbers.

Step-3: If the given number series is increasing or decreasing in a large amount, then there must be multiplication or division between the numbers.

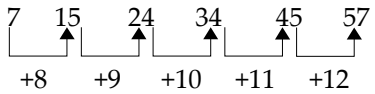
Step-4: If the given number series is increasing or decreasing with a very large amount, then there must be square/cube or square root/ cube root between the numbers.

Examples:

Understand the logical sequence of numbers given below and find the value at *'x'*.

1) 7, 15, 24, 34, 45, *x*.

Explanation:



If you observe the series, the difference between the given numbers is constantly increasing. So the next number in the series is 57.

2) 289, 169, 121, 49, *x*.

Explanation: $289, 169, 121, 49, 25$
$(17)^2\ (13)^2\ (11)^2\ (7)^2\ (5)^2$

If you observe the series, each number is followed by prime squares in the descending order. So the next number in the series is $(5^2) = 25$.

3) 1, 8, 27, 64, 125, *x*.

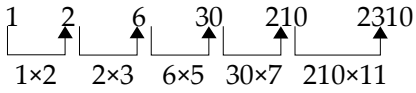
Explanation:

$1, 8, 27, 64, 125, 216$
$1^3, 2^3, 3^3, 4^3, 5^3, 6^3$

If you observe the series, each number is followed by cubes of natural numbers. So the next number in the series is $6^3 = 216$.

4) 1, 2, 6, 30, 210, *x*.

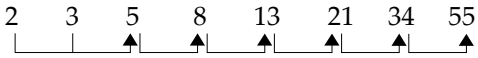
Explanation:



In this series, each number is multiplied by the next prime number starting from 2. So, 210×11 = 2310.

5) 2, 3, 5, 8, 13, 21, 34, *x*.

Explanation:



Every number is added to its previous number (Fibonacci series).

ALPHABET SERIES (WORD SERIES)

In this type of series sequence of alphabets are given in a logical order. You have to understand the logic interpreted in the given series and find the missing or the next alphabet/ word.

Examples:

Find the missing word in the following series.

1) EGI, JLN, OQS, _____.

Explanation: Every alphabet is moved 5 steps forward.

E + 5 = J ; G + 5 = L ; I + 5 = N

Hence, the next term in the series is 'TVX'.

2) AZ, BY, CX, _____ EV, FU.

Explanation: The first letter in the series is increased by 1 and second letter is decreased by 1. Hence, the answer is 'DW'.

DIRECTION SENSE

CONCEPTS

Direction sense test question will be asked to check the candidates ability in deciding the shortest way within time. In this type of questions, we will see persons or things moving in East, West, North and South directions from an initial point.

There are 4 directions viz., East, West, North, South.

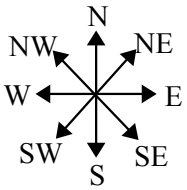
And 4 cardinal directions viz., North–East, North–West, South–East, South–West.

There are 4 types of problems which are frequently been asked in Campus Recruitment Tests.

1) Problems on Distances **2)** Problems on clocks

3) Problems on Angles **4)** Problems on Shadows

The diagram on the side illustrates the relevant positions of all the 8 directions.



Problems on directions can be solved in 2 ways.

(1) Diagrammatic way **(2)** Shortcut way

While solving the problems on directions, it is very important for you to remember the left and right directions of each direction. *i.e.* Left of the East is North. Right of East is South and so on.

Type-(1): Problems on Distances:

Steps for shortcut method:

1) If the directions are same, then add the distances.

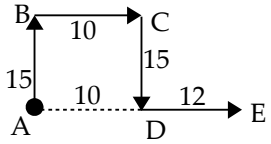
2) If directions are opposite, then subtract the distances and write the direction which has maximum value.

3) If directions are *North–East*, *North–West*, *South–East* or *South–West* then take both directions as single direction and calculate the distance using the formula.

$\sqrt{(First\ Distance)^2+(Second\ Distance)^2}$

Example: A man walk 15 Km towards North. From there he walks 10 Km towards East. Then 15 Km towards South. Finally he walks towards East 12 K*m*. How far and in which direction is he with reference to his starting point?

Explanation: Diagrammatic Method



The shortest distance is AD = 10 + 12 = 22 km and the direction is East.

Shortcut Method:

First he walked 15 Km *North*, so write N(15).

Next he walked 10 Km *East*, so write E(10) *i.e* N(15)E(10) and continue till the last statement.

Then we get, N(15) E(10) S(15) E(12)

Now apply the tips discussed above.

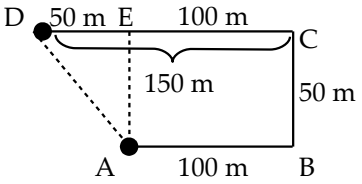
i.e. add E(10) and E(12) = E(22) ($\because$ same directions)

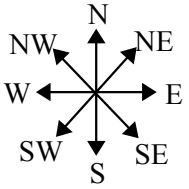
and subtract N(15) and S(15) = 0 ($\because$ opposite directions)

$\therefore$ Finally he is in *East* direction with distance 22 Km.

Example: A Boy started to school from his home. He walks 100 m in East. Then he walks 50 m to his left. From there he walks 150 m to his left again, finally he reached his school. How far and in which direction his school is located from his home?

Explanation: Diagrammatic Method:





From Δ ADE the shortest distance is AD.

BC || EA. So, BC = EA = 50.

$AD=\sqrt{(AE)^2+(DE)^2}=\sqrt{(50)^2+(50)^2}$

$AD=\sqrt{2500+2500}=\sqrt{5000}=10\sqrt{50}$

The school is in *North West* direction and at a distance of $10\sqrt{50}\,meters$ from his home.

Shortcut Method:

Write from starting point to destination.

i.e. E(100) N(50) W(150)

East and *West* are opposite directions to each other, so subtract them and write the direction which has highest value. *i.e.* W(50).

N(50) W(50) = $NW\left[\sqrt{(50)^2+(50)^2}\right]$

= $NW\left[\sqrt{2500+2500}\right]=NW\left[\sqrt{5000}\right]=NW\left[10\sqrt{50}\right]$

Required direction= *North–West*; Distance = $10\sqrt{50}\,m$

Type-(2): Problems on Clocks:

Steps to Solve:

1) Representing the given time in a clock diagram. Rotate the directions diagram according to the given clock timings. (Rotation of the direction arrows either clock wise or and clockwise but maximum 180^0 only).

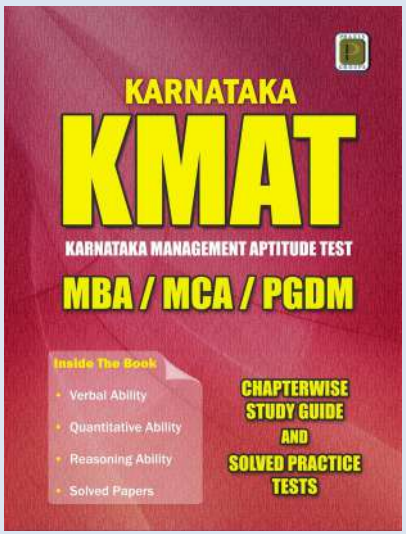
2) If two timings are given in the problem, then apply the same rotated directions to second timing also.

Example: A clock shows 10:30 (*am*/*pm*). If its minute hand points to East, then its hour hand points to?

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



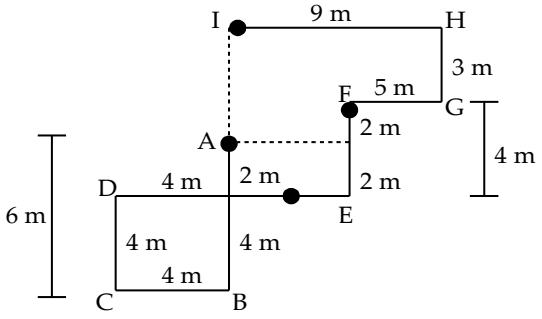
PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

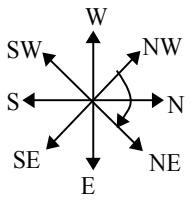
Diagram method



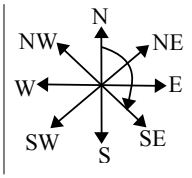
16)d; Kavitha's shadow is falling to the right of Mamatha. So, locate Mamatha at *North.* It means Mamatha is facing *South.*

17)b; Given that *South → East*, *East → North.*
Every direction is rotating 90^0 in anti clock wise. Then *West* will become *South.*

18)c; Rotate cardinal directions 90^0 clockwise, normal directions 90^0 anti clockwise. *North–West* is a cardinal direction. If rotating 90^0 clockwise it will be *North–East.*

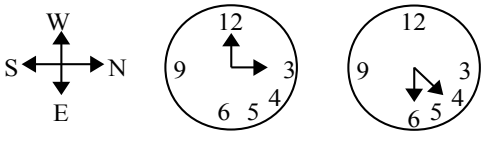


19)a; Rotate each direction 135^0 clockwise. Then North becomes *South–West.*



20)c; The shadow of Pole–2 is falling exactly to the right of Raju. So, locate Raju at *North.* Then Pole–2 will be located at *South.*

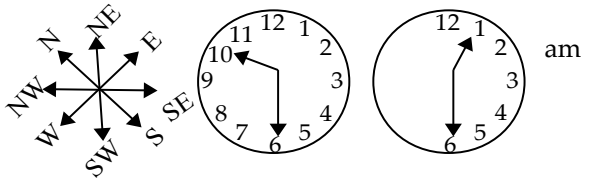
21)b; Arrange the direction diagram in such a way that at 3 pm hour hand points to *North.* Then at 4:30 pm minute hand points to East.



22)c; If a clock shows particular time in the mirror, to get the original time, we have to subtract the given particular time from 12. Here the mirror clock shows 3 am. Original time = 12–3 = 9 am.
At 9 am hour hand points to *West* in the original clock.

23)d; Rotate each direction 45° anti clockwise then apply to the time 1:30 am.

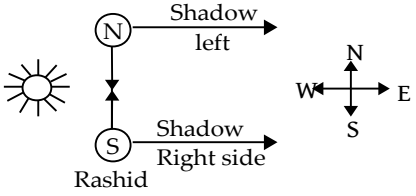
At 01:30



am

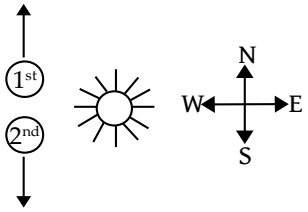
minute hand points to *South–West.*

24)e; Here, the situation is sunset. So the sun will be in the *West*. Raju's shadow was exactly to the right of Rashid. It means Rashid is located at *South i.e.* Rashid is facing *North*.



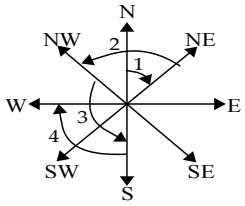
25)e; Given data is inadequate to answer this question.

26)a; The 2nd person faced to the *South* direction.



27)b;
$\theta = 45^0 - 90^0 - 135^0 + 90^0 = -90^0$
*i.e.*She is facing the direction, which is 90^0 anti clockwise from initial direction = *West*.

Diagram Method.



28)c; $\theta = 45^0 + 180^0 - 270^0 = -45^0$ *i.e.* He is facing 45° anti clock wise from starting direction = *North–West*

29)b; $\theta = 45^0 + 90^0 - 135^0 + 180^0 - 90^0 - 90^0 = 0^0$
It means she is facing in the same direction as her initial direction (*i.e. North–East*).

30)b; $\theta = 35^0 + 10^0 - 180^0 = -45^0$. It means he is facing 135° in anti clock wise direction from the starting location (*east*). i.e. 135° anti clock wise direction from East is North – West.

SYMBOLS AND NOTATIONS

CONCEPTS

In this type of question an equation is given in which operators are coded into symbols. You will be given the relationship between the symbol and operator. Using that relationship you need to convert the symbol based equation into mathematical equation. Thereafter solve the equation with the help of VBODMAS rule.

Approach:

1) Study the relations of the symbols and mathematical operations.
2) Convert the symbols into mathematical operations.
3) Use VBODMAS rule, if necessary, for simplification.
4) Calculate the given expression.
5) Find the final value after calculation, which is the required answer.

CONCEPTUAL EXAMPLES

If + means –, – means ×, × means ÷, ÷ means + then solve the following questions.

1) $4 \div 8 + 2 \times 3 - 6 = ?$

Explanation: After interchanging the operators, we get

$\Rightarrow 4 + 8 - 2 \div 3 \times 6$

(Applying VBODMAS Rule)

$\Rightarrow 4 + 8 - \frac{2}{3} \times 6 \Rightarrow 4 + 8 - 4 \Rightarrow 8.$

2) $16 \times 8 - 6 + 15 \div 27 \times 9$

Explanation: After interchanging the operators, we get

$\Rightarrow 16 \div 8 \times 6 - 15 + 27 \div 9$

Applying VBODMAS Rule

$\Rightarrow 2 \times 6 - 15 + 3 \Rightarrow 15 - 15 = 0$

EXERCISE

1) If + means –, – means ×, × means ÷, ÷ means +.
Then $(256 \times 16 \div 49 \times 7 + 125 \times 5 - 2 \div 289 \times 17) = ?$
a) 10 b) –15 c) –10 d) –17 e) 15

2) If + means –, – means +, ÷ means ×, × means ÷. Then what is the value of $(25 - 5 + 5) \div (3 \div 7 + 21)$?
a) 1 b) 0 c) 2 d) 4 e) none of these

3) If + means –, – means ×, × means ÷ and ÷ means +. Then $(278 + 8 \times 2 - 7 \div 316 + 7 \times 28 - 364) = ?$
a) 275 b) 475 c) 375 d) 575 e) none of these

4) Interchange the signs + and –, numbers 1 and 2. Based on this information, which of the following is correct?
a) 12 + 21 – 12 = 21 b) 21 + 21 + 12 = 21
c) 12 + 12 – 21 = 12 d) 21 – 21 – 21 = 33
e) 21 – 12 – 12 = 50

5) If + means ×, ÷ means - , × means ÷ and – means + then what will be the value of the following expression.
$22 \times 2 - 6 \div 7 + 36 \times 18$
a) 5 b) 15 c) 25 d) 3 e) 23

6) If *A* means +, *B* means –, *C* means ×, *D* means ÷. Then which of the following statements is correct?
a) 10A8B7C4D2 = 6 b) 12C6A3C9D3 = 71
c)14D2C9B5C5 = 38 d) 16B5A15D3C4 = 21
e) none of these

7) Interchange the signs + and ×, numbers 5 and 7. Based on this, find the value of, $5 \times 15 + 7 - 20 \times 6 = ?$
a) 68 b) 78 c) 88 d) 98 e) 58

8) Interchange the signs – and ÷, numbers 4 and 6. Based on this, simplify the expression, $16 \div 8 - 6 + 12 \div 6$.
a) 10 b) 20 c) 25 d) 30 e) 15

9) If $6 \Delta 5 = 341$ and $7 \Delta 3 = 370$ then $10 \Delta 8 = ?$
a) 189 b) 962 c) 1024 d) 1512 e) 764

10) If $6 @ 4 = 20$, and $9 @ 6 = 45$ then $16 @ 11 = ?$
a) 125 b) 112 c) 135 d) 161 e) none

11) If $x \$ y = (x + y)(x - y)$ and $a \Delta b = a + b$ then find the value of $(6 \$ 3) \times (9 \Delta 3)$?
a) 423 b) 234 c) 324 d) 824 e) none

12) If $A \oplus B = (A - B)^2$ and $A \% B = (A + B)^2$.
Then find the value of $(16 \oplus 12) \times (18 \% 12) \div 10 = ?$
a) 1331 b) 1404 c) 1234 d) 1440 e) none

13) If – means ×, × means +, + means ÷ and ÷ means –, then $(52 + 13) \times (192 \div 86 \times 46 - 21) = ?$
a) 976 b) 1706 c) 1176 d) 1617 e) 1076

Directions (14 to 18): In a certain code language,
+ means ÷, ÷ means ×, × means –, – means +. Using this information, simplify the following expressions.

14) $10 \times 5 - 125 + 5 \div 2 - 256 = ?$
a) 311 b) 113 c) 211 d) 131 e) 321

15) $106 - 1331 + 121 - 56 \div 42 = ?$
a) 2649 b) 2946 c) 2496 d) 2469 e) 2964

16) $(44 - 22 \div 4 \times 12 - 36 + 4) + 3$
a) 42 b) 43 c) 44 d) 46 e) none

17) $(10 \times 3 - 2) \times (12 - 3 + 3 \times 2) = ?$
a) 2 b) –2 c) 1 d) –1 e) 0

18) $12 \div 4 - 16 \times 32 - 64 + 16 = ?$
a) 32 b) 34 c) 63 d) 38 e) 36

Directions(19–23): Study the following sequence carefully and answer the questions given below.

2 K # 7 A 9 $ 3 @ L K 6 2 ! 9 < 8 M 2

19) Find the next term in the following series.

2 K #, 7 A $, 3 L !, ?

a) 9 < M b) 9M∧ c) 6M∧ d) 6∧M e) 9 < 2

ABSTRACT REASONING

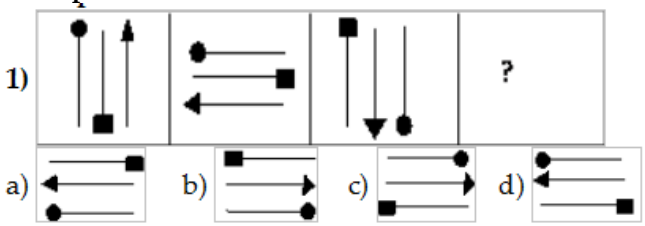
CONCEPTS

In this type of questions you will be given set of figures and asked you to identify next figure or odd figure. This chapter can be further classified into the following sections.

1. Analogy
2. Classification
3. Series
4. Addition
5. Subtraction
6. Addition and subtraction
7. Rotation-clockwise
8. Rotation-anti clockwise
9. Horizontal
10. Vertical
11. Alternative–rotation
12. Combination (clock wise rotation with addition/ subtraction)

• **Analogy:** Analogy question contains three figures and it asks to find out the fourth figure. we have to identify the relation between first two figures then apply the same relation to third figure for finding the fourth figure.

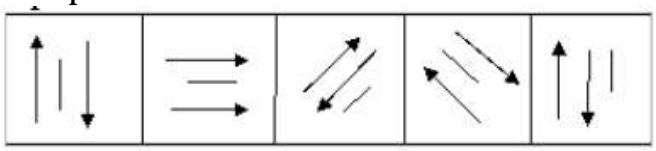
Example:



Explanation: From figure-1 to 2, the lines are rotated 90° clockwise and the circle, triangle, square are moved to its opposite side. The same rule is applied to figure-3 to obtain figure-4. The answer is option-b.

• **Classification:** In classification question you will be given five figures from which you have to identify the odd one. *i.e.* four figures out of the five are connected to each other where as one figure is no way connected. That figure is the answer for given question.

Example.



Explanation: In all above figures, each figure contain two arrows (↑) and one small line, those two arrows are in opposite direction to each other except figure-2.

• **Series:** In this type of question you will be given three or four figures which are in series. *i.e.* all the given figures are related to each other in certain pattern. You'll be asked to find out the next figure in the series. To find out the next figure you have to identify the hidden logic of the series. After tracing the logic you have to apply it to the last figure to find the asked figure. The logic in series figures can be classified into following.

Addition: In this type of series an addition of component is happening to the figures incrementally.

Subtraction: In this type of series subtraction of components is happening to the figure decrementally.

Addition and Subtraction: In this type of series, alternative addition and subtraction happens to the figure.

Rotation–Clockwise: In this type of series, figures are rotating in clockwise direction.

Rotation–Anti clockwise: In this series, figures are rotating anti clockwise.

Horizontal: In this type of series, figures move in horizontal direction.

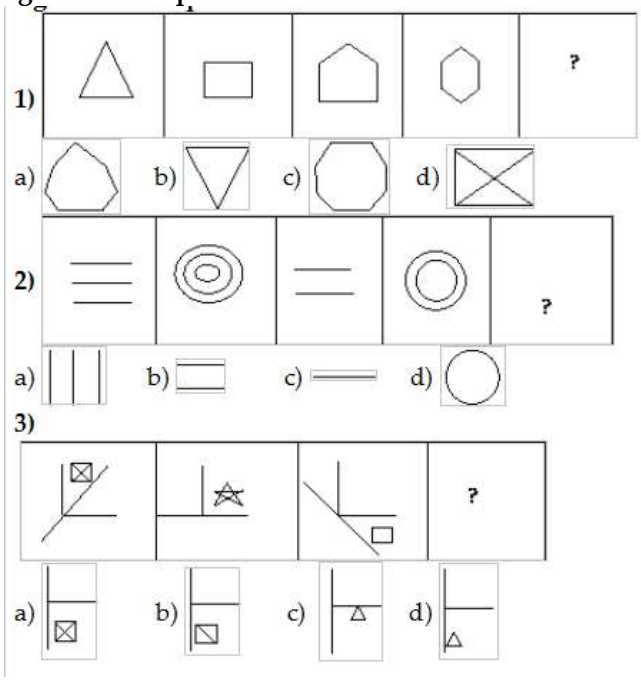
Vertical: In this type of series, figures move in vertical direction.

Alternative–Rotation: In this type of series, figures move in horizontal and vertical direction alternatively.

Combination: In this type of series all the above mentioned actions can happen.

EXERCISE-I

Select a figure from the given options which will continue the same series as established by the four figures in the question.



SYLLOGISMS

CONCEPTS

Questions on syllogism contains statements followed by conclusions. You have to analyze the given statements carefully and find which of the conclusions logically follow. Each statement of syllogism contains of three parts. They are, *subject*, *predicate* and *copula.*

Subject is that about which something is said.

Predicate is that part of the statement that which affirms is denied about the subject.

Copula is the word of the statement which denotes the relation between the subject and predicate.

Example: Consider the statement, *'woman is talented'*.

Here an information about *woman* is given. So, *woman* is the subject. *'talented'* is the quality affirmed for this subject. So it is the predicate. *'is'* denotes the relation between subject and predicate. So, it is *copula.*

Here we will discuss three types of methods to solve the questions on syllogism.

1) Diagrammatic method

2) Rules and Application method

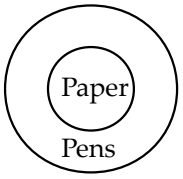
3) Numbering and Apply method

<u>1) Diagrammatic Method</u>:

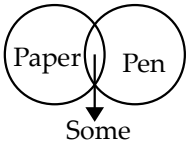
To solve the syllogism questions in this method, you have to represent the given statements in the form of a diagram. In syllogisms, frequently we come across the terms like *all*, *some* and *no, not* etc.

Example: 1) *All papers are pens.*

If the above statement are represented in a diagram, *papers* will be in inner circle and *pens* will be in outer circle. *i.e.*

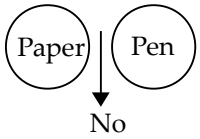


2) *Some papers are pens*.



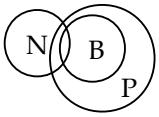
3) *No paper is pen.*

'no' indicates there is no relations exists between subject and predicate of the given statement. Hence, the two circles will not meet each other.



Example: Statements: Some Note books are books
All books are papers
Conclusions: I. Some Notebooks are papers
II. No papers is notebook

Explanation: The possible Venn diagram for the given statements is as follows:



From the given statements, statement-I follows from the above diagram but statement-II does not follow.

<u>2) Rules and Application Method:</u>

The following rules are very useful while solving problems using this method.

all	+	*all*	→	*all*
all	+	*no*	→	*no*
some	+	*all*	→	*some*
all	+	*some*	→	no conclusion
no	+	*no*	→	no conclusion
some	+	*some*	→	no conclusion
some	+	*no*	→	*some-not*
no	+	*all*	→	reverse of *some-not*
no	+	*some*	→	reverse of *some-not*

some-not/reverse of *some not*+ anything = no conclusion.

Implication Statements:

1) All → Some

If *'all A`s are B`s'* then *'some A`s are B`s'* is also true.

2) Some ↔ Some

If *'some cats are rats'* then *'some rats are cats'* is also true.

3) No ↔ No

If *'no car is bus'* then *'no bus is car'* is also true.

Note: For ***either-or*** option: If one conclusion is positive (*i.e.* starts with *all/ some*) and the other conclusion is negative (*i.e.* starts with *no*) and if they both have same objects as that of the given statements then the answer will be those two conclusions with *either-or* words.

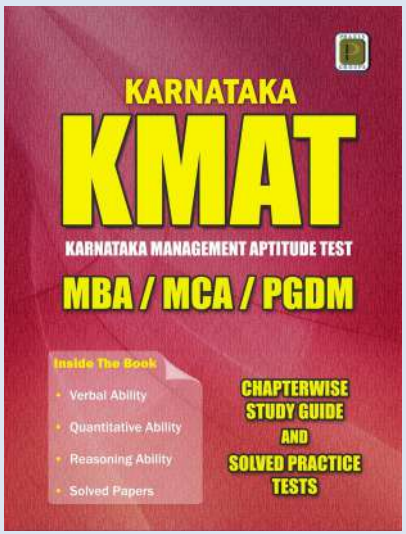
Example: 1) Statements: Some keys are locks
All locks are doors
Conclusions: I. All keys are doors
II. Some keys are doors
III. Some keys are not doors

a) only conclusion-(I) follows
b) only conclusion-(II) follows
c) only conclusion-(III) follows
d) both conclusion-(I) and (III) follows
e) None of the given conclusions follow

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

21)a; From the given statements, a*ll* + *no* = *no.* Common word also exists. So,

All tins are ~~baskets~~
No ~~backet~~ is cot
No tin is cot

So, conclusion-(I) follows. Conclusion-(II), (III) and (IV) are not valid since, *all* + *no* = *no.* And *'some'* cannot be derived from these statements.

22)g; From statement-1 and 2, *some* + *all* = *some* and common word also exists. So,

Some pen drives are ~~hard disks~~
All ~~hard disks~~ are CD's
Some pen drives are CD's

So, conclusion-(I) an (II) follow. Conclusion-(III) and (IV) do not follow, because there is no common term between statement-1 and 3.

23) Conclusion-(I) is not true, since from statement-2 and 3, *all + some = no conclusion.*

Conclusion-(II), (III): From statement-1 and 2,

Some fans are ~~switches~~
All ~~switches~~ are lights
Some fans are lights

So, conclusion-(III) is true. Conclusion-(IV) is not true, since *all + some = no conclusion.*

Hence, only conclusion- (III) follows.

24)a; (i) Check the given statements and conclusions.

If both statements are positive, then conclusion should be positive. So, conclusion-(II) which is negative is not valid. Now, we have to check whether conclusion-(I) is valid or not.

(ii) Conclusion-(I) has no direct relation, and it has been derived by combining both the statements.

(iii) So, assign the values to statements and conclusions using value table.

Statements	**Conclusion**
$\overset{100}{\text{All scales}}\ \overset{50}{\text{are chocolates}}$ $\overset{100}{\text{All chocolates}}\ \overset{50}{\text{are sweet}}$	$\overset{100}{\text{All scales}}\ \overset{50}{\text{are sweet}}$

The common word *'chocolates'* in the statements has one value as 100. So, we can solve the statements.

(iv) Now, check income and expenditure of each word in the conclusion.

Income of scales = 100 and expenditure of scales = 100.

So, Income ≥ Expenditure.

Income of sweet = 50 and expenditure of sweet = 50.

Income ≥ Expenditure.

So, conclusion-(I) is true. Hence, option-a is correct.

25)a; (i) Both statements are positive. So, conclusion should be positive. So, we check both the conclusions.

(ii) Assign values using value table.

Statements	**Conclusions**
$\overset{50}{\text{Some players}}\ \overset{50}{\text{are singers}}$ $\overset{100}{\text{All singers}}\ \overset{50}{\text{are tall}}$	$\overset{50}{\text{Some players}}\ \overset{50}{\text{are tall}}$ $\overset{100}{\text{All players}}\ \overset{50}{\text{are tall}}$

(iii) Conclusion-(I): It does not have a direct relation. It has been derived from both the statements and common word (*singers*) has at least one value as 100.

So, Income of *players* (50) ≥ Expenditure of *players* (50).

Income of *tall* (50) ≥ Expenditure of *tall* (50).

∴ Conclusion (I) is true.

(iv) Conclusion(II): Income of players (50) < Expenditure of players (100) So, conclusion-(II) is not true.

Hence, option-a is correct choice.

26)g; (i) Here one statement is positive and another is negative. So, the conclusion which combine these two statements must be negative. But conclusion-(II) is obtained from statement-1 alone. So, we have to consider even conclusion-(II). Now, we will check whether both conclusions are true or false.

(ii) Assign values using value table.

Statements	**Conclusions**
$\overset{100}{\text{All bottles}}\ \overset{50}{\text{are } plastic}$ $\overset{100}{\text{No } plastic}\ \overset{100}{\text{is stronge}}$	$\overset{100}{\text{No bottle}}\ \overset{100}{\text{is stronger}}$ $\overset{50}{\text{Some bottles}}\ \overset{50}{\text{are plastic}}$

(iii) Conclusion-(I): It has no direct relation. *i.e* It is obtained by combining both the statements. The common word (*plastic*) has one value as 100 in the statements. So, Income of *bottles* (100) ≥ Expenditure of *bottles* (100). Income of *stronger* (100) ≥ Expenditure of *stronger*(100). ∴ Conclusion-(I) follows.

Conclusion-(II): It is directly obtained from statement-1 *i.e.* it has a direct relation.

So, Income of *bottles* (100) ≥ Expenditure of *bottles* (50).

Income of *plastic* (50) ≥ Expenditure of *plastic* (50).

∴ Conclusion (II) also follows.

27)f; (i) *Positive + Positive = Positive*;

Here, the given statements are positive and conclusions which are obtained from both the statements are negative. Hence, we can say that no conclusion follows.

28)f; *Negative + Negative = No conclusion.*

So, no conclusion exists from these two statements.

∴ Option-f is correct choice.

STATEMENTS AND ARGUMENTS

CONCEPTS

In this type of questions, the statement deals with all general aspects of day to day life which may include socio economic, scientific, political issues etc. A statement is followed by two arguments. One supports the statement by pointing out the positive aspects and the other deny the statement by pointing out it's negative impact. You have to analyze given statement, arguments and decide which of the arguments strongly supports the statement by giving an appropriate opinion on the subject. Read the given arguments in the question and discard them if they are *ambiguous*, *disproportionate*, *irrelevant*, *comparative, simplistic.*

1) Ambiguous: If the given arguments does not have a clear reason or if it is not contextual or not expressing its opinion whether supporting or not. Such an argument should be discarded.

2) Disproportionate: If the given arguments are too large or too small in comparison with given statements. This kind of arguments can be discarded.

3) Irrelevant: If the given arguments are irrelevant to the context of the given statements, they can be discarded.

4) Comparative: If the argument do not state the reasons for why the proposed action is implemented and its consequences. Such arguments can be discarded.

5) Simplistic: If the given arguments do not have sufficient information to support the given statements, they cannot be considered.

CONCEPTUAL EXAMPLES

Direction: Each of the following examples consists of a statement followed by two arguments (I) and (II). Give your answer as,

a: if only argument-(I) is strong.

b: if only argument-(II) is strong.

c: if either argument-(I) or (II) is strong.

d: if neither of the arguments is strong.

e: if both the arguments are strong.

1) Statement: Should number of holidays be increased to private employees?

Arguments:

I. Yes, because employee satisfaction will be better.

II. No, it will lead to decreased productivity of private organizations.

Explanation: Though employee satisfaction is important but this will adversely affect the productivity and revenue of the organization. So the argument-(I) does not hold strong. Hence, only argument-(II) is strong.

2) Statement: Should taxes on air conditioners be further increased?

Arguments:

I. Yes, air conditioner is a luxury item and rich people can only buy them.

II. No, air conditioners are bought by financially backward sector also.

Explanation: Generally, taxes on any commodities or goods doesn't depend on the financial position of the individuals so, both the arguments does not hold strong. Hence, option-d is correct choice.

3) Statement: Should Indian software professionals who are working abroad be called back?

Arguments:

I. Yes, they must serve the mother land first and forget about high pay scales or facilities etc.

II. No, we have adequate talent here, let them stay according to their will and wish.

Explanation: The demands of an individual are as important as the demands of motherland. So, argument-(I) is not strong. Argument-(II) is weak because of its complacent attitude. Hence, option-d is correct choice.

4) Statement: Should education to women be made free in India?

Arguments:

I. No, this will weaken our present social structure.

II. Yes, this is the only way to bring back glory to Indian woman hood.

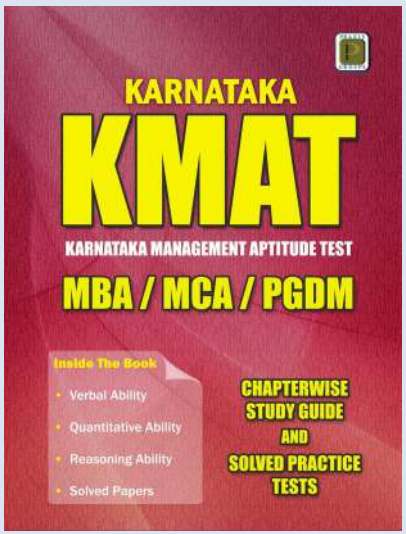
Explanation: Argument-(I) is strong. It is links, providing free education to women with weakening of social structure, which is not sensible. Argument-(II) also weak because of the term *'only'*.

Hence, option-d is correct choice.

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

11)a; Yes, it is important to manufacture nuclear bombs to protect the country from threats. So, argument-(I) is strong comparing to argument-(II).

12)a; Today computers are needed for better use of underutilized human resources and with computers we can accomplish this with better speed and efficiency. So, argument-(I) holds strong.

13)e;Both the arguments are strong. Relationship should be prevailed among all the batches and also it should not cross the limits.

14)d; It cannot followed just as others have done it. So, argument-(I) is not strong. Also, Nationalization will promote service but do not deteriorate it.
So, none of the arguments hold strong.

15)b; Connecting roads helps for development of the villages and people. So, argument-(II) holds strong.

16)b; Argument-II is strong compared to argument-(I).

17)e; Both the arguments are strong. Because industries may increase the pollution, but it also increases the employment opportunities for unemployed youth.

18)b; Even though illiterate people are not completely aware of the voting guidelines, it is their constitutional right to vote. So, they cannot be avoided.
Hence, option-b is correct choice.
19)a; Argument-(I) is stronger than argument-(II).

20)b; India is a secular country and that does not mean religion and religious values should be banned. In fact, they promote good thoughts.
So,argument-(II) is strong.

21)d; Clearly, none of them should be made more powerful than the other. Instead a balance should be created between executives and judiciary, so that each can exercise its influence over the other and prevent malfunctioning. So, both the arguments are not strong.
22)b; Just because other countries have implemented, it may not be suitable for our country. Because every country has its own environment and people's life style. So, argument-(I) is vague.
Increasing the age of retirement is indeed a genuine demand of most of the employees for self dependency. So, argument-(II) holds.

23)b; Imposing ban on fashionable dresses will be a restriction to freedom and personal choice of an individual. So, only argument-II is strong.

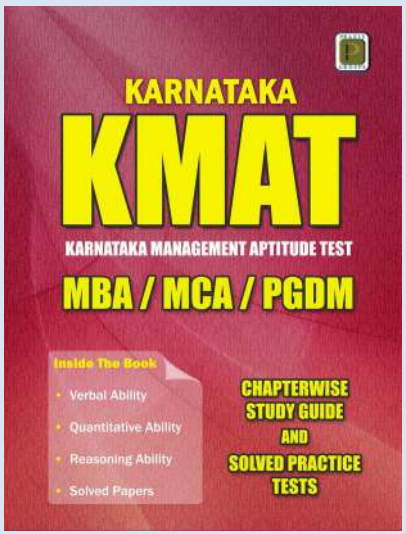
24)a; Harnessing solar energy will be helpful as it is an inexhaustible resource unlike other resources. So, argument-(I) holds. But argument-(II) is vague as solar energy is the cheapest form of energy.

25)b; Petrol/ diesel, being an essential commodity, our country must keep it in reserve. So, argument-(I) is vague. While argument-(II) is strong as it provides substantial reason for the same.

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

SECTION – D

KMAT
PRACTICE TESTS

KMAT PRACTICE TESTS

TOPICWISE QUESTION DISTRIBUTION

SECTION – A : VERBAL ABILITY	40 Questions
1. Reading Comprehension (2 Passages)	10 Questions
2. Sentence Correction and spotting errors	5 Questions
3. Cloze Test	5 Questions
4. Sentence Completion	5 Questions
5. Synonyms	4 Questions
6. Antonyms	4 Questions
7. Verbal Analogy	2 Questions
8. Idioms and Phrases	3 Questions
9. Active and Passive Voices / Reported speech	2 Questions

SECTION – B : QUANTITATIVE ABILITY	40 Questions
1. Number System (incl. Averages)	4 Questions
2. Ratio Proportion and Variation	2 Questions
3. Percentages	2 Questions
4. Interests and Discounts	2 Questions
5. Profit and Loss	2 Questions
6. Partnerships	1 Questions
7. Time and Work	1 Questions
8. Time Speed Distance	3 Questions
9. Pipes and cistern	1 Questions
10. Data Interpretation (2 or 3 sets of Tables/Graphs/Charts)	10 Questions
11. Polynomials and Quadratic Equations	2 Questions
12. Equations of a line and linear equations	1 Questions
13. Plane geometry	2 Questions
14. Coordinate Geometry or Mensuration	1 Questions
15. Trigonometry (2 +1 heights and distances)	3 Questions
16. Permutation and Combination	2 Questions
17. Probability	1 Questions

KMAT PRACTICE TESTS

TOPICWISE QUESTION DISTRIBUTION

SECTION – C : LOGICAL AND ABSTRACT REASONING	40 Questions
1. Seating Arrangement	10 Questions
2. Data Sufficiency	4 Questions
3. Coding Decoding	4 Questions
4. Blood Relations	2 Questions
5. Alphabet Test	2 Questions
6. Calendar	2 Questions
7. Clocks	1 Questions
8. Classification Analogy	2 Questions
9. Series	1 Questions
10. Direction Sense	2 Questions
11. Symbols and Notation	2 Questions
12. Non Verbal Reasoning	2 Questions
13. Verbal Reasoning	
a) Statement Conclusion	3 Questions
b) Statement Arguments	3 Questions

KMAT

PRACTICE TEST—1

SECTION -A

VERBAL ABILITY

Read the passage carefully and answer the questions given below it.

Helping others physically by removing their physical needs, is indeed a good thing, but spiritual help is more substantial as according it is, more far reaching because the need is greater. If a man's wants can be removed for an hour, it is helping him indeed; if his wants can be removed for a year, it will be more help to him; but if his wants can be removed for ever, it is surely the greatest help that can be given to him. It is only with the knowledge of the spirit that the faculty of want is annihilated for ever; so helping man spiritually is the best help that can be extended to him. He who gives spiritual knowledge is the greatest benefactor of mankind. A spiritually strong and sound man can be powerful in every other respect, if he so wishes. Until there is spiritual strength in man even physical needs cannot be well satisfied. Next to spiritual comes intellectual help. The gift of knowledge is a far higher gift than that of food and clothes; it is even higher than giving life to a man, because the real life of man consists of knowledge. Ignorance is death, knowledge is life.

1) What is the theme of the above passage?
a) Religious faith b) Social service
c) Spiritual knowledge d) Physical wants

2) How can man's physical wants be removed?
a) Through physical help
b) Through money
c) Through charity
d) Through a strengthening of his spirit

3) Which gift is higher than that of material things?
a) Gift of knowledge b) Gift of power
c) Gift of happiness d) Gift of success

4) What does 'ignorance' mean?
a) Lack of knowledge b) To be disinterested
c) To be unaware d) To be helpless ware

5) Who is the greatest benefactor of mankind?
a) One who imparts intellectual knowledge.
b) One who gives spiritual knowledge.
c) One who gives manual assistance.
d) One who protects everyone

Read the passage carefully and answer the questions given below it.

There are two basic rules in argumentation. First, consider your audience. Second, consider how to use language to get the reader where you want him. Your approach to your subject must fit the kind of audience you expect to have. The first rule requires you to imagine in advance and in detail how the reader thinks. You must be able to put yourself in the place of the reader to respond as he would to the words on the page. It requires detachment from your own feelings, and words, and an imaginative leap into the minds of the audience. This duality of mind, in which you will simultaneously think and feel, on the one hand and analyse your thoughts and feelings, and the words which express them, on the other, is the crucial change in attitude which will finally make a writer out of a scribbler. It can be achieved only through practice, through working for an audience and getting to know how the audience responds, over and over again until it becomes second nature to see the reader in imagination peering over your shoulder as you compose. Without this sense of audience, no degree of technical expertise in the use of words matter.

6) Basic rules of argumentation require
a) audience and language
b) yourself and language
c) language without audience
d) a selfish personal involvement

7) Good writing requires
a) a complete detachment from the reader
b) a psychological identification with the reader.
c) attachment to subjective feelings.
d) no consideration at all for the feelings of readers.

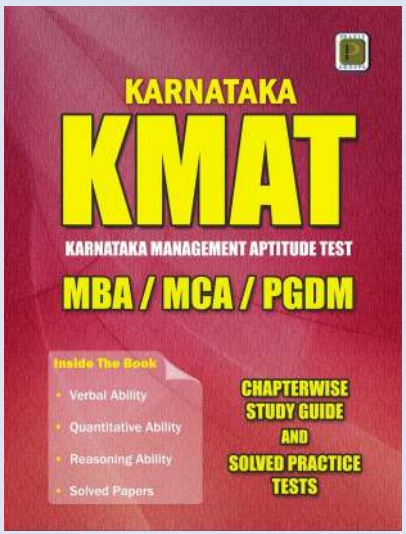
8) A true writer's success depends upon
a) a sense of audience
b) purely personal feelings
c) a mere analysis of words
d) words without thoughts

9) The duality of mind implies
a) thought feelings, analysis and words
b) thought without feelings
c) thought and feelings
d) thought and feelings but no analysis of words

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

figure in in (I), get inverted and becomes middle figure in (II).

111)a; Since, Rajesh has no brother or sister, so he is his father's only son. Now, wife of my father's son means my wife. So, Rajesh's wife is the man's mother or the man is Rajesh's son.

112) c; 'S is the aunt of T' means 'S is the sister of the father (say M) of T'. i.e; S × M + T.

113)a; Letters in Word	**Letters in Alphabet**
I E N D S H I **P**	**I** J K L M N O **P**
H I	**H I**
S H I **P**	**S** R Q **P**

114)d; 7$12, 4©2 and 3 ! 6.

115)a; Here we need to find the day of the date 20–05–1987. Formula for the day of the date = $\frac{D+Mc+L_{2d}+Lp_c+CC}{7}$

Where, D=Date; Mc=Month code; CC=Century code; L2d = Last 2 digits of the year; Lpc = Leap year code;

$\frac{20+2+87+21+0}{7}=\frac{130}{7}=4(\text{Remainder})$;

4 denotes Wednesday.

116)a; At 2 O'clock, the clock is as follows,

At 2'0 clock, the angle between the two hands

= 2 hours spaces = 2 × 300 = 600.

In 60 min longer hand gains 3300 on the shorter hand. For how many minutes longer hand gains 600 on the shorter hand?

The time required = $\frac{60\times60}{330}=\frac{120}{11}=10\frac{10}{11}min$

117)c; The relationship is $x:\left(\frac{x^2}{2}+x\right)$

$\Rightarrow 8:\left(\frac{8^2}{2}+8\right)\Rightarrow 8:(32+8)=8:40$

$\Rightarrow 16:\left(\frac{16^2}{2}+16\right)\Rightarrow 16:(128+16)=16:144.$

118)b; The relation is, Number : Sum of digits.

3895 : (3 + 8 + 9 + 5) : : 3895 : 25

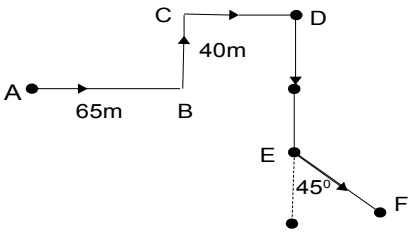
119)c; The pattern is +8,+8,+16,+16,+24, ...

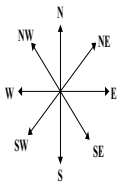
∴ Missing number = 135 + 24 = 159.

120)c; Diagram Method:

I started from 'A', moved 65*m* up to B. Then turned left and walked 40*m* upto C. Then I turned to my right and walked 30*m* upto D. Then I turned to my right and walked 73*m* up to E. Turning to left at an angle of 45^0 finally I was walking in the direction 'EF'.

i.e. **South-East**. Hence the answer is (c).





Shortcut Method:

Step-1: I moved 65*m* towards East. So, write E_{65}.

Step-2: From there I turned my left. i.e. left of East is North. So, N_{40}.

Step-3: From there I turned to my right and walked 30*m*. i.e. Right of North is East. So, write E_{30}.

Step-4: Then I turned to my right that means right of East is South 73 *m*. So, write S_{73}.

Step-5: Now, I am in the South direction and turned 45^0 left. i.e., South-East.

KMAT

PRACTICE TEST—2

SECTION -A

VERBAL ABILITY

Read the passage carefully and answer the questions given below it.

Akbar had quarrelled with Birbal over something important and had asked him not to come to the palace again. Akbar started missing Birbal and wanted him back, but could not find out where he was. Akbar hit upon a plan. He sent a message to all the villages that wells have been selected to wed the royal well and so they had to bring the bride capital immediately. This headmen of the various villages were alarmed at the impossible task and came rushing to the capital to apologise for their inability to move their wells. One man, Khaji, however, came to discuss the details of the wedding. Khaji wanted to know whether the marriage ceremony would be conducted in the traditional manner. Akbar assured him that all the formalities would be observed. Khaji was happy and assured Akbar that he would bring the bride to the gates of the city. Khaji added that according to the tradition, the bridegroom was to meet the bride at the village gates and take her into the city. He also asked Akbar when was the commitment date from the bridegroom so that they could set out with the bridal party. Akbar was happy to hear all this. He realized that such an intelligent idea could be thought out only by the fertile brain of Birbal and told Khaji that he did not want the well but the man who gave the idea.

1) Why did Akbar decide to perform the marriage

a) He wanted to know how marriage are performed

b) He wanted to increase the water in his well.

c) He wanted to test the intelligence of village headmen.

d) He wanted to find out the where about of Birbal

2) Which of the following is not true in the context of the passage ?

a) Birbal was the most intelligent man in Akbar's Kingdom.

b) Khaji thought of the idea that the marriage of wells should be conducted in a traditional manner

c) Akbar enjoyed Birbal's company

d) The King's well was to be the bridegroom

3) Which of the following true in the context of the passage?

a) Akbar quarrelled with others on small matters

b) Akbar ordered ll the village headmen to find out about Birbal

c) Every village headman did not react to Akbar's proposal in the same way.

d) Khaji was to bring the bridegroom to the village gates

4) Why did Akbar say that he did not want the well which Khaji was offering ?

a) Akbar did not like Khaji's demands

b) Akbar's intention behind his plan to perform the marriage was fulfilled.

c) There was not much water in the well

d) Akbar knew that Birbal came disguised as Khaji

5) Why did Khaji come to meet Akbar

a) He wanted to know whether the marriage would be performed in a traditional manner.

b) He wanted to know whether the bridegroom would come to his village gate to manner

c) He wanted to know why Akbar thought of a marriage between wells

d) He wanted to know when the marriage ceremony was to be held.

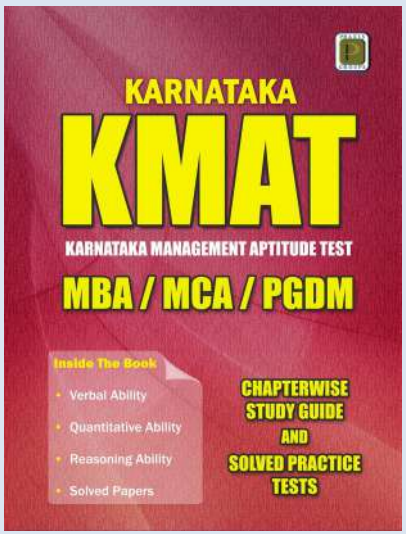
Read the passage and answer the given questions.

What you call 'my body' is just a heap of food that you have eaten, that you have accumulated over a period of time. What you call 'my mind' is just a heap of impressions that you have gathered from outside. So these two things are still outside. Your mind is just society's garbage bin. Anybody who walks by you, stuffs something in your head and goes. The accumulative part of the mind is subject to all kinds of social, religious and cultural situations, you are being exposed to. The very way you think, feel and understand life is just what kind of garbage you gathered in your head. Some of you have social garbage; religious garbage, spiritual garbage, it doesn't matter. But all this has come from outside. Your ability to recycle the garbage is your intellect. When your intellect becomes razor sharp, nothing sticks to it, it doesn't get attached to anything, it is not identified with anything, it just makes you see everything simply

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

100)b; Since the statements regarding set of bikes, only 1 and 4 can both be true. Statement 2 and 3 both cannot be true, because if 'all bikes are red' then 'some bikes cannot be red'. So, only 1 and 4 are both true.

101)d; The given word contains odd number of letters. So, keep the middle letter as it is and reverse the 1st and 2nd half. The middle letter in the word '*DIVISIBLE*' is '*S*' and the reverse of 1st half is '*IVID*' and the reverse of 2nd half is '*ELBI*'.

The code for the word '*DIVISIBLE*' is '*IVIDSELBI*'.

102)a; By giving our own codes to the letters as follows.

C–H–A–P–T–E–R = 3–8–2–7-6–5–1

C–H–A–M–P–I–O–N = 3–8–2–4–7–9–0–92

So, *I-M-P-O-R-T-A-N-T* = 9–4–7–0–1–6–2–92–6.

103)c; Here *S–U–M-M–ER*→ 2-8-4–4-9 and

R–U–N–N–ER → 3 – 8 – 6 - 6 - 9

First two numbers of the word *WINNER* start with new numbers; i.e., *W-I-N-N-ER* → 7-1-6-6-9.

104)c; From the 1st and 2nd statements,

we can write , '*elt*' means 'need'.

From 2nd and 3rd statements, 'afy' means 'pen'.

Now from 2nd statement, 'He' means 'doe'.

105)b; 54 days is 7 weeks and 5 days. Thus, 54 days after is the same as the day 5 days after. 5 days after Sunday will be Friday.

106)a; After interchanging operators we get,

36×2–24÷6+7×3 = 36×2–4+7×3 = 72–4 + 21 = 93–4 = 89.

107)c; After interchanging operators we get,

78 × 36 ÷ 6 + 4 – 3 × 4 = 78 × 6 + 4 – 3 × 4

⇒ 468 + 4 – 12 = 472 –12 = 460.

108)d; The line from B to A traverses North-East (Since, B is to the South-West of A). Hence, a point above above C (which is to the South-East of A) that meets the line from B towards A will be to the North-East of A.

109)b; In one step, the lowermost line rotates through 1800. In the next step, the uppermost line disappears. In the third step, the line which rotated in first step disappears. The process is repeated.

110)d; Three steps are added in each turn.

111)b; Sushmita is daughter of Shyam Sundar. So, Dheeraj is son of Shyam Sundar. Dharmaiah is Shyam Sundar's father, this mean Dharmaiah is grandfather of Dheeraj. Dheeraj's mother is Daughter–in–law of Dharmaiah and his wife Susheela Devi.

112)c; Gopi's mother is sister of Vimala and daughter of Manisha. This means Manisha is mother of Vimala. Susheela is daughter of Vimala and sister of Lavanya. So, Lavanya is daughter of Vimala. ∴ Manisha is grand mother of Lavanya.

113)d; If two lefts (LL) are there in the question then subtract (Maximum – Minimum) and check from the given end the question. Let us apply to this question.

Given, 9th to the left of

13th from the left end

Here, LL (left – left) came, So, 13 – 9 = 4.

∴ Answer will be the digit/letter which is at 4th place from left end (given) in the series.

i.e., Answer is '6'.

114)c; 2 4 $ A @ 5 6 2 3 & 6 5 7 2 ~ $ 8 4 5 6 ! 8 % A.

∴ Only three special characters are existing according to the given condition.

115)a; Write leap years up to before and after the given years and eliminate all the leap years.

2084 (leap year), 2085, 2086 (Given year), 2087, 2088 (leap year).

After eliminating leap years we get only 2085, 2086, 2087. Now add the code 6,11, 11 to the above years.

Hence, the year 2097 will have same calendar as 2086.

2085, (2086), 2087

6 11 11

2097

116)c; Angle traced by hour hand in 5 *hrs* 10 *min*

$5+\frac{10}{60}hours \Rightarrow \frac{31}{6}hours \Rightarrow 30\times\frac{31}{6}=155^0.$

117)b; $\frac{2/3}{5/6}=\frac{8/7}{x}\Rightarrow\frac{2}{3}\times\frac{6}{5}=\frac{8}{7}\times\frac{1}{x}$

$\Rightarrow\frac{12}{15}=\frac{8}{7x} \quad \Rightarrow 7x=\frac{8\times15}{12} \quad \Rightarrow x=\frac{10}{7}$.

118)b; The relation is as follows.

$x:\frac{x^3\times x^4}{x^2}=2:\frac{2^3\times2^4}{2^2}=2\times16=32.$

Similarly, $3:\frac{3^3\times3^4}{3^2}=3\times81=243.$

119)a; The pattern is +20.5, +22.5, +24.5, +26.5,+ .....

∴ Missing number = 124.5 + 26.5 = 151.

120)a; Clockwise direction indicates (+), and

Anti clockwise direction indicates (-).

$\theta = -180^o + 45^o - 270^o - 45^o = -450^o = -(360^o + 90^o) = -90^o$

The starting direction was East. So, from east 90^o anticlockwise. i.e., North direction. His final direction was North.

KMAT

PRACTICE TEST—3

SECTION -A

VERBAL ABILITY

Read the passage carefully and answer the questions given below it.

Family bonds in the subcontinent, whatever the trend elsewhere in the world, apparently continue to be strong. While the rest of the world frowns upon investing on near and dear, with a share in the power and pelf, the people of the subcontinent are least bothered about facing the music of 'nepotism'. The politicians of India look upon the rise of their sons and sons-in-law, uncles and aunts, as a legitimate part of a functioning democracy. Thus, we have had a host of relatives of those in power and position, with adequate ambition to "serve the people", clamouring for tickets, election after election in this country.

1) The paragraph best supports the statement that ___.

a) democracy cannot thrive unless there is a fair share of the relatives of a politician in power.

b) The rise of the relatives of the politicians in the high office is unbecoming and demeaning.

c) The politicians in India are highly supported by the members of their family in 'serving' the society.

d) The administrators in other countries than India fail to receive the required support from their relatives.

2) Choose the word which is most similar in meaning as the word '*Pelf*' used in the passage.

a) Authority b) Wealth c) strength d) influence

3) Choose the word which is most similar in meaning as the word '*Clamour*' used in the passage.

a) Demand b) Campaign c) Claim d) Shout

4) Choose the word which is most opposite in meaning as the word '*Legitimate*' used in the passage.

a) Official b) Licentious c) Informal d) Forbidden

5) Choose the word which is most opposite in meaning as the word '*Legitimate*' used in the passage.

a) Uncanny b) Defective c) Unjustifiable d) Passable

Read the passage and answer the given questions.

Postmodernism is a complicated term, or a set of ideas, one that has only emerged as an area of academic study since the mid–1980s. Postmodernism is hard to define, because it is a concept that appears in a wide variety of discipline or areas of study, including art, architecture, music, film, literature, sociology, communications, fashion and technology. It's hard to locate it temporally or historically, because it's not clear exactly when postmodernism begins. Perhaps the easiest way to start thinking about postmodernism is by thinking about modernism, the movement from which postmodernism seems to grow or emerge. Modernism has two facets, or two modes of definition, both of which are relevant to understanding postmodernism. The first facet or definition of modernism comes from the aesthetic movements broadly labelled "modernism" This movement is roughly coterminous with twentieth century western ideas about art(though traces of it in emergent forms can be found in the nineteenth century as well). Modernism, as you probably know, is the movement of visual arts, music, literature and drama which rejected old Victorian standards of how art should be made, consumed, and what it should mean. In the period of "high modernism", from around 1910 to 1930, the major figures of modernism literature helped radically to redefine what poetry and fiction could be and do: figures like Woolf, Joyce, Eliot, Pound, Stevens, Mallarme and Rilke are considered the founders of twentieth century modernism.

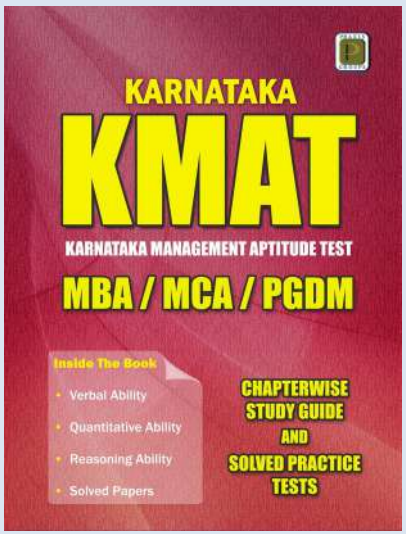
From a literary perspective, the main characteristics of modernism include subjectivity in writing, A blurring of distinction between genres, an emphasis on fragmented forms, a rejection of elaborate formal aesthetics in favour of minimalist designs and a rejection, in large part, of formal aesthetic theories and a rejection between "high" and "low" or popular culture, both in choice of materials used to produce art and methods of displaying and distributing it.

Postmodernism, like modernism, follows most of these same ideas, rejecting boundaries between high and low forms of art, rejecting rigid genre distinction, favouring reflexivity and discontinuity. But while postmodernism seems very much like modernism in these ways, it differs from modernism in its attitude toward a lot of these trends. Modernism, for example, tends to present a fragmented view of human subjectivity and history, but presents that fragmentation as something tragic, something to be lamented. Many modernist works try to uphold the idea that works of art can provide the

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart

109)a; There are three columns, each containing 1 cube; two columns, each containing 2 cubes and one column, each containing 3 cubes.

Number of cubes in column of 1 cube = 3×1 = 3.

Number of cubes in column of 2 cubes = 2×2 = 4.

Number of cubes in column of 3 cubes = 1×3 = 3.

∴Total number of cubes in the figure = 3+4+3=10.

110)a; In the part A, 4 symbols are given and are numbered from 1 to 4. As shown in the part B, the second symbol will remain constant and all other 3 symbols replaces by one another in anticlockwise direction. In the part-C, the thrid symbol will remain same and all other replaces by one another in anti–clockwise direction. The process will repeat upto part-D and then in the part-E the first symbol will remain constant and all other 3 symbols are replaces one another in anti clockwise direction. So, the next series should be, second symbol will remain stable and all other three replaces by one – another. Which is in option-a i.e, 'F'.

111) d; Ashwini and Kavya are sisters. Dheksha is Kavya's mother. This means Ashwini is also daughter of Dheeksha. Granthik is Dheeksha's father. This means Granthik is Ashwini's grand father. Ashwini is grand daughter of Granthik.

112)d; Akshaya's father-in-law Gowrav is father of Prathik. Prathik is father of Smrithika. This means Akshaya is wife of Prathik and Smrithika is grand daughter of Gowrav. As Manusri is sister of Smrithika, this means Manusri is grand daughter of Gowrav.

113)d; 1**B**2B3**B**L4B2BCZ2BLMN1**B**X2BE4862B**B**.

114)c; 1A**A25**3**L31**X58ZZPQ9823**M23**S14P74

115)d; Spoorthi and Sudha born in the same year and Spoorthi celebrate her birthday every four years, that means Spoorthi born on February 29. Sudha celebrate 15 days after Spoorthi's birthday. So Sudha born on 15-March-1996.

Sudha's birthday = $\frac{D+M_c+LP_c+Y_c+L_{2d}}{7}$

Where D → Date; Mc → Month code;

Lpc → Leap year code; Yc →Year code;

L2d → Last 2 digits of the year.

i.e. $\frac{15+4+96+24+0}{7} = \frac{139}{7}=6$

Therefore, Sudha born on friday.

116)c; In 20 minutes the angle made by longer hand = $20\times 6^0=120^0$.

The angle made by shorter hand= $(20)\left(\frac{1^0}{2}\right)=10^0$

⇒ The difference = 1200–100 = 1100 (or)

The difference between the angles made by two hands in 20 min = $20\times\frac{11^0}{2}=110^0$

117)a; Relation = $x:\frac{x^3+2}{2}\Rightarrow\frac{4^3+2}{2}=4:33.$

Similarly, $7:\frac{7^3+2}{2}\Rightarrow 7:172.5$

118)b; The relation is,

number : (number - sum of digits).

∴ 243 : 243-(2+4+3) ⇒ 243 : 234

Similarly, 203 : 203-(2+0+3) ⇒ 203 : 198

119) c; a = 45; d = 41 – 45 = - 4 ;

Let t_n = a + (n -1)d ⇒ 45 + (n -1)(- 4)

t_n = 45 – 4n + 4 ⇒ t_n = 49 – 4n.

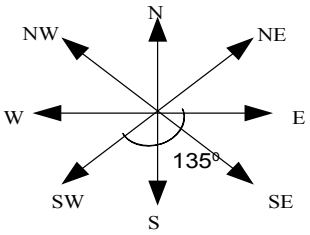
By trial and error, n = 12

t_n = 49 – 4(12) ⇒ 49 – 48 = 1

The next term i.e -3 is negative.

120) d; Take θ as positive if he turns RHS or clock-wise and θ as negative if he turns LHS or anti-clock-wise.

θ = 900 -1800 + 900 +1000 +350 = 1350. This means he is in the direction which is 1350 clockwise from his starting direction (East).



∴ He is in the South-West direction now.

How to Order

Purchase at :

amazon.in

flipkart.com

Bulk Purchases

Institutions, distributors, wholesalers and other organizations who wish to make a bulk purchase of this book should contact at below. We provide books with institute cover page upon bulk purchases

Phone : 07032206275 , 09246844022

Email : sales@praxisgroup.com

Distributed & Marketed by:
PRAXIS GROUPS
Ph : 9246844022, 07032206275,
sales@praxisgroup.com

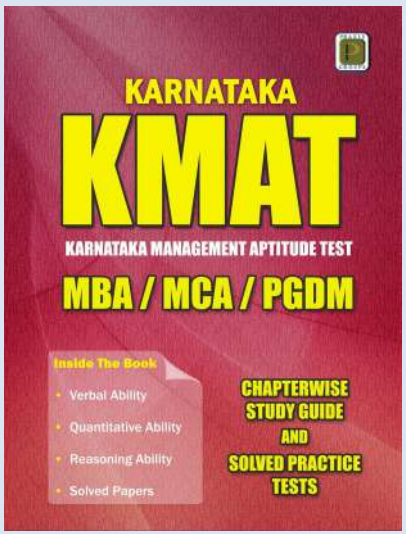
ISBN 978-81-930685-4-0

Price: ₹ 320/-

E-Book

Mathematical Skills	CLICK HERE
Verbal Ability (Language Comprehension)	CLICK HERE
Logical Reasoning (Basic Aptitude)	CLICK HERE
Practice Papers	CLICK HERE

(OR)



PRINTED BOOK

Purchase at Following e-Commerce sites

Buy Now from amazon.com

View or Buy on Flipkart