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For UPSC and State Civil Services Examinations

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General Studies Paper II (CSAT)

for

UPSC and State Civil Services Examinations

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CENGAGE

General Studies
Paper II (CSAT)

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Preface

If you ever happen to be walking down the streets of places where preparation for Civil Services is done, it will not be uncommon for you to come across or make the acquaintance of 'several' starry eyed yet completely committed IAS aspirants. Yet, 'several' would be an understatement given the number that runs into lakhs! But when we say committed, we mean it; these young men and women are ready to sacrifice almost all their youthful follows including sleep, comfort and even a semblance of a normal life to achieve one goal—IAS!

Sadly, this dream remains a distant one for a large majority of these aspirants in spite of the endless hours of study and sleep forsaken nights. When we tried to unravel WHY, the responses were almost synchronous:

"The subject was so vast that there was too much to cover and I could never complete it."

"I read so much but could not retain it."

"I studied something but was quizzed on something else in the exam."

"I kept reading but did not attempt to solve the past year papers or give a mock exam."

"Subscribing to several sources of information/preparation such as a coaching class, the internet and books was futile; after all there are only 24 hours in a day."

"My almirah was full of too many books,but I could barely complete a few."

And while the candid answers stated above clearly gave us a challenging problem—we did not attempt to solve it. We instead focused on a holistic solution—the synchronizing of effort i.e. Learning and Positive Results!

It is with this aim that we—PrepMate collaborated with Cengage India—are continuously striving to develop a comprehensive learning model that is a combination of online and offline so as to effectively address the issues that most aspirants grapple with.

About the Online–Offline Learning Model

The learning model initiates the process with a series of books targeted at cracking the UPSC exam. The books stand apart from others available because of the following unique features:

- We use a conceptual approach, simple language, explain concepts with diagrams, cite sufficient examples, pose pertinent questions in a reader friendly format—to ensure that the contents of these books can be read and assimilated in a time-bound manner.
- The content is specially designed taking into account the trend in UPSC exams in recent years.

- The Practice Questions at the end of each chapter are exhaustive to provide sufficient preparation to crack the exams.
- We have tried to encapsulate all that is required to be learnt for a particular subject into a single book.

Usually, an aspirant purchases a book, but never gets a chance to contact the authors. We believe that the contact among aspirants and authors is important for learning and motivation of the aspirants. That is precisely why we have developed an application and a web portal to answer your queries and provide you with continuous support during your preparation.

It is through this online system that we provide the following services:

1. Videos covering important and difficult topics
2. Daily prelims quiz
3. Assistance in interview preparation
4. Regular updates
5. Daily current affairs
6. Monthly current affairs magazine
7. Radio news analysis
8. Educational videos
9. Previous years' papers and solutions
10. Free study materials

Looking forward to being your partner in the journey towards achieving your dream!

In case you have any specific queries or constructive feedback you can always share the same with us via e-mail at info@prepmate.in.

PrepMate

Acknowledgements

"We cannot accomplish all that we want to do without working together"

The complete UPSC learning module by Prepmate has been the culmination of more than a year of ideation and brain storming by a lot of people. It is only natural that we should gratefully acknowledge their valuable contribution sincerely. I, Shubham Singla, founder of PrepMate Edutech, thank you all for being with me in this whole project. Rajinder Paul Singla, Nirmal Singla, Ramnik Jindal, Sharat Gupta, Subhash Singla and Vijay Singla—thank you for your continuous support and motivation.

We would also like to thank Maninder Mann and Sundeep Singh Garha who helped us in first conceiving and later developing the synergistic print–digital model of the project—without you we would be missing our competitive edge.

Implementation of strategy can more often than not prove challenging and the development of the online module did prove to be tougher than we had envisaged. But our technical team was focused on enabling our dream and delivering the best, and they surely did. With a specific mention to the testing of both the website and the application, we would like to thank Surabhi Misra, Parth and Tanvir who did their job patiently and effectively in spite of the road blocks.

Our videos and books could not have been possible without the help of our graphics design team—Sandeep, Sukhjinder and Roshni toiled endlessly to ensure the best designed audio-visuals.

It is an understatement to state that the sourcing and reviewing of existing content and the generation of content was the most crucial part of this project and the backbone of our Learning Module. This would just not have been possible without our team of content contributors: Isha Gupta, Shelly Jindal, Gurdeep Kaur, Surabhi Misra, Shaffy Garg, Dipika Arora, Sunil, Bhupinderjit Singh, Shantnu, Tanvir, Anmol, Kriti, Tanya, Sahil, Suraj and Dilshad, who left no stone unturned in their pursuit of excellence—your pivotal contributions are gratefully acknowledged.

We would like to extend a special thanks to our staff members Geeta, Jitender, Manoj and Pinki, who helped us in the most laborious job i.e. typing through the several manuscripts of our books—your contribution is sincerely appreciated.

It is imperative that we thank Isha Gupta, Shelly Jindal, Anjum Diwan, Rajesh Goel, Shikha Sharma and Ravinder Indoura, for their critical yet constructive feedback that identified and subsequently rectified the errors that crept in during the development process. We will never be able to thank them enough for this—you fortified the very foundation of our model.

We sincerely acknowledge the initiatives and support from the entire editorial team of Cengage India in the process of publishing this book.

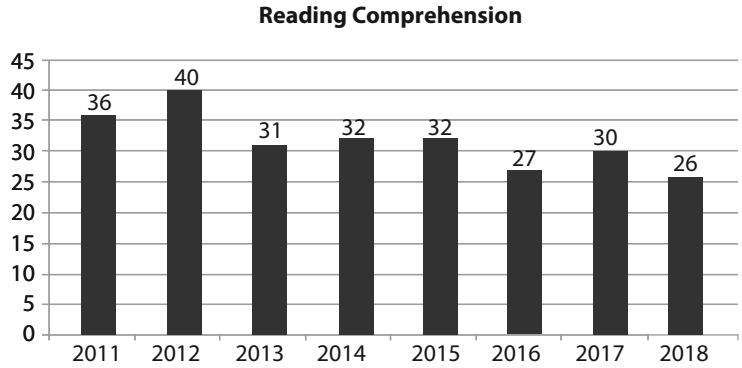
PrepMate

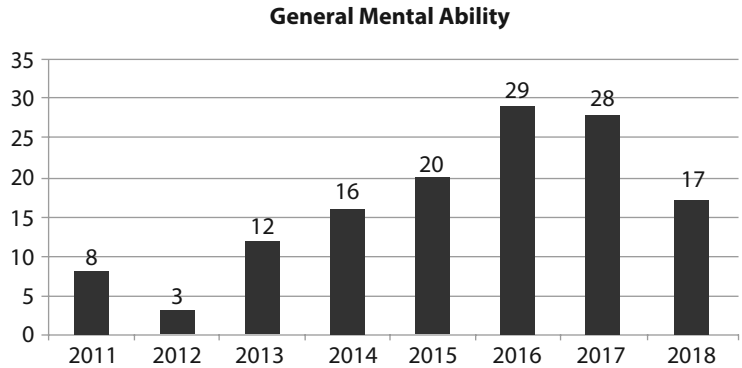
List of Videos

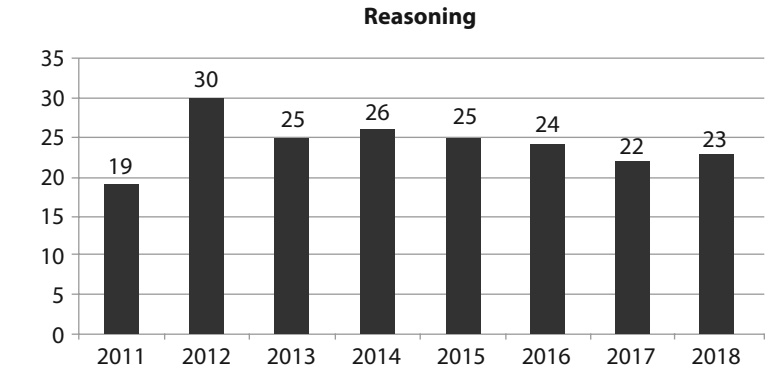
1.	Introduction to Reading Comprehension
2.	Introduction to General Mental Ability and Basic Numeracy
3.	Are You Afraid of Maths?
4.	Introduction to Reasoning
5.	Why Reasoning Is Everyone's Cup of Tea?
6.	How to Solve Puzzles?
7.	Introduction to Data Interpretation

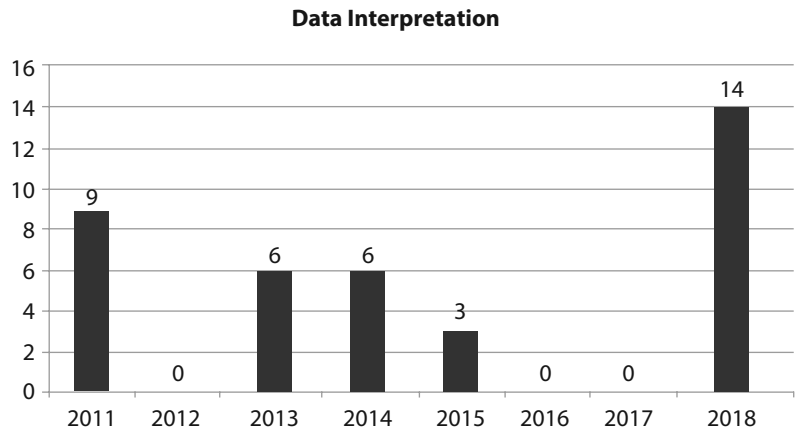
Number of Questions Asked From Various Sections in Previous Years' CSAT

Section	2018	2017	2016	2015	2014	2013	2012	2011
Reading Comprehension	26	30	27	32	32	31	40	36
General Mental Ability and Basic Numeracy	17	28	29	20	16	12	03	08
Data Sufficiency	00	00	00	00	00	00	00	00
Reasoning	23	22	24	25	26	25	30	19
Data Interpretation	14	00	00	03	06	06	00	09
Decision Making (including Communication Skills)	00	00	00	00	00	06	07	08
Total	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**









Reasoning, General Mental Ability and Data Interpretation sections can be further analysed.

Chapter wise Analysis of Reasoning Questions Asked in Previous Years

Chapter	2018	2017	2016	2015	2014	2013	2012	2011
Direction Sense	0	0	3	2	2	0	0	3
Ranking and Sitting Arrangements	3	2	3	0	3	3	2	1
Venn Diagrams	0	0	0	0	0	0	1	0
Sets	1	0	0	4	2	1	0	5
Deductive Reasoning	0	2	0	2	0	1	5	4
Verbal Reasoning	0	4	4	3	5	0	7	0
Blood Relations	0	1	0	0	0	0	0	0
Coding-Decoding	2	1	1	1	0	0	0	0
Series	2	0	0	1	0	0	0	0
Insert the Missing Character	1	0	0	1	1	2	0	1
Problem Figures	3	0	0	2	4	4	2	0
Cubes and Dice	4	0	1	1	0	1	2	0
Analytical Reasoning	0	0	0	0	0	0	0	2
Puzzles	7	12	12	8	9	13	11	3
Total	**23**	**22**	**24**	**25**	**26**	**25**	**30**	**19**

Chapter wise Analysis of General Mental Ability Questions Asked in Previous Years

Chapter	2018	2017	2016	2015	2014	2013	2012	2011
Linear Equations	7	6	7	6	3	3	0	2
Quadratic Equations	0	1	0	0	0	0	0	0
Percentages	0	2	3	3	0	0	0	0
Ratios	0	2	2	3	0	2	1	0
Profit and Loss	3	1	2	1	2	0	0	0
Simple and Compound Interest	1	0	0	0	0	0	0	0
LCM and HCF	0	0	1	0	2	1	0	1
Speed, Distance and Time	2	1	2	1	2	3	1	1
Averages	0	4	3	0	0	0	1	1
Work and Time and Pipes and Cisterns	0	1	2	1	0	2	0	0
Calendars and Clocks	0	3	0	1	2	0	0	0

Progressions	0	2	1	0	2	1	0	1
Two - Dimensional Figures	1	0	2	0	1	0	0	1
Three - Dimensional Figures	0	2	2	0	0	0	0	0
Permutations and Combinations	2	2	1	4	2	0	0	1
Probability	1	1	1	0	0	0	0	0
Total	**17**	**28**	**29**	**20**	**16**	**12**	**3**	**8**

Chapter wise Analysis of Data Interpretation Questions Asked in Previous Years

Chapter	2018	2017	2016	2015	2014	2013	2012	2011
Line Graphs	4	0	0	1	4	0	0	0
Bar Graphs	3	0	0	1	1	0	0	0
Tabulation	0	0	0	0	0	0	0	0
Pie Diagrams	0	0	0	0	0	5	0	2
Miscellaneous Graphs	7	0	0	1	1	1	0	7
Total	**14**	**0**	**0**	**3**	**6**	**6**	**0**	**9**

Unit - I

READING COMPREHENSION

1 WHAT DOES READING COMPREHENSION INVOLVE?

Reading comprehension (RC) mainly involves two tasks.

1. Reading the passage.
2. Answering the questions, asked from the passage, on the basis of one's understanding of the passage.

To ensure a successful completion of both the tasks, the following principles are listed.

Just reading the principles given below would not help; rather, the principles have to be inculcated in practice while answering the questions.

Principles to Read Well

1. Understanding the passage is of primary importance. Therefore, one should not read the passage in haste without understanding it. Instead, one should read at a normal speed. This principle is especially applicable in CSAT because the passage length usually varies from 100 to 350 words and the questions asked from the passage primarily test the candidate's understanding of it.

   Reading at a speed that hampers the candidate's passage comprehension ability will only result in the loss of time of the candidate, and the candidate will end up reading the passage again and wasting more time on the same. Therefore, reading the passage at a normal speed actually saves a lot of time of a candidate.
2. It is worthwhile to read a part of the passage again if one is not able to understand that particular part of the passage. It is even worth reading the whole passage again if one is not able to follow it.
3. It is important to infer the topic of the passage. Generally, the topic of the passage can be inferred by reading the beginning of the passage. Therefore, it is important to focus on the beginning of the passage. If one is able to infer the topic of the passage, it is easier to understand the rest of the passage. Example: Topic of the Passage-1, CSAT 2011 paper set A, is "role of state" mentioned in the first line of the passage.
4. A candidate is not expected to remember the passage word by word. However, he or she is expected to remember the gist of the passage.
5. It is also important to understand the role of each paragraph in the passage. For instance, a paragraph may contain the explanation of a theory, criticism of an idea, comparison of two ideas, advantages of a strategy, etc.
6. After reading a certain part of the passage, it is important to recall the gist of the passage especially while reading lengthy passages. Otherwise, a candidate tends to forget the information which was read earlier in the passage.
7. Look for the opinion of the author in the passage. It is particularly important because many questions are based only on the opinion of the author.
8. RC does not test the vocabulary of a candidate, it rather tests the ability to comprehend the written text. Therefore, we do not recommend learning word lists and consider it as a waste of time.

9. If you find a passage very difficult, attempt the passage at the end. Do not solve the passage at the cost of leaving other questions unattempted.
10. Sometimes, the passage is very difficult to understand but the questions asked from the passage are very easy to answer. Therefore, if the candidate is not able to understand the passage, we recommend that the candidate should go through the questions and try to find the answers to the questions from the passage.

Some books on RC suggest writing a passage map. However, we do not suggest this strategy and consider such a strategy counterproductive, because writing while reading disturbs the flow of reading and hampers the understanding of the passage.

Principles to Answer the Questions Accurately

Always answer the questions according to the information mentioned in the passage. Questions on passages asked in CSAT can be categorized. Categorization is required for two reasons: First, categorization familiarizes the candidate with the type of questions asked in the CSAT exam. Second, a candidate can adopt an appropriate strategy for each type of question. Therefore, ultimately categorization saves time and improves the accuracy of a candidate in answering the questions.

2 CATEGORISATION OF QUESTIONS ASKED UNDER RC

There are three main categories of questions asked under RC.

Overall Idea Conveyed by the Author

Finding an answer to this type of question requires an overall understanding of the passage. The overall idea is covered in the whole passage (or in all the parts of the passage) and not in a particular part of the passage.

Wrong answer choices are those which are either discussed in only a part of the passage or are not discussed in the passage at all.

This question is asked in a variety of ways some of which are as follows:

1. What is the essential message conveyed by the author of the passage?
2. Which of the following statements best describe the thought of the writer?
3. The passage thematically centres on.
4. What is the crux of the passage?
5. Which one of the following statements conveys the key message of the passage?
6. Which one of the following statements conveys the inference of the passage?
7. Which of the following would be an appropriate title for the passage?

Specific Detail Type Questions

Specific detail type questions are based on the information given in some part of the passage.

Finding an answer to these questions requires a candidate to refer to that part of the passage from where the question has been asked except if the candidate is sure about the correct answer.

Wrong answer choices are those which are either not mentioned in the passage or convey a different meaning from what is stated in the passage.

Specific detail type questions constitute a major chunk of RC questions. These questions can be further categorized as follows:

Simple specific detail type questions

These questions require a candidate to find a single piece of information in the passage and are the easiest of all the types of specific detail questions.

The question stem guides the search for the correct answer towards that part of the passage where related information is present in the passage. For instance, the question stem in the following example is 'the strategy of inclusive growth can be effected by focusing on'.

Example of simple specific detail question:

(Q .2 Set A, CSAT 2011)

1. According to the passage, the strategy of inclusive growth can be effected by focusing on
   a. Meeting all the needs of every citizen in the country.
   b. Increasing the regulations over the manufacturing sector.
   c. Controlling the distribution of manufactured goods.
   d. Delivery of the basic services to the deprived sections of the society.

Scattered specific detail type questions

These questions require a candidate to evaluate many details given in the question.

Wrong answer choices are those which are either not mentioned in the passage or mould the meaning of the information stated in the passage.

Example of a scattered specific detail question:

(Q .1 Set A, CSAT 2011)

2. According to the passage:
   a. The objective of inclusive growth was laid down by the founding fathers of the nation.
   b. The need of the hour is to have an enabling government.
   c. The government should engage in maximum interference in market processes.
   d. There is a need to change the size of the government.

   Which of the statements given above are correct?

   a. 1 and 2 only b. 2 and 3 only c. 1 and 4 only d. 1, 2, 3 and 4

Common question stem-based specific detail type questions

These questions require a candidate to evaluate various statements given under a common question stem.

In these types of questions, the question stem guides a candidate to that part of the passage where the candidate finds the information which can be compared with the statements given in the question to evaluate both the statements.

'Common question stem based specific detail questions' differ from 'scattered specific detail questions'. 'Scattered specific detail questions' do not involve common question stem and consequently, the candidate is required to find the answer from various scattered parts of the passage. However, in 'common question stem-based specific detail questions', the candidate is required to find the answer from a single part of the passage where the information related to the common question stem is mentioned.

Example of a common question stem-based specific detail question:

(Q .7 Set A, CSAT 2011)

3. What according to the passage are the manifestations of social movements?
   1. Aggressiveness and being incendiary
   2. Instigation by external forces
   3. Quest for social equality and individual freedom
   4. Urge for granting privileges and self-respect to disparaged sections of the society.

   Select the correct answer from the codes given below:

   a. 1 and 3 only b. 2 and 4 only c. 3 and 4 only d. 1, 2, 3 and 4

Two-statement specific detail type questions

In these questions two statements require evaluation.

The statements, requiring evaluation, are very close to the information given in the passage and therefore require a careful comparison.

As the statements are very close to the information stated in the passage, a candidate is essentially required to refer back to the passage and compare the statements with the information given in the passage.

A wrong statement is either not mentioned in the passage or is similar to the information given in the passage but different in meaning from what is stated in the passage.

Usually, a wrong statement is an extreme statement which conveys an extreme meaning as it involves use of words such as never, always etc., in place of may, sometimes etc.

Example of a two statement specific detail question:

(Q .8 Set A, CSAT 2011)

4. With reference to the passage, consider the following statements:
   1. To be a creative society, it is essential to have a variety of social movements.
   2. To be a creative society, it is imperative to have potential contradictions and conflicts.

   Select the correct answer from the codes given below:

   a. 1 only b. 2 only c. Both 1 and 2 d. Neither 1 nor 2

PASSAGE 17

During the Cold War, the world powers contributed heavily to military budgets, at rates ranging from 5 to 10 percent of the GDP for the United States and perhaps 20 percent for the Soviet Union. Which theories can explain the world powers military expenditure levels, as well as the sharp decreases in military expenditure in the 1990s?

One theoretical approach is based on reciprocity. Each world power responds to the other's military expenditure by raising or lowering its own military budget in the next time period.

An alternative theoretical model explains that each world power's military expenditure is domestically driven. This would follow from ideas such as the organisational process model of foreign policy and the power of the military–industrial complex. The recent decreases in military expenditure would probably be best explained by internal economic problems in both world powers.

Therefore, military expenditure can be explained by at least two perfect theoretical models, perfect in the sense that they can explain the outcome in terms of a general model with implications for other cases and neither model can be ruled out by scientific evidence.

1. What is the passage mainly about?
   (a) The theoretical explanations of the fact.
   (b) The explanation of the two theories.
   (c) Discussion of a fact and its consequences.
   (d) Causes of a particular theory.

2. Consider the following statements:
   1. The theory of reciprocity explains the low level of the military expenditure by the two world powers.
   2. The theory of reciprocity is the primary explanation for the level of the military expenditure by the two world powers.
   3. The theory of reciprocity is insufficient to explain heavy contribution by the world powers into military budgets.

   Which of the statement(s) given above is/are correct?
   (a) 1 only (b) 1 and 2 (c) 2 and 3 (d) None of the above

3. Consider the following assumptions:
   1. Economic growth usually leads to increased expenditure on military.
   2. Economic problems may result in reduction of expenditure on military.
   3. During the Cold War, the expenditure on military by the Soviet Union was higher than that by the United States.

With reference to the above passage, which of these assumption(s) is/are valid?
(a) 2 only (b) 2 and 3 (c) 1 and 2 (d) None of the above

4. Consider the following assumptions:
   1. During the Cold War, both the world powers raised expenditure on military.
   2. Reciprocity refers that each world power changes the expenditure on military in accordance with changes in the expenditure on military by the other world powers.
   3. The increase in expenditure on military can also be due to domestic reasons.
   4. Theoretical models completely explain the expenditure on military by the world powers.

   With reference to the above passage, which of these assumption(s) is/are valid?
   (a) 1 and 2 only (b) 3 and 4 only (c) 1, 2 and 3 only (d) 1, 2, 3 and 4

PASSAGE 18

How do the foreign policies of democracies differ from those of authoritarian governments? Although public opinion operates in some form in almost all the states, it plays a greater role in democracies.

Some philosophers have argued that lasting peace would depend on states becoming democracies, with elected representative legislatures to check the power of hereditary monarchs to make war. They thought that checks and balances in democratic state would act as a brake on the use of military force as compared with the autocratic state where a single individual (or a few) could make war without any regard for the opinion of the people.

Scholars have formulated various hypotheses and have examined data to check the validity of these hypotheses. Such hypotheses relate to the idea that democracy is linked with a kind of foreign policy fundamentally different from that of authoritarianism. One hypothesis considered was that democracies are generally more peaceful than authoritarian governments. To their surprise, this turned out to be untrue.

However, the truth about democracies is that, though they fight wars against authoritarian states, they never fight with each other. This phenomenon is called democratic peace.

1. What is the passage mainly about?
   (a) Foreign policies of authoritarian states. (b) Foreign policies of democratic states.
   (c) Foreign policies of republic states. (d) Foreign policies of contemporary states.

2. Consider the following statements:
   1. In comparison with democratic states, authoritarian states fight more wars.
   2. Philosophers and the author share the same point of view on the foreign policies of the democracies.

Which of the statement(s) given above is/are correct?
(a) 1 only (b) 2 only (c) Both 1 and 2 (d) Neither 1 nor 2

3. According to philosophers, why do democracies not engage in a war?
   1. There is concern for the safety of the people.
   2. Economic resources are widely distributed.
   3. Public opinion does play a role in the democracies.
   4. There are mechanisms to keep a check on the power of the executive.

   Select the correct answer using the codes given below:
   (a) 4 only (b) 1 and 4 (c) 2 and 3 (d) None of the above

4. What is meant by the term "democratic peace"?
   (a) The tendency of some nations to avoid interference in internal matters of the other nations.
   (b) The tendency of some nations to fight wars with the other nations.
   (c) The tendency of some nations not to have wars with the similar nations.
   (d) The tendency of some nations not to have wars with the other nations.

PASSAGE 19

Organisational culture refers to a system of shared values and behaviour patterns by the members of an organisation. An organisation's culture can be described on the basis of various dimensions such as innovation in the organisation, people orientation, team orientation, the ability of the organisation to change, aggressiveness, etc.

Organisational culture is vital for the organisation due to various reasons. The organisational culture provides the sense of identity to the organisation and distinguishes an organisation from the other organisations. It increases the commitment of the members of the organisation towards the goals of the organisation. Organisational culture also clarifies the goals of the organisation and the means to achieve these goals to the members of the organisation.

Organisational culture can serve as a liability for the organisation as well. Culture acts as a barrier to change and to adapt to the changing world. Also, organisational culture prevents the collaboration of an organisation with some other organisation, especially when the cultures of the organisations are different. For instance, it is difficult for a democratic organisation to merge with an authoritarian organisation.

1. Consider the following statements:
   1. Organisational culture remains uniform throughout an organisation.
   2. Organisational culture reduces the dissatisfaction of the employees.

To answer such questions, read the information (the meaning of which has been asked) in the passage and identify the meaning of the information.

Statement 1 is correct because the statement can be inferred from reading the first two sentences of the third paragraph of the passage.

Statements 2 and 3 are correct because both the statements reflect the meaning of the information given in the question stem.

PASSAGE 17

1. **Solution: (a) The theoretical explanations of the fact.**

Explanation:

This is an 'overall idea type' question. Therefore, the answer to this question is based on an overall understanding of the passage.

The passage mentions the fact that during the cold war, the world powers contributed large money to the defence and, after the cold war, world powers sharply reduced their defence expenditure. After mentioning this fact, two theoretical explanations are provided to explain this fact. Therefore, choice (a) is the right answer.

Choices (b), (c) and (d) are inappropriate because these choices do not explain the overall idea of the passage.

2. **Solution: (a) 1 only**

Explanation:

This is a 'scattered specific detail type' question and requires a candidate to evaluate many details given in the question.

Statement 1 is correct because the theory of reciprocity does explain the high as well as the low levels of spending by the two world powers.

Statement 2 is incorrect because it cannot be inferred from the passage that the theory of reciprocity is the primary explanation for the level of military expenditure by the two world powers.

Statement 3 is incorrect because the theory of reciprocity explains heavy contribution by the world powers to military budgets.

3. **Solution: (a) 2 only**

Explanation:

This is a 'scattered specific detail type' question and requires a candidate to evaluate many details given in the question.

Statement 1 is incorrect because it cannot be inferred from the passage that the economic growth usually leads to high expenditure on military.

Statement 2 is correct because it can be inferred from the passage. The passage states that world powers reduced military expenditure on account of internal economic problems.

Statement 3 is incorrect. The passage only states that the expenditure on military as the percentage of respective domestic GDP was higher by the Soviet Union than that by United States. However, it does not mention anything about the actual amount of expenditure on defence.

4. **Solution: (c) 1, 2 and 3 only**

Explanation:

This is a 'scattered specific detail type' question and requires a candidate to evaluate many details given in the question.

Statement 1 is correct as it is mentioned in the first paragraph of the passage.

Statement 2 is correct as it is mentioned in the second paragraph of the passage.

Statement 3 is correct because it can be inferred from the third paragraph of the passage that increase in the expenditure on the military can also be due to domestic reasons.

Statement 4 is incorrect because it is an extreme statement. Theoretical models explain the expenditure on military by the world powers, but it cannot be inferred from the passage that these models completely explain the expenditure on military by the world powers.

PASSAGE 18

1. **Solution: (b) Foreign policies of the democratic states.**

Explanation:

This is an 'overall idea type' question. Therefore, the answer to this question is based on an overall understanding of the passage.

The passage discusses the foreign policies of democracies. Therefore, choice (b) is the right answer.

Choice (a) is inappropriate because the foreign policies of the authoritarian states are discussed only to explain the foreign policies of the democratic states.

Choices (c) and (d) are inappropriate because these choices are not covered in the passage.

2. **Solution: (d) Neither 1 nor 2**

Explanation:

This is a 'two-statement specific detail type' question. The two statements given in the question require evaluation.

The statements requiring evaluation are very close to the information given in a passage and, therefore, require careful comparison with the information given in the passage.

Statement 1 is incorrect because it cannot be inferred from the information given in the passage. The passage only indicates that the democracies do not fight wars with the other democracies, but it does not state that the authoritarian states fight more wars.

Statement 2 is incorrect because the philosophers have argued that the democracies are more peaceful than the authoritarian states, whereas the author believes that the democracies are not more peaceful than the authoritarian states.

3. **Solution: (a) 4 only**

Explanation:

This is a 'common question stem-based specific detail' question. The question requires evaluation of various statements to identify whether each statement is given by the philosophers as a reason behind democracies not engaging in a war.

The question stem 'According to Philosophers, why democracies do not engage in war' directs the search for the answer to the second paragraph of the passage.

Statements 1, 2 and 3 are not given as reasons by philosophers to explain why democracies do not engage in a war.

Statement 4 is given as a reason by the philosophers to explain why democracies do not engage in a war.

4. **Solution: (c) The tendency of some nations not to have wars with the similar nations.**

Explanation:

This is a 'simple specific detail type' question.

The question stem 'democratic peace' guides the search for the answer to the last part of the passage.

Democratic peace refers that democracies do not fight war with other democracies. Therefore, choice (c) is the correct answer.

PASSAGE 19

1. **Solution: (a) 3 only**

Explanation:

This is a 'scattered specific detail type' question and requires an evaluation of many details given in the question. Right answer choices are mentioned in the passage and wrong answer choices are neither mentioned in the passage nor mould the meaning of the information stated in the passage.

Statements 1, 2 and 4 are incorrect because these statements are not mentioned in the passage.

Statement 3 is correct because it is mentioned in the second sentence of the last paragraph.

2. **Solution: (b) Importance of organisational culture.**

Explanation:

This is an 'overall idea type' question. Therefore, the answer to this question is based on an overall understanding of the passage.

The passage mentions advantages and disadvantages of organizational culture. Therefore, it discusses the importance of organizational culture. Therefore, choice (b) is the right answer.

Choice (a) is inappropriate because it is not mentioned in the passage.

Choices (c) and (d) are inappropriate because only the first paragraph of the passage provides information relating to these choices. Therefore, none of these choices constitutes the overall idea of the passage.

3. **Solution: (d) Neither 1 nor 2**

Explanation:

This is a 'two statement specific detail type' question. The two statements given in the question require evaluation.

The statements requiring evaluation are very close to the information given in a passage and, therefore, require careful comparison with the information given in the passage.

Statement 1 is correct because the second and the third paragraphs of the passage provide information about the role of the organizational culture in the functioning of the organization.

Statement 2 is correct because the last paragraph of the passage states that an organizational culture may act as a barrier to the change.

Therefore, none of the statements is incorrect.

4. **Solution: (a) 1 and 2 only**

Explanation:

This is a 'common question stem-based specific detail' question. The question requires evaluation of various statements to identify whether each statement constitutes the organizational culture of the organization.

The question stem 'Organization culture includes' directs the search for the answer to the first paragraph of the passage.

Statements 1 and 2 are included in the organizational culture as the passage states that people orientation and aggressiveness are the dimensions of the organizational culture.

Statements 3, 4 and 5 are not included in the organizational culture.

Unit - II

Decision Making

Decision making involves the selection of the most logical alternative of the given alternatives. In CSAT decision-making questions, a candidate is required to analyse a given situation and choose the most appropriate response of the four responses given.

There is no penalty for the wrong answers. Also, the responses are evaluated on the basis of the degree of appropriateness of response for the given situation.

In CSAT 2011, 2012 and 2013, the questions asked in the decision-making section were 8, 7 and 6, respectively. There has been no question from this section since CSAT 2014.

1 STRATEGY TO LEARN DECISION MAKING

The following strategy has been devised to enable students to learn decision making:

Step 1: Read the decision situations and the corresponding explanations given in the practice exercise.

Step 2: Learn the factors which are considered while making decisions, so that you develop the prudence required to evaluate the situation.

Step 3: Attempt the unsolved exercise and compare the factors which you consider while making decisions with the factors given in the explanation in this book.

Step 4: Revise the exercises repeatedly to develop an adequate level of analysis to answer decision-making questions accurately in CSAT.

2 BASIC FACTORS IN DECISION MAKING

Following is an illustrative list of some of the factors which are taken into account while making decisions:

1. Social concern: Social concern refers to the concern for others in the society.

   Social concern of a person is ascertained by evaluating the response of the person to various decision situations such as an old man requiring help, an injured person required to be taken to the hospital, etc.

2. Protection of one's own rights: Every informed and aware individual is expected to stand for his or her own rights.

   The tendency of a person to stand for his or her own rights is ascertained by evaluating the response of the person to various decision situations in which the right of the person is being violated such as poor-quality food served in a hostel mess, pressure by a criminal to sell your land to him at a low rate, unjust treatment at place of work, etc.

3. Role clarity: An individual is expected to be clear about his or her role in both the personal and the professional life.

   Role clarity in a person is ascertained by putting him or her under various situations such as dealing with the people approaching the person with law and order problems which are required to be referred to the police.

4. Practicality and awareness of self-abilities: It is important that one should be aware about one's abilities and limitations.

   For instance, an individual cannot complete the work single-handedly which requires a whole team effort. Likewise, a person cannot save a house from a huge fire alone. Instead, it is appropriate to call a fire brigade for the rescue operation.

5. Tendency to indulge in the illegal activities: A good human being is expected not to indulge in illegal activities, no matter how harsh the circumstances are.

   For instance, paying and receiving bribe is unacceptable, no matter whatever incentive or explanation is associated with the payment or receipt of the bribe.

3. You want to get married to a person of your own choice. However, your family members do not support your marriage with that person. Your family members give reasons for not supporting the marriage. You do not find these reasons convincing enough to reject the person you want to marry. You will _____

   (a) keep the decision on hold and decide that you will not marry
   (b) marry the person of your own choice
   (c) try to convince your family about your choice
   (d) accept the decision of your family

   Solution:

   The situation examines that whether a person considers the views of the family with one's own views for taking important decisions of life.

   Choice (a) is incorrect because keeping the decision on hold and deciding not to marry is not a solution to the given situation.

   Choice (b) is incorrect because it does not consider the views of your family which are important in your life.

   Choice (c) is the most appropriate because it takes into account both your own views and the views expressed by your family. Moreover, convincing others involve rational confrontation and discussion over the issue at hand which lead to sound decisions in life.

   Choice (d) is incorrect because it requires you to give up your desire to marry the person of your choice without sufficient reasons.

4. You are moving along a busy road and you notice a blind man trying to cross the busy road. The blind man is not able to cross the road due to heavy traffic on the road. Nobody stops to help the blind man cross the road. You will _____

   (a) ask someone to help him
   (b) go and help him
   (c) stop the traffic so that he can cross the road
   (d) ignore and move on

   Solution:

   The situation examines in a person the quality of concern for others. If one has a concern for the blind man, he or she will help the blind man to cross the road.

   Choice (b) is the most appropriate because rather than asking someone to help the blind man, one should help the blind man.

5. While traveling in a car to reach the venue of the wedding of your best friend, some people stop your car and seek your help to take a mildly injured child to the hospital.

Solutions for

Decision Making

PRACTICE EXERCISE–1

1. **Solution: (d) Attend the wedding**

   Explanation:

   The situation requires respect for the feelings of the maid who is inviting you to the marriage of her daughter.

   Choice (d) is the most appropriate answer. The feelings of the maid should be given due respect by attending the wedding. One should be respectful towards the feelings of the people who engage in professions which are often less paid and are not looked at in a dignified manner in the society.

   Choice (a) is incorrect as it reflects lack of your concern for the feelings of the maid.

   Choice (b) is incorrect as giving money is not a substitute for attending the wedding and will still reflect lack of respect for the feelings of the maid.

   Choice (c) is incorrect as making excuses in front of other people reduce the credibility of a person.

2. **Solution: (c) Decide that you cannot afford it**

   Explanation:

   The situation ascertains the way you act when your desire is beyond your means.

   Choice (c) is the most appropriate because it is important for an individual to overcome his desire when the desire is beyond the means of an individual.

   Choice (a) is inappropriate because it reflects the tendency to make compromises for satisfying the desires.

   Choice (b) is inappropriate because it reflects the tendency to go beyond one's means to satisfy desires.

   Choice (d) is inappropriate though more appropriate than choice (a) and (b) because it reflects a prolonged effect of desire on the behaviour and limited tendency to overcome one's desires.

3. **Solution: (c) Collect the necessary information about his destination and guide him accurately**

   Explanation:

   The situation tests how much are you socially responsible especially when you are under pressure.

   Opportunity to help the old man examines the sense of social responsibility in a person. When one is getting late, then he or she is under pressure and often ignores social responsibilities.

   Choice (c) is the most appropriate response because a person should fulfill his or her social responsibility even under pressure.

   Choices (b) and (d) are inappropriate as the old man has only lost his way. This does not mean that he needs money or help of the police.

   Choice (a) is inappropriate because it reflects the lack of social responsibility in the person.

4. **Solution: (d) Contact the club authorities and make an announcement for the parents**

Unit - III

General Mental Ability and Basic Numeracy

General Mental Ability (GMA) is the largest part of CSAT preparation. There are 16 chapters in this book covered under GMA. In the years 2017, 2016, 2015, 2014, 2013, 2012, and 2011, the number of questions asked in CSAT from this section were 28, 29, 20, 16, 12, 3 and 8 respectively.

The level of difficulty of GMA questions is comparatively low. Therefore, even the candidate who is not very confident about his or her mathematical skills can easily prepare for GMA.

The chapters on GMA have been drafted and discussed keeping in mind the level and type of questions asked in CSAT.

Chapter 1

LINEAR EQUATIONS

Linear equations refer to those equations wherein the unknown variable has the power of 1. For instance, $2x = 6$ is a linear equation as x, the unknown variable, has the power of 1.

Linear equations can be further divided on the basis of the number of unknown variables as follows:

1 LINEAR EQUATIONS IN ONE VARIABLE

The general form of linear equation in one variable (or unknown value) is $ax = b$. In this equation, the value of x is unknown, whereas a and b are constants. For instance, $2x = 6$ is a linear equation in one variable. In this equation, the value of x is unknown.

The value of x can be calculated as follows:

$2x = 6$

$x = \frac{6}{2} = 3$

2 LINEAR EQUATIONS IN TWO VARIABLES

The general form of linear equation in two variables (or unknown values) is $ax + by + c = 0$. In this equation, values of x and y are unknown, whereas a, b and c are constants. For instance, $2x + 1y + 5 = 0$ is a linear equation in two variables. In this equation, values of x and y are not known, and 2, 1 and 5 are constants.

The golden rule for solving linear equations: The number of equations available to solve for the values of variables, should be equal to or more than the number of variables. For instance, if we have to find out the values of two variables, minimum number of equations required will be two.

Let us now learn how to solve linear equations.

Consider: $2x + 1y - 5 = 0$

$1x + 1y - 3 = 0$

The equations can be written as:

$2x + 1y = 5$ (1)

$1x + 1y = 3$ (2)

Linear equations in two variables can be solved by carrying out mathematical operations on given equations in order to eliminate one variable.

Let us learn from the following examples.

1. If a variable is equal in magnitude in both the equations but it is of opposite sign, then we add both the equations as follows:

   For instance: $2x + 1y = 5$
   $1x - 1y = 3$

   Adding both the equations, we get: $3x = 8$

   When one variable is eliminated, the equation can be solved as a linear equation in one variable.

   Thus, $x = \frac{8}{3}$

   The value of x can be inserted in any of the two equations to calculate the value of y.

   $2 \times \frac{8}{3} + 1y = 5$

   $y = 5 - \frac{16}{3} = -\frac{1}{3}$

   Let us check the solution.

   Put values of x and y in $2x + 1y = 5$ and $1x - 1y = 3$

   $2 \times \frac{8}{3} + 1 \times -\frac{1}{3} = \frac{16}{3} - \frac{1}{3} = 5$

   $1 \times \frac{8}{3} - 1 \times -\frac{1}{3} = \frac{8}{3} + \frac{1}{3} = 3$

   We find that the left hand side of the equation is equal to the right hand side of the equation. Therefore, values of x and y are correct.

2. If a variable is equal in magnitude in both the equations and the variable possesses the same sign in both the equations, then we subtract one equation from the other equation (or multiply one of the equations by –1) as follows:

   For instance: $2x + 1y = 5$
   $1x + 1y = 3$

   Multiplying the second equation by –1, we get:

   $2x + 1y = 5$

   $-1x - 1y = -3$

   Adding both the equations, we get: $x = 2$

   Putting $x = 2$ in $1x + 1y = 3$, we get: $y = 1$

If the whole equation is either multiplied or divided by a number, then the value of unknown variables remains the same and the equations are called as a parallel set of equations.

For instance, let two equations be $3x = 9$ and $6x = 18$
If we multiply first equation by 2, we get $2(3x) = 2(9)$ or $6x = 18$
The value of $x = 3$ can be calculated by solving any equation.

3. If both the variables in the given equations are of unequal value, then we multiply or divide either one or both the equations by some number(s) in a way that one variable becomes equal in magnitude in both the equations and then we add or subtract the equations as mentioned in category 1 and 2 above.

For instance: $2x + 1y = 5$
$3x + 2y = 8$
In the above equations, if we add or subtract the equations, then one variable will not be eliminated. Therefore, we multiply the first equation by 2 so that variable y can be eliminated.
The equation becomes: $4x + 2y = 10$
$3x + 2y = 8$
Now, subtracting both the equations, we get:
$x = 2$
Putting $x = 2$ in $4x + 2y = 10$ or $3x + 2y = 8$, we get:
$y = 1$

Solved Examples

1. Solve: $2x + 3y = 7$
$3x + 2y = 8$

Solution:

Multiply first equation by 3 and second equation by 2, we get:

$6x + 9y = 21$

$6x + 4y = 16$

Now, subtract both the equations, we get:

$5y = 5 \Rightarrow y = 1$

Put $y = 1$ in either $2x + 3y = 7$ or $3x + 2y = 8$, we get

$x = 2$

2. Solve: $4x - 5y = 35$
$3x + 4y = 3$

Solution:

Multiplying the first equation by 3 and the second equation by 4, we get:

$12x - 15y = 105$

$12x + 16y = 12$

Subtracting both the equations, we get:

$-31y = 93 \Rightarrow y = -3$

Putting $y = -3$ in $12x - 15y = 105$

$12x = 60 \Rightarrow x = 5$

3. Solve: $6x + 5y = 4$

$12x + 10y = 8$

Solution:

If we multiply the first equation by 2, then it becomes exactly the same as the second equation. Thus, both the equations are parallel set of equations. As a minimum of two equations are required to calculate the values of 2 variables, we cannot solve the equation or we can say that there are infinite solutions for the values of x and y.

4. Solve: $\frac{3}{x} + \frac{5}{y} = 1$

$\frac{4}{x} + \frac{4}{y} = 1$

Solution:

Let $\frac{1}{x} = a$ and $\frac{1}{y} = b$. Therefore, the equation becomes:

$3a + 5b = 1$

$4a + 4b = 1$

Multiplying the first equation by 4 and the second equation by 3, we get:

$12a + 20b = 4$

$12a + 12b = 3$

Subtracting both the equations, we get:

$8b = 1 \Rightarrow b = \frac{1}{8}$

Putting $b = \frac{1}{8}$ in $12a + 20b = 4$, we get:

$12a + 20 \times \frac{1}{8} = 4$

$12a = 4 - \frac{5}{2}$

$a = \frac{3}{2} \times \frac{1}{12} = \frac{1}{8}$

Now, $\frac{1}{x} = a \Rightarrow \frac{1}{x} = \frac{1}{8} \Rightarrow$ Therefore, $x = 8$

Similarly, $\frac{1}{y} = b \Rightarrow \frac{1}{y} = \frac{1}{8} \Rightarrow$ Therefore, $y = 8$

3 LINEAR EQUATIONS IN THREE VARIABLES

We can solve linear equations in three variables by solving two out of three equations at a time, in a way that one variable gets eliminated. In this way, we will be left with linear equations in two variables.

Let us look at the example:

$2x + 1y + 1z = 7$ (1)

$1x + 2y + 3z = 14$ (2)

$2x + 3y + 4z = 20$ (3)

Let us consider the first and the second equations. If we multiply the first equation by 3, we get:

$6x + 3y + 3z = 21$

$1x + 2y + 3z = 14$

Subtracting the second equation from the first, we get:

$5x + y = 7$ (4)

Now, we take the second and the third equations. We multiply the second equation by 4 and the third equation by 3, we get:

$4x + 8y + 12z = 56$

$6x + 9y + 12z = 60$

Subtracting the equations, we get:

$2x + y = 4$ (5)

From Equations 4 and 5, we can calculate the values of x and y, we get:

$x = 1$ and $y = 2$

Put $x = 1$ and $y = 2$ in any of the three equations, we get $z = 3$.

Solved Examples

5. How many pieces of length 80 cm can be cut from a rod which is 40 m long?

Solution:

1 m = 100 cm

$$\text{Number of pieces} = \frac{\text{Total Length of the Rod}}{\text{Length of One Piece}} = \frac{40\times100}{80} = \frac{4,000}{80} = 50 \text{ pieces}$$

6. A possessed a certain sum of money. He gave one fourth of this sum to B. B in turn gave half of what he received from A to C. If the difference between the remaining amount with A and the amount received by C is ₹2,500, how much money is remaining with A?

Solution:

Suppose A initially possessed ₹x.

$$\text{Amount received by B} = ₹\frac{x}{4}$$

$$\text{Amount remaining with A} = ₹\left[x - \frac{x}{4}\right] = ₹\frac{3x}{4}$$

$$\text{Amount received by C} = ₹\left[\frac{1}{2}\times\frac{x}{4}\right] = ₹\frac{x}{8}$$

$$\frac{3x}{4} - \frac{x}{8} = 2,500 \Rightarrow 5x = 2,500\times8 \Rightarrow x = 4,000$$

$$\text{Hence, amount remaining with A} = ₹\frac{3x}{4} = ₹3,000$$

7. A man divides his total property in such a way that half of his property is given to his wife, 2/3rd of the remaining property is divided equally among his three sons and the rest of the property is divided equally among his three daughters. If the share of each daughter in the property is worth ₹30 lakhs, then what is the share of each son?

Solution:

Let the total property = x

$$\text{Wife's share} = \frac{1}{2}x$$

$$\text{Remaining share} = \left(1 - \frac{1}{2}\right)x = \frac{1}{2}x$$

Share of 3 sons $= \left(\frac{2}{3}\times\frac{1}{2}\right)x = \frac{1}{3}x$. Therefore, each son's share $= \frac{1}{3}x\times\frac{1}{3} = \frac{1}{9}x$

Share of 3 daughters $= \left(\frac{1}{2}-\frac{1}{3}\right)x = \frac{1}{6}x$

Each daughter's share $= \frac{1}{3}\times\frac{1}{6}x = \frac{1}{18}x$

$\frac{1}{18}x = ₹30$ lakhs $\leftrightarrow x = 30 \times 18 = ₹540$ lakhs

Each son's share $= \frac{1}{9}x = \frac{1}{9}\times 540 = ₹60$ lakhs

8. A man divides ₹8,400 among his 4 sons, 4 daughters and 2 friends. If each daughter receives 6 times as much as each friend and each son receives 4 times as much as each friend, then what is the share of each daughter?

Solution:

Let the share of each friend = ₹x

Then, share of each daughter = ₹$6x$; Share of each son = ₹$4x$

Therefore, $4 \times 6x + 4 \times 4x + 2 \times x = 8{,}400$

$24x + 16x + 2x = 8{,}400$

$42x = 8{,}400$, $x = 200$.

Share of each daughter $= 6x = 6 \times 200 = ₹1{,}200$.

9. A man spends $\frac{2}{5}$th of his salary on house rent, $\frac{3}{10}$th of his salary on food and $\frac{4}{15}$th of his salary on miscellaneous items. If after incurring all these expenditures, ₹1,000 are left with him, then find his expenditure on food.

Solution:

Let the total salary of the man be x.

Expenditure on house rent $= \frac{2}{5}\times x$

Expenditure on food $= \frac{3}{10}\times x$

Expenditure on miscellaneous items = $\frac{4}{15} \times x$

Part of the salary left = $1x - \left(\frac{2}{5}x + \frac{3}{10}x + \frac{4}{15}x\right) = 1x - \frac{29x}{30} = \frac{1}{30}x$

$\frac{1}{30}x = 1{,}000 \Rightarrow x = 30{,}000$

Expenditure on food = $\frac{3}{10} \times x = ₹9{,}000.$

10. A stick is painted with different colours. If $\frac{1}{10}$ th of the stick is blue, $\frac{1}{2}$ of the remaining stick is white and the remaining $4\frac{1}{2}$ cm is black, find the total length of the stick.

Solution:

Let the length of the stick = x cm.

Then, blue part = $\frac{x}{10}$ cm

Remaining white and black part = $\left(x - \frac{x}{10}\right)\text{cm} = \frac{9x}{10}$ cm

White part = $\frac{1}{2} \times \frac{9x}{10}$ cm = $\frac{9x}{20}$ cm

Remaining black part = $\frac{9x}{10} - \frac{9x}{20}\text{cm} = \frac{9x}{20}\text{cm}$

$\frac{9x}{20} = 4\frac{1}{2}$

$\Rightarrow x = \frac{9}{2} \times \frac{20}{9} = 10$ cm

Hence, the total length of the stick = 10 cm

11. Village A has a population of 36,000 persons, which is decreasing at the rate of 1,200 persons per year. Village B has a population of 12,000 persons, which is increasing at the rate of 800 persons per year. In how many years the population of both the villages will be equal?

Solution:

Let the populations of village A and B be equal after x years.

$36000 - 1200x = 12000 + 800x$

$2000x = 24000$

$x = 12$

Therefore, the population of the two villages will be equal after 12 years.

12. A tin of milk was $\frac{4}{5}$th full. When 6 bottles of milk were taken out and 4 bottles of milk were poured into it, it was $\frac{3}{4}$th full. How many bottles of milk can the tin contain?

Solution:

Let the number of bottles that can fill the tin completely be x.

Then, $\frac{4}{5}x - \frac{3}{4}x = (6 - 4)$

$\Rightarrow \frac{x}{20} = 2 \Rightarrow x = 40$

Therefore, the required number of bottles to fill the tin is 40.

13. Two pens and three pencils cost ₹86. Four pens and a pencil cost ₹112. Find the cost of a pen and a pencil.

Solution:

Let the cost of a pen and a pencil be ₹x and ₹y, respectively.

Then, $2x + 3y = 86$ and $4x + y = 112$

Solving both the equations, we get: $x = 25$ and $y = 12$

$\therefore$ Cost of a pen = ₹25 and cost of a pencil = ₹12

14. A possessed 75 currency notes, either of ₹100 or ₹50. The total amount of all these currency notes was ₹5,000. How many notes of ₹50 were possessed by A?

Solution:

Let the number of 50 rupee notes possessed by A be x.

Then, the number of 100 rupee notes = $75 - x$

$50x + 100\ (75 - x) = 5{,}000$

$50x = 2{,}500 \Rightarrow x = 50$

Therefore, A possessed 50 notes of ₹50.

15. An employer pays ₹20 for each day a worker works, and fines ₹3 for each day when the worker is absent. At the end of 60 days, the worker is paid ₹280. For how many days was the worker absent?

Solution:

Suppose the worker was absent for x days. He worked for $(60 - x)$ days.

$20(60 - x) - 3x = 280$

$\Rightarrow 1200 - 23x = 280$

$\Rightarrow 23x = 920$

$\Rightarrow x = 40$

Therefore, the worker was absent for 40 days.

16. One third of A's marks in General Studies exceeds one half of B's marks in General Studies by 60. If A and B together scored 480 marks, then how many marks did B score in General Studies?

Solution:

Let A's and B's marks in General Studies be x and y, respectively.

Then, $\frac{1}{3}x - \frac{1}{2}y = 60 \leftrightarrow 2x - 3y = 360$ (i)

$x + y = 480$ (ii)

Solving (i) and (ii), we get: $x = 360$ and $y = 120$

Thus, B scored 120 marks.

17. There is one overripe apple for every 20 apples in a crate of apples. If 3 out of every 4 overripe apples are considered unsaleable and there are 12 unsaleable apples in the crate, then how many apples are there in the crate?

Solution:

Let the total number of apples in the crate = x

Number of overripe apples = $\frac{1}{20}x$

Number of unsaleable apples = $\left(\frac{3}{4} \times \frac{1}{20}x\right) = \frac{3}{80}x$

$\frac{3}{80}x = 12$

$\Rightarrow x = 320$

18. In a circus, in addition to 40 hens there are 45 dogs and 8 lions with some keepers (men in-charge of animals). If the total number of feet is 210 more than the number of heads, find the number of keepers.

Solution:

Let the number of keepers = x.

Total number of heads = $(40 + 45 + 8 + x) = (93 + x)$

Total number of feet = $(45 + 8) \times 4 + (40 + x) \times 2 = (292 + 2x)$

$(292 + 2x) - (93 + x) = 210 \Rightarrow x = 11$

Therefore, the number of keepers = 11

19. In a certain office one third of the workers are women, half of the women are married and half of the married women have children. If half of the men are married and one third of the married men have children, what part of the total number of workers is without children?

Solution:

Let the total number of workers = x

Number of women workers = $\frac{x}{3}$ and number of men workers = $\left(x - \frac{x}{3}\right) = \frac{2x}{3}$

Number of women workers with children = $\frac{1}{2} \times \frac{1}{2} \times \frac{x}{3} = \frac{x}{12}$

Number of men workers with children = $\frac{1}{3} \times \frac{1}{2} \times \frac{2x}{3} = \frac{x}{9}$

Number of workers with children = $\left(\frac{x}{12} + \frac{x}{9}\right) = \frac{7x}{36}$

Number of workers without children = $\left(x - \frac{7x}{36}\right) = \frac{29x}{36}$

Therefore, $\frac{29}{36}$ th part of the workers is without children.

20. An amount was distributed equally among 14 boys, each boy got ₹80 more than that when the same amount was distributed equally among 18 boys. What was the amount which was distributed?

Solution:

Let the total amount be ₹x.

Then, $\frac{x}{14} - \frac{x}{18} = 80 \Rightarrow \frac{2x}{126} = 80 \Rightarrow \frac{x}{63} = 80 \Rightarrow x = 63 \times 80 = 5,040$

Hence, total amount = ₹5,040.

21. A bus started with a certain number of passengers on board. At the first stop, one third of the passengers got down from the bus and 30 new passengers boarded the bus. At the second stop, one half of the new total number of passengers got down from the bus and 5 new passengers boarded the bus. As it reached the third stop, it had 40 passengers on board. Find the number of passengers in the bus when it just started.

Solution:

Let the number of passengers in the bus in the beginning be x.

After the first stop, number of passengers $= \left(x - \frac{x}{3}\right) + 30 = \left(\frac{2x}{3} + 30\right)$

After the second stop, number of passengers $= \frac{1}{2}\left(\frac{2x}{3} + 30\right) + 5$

$$\frac{1}{2}\left(\frac{2x}{3} + 30\right) + 5 = 40$$

$$\Rightarrow \frac{2x}{3} + 30 = 2 \times 35$$

$$\Rightarrow \frac{2x}{3} = 70 - 30$$

$$x = \left(40 \times \frac{3}{2}\right) = 60$$

Therefore, the number of passengers on board when the bus just started was 60.

22. A party was attended by both men and women. After some time, 10 women left the party. The ratio of remaining men and women was 2 : 1. Thereafter, 25 men left the party. Now, the ratio of remaining men and women is 1 : 3. Find the initial number of women at the party.

Solution:

Let the initial number of men at the party = x

Let the initial number of women at the party = y

Number of women present in the party after 10 women left the party = $y - 10$

Given that $x = 2(y - 10)$

Number of men after 25 men left the party = $2(y - 10) - 25$

Given that $3\,[2(y - 10) - 25] = y - 10$

$y = 25$

Hence, the initial number of women at the party = 25

23. Both A and B possess some money. If A gives ₹30 to B, then B will have twice the sum of money as much as left with A. But, if B gives ₹10 to A, then A will have thrice the sum of money as much as left with B. How much money was initially possessed by A?

Solution:

$2(A - 30) = B + 30 \Rightarrow 2A - B = 90$ (1)

$A + 10 = 3(B - 10) \Rightarrow A - 3B = -40$ (2)

Solving Equations (1) and (2), we get: $A = 62$ and $B = 34$

Therefore, A initially possessed ₹62.

Note: It is important to learn how to solve the linear equations because under various topics of GMA, the candidate is required to solve the questions with the help of linear equations.

Practice Exercise

1. If one third of a tank can hold 80 L of water, then the quantity of water, one half of the tank can hold is:
   (a) 100 L
   (b) 120 L
   (c) 240 L
   (d) None of the above

2. A tank is $\frac{2}{5}$th full. If 16 litres of water is added to the tank, then it is $\frac{6}{7}$th full. The capacity of the tank is:
   (a) 30 L (b) 35 L
   (c) 40 L (d) 42 L

3. A bucket full of fluid can fill either three large bottles or seven small bottles. One large bottle is filled with fluid and used to fill an empty small bottle. What part of the large bottle contains fluid after filling one small bottle?
   (a) $\frac{3}{7}$
   (b) $\frac{4}{7}$
   (c) $\frac{4}{21}$
   (d) None of the above

4. A person travels 3.5 km from place A to place B. Of this distance, he travels $1\frac{2}{3}$ km by bicycle, $1\frac{2}{3}$ km by scooter and the rest of the distance on foot. How much distance does he travel on foot?

Solutions for

General Mental Ability and Basic Numeracy

1. LINEAR EQUATIONS

1. **Solution: (b) 120 L**

Explanation:

Let the capacity of the tank = x L

Then, $\frac{1}{3}x = 80 \Rightarrow x = 240$ L

Therefore, $\frac{1}{2}x = 120$ L

2. **Solution: (b) 35 L**

Explanation:

Let the capacity of the tank = x L

Then, $\frac{6}{7}x - \frac{2}{5}x = 16$

$\Rightarrow 30x - 14x = 16 \times 35$

$\Rightarrow 16x = 16 \times 35$

$\Rightarrow x = 35$ L

3. **Solution: (b) $\frac{4}{7}$**

Explanation:

Let the capacity of the bucket be 1 unit of fluid.

Then, capacity of 1 large bottle = $\frac{1}{3}$

Capacity of 1 small bottle = $\frac{1}{7}$

Fluid left in the large bottle after filling the small bottle = $\left(\frac{1}{3} - \frac{1}{7}\right) = \frac{4}{21}$

Part of the large bottle remaining = $\frac{\frac{4}{21}}{\frac{1}{3}} = \frac{4}{7}$

4. **Solution: (b) $\frac{1}{6}$ km**

Explanation:

Distance travelled on foot = $\left[\frac{7}{2} - \left(\frac{5}{3} + \frac{5}{3}\right)\right]$ km $= \left(\frac{7}{2} - \frac{10}{3}\right)$ km $= \frac{1}{6}$ km

5. **Solution: (c) 50 cm**

Explanation:

Let the length of the longer piece = x cm

Then, length of the shorter piece = $\left(\frac{2}{5}x\right)$

Therefore, $x + \frac{2}{5}x = 70 \Rightarrow \frac{7x}{5} = 70$

$\Rightarrow x = \left(\frac{70 \times 5}{7}\right) = 50$ cm

6. **Solution: (b) 28 students**

Explanation:

Original number of sections = (16 – 2) = 14

Original number of students = $(22 \times 14) = 308$

Present number of students = $(21 \times 16) = 336$

Number of new students admitted

= (336 – 308) = 28 students.

7. **Solution: (b) 1 h**

Explanation:

Total time available between 9 a.m. and 1:30 p.m. = 4 h 30 min.

Total number of breaks in between the four periods = 3

Total duration of the breaks = $3 \times 10 = 30$ min

Total duration of four periods = 4 h 30 min – 30 min = 4 h.

Therefore, Duration of each period = $\frac{4}{4} = 1$ h.

8. **Solution: (d) 503**

Explanation:

H	Min	S
3	18	12
–2	–02	–54
1	15	18

Time period during which light was seen = 1 h 15 min and 18 s = 1 × 60 × 60 + 15 × 60 + 18 = 3,600 + 900 + 18 = 4,518 s.

Therefore, number of times the light was seen = $\left(\frac{4,518}{9}+1\right)$ = 503 times.

(1 is added because the time period starts from a point when the light was first seen and ends at a point when the light was last seen.)

9. **Solution: (a) 2**

Explanation:

7a + 5 m = 38 or 5 m = (38 − 7a)

or m = $\frac{38-7a}{5}$, m is a natural number.

Thus, (38 − 7a) should be completely divisible by 5. This happens only when a = 4.

When a = 4, then m = $\frac{10}{5}$ = 2.

10. **Solution: (c) 35**

Explanation:

Let the number of boys be x.

Then, number of girls = $4x$.

Total number of children = $(x + 4x) = 5x$.

Therefore, the total number of children must be a multiple of 5. Among the given options, 35 is a multiple of 5. Thus, the total number of children in the class is 35.

11. **Solution: (b) 13th day**

Explanation:

Money earned in 2 days = ₹(20 − 15) = ₹5

Money earned in 12 days = $\frac{5}{2}\times 12$ = ₹30

On 13th day, the man earns ₹20 again. Thus, on the 13th day the man will have ₹50 with him.

12. **Solution: (b) 9 m**

Explanation:

26 trees have 25 gaps between them.

Therefore, the distance between two consecutive trees = $\frac{225}{25}$ m = 9 m.

13. **Solution: (a) $\frac{12}{25}$**

Explanation:

Girls = $\frac{3}{5}$, Boys = $\left(1-\frac{3}{5}\right)=\frac{2}{5}$

Part of the total number of students absent = $\frac{3}{5}\text{of}\frac{3}{5}+\frac{2}{5}\text{of}\frac{2}{5}=\frac{9}{25}+\frac{4}{25}=\frac{13}{25}$

Part of the total number of students present = $\left(1-\frac{13}{25}\right)=\frac{12}{25}$.

14. **Solution: (c) $\frac{3}{4}$**

Explanation:

Let the number of votes casted = x

Then, number of votes required = $\frac{x}{2}$

Counted votes = $\frac{2x}{3}$,

Uncounted votes = $\left(x-\frac{2x}{3}\right)=\frac{x}{3}$

Votes won by the candidate so far

= $\frac{1}{2}$ of $\frac{x}{2}=\frac{x}{4}$

Remaining votes required = $\left(\frac{x}{2}-\frac{x}{4}\right)=\frac{x}{4}$

Therefore, part of the remaining votes the candidate requires to win the election = $\frac{(x/4)}{(x/3)}=\left(\frac{x}{4}\times\frac{3}{x}\right)=\frac{3}{4}$.

15. **Solution: (d) 100 ml**

Explanation:

Suppose, initially each test tube contains x ml.

Then, $(x-20)+\frac{2}{3}(x+20)=\frac{4}{3}(x+20)$

$\Rightarrow (x-20)=\frac{2}{3}(x+20)$

$\Rightarrow (3x-60)=2(x+20)$

$\Rightarrow x = 100$ ml.

16. **Solution: (d) 100**

Explanation:

$A - 10 = B + 10 \Rightarrow A - B = 20$ (1)

$A + 20 = 2(B - 20) \Rightarrow A - 2B = -60$ (2)

Solving Equations (1) and (2), we get:

$A = 100, B = 80$.

17. **Solution: (c) 500**

Explanation:

$N \times 500 = (5,50,000 - 3,00,000) = 2,50,000$

$\Rightarrow N = 500$

Therefore, the number of persons who contributed the money = 500.

18. **Solution: (a) $\frac{1}{7}$**

Explanation:

Original share in the total cost of each person $= \frac{1}{8}$

New share in the total cost of each person $= \frac{1}{7}$

Increase in the share of each of the remaining persons $= \left(\frac{1}{7}-\frac{1}{8}\right)=\frac{1}{56}$

Therefore, increase in the share as part of the original share $=\frac{(1/56)}{(1/8)}=\left(\frac{1}{56}\times 8\right)=\frac{1}{7}$.

19. **Solution: (c) 72**

Explanation:

Let the Number of benches in the class = x

Then, $6(x + 1) = 7x - 5 \Rightarrow x = 11$

Hence, the number of students in the class

$= 6(x + 1) = 6 \times 12 = 72$.

20. **Solution: (c) ₹1.60**

Explanation:

Cost of 6 bananas $= 4.80 \times 2 =$ ₹9.60

Cost of 6 bananas = Cost of 3 mangoes = Cost of 5 apples = Cost of 6 oranges

Cost of 6 oranges = ₹9.60

Therefore, cost of 1 orange $=$ ₹$\frac{9.60}{6}$ = ₹1.60.

21. **Solution: (b) 1,000 $(x - y) + yz$**

Explanation:

Cost of stitching z shirts = Cost of stitching first 1,000 shirts + Cost of stitching shirts other than first 1,000 shirts $= 1,000 \times x + (z - 1,000)y = 1,000x + zy - 1,000y$

$=$ ₹$[1,000(x - y) + yz]$

22. **Solution: (b) ₹200**

Explanation:

Let the fixed charge = ₹x and the variable charge = ₹y per km

Then, $x + 15y = 125$ (1)

$x + 25y = 175$ (2)

Solving Equations (1) and (2), we get

$x = 50, y = 5$.

Therefore, cost of travelling 30 km

$=$ ₹$(50 + 30 \times 5) =$ ₹200.

Unit - IV

Data Sufficiency

In the past CSAT papers, no question has been asked from the data sufficiency section so far. Therefore, this section does not hold much importance in the CSAT exam.

Yet, it is recommended to prepare for this section because CSAT exam may have surprises in it. Data sufficiency is covered under two popular formats in this book with questions from all the areas that are relevant and important from the exam point of view. Practicing all these questions will prepare a candidate to comfortably attempt data sufficiency questions which may be asked in the future CSAT exams.

Practice Exercise – 1

Directions for questions (1–30): Read the following instructions carefully and mark the answers based on the given instructions.

Select choice (a) as an answer if the question can be answered by using only one of the statements alone.

Select choice (b) as an answer if the question can be answered by both the statements individually.

Select choice (c) as an answer if the question can be answered by using both the statements together, but cannot be answered using either statement alone.

Select choice (d) as an answer if the question cannot be answered even by using both the statements together.

1. What is the ratio of the two numbers?
   I. The sum of two numbers is twice their difference.
   II. The smaller number is 2.

2. What is the two-digit number whose first digit is 'a' and the second digit is 'b'?
   I. The number is a multiple of 51.
   II. The sum of the digits a and b is 6.

3. What is the two-digit number?
   I. The sum of the digits is equal to the difference between the two digits.
   II. The difference between the two digits is 9.

4. What is the two-digit number?
   I. The difference between the number and the number obtained by interchanging the positions of the digits is 36.
   II. The sum of the digits of that number is 12.

5. What is the present age of C?
   I. Three years ago, the average age of A and B was 18 years.
   II. The present average age of A, B and C is 21 years.

6. The sum of the ages of P, Q and R is 96 years. What is the age of Q?
   I. P is 6 years older than R.
   II. The sum of the ages of Q and R is 56 years.

7. A is twice as old as B. What is the difference in their ages?
   I. Five years ago, the ratio of their ages was 3 : 1.
   II. Ten years ahead, the ratio of their ages will be 3 : 2.

8. How old will C be after 10 years?
   I. Five years ago, the average age of A and B was 15 years.
   II. Average age of A, B and C today is 20 years.

9. How many children are there in the group?
   I. Average age of the children in this group is 15 years. The sum of the ages of all the children in this group is 225 years.
   II. The sum of the ages of all the children in the group and the teacher is 250 years. The age of the teacher is 10 years more than the average age of the children.

10. What is the average age of children in the class?
   I. Age of the teacher is as many years as the number of children.
   II. Average age increases by 1 year if the teacher's age is also included.

11. What is the C.P. of the article?
   I. The profit earned on the article is one third of the C.P.
   II. The article is sold for ₹400.

12. A man mixes two types of coffees (X and Y) and sells the mixture at the rate of ₹17 per kg. Find the profit made by the man.
   I. The rate of X is ₹20 per kg.
   II. The rate of Y is ₹13 per kg.

13. What is the price of a pen?
   I. A man can buy 14 pens and 35 pencils for ₹84.
   II. At 50% discount on the price of pens, the man can buy 4 pens and 5 pencils for ₹12.

14. What is the rate of simple interest?
   I. The total interest earned was ₹4,000.
   II. The sum was invested for 4 years.

15. Find the principal which earned interest?
   I. The total S.I. was ₹4,000 after 4 years.
   II. The total of the principal and the S.I. was double the amount of the principal after 5 years.

16. A man borrowed a total sum of ₹25,000 from two moneylenders. To one he paid an interest at 10% p.a. and to the other he paid at 20% p.a. How much money did he borrow at each rate of interest?
   I. The sum of the interests after 1 year was ₹4,000.
   II. The interest paid to the first moneylender was thrice the interest paid to the second.

17. What is the rate of C.I.?
   I. The principal was invested for 3 years.
   II. The earned interest was ₹1,331.

18. How long will Machine A take to produce x candles (working alone)?
   I. Machine B produces x candles in 6 min.
   II. Machines A and B working together produce x candles in 2 min.

Unit - V

Data Interpretation

In the past, CSAT has not given adequate importance to data interpretation. The number of questions asked from this section in CSAT 2015, 2014, 2013, and 2011 were 3, 6, 6 and 9 respectively.

Data interpretation is covered under five chapters in this book. The questions included in these chapters are strictly in accordance with the questions expected to be asked in CSAT. These questions often do not involve large calculations, but test the ability of the candidate to understand various concepts presented through graphs, tables, pie charts, etc.

Chapter 1

Line Graphs

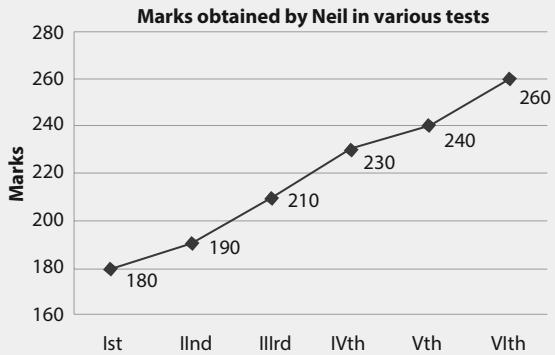
A line graph is a graph which displays information in the form of a series of data points connected by a line segment.

A line graph is bordered by two axes. The horizontal axis is called the *x*-axis and the vertical axis is called the *y*-axis. Typically, the *y*-axis represents the dependent variable and the *x*-axis represents the independent variable.

An independent variable is a variable, the value of which does not depend on the occurrence of any particular event. A dependent variable, however is a variable, the value of which depends on the occurrence of a particular event. For instance, in the line graph given below, the serial numbers of different tests taken by Neil (Ist, IInd, IIIrd, etc.,) are the independent variables and the scores obtained by Neil in these tests represent the values of dependent variables.

Solved Examples

Directions for questions 1–7 are as follows: Neil is a civil services aspirant and a very hard working person. He has joined a test series to facilitate civil services preliminary examination preparation. The scores obtained by Neil in all the six tests are depicted by the graph given below. All the scores have been obtained out of the maximum total of 400.



1. What are the highest and the lowest scores obtained by Neil among all the scores obtained by him in the tests?

   (a) 260 and 180 (b) 260 and 240 (c) 180 and 260 (d) None of the above

   Solution: (a) 260 and 180

   Explanation:

   By looking at the graph it can be seen that the highest point on Y axis is 260 and the lowest point is 180.

   Therefore, the highest score obtained by Neil is 260 and the lowest score obtained by Neil is 180.

2. What is the average score obtained by Neil in all the tests?

   (a) 210 (b) 215 (c) 218 (d) 220

   Solution: (c) 218

   Explanation:

   Method I (Simple average method)

   The average score obtained by Neil in all the tests

   $$= \frac{\text{Total score obtained by Neil in all the tests}}{\text{Number of tests}}$$

   $$= \frac{180+190+210+230+240+260}{6} = \frac{1310}{6}$$

   = 218.33 or 218 (round off)

   Method II (Assumed average method)

   Let us assume that the average is 220.

   The average score obtained by Neil in all the tests

   $$= \text{Assumed average} \pm \frac{\text{sum of differences of individual observations from the assumed average}}{\text{Number of observations}}$$

   $$= 220 + \frac{-40-30-10+10+20+40}{6}$$

   $$= 220 - \frac{10}{6} = 218.33 \text{ or } 218 \text{ (round off)}$$

3. What is the overall percentage of marks obtained by Neil in all the tests?

(a) 54% (b) 55% (c) 56% (d) 57%

Solution: (b) 55%

Explanation:

Method I:

$$\text{Overall percentage of marks} = \frac{\text{Total score obtained in all the tests}}{\text{Total of maximum marks of all the tests}} \times 100$$

$$= \frac{1310}{2400} \times 100 = 54.58\% \text{ or } 55\% \text{ (round off)}$$

Method II:

$$\text{Overall percentage of marks} = \frac{\text{Average score}}{\text{Maximum marks}} \times 100 = \frac{218.33}{400} \times 100$$

$$= 55\% \text{ (round off)}$$

4. In which test is there a fall in the percentage of marks as compared with the previous test?

(a) Ist (b) IInd (c) IVth (d) None

Solution: (d) None

Explanation:

$$\text{Percentage of marks in a test} = \frac{\text{Marks obtained in a test}}{\text{Maximum marks in a test}} \times 100$$

In all the tests, the numerator (i.e., the marks obtained) is increasing and the denominator (i.e., maximum marks) remains the same. When the numerator increases and the denominator of the fraction remains the same, then the value of the fraction increases and so does the percentage. Therefore, in none of the tests there is a fall in the percentage.

5. In which test Neil obtains the highest percentage increase in marks over the immediately preceding test?

(a) IIIrd (b) IVth (c) Vth (d) VIth

Solution: (a) IIIrd

Explanation:

Increase in marks over the previous test = Marks obtained in the test – Marks obtained in the previous test

Percentage increase in marks over the previous test =

$$\frac{\text{Increase in marks over the previous test}}{\text{Marks obtained in the previous test}} \times 100$$

Method I:

For IInd test $= \frac{190-180}{180} \times 100 = 5.55\%$

For IIIrd test $= \frac{210-190}{190} \times 100 = 10.53\%$

For IVth test $= \frac{230-210}{210} \times 100 = 9.52\%$

For Vth test $= \frac{240-230}{230} \times 100 = 4.34\%$

For VIth test $= \frac{260-240}{240} \times 100 = 8.33\%$

Therefore, the highest percentage increase in marks over the immediately preceding test was witnessed in the IIIrd test.

Method II:

The question can also be answered with minimum calculations as follows:

Step 1. By looking at the graph, identify the maximum increase in marks over the preceding test (e.g., In IIIrd, IVth and VIth test, there is an increase of 20 marks each)

Step 2. Identify the smallest denominator out of the three denominators that are used in calculating the percentage increase in each of the three tests. It is 190 for the IIIrd test.

In test III, as the numerator is the highest and the denominator is the lowest, therefore the fraction is the highest, that is, $\left(\text{As } \frac{20}{190} > \frac{20}{210} > \frac{20}{240}\right)$

Note: Method II is preferred because it avoids many unnecessary calculations and saves a lot of time during the exam.

6. Consider the following statements:

I. Neil has scored the highest marks in the VIth test.

II. Neil has scored more than 50% marks in three tests.

III. The score obtained by Neil has consistently improved with all the tests.

Which of the statements given above is/are correct?

(a) I and II (b) I and III (c) II and III (d) I, II and III

Solution: (b) I and III

Explanation:

Statement I is correct because Neil has scored the highest marks in the VIth test i.e., 260 marks.

Statement II is incorrect because Neil has scored more than 50% marks (more than half i.e., 200) in four tests namely, IIIrd, IVth, Vth and VIth.

Statement III is correct because the scores obtained by Neil in successive tests have increased consistently.

7. Which of the following statement can be surely concluded about the performance of Neil?

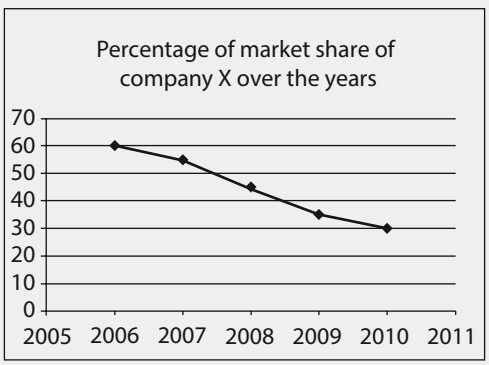
(a) Neil has maximum chances of qualifying the preliminary exam.
(b) Neil's performance is excellent.
(c) The performance of Neil has been improving over the given time period.
(d) Neil is required to take more tests.

Solution: (c) The performance of Neil has been improving over the given time period.

Explanation:

The scores obtained by Neil in various tests have shown an increasing trend over the given period of time. Therefore, it can be concluded that Neil's performance has been improving over the given time period. However, rest of the statements cannot be stated with full conviction by only referring to the graph.

Directions for questions 8–12 are as follows: The following line-graph depicts the market share of company X in its respective industry from the years 2006 to 2010. Study the graph and answer the questions that follow:



8. For how many years, the market share of the company in its industry was more than 40%?

(a) 1 (b) 2 (c) 3 (d) 4

Solution: (c) 3

Explanation:

The market share of the company, in its respective industry, was more than 40% for 3 years (i.e., 2006, 2007 and 2008).

9. In which year the sales of the company were the highest?

(a) 2006 (b) 2010 (c) 2006 or 2010 (d) Data inadequate

Solution: (d) Data inadequate

Explanation:

Sales of the company cannot be determined only on the basis of the market share of the company. To calculate the sales of the company, both the values for the market share of the company in the industry and aggregate sales of the industry are required. As the data for the aggregate sales of the industry is not available, sales of the company cannot be determined.

10. A Company is called a market leader in its industry if it has the largest share in its respective industry. In which of the following years Company X was surely the market leader in its industry?

(a) 2007 (b) 2008 (c) 2009 (d) 2010

Solution: (a) 2007

Explanation:

In 2007, the share of the company in its industry was more than 50% (i.e., 55%). Therefore, in 2007 the share of every other company in the industry was less than 50%. In rest of the years mentioned in answer choices, the share of the company in the industry was less than 50%. Therefore, there can be another company with a share of more than 50% in the industry.

11. Which of the following statements can be made conclusively about the market share of the company?

1. The market share of the company in the industry was highest in 2006.
2. The sales of the company have declined from 2006 to 2010.
3. The market share of the company has declined from 2006 to 2010.
4. The market share of the company will fall below 20% in the next year.

Which of the statements given above is/are correct?

(a) 1 and 2 only (b) 1 and 3 only (c) 1, 2 and 3 (d) 2, 3 and 4

Solution: (b) 1 and 3 only

Explanation:

Statement 1 is correct because in year 2006, the market share of the company X was 60%. In all other years, the market share of company X was less than 60%.

Statement 2 cannot be stated with surety because the sales of the company are not given in the graph and only the market share of the company is given.

Statement 3 is correct as the market share of the company has declined from 60% (in year 2006) to 30% (in year 2010).

Statement 4 is based on the future prediction. Whether the market share of Company X will fall below 20% cannot be stated with full conviction.

12. Apart from the market share given in the graph, what additional information is required to calculate the sales of the company over the given time period?

(a) Total sales of the industry (b) Total production of the company
(c) Total production of the industry (d) None of the above

Solution: (a) Total sales of the industry

Explanation:

Market share of the company × Sales of the industry = Sales of the company.

Directions for the questions 13–19 are as follows: The following line graph gives the annual profit percentage earned by a company during the period 2007–2012. Study the line graph and answer the questions that follow.

Profit percentage earned by the company over the years

$$\textbf{\% profit} = \frac{\textbf{Revenue} - \textbf{Expenditure}}{\textbf{Expenditure}} \times \textbf{100}$$

13. If the revenue earned by the company in 2009 was ₹290 crores, what was the expenditure incurred by the company in 2009?

(a) ₹210 crores (b) ₹200 crores (c) ₹180 crores (d) ₹170 crores

Solution: (b) ₹200 crores

Explanation:

$$\% \text{ profit} = \frac{\text{Revenue} - \text{Expenditure}}{\text{Expenditure}} \times 100$$

$$45 = \frac{290 - \text{Exp.}}{\text{Exp.}} \times 100$$

$$\frac{45}{100}\ \text{Exp.} + \text{Exp.} = 290$$

$$\text{Exp.}\left(1 + \frac{9}{20}\right) = 290$$

Expenditure = ₹200 crores

14. What is the overall profit percentage earned by the company over the given time period?

(a) 55.7% (b) 55.8% (c) 55.9% (d) Data inadequate

Solution: (d) Data inadequate

Explanation:

$$\text{Overall profit percentage} = \frac{\text{Total Revenue} - \text{Total Expenditure}}{\text{Total Expenditure}} \times 100$$

Therefore, overall profit earned by the company cannot be calculated only on the basis of profit percentage earned by the company for various years as figures of total revenue and total expenditure of the company are not given.

15. Which of the following data are required to calculate the overall profit percentage of the company for the given time period?

1. Revenue of the company over the given time period.
2. Expenditure of the company over the given time period.
3. Profit of the company over the given time period.
4. Profit percentage of the company over the given time period.

Which of the following combinations **can** calculate the overall profit percentage of the company?

(a) 1 and 2 (b) 1 and 4 (c) 2 and 3 (d) All the above

Solution: (d) All the above

Explanation:

$$\text{Overall profit percentage} = \frac{\text{Total Revenue} - \text{Total Expenditure}}{\text{Total Expenditure}} \times 100$$

Overall profit percentage of the company can be calculated by statements 1 and 2 {Choice (a)}, statements 1 and 4 {choice (b)} and statements 2 and 3 {choice (c)}.

This is because choices (a), (b) and (c) can be used to calculate the overall profit percentage, as the values for expenditure and revenue can either be directly put in the formula or easily determined.

Therefore, choice (d) is the correct answer.

16. For how many years, there was an increase in the profit percentage earned over the previous year?

(a) 2 (b) 3 (c) 4 (d) 5

Solution: (b) 3

Explanation:

During the years 2008, 2010 and 2012, the company has earned a higher profit percentage over the respective previous years.

17. If the expenditure in 2007 and 2008 was equal, then the approximate ratio between the revenues of 2007 and 2008 was:

(a) 1 : 1 (b) 3 : 4 (c) 7 : 8 (d) Data inadequate

Solution: (c) 7 : 8

Explanation:

Let the expenditure in 2007 be x

Therefore, expenditure in 2008 = x

Also, let the incomes in 2007 and 2008 be I_7 and I_8, respectively.

Then, for the year 2007, we have;

$$40 = \frac{I_7 - x}{x} \times 100 \Rightarrow \frac{40}{100} = \frac{I_7}{x} - 1 \Rightarrow I_7 = \frac{140x}{100} \quad \text{(i)}$$

And, for the year 2008, we have;

$$60 = \frac{I_8 - x}{x} \times 100 \Rightarrow \frac{60}{100} = \frac{I_8}{x} - 1 \Rightarrow I_8 = \frac{160x}{100} \quad \text{(ii)}$$

From (i) and (ii), we get: $\frac{l_7}{l_8} = \frac{\frac{140x}{100}}{\frac{160x}{100}} = \frac{7}{8}$

18. If the profit earned by the company in the year 2011 was ₹5 crores, then what was the profit earned by the company in the year 2010?

(a) ₹5.0 crores (b) ₹4.8 crores (c) ₹6.8 crores (d) Data inadequate

Solution: (d) Data inadequate

Explanation:

Profit earned by the company in 2010 cannot be calculated on the basis of the profit earned in 2011.

19. Consider the following statements:

1. The profit margin of the company is falling over the years.
2. In 2012, the company earned the highest profit margin.
3. In 2007, the company earned the lowest profit.

Which of the statements given above is/are correct?

(a) 1 only (b) 2 only (c) 1 and 3 (d) 2 and 3

Solution: (b) 2 only

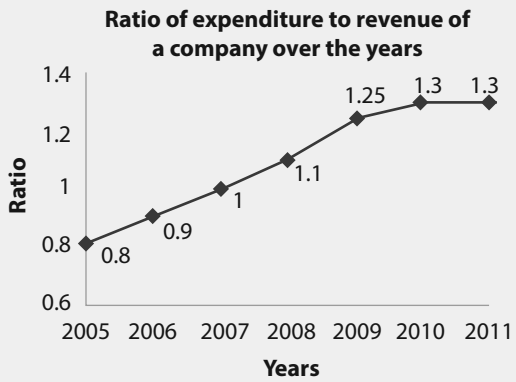
Explanation:

Statement 1 is incorrect because the profit margin of the company has shown a mixed trend according to the graph.

Statement 2 is correct because in 2012, the company earned the highest profit margin of 70%.

Statement 3 cannot be evaluated because the actual amount of profit earned by the company cannot be determined.

Directions for the questions 20–26 are as follows: The following line-graph gives the ratio between expenditure and revenue of the company from the year 2005 to 2011. Study the following graph and answer the questions based on the same.



20. In which of the following year was the ratio of expenditure to revenue of the company the lowest?

(a) 2005 (b) 2006 (c) 2007 (d) 2008

Solution: (a) 2005

Explanation:

In 2005, the ratio of expenditure to the revenue of the company was the lowest (ratio was 0.8).

21. In which of the following years was the ratio of revenue to the expenditure of the company the lowest?

(a) 2005 (b) 2007 (c) 2009 (d) 2011

Solution: (d) 2011

Explanation:

In the year 2011, the ratio of the expenditure to the revenue of the company was the highest (ratio was 1.3).

Therefore, in the year 2011, the ratio of revenue to the expenditure of the company was the lowest.

22. For how many years the revenue earned by the company was more than the expenditure incurred by the company?

(a) 1 (b) 2 (c) 3 (d) 4

Solution: (b) 2

Explanation:

If expenditure or revenue is <1, then the revenue of the company is more than its expenditure. In 2005 and 2006, the ratios of the expenditure to revenue is 0.8 and 0.9, respectively. Therefore, for 2 years the revenue is more than the expenditure.

23. If the expenditure of the Company in 2006 was ₹180 crores, then the revenue of the Company in 2006 was:

(a) ₹162 crores (b) ₹198 crores (c) ₹200 crores (d) ₹220 crores

Solution: (c) ₹200 crores

Explanation:

Expenditure/Revenue = 0.9 (ratio given for the year 2006)

180/Revenue = 0.9

180/0.9 = Revenue

Revenue of the company in the year 2006 = ₹200 crores

24. What was the percentage decrease in the revenue of the company from the year 2005 to 2011?

(a) 72 (b) 56 (c) 28 (d) Data inadequate

Solution: (d) Data inadequate

Explanation:

As revenues earned during different years are not given, percentage decrease in revenue cannot be calculated.

25. If the revenue earned in 2011 was ₹300 crores and the total expenditure in 2010 and 2011 taken together was ₹650 crores, then the revenue in 2010 was:

(a) ₹200 crores (b) ₹250 crores (c) ₹300 crores (d) ₹420 crores

Solution: (a) ₹200 crores

Explanation:

Expenditure in the year 2011 = Revenue in year 2011 × Ratio of the expenditure and revenue in the year 2011 = 300 × 1.3 = ₹390 crores

Expenditure in the year 2010 = Expenditure in the years 2011 and 2010 – Expenditure in the year 2011 = 650 – 390 = ₹260 crores

$$\text{Revenue in the year 2010} = \frac{\text{Expenditure in the year 2010}}{\text{Ratio (for the year 2010)}} = \frac{260}{1.3} = ₹200 \text{ crores}$$

26. Consider the following statements:

1. There has been a consistent fall in the revenue of the company over the given period of time.
2. The company is suffering losses since 2008 (Loss = Expenditure – Revenue).
3. The expenditure of the company has increased over the given period of time.

Which of the statements given above is/are correct?

(a) 1 only (b) 2 only (c) 1 and 3 (d) 2 and 3

Solution: (b) 2 only

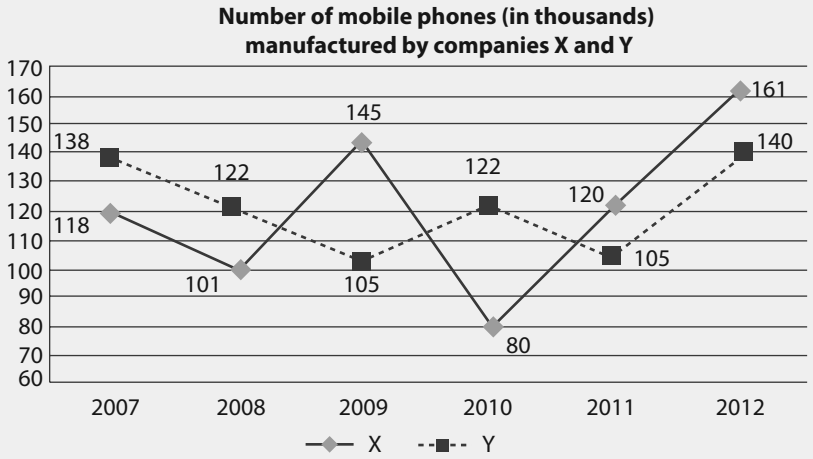
Explanation:

Statement 1 cannot be evaluated because the revenue figures of the company cannot be determined.

Statement 2 is correct because the expenditure is more than the revenue of the company since 2008.

Statement 3 cannot be evaluated because the expenditure figures of the company cannot be determined.

Directions for questions 27–33 are as follows: The two companies X and Y are one of the largest producers of mobile phones in the economy. The following line graph depicts the production of mobile phones by two companies for the time period from 2007 to 2012. Study the following line-graph and answer the questions based on the same.



Y-axis measures the number of mobile phones manufactured by companies X and Y.

Solutions for

Data Interpretation

1. LINE GRAPHS

1. **Solution: (a) 210 and 320**

Explanation:

According to the graph, the minimum production of the company is 210 tonnes and the maximum production of the company is 320 tonnes.

2. **Solution: (c) 267**

Explanation:

Average Production of the Company for All the Years

$$= \frac{\text{Total Production by the Company for All the Years}}{\text{Number of Years}}$$

$$= \frac{210+230+250+280+310+320}{6}$$

$$= \frac{1600}{6} = 266.67 \text{ or } 267 \text{ tonnes (round off)}$$

3. **Solution: (d) None**

Explanation:

In all the given years, production of the company has increased in the current year as compared with the production in the previous year. Therefore, in none of the years there has been a fall in production as compared with the previous year.

4. **Solution: (c) 2010**

Explanation:

Increase in production over the previous year's production = Production in a particular year – Production in the previous year

Percentage Increase in Production over the Production in Previous Year

$$= \frac{\text{Increase in Production over Production in Previous Year}}{\text{Production in Previous Year}} \times 100$$

Method I:

$$\text{For 2008} = \frac{230-210}{210} \times 100 = 9.52\%$$

$$\text{For 2009} = \frac{250-230}{230} \times 100 = 8.69\%$$

$$\text{For 2010} = \frac{280-250}{250} \times 100 = 12.0\%$$

$$\text{For 2011} = \frac{310-280}{280} \times 100 = 10.71\%$$

$$\text{For 2012} = \frac{320-310}{310} \times 100 = 3.22\%$$

Therefore, in the year 2010, there was highest percentage increase in production over the production in the year 2009.

Method II:

The question can also be answered with minimum calculations. The aim is to find out the highest fraction which can be done as follows:

Step 1. Identify the highest increase in production over the production in the previous year (In the years 2010 and 2011, there is an increase of 30 tonnes in the production each year over the production in the previous year)

Step 2. Select the smallest denominator out of the two denominators in question, Therefore, select the smaller amount out of 2009 and 2010 production figures (which is 2009's production of 250 tonnes).

As the numerator is highest and the denominator is smallest, therefore the proportion is the largest i.e., $\frac{30}{250}\times 100$ $\left(\text{As}\frac{30}{250}>\frac{30}{280}\right)$.

Method II is preferred because it involves fewer calculations and saves the precious time of the student during the exam.

5. **Solution: (b) 1 and 3**

Explanation:

Statement 1 is correct because the production of the company is maximum in the year 2012 (i.e., 320 tonnes).

Statement 2 is incorrect because the production of the company was more than the average production for exactly 3 years. (Average production = 266.67 tonnes)

Statement 3 is correct because the graph indicates that the production of the company has increased over the years.

6. **Solution: (c) The production of the company has risen over the time period.**

Explanation:

Clearly, from the graph the production of the company has risen over the time period. Rest of the statements cannot be concluded from the graph.

7. **Solution: (c) 4**

Explanation:

During the elections held in the years 2009, 2010, 2011 and 2012, more than 50% students of the university casted votes.

8. **Solution: (d) Data inadequate**

Explanation:

Number of voters cannot be determined just on the basis of percentage of voters.

9. **Solution: (b) 2,000**

Explanation:

$$\frac{\text{Number of voters in 2012}}{\text{Number of Students in 2012}}\times 100=60$$

$$\Rightarrow \frac{\text{Number of Voters in 2012}}{\text{Number of Students in 2012}}=\frac{60}{100}$$

$$\Rightarrow \frac{1200}{\text{Number of Students in 2012}}=\frac{60}{100}$$

$$\Rightarrow \frac{1200\times 100}{60}=\text{Number of Students in 2012}$$

Therefore, Number of students in 2012 = 2,000

10. **Solution: (c) 1, 3 and 4**

Explanation:

Statement 1 is correct because the percentage of students who casted votes has increased over the given time period from 40% to 60%.

Statement 2 cannot be evaluated because the total number of voters in student elections are not known. Only the percentage of students who participated in the elections is given.

Statement 3 is correct because in 2007, 40% of the students casted votes. Therefore, 60% of the students did not cast votes.

Statement 4 is correct because in 2012, 60% of the students casted votes.

11. **Solution: (a) Total number of students who did not cast votes in a particular year.**

Explanation:

100% – percentage of students who casted votes = percentage of students who did not cast votes.

From the number of students who did not cast votes and their percentage composition in the total students, we can calculate the total number of students in the university in any particular year.

12. **Solution: (b) 780**

Explanation:

Number of Employees at the End of Each Year = Number of Employees at the Beginning of Each Year + Number of Employees Who Joined the Organization During the Year – Number of Employees Who Left the Organization During the Year

Number of employees at the end of 2007 = 800 + 350 – 250 = 900

Number of employees at the end of 2008 = 900 + 300 – 280 = 920

Number of employees at the end of 2009 = 920 + 290 – 290 = 920

Number of employees at the end of 2010 = 920 – 300 + 280 = 900

Number of employees at the end of 2011 = 900 – 320 + 270 = 850

Number of employees at the end of 2012 = 850 – 330 + 260 = 780

13. **Solution: (b) 2008 and 2009**

Explanation:

Calculations are done in the previous solution.

14. **Solution: (a) 2007**

Explanation:

In 2007, net addition of employees to the existing number of employees in the organization was 100 (Net Addition = Joined – Left)

15. **Solution: (b) 2009**

Explanation:

According to the calculations done under the solution of question 12, the company had the maximum number of employees in 2009 or 2008 (920 employees). As 2008 is not mentioned in the answer choices, 2009 is the answer.

16. **Solution: (b) 97.5%**

Explanation:

$$\frac{\text{No. of employees at the end of 2012}}{\text{No. of employees at the beginning of 2007}} \times 100$$

$$= \frac{780}{800} \times 100 = 97.5\%$$

17. **Solution: (a) 26 : 33**

Explanation:

Minimum number of employees who joined the organization in any of the given years : Maximum number of employees who left the organization in any of the given years

260 : 330

26 : 33

18. **Solution: (a) 1951**

Explanation:

In 1951, the sex ratio (or the ratio of females to males) was the minimum in society A. The ratio was 896 : 1,000.

19. **Solution: (a) 2**

Explanation:

When the sex ratio is greater than 1,000, then the number of females is more than the

Unit - VI

REASONING

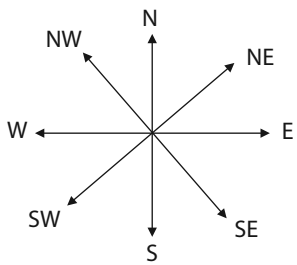
Strong preparation of reasoning section is essential for qualifying CSAT. In the past years, a very high weightage has been given to the reasoning section in CSAT. The question asked from this section in CSAT 2017, 2016, 2015, 2014, 2013, 2012 and 2011 were 22, 24, 25, 26, 25, 30 and 19 respectively.

There are 14 chapters in this book dedicated to reasoning which comprehensively cover the type and the level of questions asked in CSAT. To score well in CSAT, it is important for the candidate to develop perfection in solving the problems covered under this section

Chapter 1 DIRECTION SENSE

This chapter tests a candidate's direction sense. The candidate is required to read a series of instructions relating to an object which is constantly changing directions, and then either determine the final direction in which the object is travelling or the distance travelled by the object (usually from the starting point).

The figure given below indicates the positions of various directions and will help the candidate to develop a direction sense.



Solved Examples

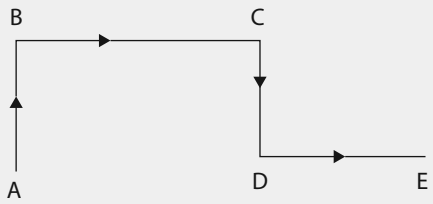
1. A person travels in the north direction, then turns right, then again turns right and thereafter turns left. In which direction is the person travelling now?

   (a) North (b) South (c) East (d) West

   Solution: (c) East

   Explanation:

   The movement of the person is indicated in the figure given below (from A to B, B to C, C to D and D to E). The final movement is in the direction indicated by the line segment DE, which is towards the East direction.



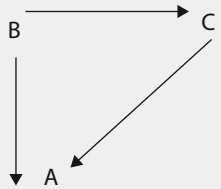
2. If A is to the south of B and C is to the east of B, what is the direction of A with respect to C?

(a) North–east (b) South–east (c) North–west (d) South–west

Solution: (d) South–west

Explanation:

From the figure given below, A is south–west of C.



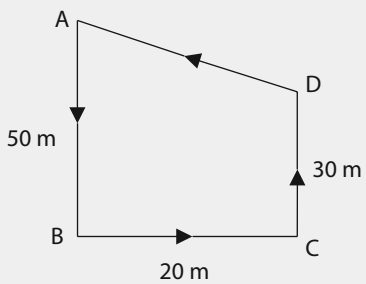
3. A runs 50 m south from her house. Then, she turns left and runs 20 m more, then she turns towards the north and runs 30 m further and finally starts walking towards her house on the shortest possible route. In which direction is she walking now?

(a) West (b) South–east (c) North–west (d) None of the above

Solution: (c) North–west

Explanation:

The movement of A is shown in the figure given below (A to B, B to C, C to D and D to A). She is walking from D to A in the north–west direction.



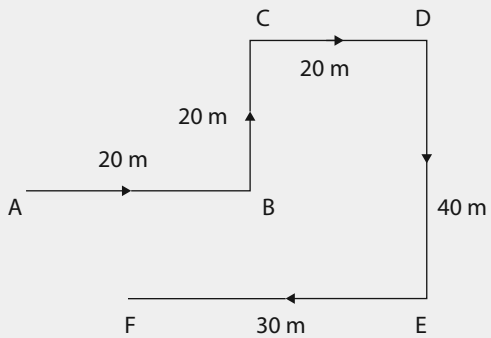
4. P is facing the north direction. He then turns right and walks 20 m. He then turns to his left and walks 20 m. Next, he moves 20 m to his right. He then turns to his right again and walks 40 m. Finally, he turns to his right and moves 30 m. In which direction is he now with respect to his starting point?

(a) South–west (b) South (c) North–west (d) South–east

Solution: (d) South–east

Explanation:

Let us assume that P starts from point A. He turns right and walks 20 m towards east up to point B, turns left and moves 20 m up to point C, turns right and moves 20 m up to point D. At D where he is facing east, he takes a right turn and turns towards south and walks 40 m up to E. Next, he turns right again and walks 30 m up to F, his final position. F is south–east of A. Therefore, P is south–east of his starting point.



5. A direction pole was situated on a crossing. Due to an accident the pole turned in such a manner that the pointer which indicated east direction, was now pointing towards the south. According to the pointer, one traveller was travelling in the north direction. In which direction was he actually travelling?

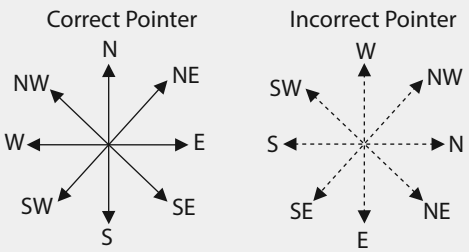
(a) North (b) South (c) East (d) West

Solution: (c) East

Explanation:

The directions on the correct pointer and the incorrect pointer are shown in the figure given below.

North direction according to the incorrect pointer is actually the East direction.

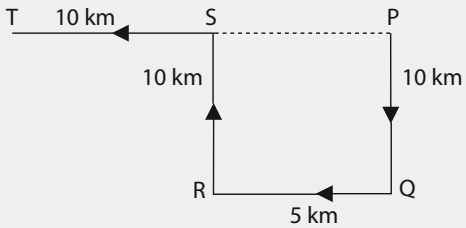


6. One day, A left home and cycled 10 km southwards, turned right and cycled 5 km, turned right again and cycled 10 km and finally, turned left and cycled 10 km. What is the minimum distance A is required to travel to reach back home from this point?

(a) 10 km (b) 15 km (c) 20 km (d) None of the above

Solution: (b) 15 km

Explanation:



A starts from point P (home), moves 10 km southwards up till Q, turns right and moves 5 km up till R, turns right again and moves 10 km up till S and finally turns left and moves 10 km up till T.

A's distance from the initial position = PT = PS + ST = QR (because PS = QR) + ST

= 5 km + 10 km = 15 km.

7. A person walks 9 km towards the north. From there he walks 5 km towards the South. Then, he walks 3 km towards east. How far and in which direction is he with respect to his starting point?

(a) 5 km north–east (b) 7 km north–east
(c) 5 km south–west (d) 5 km south–west

Solution: (a) 5 km North–east

Explanation:

The person walks 9 km northwards from A to B, then walks 5 km southwards up to C, then turns towards east and walks 3 km up to D.

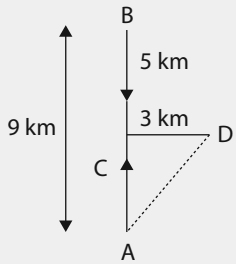
Then, AC = (AB – BC) = (9 – 5) = 4 km

CD = 3 km

Distance from the starting point = $\sqrt{AC^2 + CD^2} = \sqrt{4^2 + 3^2} = 5$ km

Also, D is north–east of A

Therefore, choice (a) is the correct answer.



8. Two cars start moving towards each other from two opposite points 150 km apart on a main road. The first car covers 25 km on the main road, takes a right turn and then covers 25 km more. It then turns left and covers another 25 km and then turns to reach the main road. In the meantime, due to a minor breakdown, the other car covers only 40 km along the main road. What is the remaining distance between the two cars?

(a) 35 km (b) 50 km (c) 60 km (d) None of the above

Solution: (c) 60 km

Explanation:

Let X and Y be two cars.

Car X travels along the path PA, AB, BC and CD.

Now, AD = BC = 25 km.

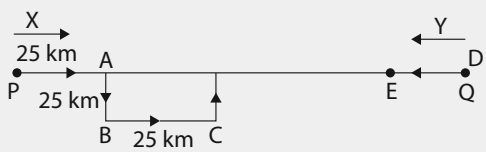
Distance travelled by car X on the main road = PD

PD = PA + AD = 50 km

Distance travelled by car Y = QE = 40 km

Therefore, the distance between the two cars = PQ – (PD + QE)

= [150 – (50 + 40)] km = 60 km



Solutions for

Reasoning