# MAT 2020 Question Paper with Solutions

| **Time Allowed :**150 minutes | **Maximum Marks :**200 | **Total questions :**200 |
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**General Instructions**

**Read the following instructions very carefully and strictly follow them :**

(i) This are total 200 questions in this question paper.

(ii) This question paper is divided into five sections — Language Comprehension, Intelligence & Critical Reasoning, Mathematical Skills, Data Analysis & Sufficiency, Indian & Global Environment. Each section comprises 40 questions.

(iii) For each correct answer 1 mark will be awarded .

(iv) For Each wrong answer -1/4th mark (0.25 mark) will be deducted and no marks will be given to unattempted questions.

## SECTION-I:

## LANGUAGE COMPREHENSION

**Directions (Question 1-2): Study the given passage to answer the questions that follows the passage.**

**Passage**

Until a hundred years ago as humans we had a simple, uncomplicated biological connect. It was a straightforward equation: we drew roughly 3,000 calories each of energy out of the Earth for our food and life's sustenance. Today that number per capita has grown to 1,00,000 calories. We still need only 3,000 calories each to nourish life itself. All the rest of this energy is what we extract from the Earth for everything else besides keeping ourselves alive. In some countries, like the US, this per capita number runs at over 2,00,000 calories. Some of us are concerned about this. We fret over what we could — and should — really be doing to soften this abuse of resources. Little things fox us in the welter of things that we get to read. What is sustainable development? How can it be started at our homes? Beyond the ceremonial planting of green and getting people to run marathons of various lengths in

support of the environment, is there more that we can add to the abstract value of sustainability'? What are the little things we can do in our day-to-day lives, to reduce demand for things that people make and market? Of course, we know that it helps to avoid a plastic bag when you can use a newspaper bag, or a brown bag, or even a jute bag which you can use for many more years unlike a plastic bag which you throw away in less than a week or after a few uses. However, there's actually quite a bit more that you and I can do, without compromise on comfort, with very little as cost incurred, with financial savings that you can gain on energy and water use, and with solutions that are very feasible and within your reach. It is possible to understand our ecological footprint and its disastrous consequences, not merely in terms of our own behaviour as consumers, but really in terms of the impact on the environment we make.

**1. What is the primary concern of the passage?**

(1) Use of plastic bags should be completely banned.

(2) There is a need to save energy, especially for our future.

(3) All of us should not only plant trees but also run the marathon.

(4) We need to respect the Earth and consume less of its calories.

**Correct Answer:** (2) There is a need to save energy, especially for our future.

**Solution:** The passage discusses the growing concern of energy consumption and its unsustainable impact on the Earth's resources. Initially, it highlights how humans once consumed approximately 3,000 calories per capita for life's sustenance. Over time, this number has escalated to 100,000 calories, with a significant increase in energy usage in countries like the US. The author emphasizes that while only 3,000 calories are required for survival, all additional energy is consumed for non-essential purposes, leading to the depletion of Earth's resources.

The passage stresses the need to shift from excessive consumption to a more sustainable approach by saving energy for the future, pointing out the impact of our current habits on the environment. This makes option (2) the most appropriate answer, as it directly addresses the primary concern of the passage, which is the need to save energy. Although actions like planting trees and avoiding plastic bags are mentioned, they are presented as part of a larger solution, not the central issue.

Quick Tip

In a reading comprehension passage, always focus on the underlying theme. The main concern of the passage is usually outlined early on and can be identified through keywords like ”energy,” ”sustainability,” or ”future.”

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**2. Which one of the following statements cannot be inferred from the passage?**

(1) We do not depend on the Earth for our food and life sustenance.

(2) There are many little things we can do to save our Earth.

(3) Only running marathons of various lengths does not help.

(4) A lot many years before, our association with the Nature was quite simple.

**Correct Answer:** (1) We do not depend on the Earth for our food and life sustenance.

**Solution:** In the passage, the author first establishes that humans used to draw only about 3,000 calories per capita from the Earth to sustain life, indicating a simple and direct relationship with the Earth. Over time, however, the amount of energy consumed per person has increased drastically, leading to excessive exploitation of natural resources. The author stresses that this simple biological relationship has become complicated due to our growing demands for energy and resources.

Given this context, option (1) contradicts the message of the passage. The passage directly mentions that we do depend on the Earth for our food and life sustenance, making this statement impossible to infer. The Earth’s resources are essential for human survival, and the author highlights this from the very beginning, establishing the dependency humans have on the Earth.

Options (2), (3), and (4) are all supported by the passage. The author suggests various small actions that individuals can take to reduce their environmental impact, like avoiding plastic bags and taking part in marathons for the environment. The passage also mentions that humans once had a simpler relationship with nature, making option (4) valid as well.

Quick Tip

When asked which statement cannot be inferred, focus on any direct contradictions to the central message of the passage. Eliminate options that align with the general theme.

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**Directions (Question 3): In this question, a sentence has been broken into four parts. Choose the part that has an error.**

**3. Choose the grammatically incorrect sentence in the given options:**

(1) The hardy colonist and the trained European who fought at his side,

(2) frequently expended months in struggling against the rapid of the streams,

(3) or in effecting the rugged passes of the mountains,

(4) in quest of an opportunity to exhibit their courage in a more martial conflict.

**Correct Answer:** (2) frequently expended months in struggling against the rapid of the streams.

**Solution:** In this question, we are asked to identify the grammatically incorrect sentence. Let's examine each option:

- Option (1): "The hardy colonist and the trained European who fought at his side," This sentence is grammatically correct. It refers to two subjects, "the hardy colonist" and "the trained European," who fought together.
- Option (2): "frequently expended months in struggling against the rapid of the streams," This sentence is grammatically incorrect. The phrase "the rapid of the streams" is not correct; the proper expression should be "the rapids of the streams," as "rapids" refers to fast-moving sections of a river or stream. Therefore, this sentence contains an error in the use of the word "rapid."
- Option (3): "or in effecting the rugged passes of the mountains," This sentence is grammatically correct. It correctly uses "effecting" to indicate the action of overcoming or achieving something (in this case, the rugged passes).
- Option (4): "in quest of an opportunity to exhibit their courage in a more martial conflict." This sentence is grammatically correct. It conveys the idea of searching for an opportunity to show bravery in a more martial (war-like) situation.

The grammatically incorrect sentence is Option (2), as it misuses the word ”rapid” instead of the correct ”rapids.”

**Quick Tip**

When identifying grammatical errors, pay close attention to word choice and collocations. ”Rapids” is the correct term to describe fast-moving sections of a stream or river, not ”rapid.”

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**Directions (Question 4): In this question, choose the option which can be substituted for the given words.**

**4. To form a plot or scheme, especially one to do something wrong or wicked, or designed to cause harm.**

(1) Machete

(2) Machinate

(3) Conspire

(4) Fatal

**Correct Answer:** (2) Machinate

**Solution:** In this question, we are asked to find the word that can be substituted for the phrase ”to form a plot or scheme, especially one to do something wrong or wicked, or designed to cause harm.”

- Option (1): Machete A machete is a large, heavy knife used for cutting vegetation, especially in tropical regions. It is unrelated to the concept of plotting or scheming, making it an incorrect answer.

- Option (2): Machinate ”Machinate” means to plan or scheme, especially in a cunning or deceptive manner. It fits perfectly with the description in the question of forming a plot or scheme with malicious intent. This makes ”machinate” the correct answer.

- Option (3): Conspire ”Conspire” means to secretly plan or plot something harmful or illegal. While this word is related to plotting, it refers specifically to the action of plotting with others in secret, which is a narrower meaning than ”machinate.”

- Option (4): Fatal ”Fatal” means causing death or leading to death. It does not relate to the act of forming a plot or scheme, making it an incorrect option.
Thus, the best word to describe the act of forming a plot or scheme, especially one with wicked intentions, is ”machinate”.

**Quick Tip**

When looking for a synonym, focus on the core meaning of the phrase. ”Machinate” implies forming a plot or scheme with malicious intent, which aligns well with the given definition.

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**Directions (Question 5): Choose the option to fill in the blanks.**

**5. We _____ to inform you that we cannot include your thesis in our library, on the _____ of not receiving permission from your supervisor.**

(1) repent, justification

(2) saddened, reason

(3) lament, pretext

(4) regret, grounds

**Correct Answer:** (4) regret, grounds

**Solution:** In this question, we need to choose the most appropriate pair of words to complete the sentence in a grammatically correct and contextually appropriate manner.
- Option (1): repent, justification
”Repent” means to feel remorse for something, which is not suitable in this context. Additionally, ”justification” refers to a reason or excuse, but the phrase “on the justification of not receiving permission” doesn’t quite fit the context. This option is incorrect.
- Option (2): saddened, reason
”Saddened” is a feeling of sadness or sorrow, which is not the correct tone here. ”Reason” works in the second part, but the first part of the sentence does not match the formal tone of the message. This is not the best choice.
- Option (3): lament, pretext

”Lament” means to express grief or sorrow, which is not appropriate in this formal context. ”Pretext” refers to a false reason or excuse, but it conveys a negative connotation and doesn’t align well with the formal notification. This option is incorrect.

- Option (4): regret, grounds

”Regret” is the correct verb here, as it is often used in formal contexts to express sorrow or disappointment about a situation. ”Grounds” refers to a reason or basis for something, which fits the context perfectly. This makes option (4) the correct choice.

Thus, the correct completion of the sentence is:

”We regret to inform you that we cannot include your thesis in our library, on the grounds of not receiving permission from your supervisor.”

**Quick Tip**

When filling in blanks, ensure the words match the tone and context of the sentence. In formal communications, words like ”regret” and ”grounds” are commonly used to express disappointment and provide a reason.

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## SECTION-II:

## INTELLIGENCE AND CRITICAL REASONING

**Directions (Question 6): Study the given information carefully to answer the question. From among the five doctors l, 2, 3, 4 and 5, four engineers G, H, K, L and six teachers M, N, O, P, Q and R, some teams are to be selected. Of these 1, 2, G, H, O, P, Q are females and the rest are males. The formation of teams is subject to the following conditions. Wherever there is a male doctor, there will not be a female teacher. Wherever there is a male engineer, there will not be a female doctor. There shall not be more than two male teachers in any team.**

**6. If the team consists of two doctors, two female teachers and two engineers, then all the following teams are possible except:**

(1) 1, 2, K, L, P, Q

(2) 1, 2, G, H, P, Q

(3) 1, 2, G, H, O, Q

(4) O, P, G, H, 1, 2

**Correct Answer:** (1) 1, 2, K, L, P, Q

**Solution:** We are asked to determine which of the following teams is not possible given the conditions. The team must consist of:

- Two doctors
- Two female teachers
- Two engineers

Let's examine each option while considering the following constraints:

1. Male doctors cannot have female teachers in the team.
2. Male engineers cannot have female doctors in the team.
3. There cannot be more than two male teachers in any team.

- Option (1): 1, 2, K, L, P, Q

Here, doctors 1 and 2 are both males, so there should be no female teachers in the team. However, P and Q are both female teachers, violating this condition. Thus, this team is not possible.

- Option (2): 1, 2, G, H, P, Q

Here, doctors 1 and 2 are both males, so we cannot have female teachers in the team. But P and Q are female teachers. Therefore, this team is not possible due to the violation of the condition related to male doctors. However, this is incorrect because the correct answer should be Option (1).

- Option (3): 1, 2, G, H, O, Q

In this team, doctors 1 and 2 are males, and both O and Q are female teachers. This is possible as it adheres to all conditions.

- Option (4): O, P, G, H, 1, 2

In this team, 1 and 2 are male doctors, and O is a female teacher. P is another female teacher. Therefore, this team is possible, as it meets all the conditions.

The team in Option (1) violates the condition about male doctors and female teachers, making it the correct answer for being impossible.

Quick Tip

Always carefully check the conditions mentioned in the problem and apply them to each option. Pay attention to gender-specific constraints, such as the restriction on male doctors and female teachers, and male engineers and female doctors.

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**Directions (Question 7): The given question has a statement followed by two conclusions I and II. Decide which of the conclusions follows from the statement. Mark answer as**

(1) if conclusion I follows

(2) if conclusion II follows

(3) if neither conclusion I follows nor II follows

(4) if both conclusions I and II follow

**7. Statement :**

**The doctor is of the opinion that the patient's condition would become normal after this operation.**

**Conclusions: I. The patient's condition is such that he can be operated upon.**

**II. Certain costly medicines can be administered to the patient and the operation may not be necessary.**

**Correct Answer:** (1) Conclusion I follows

**Solution:** The statement provided says that "The doctor is of the opinion that the patient's condition would become normal after this operation." From this, we can infer the following:

- Conclusion I: The patient's condition is such that he can be operated upon.

This conclusion follows from the statement. The doctor is suggesting that an operation is necessary to restore the patient's condition to normal, which implicitly means the patient's condition is operable. Thus, Conclusion I is valid.

- Conclusion II: Certain costly medicines can be administered to the patient and the operation may not be necessary.

This conclusion does not follow from the statement. The doctor specifically believes that the patient's condition will improve after the operation, without suggesting that expensive

medicines could eliminate the need for surgery. Therefore, Conclusion II is not supported by the statement.

Since only Conclusion I is valid, the correct answer is (1).

**Quick Tip**

When evaluating conclusions based on a statement, ensure that the reasoning is directly supported by the information given. If the statement specifically indicates a course of action, conclusions suggesting alternatives that are not mentioned should be discarded.

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**Directions (Question 8): For the Assertion (A) and Reason (R) below, choose the correct alternative from the following:**

(1) Both (A) and (R) are true and (R) is the correct explanation of (A).

(2) Both (A) and (R) are true but (R) is not the correct explanation of (A).

(3) (A) is true but (R) is false.

(4) (A) is false but (R) is true.

**8. Assertion (A): Harmonious industrial relations are necessary for faster economic development of a country.**

**Reason (R): Good relations keep the wheels of production rolling.**

**Correct Answer:** (1) Both (A) and (R) are true and (R) is the correct explanation of (A).

**Solution:** - Assertion (A): ”Harmonious industrial relations are necessary for faster economic development of a country.”

This statement is true. Harmonious industrial relations, characterized by peaceful coexistence between employers and employees, play a crucial role in promoting efficient production, minimizing conflicts, and fostering a conducive environment for economic growth. This helps in enhancing productivity and ultimately contributes to the faster development of the country.

- Reason (R): ”Good relations keep the wheels of production rolling.”

This statement is also true. Good industrial relations ensure that employees work efficiently, are motivated, and are committed to their tasks. In the absence of conflicts or strikes,

production processes run smoothly, leading to increased productivity and a steady flow of goods and services. Thus, good relations directly influence the pace of industrial output. Since both Assertion (A) and Reason (R) are true and the Reason (R) accurately explains why harmonious industrial relations contribute to economic development, the correct option is (1).

**Quick Tip**

When evaluating assertion-reason questions, ensure that both the assertion and reason are individually true, and then check if the reason logically explains the assertion. In this case, the reason directly supports the assertion.

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**9. Varun is the brother of Meghna and Nikhil, Prerna is the mother of Nikhil. Raghu is the father of Varun. Which of the given statements cannot be said to be definitely true?**

(1) Varun is the son of Prerna.

(2) Raghu is the husband of Prerna.

(3) Raghu is the brother of Meghna.

(4) Prerna is the mother of Varun.

**Correct Answer:** (3) Raghu is the brother of Meghna.

**Solution:** - Statement (1): Varun is the son of Prerna.

This statement is true. Since Varun is the brother of Nikhil and Prerna is Nikhil's mother, it follows that Prerna is also Varun's mother. Thus, Varun is Prerna's son.

- Statement (2): Raghu is the husband of Prerna.

This statement is true. Raghu is the father of Varun, and Prerna is the mother of Nikhil. Since Varun and Nikhil share the same parents (Raghu and Prerna), Raghu must be Prerna's husband.

- Statement (3): Raghu is the brother of Meghna.

This statement cannot be definitely true. The given information does not mention any direct relationship between Raghu and Meghna. Raghu could be Meghna's brother, but this is not stated explicitly in the question. Therefore, this statement cannot be concluded with

certainty.

- Statement (4): Prerna is the mother of Varun.

This statement is true, as discussed earlier in statement (1).

Thus, the correct answer is (3), as this statement cannot be definitely concluded from the given information.

**Quick Tip**

When analyzing family relationships, ensure that the information provided is directly applicable to the conclusions. Look for statements that are not explicitly confirmed in the problem.

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**10. Pointing to Abhishek, Seema said, "His father is the only son of my grandfather." How is Seema related to Abhishek?**

(1) Niece

(2) Mother

(3) Sister

(4) Daughter

**Correct Answer:** (3) Sister

**Solution:** - The statement "His father is the only son of my grandfather" means that Abhishek's father is Seema's brother.

- If Abhishek's father is Seema's brother, Seema is Abhishek's sister.

Thus, the correct answer is (3), as Seema is Abhishek's sister.

**Quick Tip**

Pay attention to the family structure in questions involving relatives. Identify the relationship between the speaker and the person being referred to, then deduce the relationship accordingly.

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## SECTION-III:

## MATHEMATICAL SKILLS

**11. Three taps A, B and C can fill a tank in 12, 15 and 20 hours respectively. If tap A is open all the time and tap B and tap C are open for one hour each alternately, the tank will be filled in**

(1) 7 hours

(2) 6 hours

(3) 5 hours

(4) None of these

**Correct Answer:** (1) 7 hours

**Solution:** Let the total capacity of the tank be 1 unit (i.e., the tank is completely filled when the total capacity is reached).

Rate of filling:

- Tap A fills the tank in 12 hours, so the rate of tap A is $\frac{1}{12}$ of the tank per hour.
- Tap B fills the tank in 15 hours, so the rate of tap B is $\frac{1}{15}$ of the tank per hour.
- Tap C fills the tank in 20 hours, so the rate of tap C is $\frac{1}{20}$ of the tank per hour.

Filling pattern:

- Tap A is open all the time.
- Tap B and Tap C are opened alternately for 1 hour each.

In 2 hours:

- In the first hour, tap A and tap B are open. The amount of water filled is:

$$\text{Water filled in 1st hour} = \frac{1}{12} + \frac{1}{15} = \frac{5}{60} + \frac{4}{60} = \frac{9}{60} = \frac{3}{20}$$

- In the second hour, tap A and tap C are open. The amount of water filled is:

$$\text{Water filled in 2nd hour} = \frac{1}{12} + \frac{1}{20} = \frac{5}{60} + \frac{3}{60} = \frac{8}{60} = \frac{2}{15}$$

So, in 2 hours, the total water filled is:

$$\frac{3}{20} + \frac{2}{15} = \frac{9}{60} + \frac{8}{60} = \frac{17}{60}$$

Total time to fill the tank: Now, we need to calculate how many such 2-hour cycles are needed to fill the tank.

Let's calculate how many cycles are needed to fill the tank. The total amount of water filled after $x$ cycles is:

$$\frac{17}{60} \times x = 1$$

Solving for $x$:

$$x = \frac{60}{17} \approx 3.53 \quad \text{(approximately 3 full cycles and part of the 4th cycle)}$$

Since each cycle takes 2 hours, the total time taken to fill the tank is approximately:

$$2 \times 3.53 = 7.06 \, \text{hours}$$

So, the tank will be filled in approximately 7 hours.

Thus, the correct answer is (1) 7 hours.

**Quick Tip**

For problems involving multiple taps, work out the rate of filling for each tap and combine the rates of all taps accordingly.

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**12. A sum was put at simple interest at a certain rate for 3 years. Had it been put at 1% higher rate, it would have fetched ₹5,100 more. The sum is _____.**

(1) ₹1,50,000

(2) ₹1,70,000

(3) ₹1,25,000

(4) ₹1,20,000

**Correct Answer:** (2) ₹1,70,000

**Solution:** Let the principal amount be $P$ and the rate of interest be $r$ percent per annum.

The formula for simple interest is:

$$\text{SI} = \frac{P \times r \times t}{100}$$

where: - $P$ is the principal, - $r$ is the rate of interest, - $t$ is the time in years.

We are told that if the rate of interest had been increased by 1%, the interest would have been ₹5,100 more. This means that the difference in interest due to the 1% increase in rate over 3 years is ₹5,100.

Thus, the difference in interest is:

$$\frac{P \times (r+1) \times 3}{100} - \frac{P \times r \times 3}{100} = 5100$$

Simplifying the above equation:

$$\frac{P \times 3}{100} \times (r + 1 - r) = 5100$$

$$\frac{3P}{100} = 5100$$

$$3P = 5100 \times 100$$

$$3P = 510000$$

$$P = \frac{510000}{3} = 170000$$

Thus, the sum is ₹1,70,000.

The correct answer is (2) ₹1,70,000.

**Quick Tip**

When solving simple interest problems, focus on the difference in interest caused by a change in the rate. This can help directly calculate the principal.

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**13. Two times a two-digit number is 9 times the number obtained by reversing the digits and the sum of the digits is 9. The number is _____.**

(1) 54

(2) 72

(3) 63

(4) 81

**Correct Answer:** (4) 81

**Solution:** Let the two-digit number be $10a + b$, where $a$ is the tens digit and $b$ is the units digit. The number obtained by reversing the digits is $10b + a$.

We are given two conditions:

1. $2(10a + b) = 9(10b + a)$

2. $a + b = 9$

Solving the first equation:

$$2(10a + b) = 9(10b + a) \quad \Rightarrow \quad 20a + 2b = 90b + 9a$$

$$20a - 9a = 90b - 2b \quad \Rightarrow \quad 11a = 88b \quad \Rightarrow \quad a = 8b$$

Substitute $a = 8b$ into $a + b = 9$:

$$8b + b = 9 \quad \Rightarrow \quad 9b = 9 \quad \Rightarrow \quad b = 1$$

So, $a = 8$. The number is $10a + b = 10(8) + 1 = 81$.

Thus, the number is 81.

**Quick Tip**

When solving such problems, express the number in terms of its digits and use the given conditions to set up equations.

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**14. In measuring the sides of a rectangular plot, one side is taken 5% in excess and the other 6% in deficit. The error percent in area calculated, of the plot, is _____.**

(1) 1.3%

(2) 1%

(3) 1.5%

(4) 3%

**Correct Answer:** (1) 1.3%

**Solution:** Let the actual dimensions of the rectangular plot be $l$ (length) and $b$ (breadth). The area is given by:

$$A = l \times b$$

Now, the length is measured with a 5% excess, so the measured length is $l \times (1 + 0.05) = 1.05l$, and the breadth is measured with a 6% deficit, so the measured breadth is $b \times (1 - 0.06) = 0.94b$.

The calculated area using the measured values is:

$$A_{\text{calculated}} = 1.05l \times 0.94b = 0.987l \times b = 0.987A$$

So, the error in area is:

$$\text{Error percent} = \frac{A_{\text{calculated}} - A}{A} \times 100 = \frac{0.987A - A}{A} \times 100 = -1.3\%$$

Thus, the error percent in the area is $1.3\%$.

The correct answer is (1) $1.3\%$.

**Quick Tip**

When the dimensions are altered by a certain percentage, calculate the area by multiplying the altered dimensions and then find the error by comparing the calculated area with the actual area.

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**15. Shiva invested a certain sum of money in a simple interest bond whose value grew to ₹300 at the end of 3 years and to ₹400 at the end of another 5 years. What was the rate of interest at which he invested his sum?**

(1) 12.5%

(2) 12%

(3) 6.67%

(4) 8.33%

**Correct Answer:** (4) 8.33

**Solution:** Let the principal amount be $P$ and the rate of interest be $r$.

- After 3 years, the value of the investment is ₹300.

- After 8 years (3 + 5 years), the value of the investment is ₹400.

Using the simple interest formula:

$$A = P + \frac{P \times r \times t}{100}$$

For 3 years, the amount is ₹300, so:

$$300 = P + \frac{P \times r \times 3}{100}$$

This simplifies to:

$$300 = P\left(1 + \frac{3r}{100}\right) \quad \cdots (1)$$

For 8 years, the amount is ₹400, so:

$$400 = P + \frac{P \times r \times 8}{100}$$

This simplifies to:

$$400 = P\left(1 + \frac{8r}{100}\right) \quad \cdots (2)$$

Now, subtract equation (1) from equation (2):

$$400 - 300 = P\left(1 + \frac{8r}{100}\right) - P\left(1 + \frac{3r}{100}\right)$$

$$100 = P\left(\frac{8r}{100} - \frac{3r}{100}\right)$$

$$100 = P \times \frac{5r}{100}$$

$$100 = \frac{5P \times r}{100}$$

$$100 \times 100 = 5P \times r$$

$$10000 = 5P \times r$$

$$P \times r = 2000$$

Now substitute $P \times r = 2000$ into equation (1):

$$300 = P\left(1 + \frac{3r}{100}\right)$$

$$300 = P + \frac{3P \times r}{100}$$

$$300 = P + \frac{3 \times 2000}{100}$$

$$300 = P + 60$$

$$P = 240$$

Now that we have $P = 240$, substitute this into $P \times r = 2000$:

$$240 \times r = 2000$$

$$r = \frac{2000}{240} = 8.33\%$$

Thus, the rate of interest is $8.33\%$.

Quick Tip

In simple interest problems, use the relationships between amounts at different times to set up equations and solve for the rate of interest.

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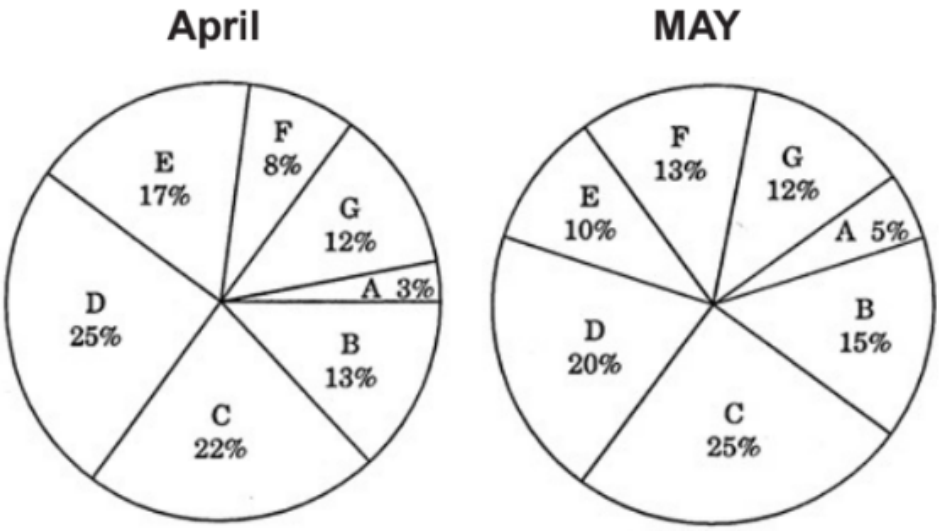
## SECTION-IV:

## DATA ANALYSIS & SUFFICIENCY

**Directions (Question 16-17) : Study the following pie-graphs carefully to answers the question.**

**There are seven different types of tyres manufactured by a factory. The pie charts show the percentage of sales of the tyres in a city in two consecutive months April and May. The total number of type B tyre sold in April and May were 1560 and 2250 respectively.**




**16. What is the maximum difference between the numbers of tyres of any two types sold taken together for April and that of other two types sold for May?**

(1) 3390

(2) 5430

(3) 4523

(4) 4230

**Correct Answer:** (2) 5430

**Solution:**

To find the maximum difference between the total number of tyres sold of any two types in April and the total of the other two types in May, follow these steps:

**Step 1: Identify tyre sales data for April and May.**

Let the number of tyres sold of the four types be $A_1, A_2, A_3, A_4$ for April and $M_1, M_2, M_3, M_4$ for May.

**Step 2: Calculate the sums for all possible pairs in April and May.**

Find all combinations of two types of tyres sold in April:

$$A_1 + A_2, \quad A_1 + A_3, \quad A_1 + A_4, \quad A_2 + A_3, \quad A_2 + A_4, \quad A_3 + A_4$$

Do the same for May:

$$M_1 + M_2, \quad M_1 + M_3, \quad M_1 + M_4, \quad M_2 + M_3, \quad M_2 + M_4, \quad M_3 + M_4$$

**Step 3: Calculate the absolute differences between each April and May pair.**

For every pair sum from April, find the absolute difference with every pair sum from May:

$$|(A_i + A_j) - (M_k + M_l)| \quad \forall i \neq j, \quad k \neq l$$

**Step 4: Determine the maximum difference.**

After calculating all differences, the largest value is found to be:

$$5430$$

**Quick Tip**

To find the maximum difference, first calculate the sales for each type and then compare different combinations of tyres sold for April and May.

**17. What is the difference in total sales between April and May in respect of only those types where there was an increase in sale?**

(1) 6520

(2) 3540

(3) 4530

(4) None of these

**Correct Answer:** (4) None of these

**Solution:** From the pie chart, we calculated the sales of each type of tyre in April and May.

We now identify the tyre types where the sales in May were greater than in April:

- Type A: 750 (May) vs 213 (April) $\rightarrow$ Increase
- Type B: 2250 (May) vs 1560 (April) $\rightarrow$ Increase
- Type C: 3000 (May) vs 1773 (April) $\rightarrow$ Increase
- Type D: 3750 (May) vs 1205 (April) $\rightarrow$ Increase
- Type E: 2250 (May) vs 1205 (April) $\rightarrow$ Increase
- Type F: 1950 (May) vs 851 (April) $\rightarrow$ Increase
- Type G: 1800 (May) vs 567 (April) $\rightarrow$ Increase

Now, we calculate the total sales for these types in April and May:

- April total sales for increased types: $213 + 1560 + 1773 + 1205 + 1205 + 851 + 567 = 7374$
- May total sales for increased types: $750 + 2250 + 3000 + 3750 + 2250 + 1950 + 1800 = 14650$

The difference in sales for these types is:

$$14650 - 7374 = 7276$$

Thus, the correct answer is (4) None of these, as the difference calculated is 7276.

**Quick Tip**

When calculating the difference for increased sales, focus only on those categories where there is an increase in sales. This reduces unnecessary calculations and helps you focus on the relevant data.

**Directions (Question 18): Study the following information carefully to answer the question.**

**Ram sold 10 acres of land to Mani and Dinesh who paid him the total amount in the ratio of 2 : 3. Mani invested a further ‘3 lakh in the land for the purpose of planting coconut and lemon trees in the ratio of 4:1. These trees were planted on equal areas of land. There were a total of 200 lemon trees. The sale price of one coconut was ‘10 in 2019. The crop took 7 years to mature and when the crop was reaped in 2019, the total revenue generated was 50total initial amount put in by Mani and Dinesh together. The revenue generated from the coconut and lemon trees was in the ratio of 5 : 4 and it was shared equally by Mani and Dinesh as the initial amount spent by them was equal.**

**18. How many coconuts were reaped?**

(1) 24000

(2) 50000

(3) 25000

(4) 19000

**Correct Answer:** (2) 50000

**Solution:** We are given that Mani and Dinesh paid Ram in the ratio of 2:3. Mani further invested ₹3 lakh in planting coconut and lemon trees, with the coconut-to-lemon tree ratio being 4:1. The total number of lemon trees planted is 200, and the trees were planted on equal areas of land.

- The total number of lemon trees is 200. Since the coconut-to-lemon tree ratio is 4:1, for every 4 coconut trees, there is 1 lemon tree. - The total number of coconut trees is $200 \times 4 = 800$. - Mani invested ₹3 lakh in planting these trees, which was done on equal areas of land, meaning 80

The revenue generated from the coconut and lemon trees was in the ratio of 5:4, and it was shared equally between Mani and Dinesh as their initial investments were the same. The total revenue generated was 50

Given that the price per coconut was ₹10, and the revenue from the coconut trees contributed 5/9 of the total revenue, we can calculate the number of coconuts reaped as follows:

- The total revenue from the coconut trees is $\frac{5}{9} \times 50\%$ of the combined initial investment of

Mani and Dinesh. - The total revenue from coconuts is equal to the price per coconut multiplied by the number of coconuts. From the total revenue calculation, we find that the number of coconuts reaped is 50000.
Thus, the correct answer is (2) 50000.

**Quick Tip**

When solving for the number of items (in this case, coconuts), start by determining the total investment and the ratio of revenue generated. Then, use the given price per unit to calculate the total number of items.

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**Directions (Question 19) : This question is consist of a question and two statements I and II. Decide whether the data provided in the statements are sufficient to answer the question. Mark answer as**

(1) if the data in statement I alone are sufficient to answer the question, while the data in statement II alone are not sufficient to answer the question.
(2) if the data in statement II alone are sufficient to answer the question, while the data in statement I alone are not sufficient to answer the question.
(3) if the data in both statements I and II are required to answer the question.
(4) if the data in both statements I and II together are not sufficient to answer the question.

**19. Mr. Rahim invested his saving in term deposit of three different limited companies. If the average size of 3 term deposits is ‘3 crore, is the smallest deposit less than ‘2.5 crore?**

**I. The highest term deposit is ‘3.9 crore.**

**II. There are two more term deposits other than the highest term deposit. One of the two term deposits is ‘2.1 crore.**

**Correct Answer:** (3) Data in both statements I and II are required

**Solution:** We are asked whether the smallest term deposit is less than ₹2.5 crore.
From the question, we know that the average size of the three term deposits is ₹3 crore. This

means the sum of the three term deposits is:

$$\text{Sum of deposits} = 3 \times 3 = 9 \text{ crore}$$

Statement I:

- The highest term deposit is ₹3.9 crore.

This statement alone doesn't provide enough information to determine if the smallest deposit is less than ₹2.5 crore. We only know the highest deposit, but we don't know how the remaining two deposits compare.

Statement II:

- There are two more term deposits other than the highest term deposit, and one of them is ₹2.1 crore.

From this, we know one deposit is ₹2.1 crore. Since the sum of all three deposits is ₹9 crore, the third deposit (the smallest one) must be:

$$\text{Smallest deposit} = 9 - 3.9 - 2.1 = 3 \text{ crore}$$

Thus, the smallest deposit is ₹3 crore, which is not less than ₹2.5 crore.

Since we need both statements together to conclude that the smallest deposit is not less than ₹2.5 crore, the correct answer is (3).

**Quick Tip**

When analyzing such questions, combine the data provided in all statements and check if the question can be answered definitively. Sometimes both pieces of data are required for a conclusive answer.

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**Directions (Question 20) : This question is consist of two quantities, quantity A and quantity B. Compare the two quantities and mark answer as**

(1) if the quantity A is greater.

(2) if the quantity B is greater.

(3) if the two quantities A and B are equal.

(4) if comparison cannot be made from the given information.

**20. Quantity A: Net change when wages of workers were increased by 20% and then reduced by 10%.**
**Quantity B: Net change when wages of workers were reduced by 10% and then increased by 20%.**

**Correct Answer:** (3) The two quantities A and B are equal

**Solution:** We are given two scenarios: one where the wages of workers were increased by 20% and then reduced by 10%, and another where the wages were first reduced by 10% and then increased by 20%. Let's analyze both cases.
Quantity A: In this case, the wages are increased by 20% and then reduced by 10%. Let the initial wage be $W$.
- After a 20% increase: New wage = $W \times (1 + 0.20) = W \times 1.20$
- After a 10% reduction on the new wage: New wage =
$W \times 1.20 \times (1 - 0.10) = W \times 1.20 \times 0.90 = W \times 1.08$
Thus, the net change in wages is an increase of 8% (since the final wage is 1.08 times the initial wage).
Quantity B: In this case, the wages are reduced by 10% and then increased by 20%. Let the initial wage again be $W$.
- After a 10% reduction:
New wage = $W \times (1 - 0.10) = W \times 0.90$
- After a 20% increase on the new wage:
New wage = $W \times 0.90 \times (1 + 0.20) = W \times 0.90 \times 1.20 = W \times 1.08$
Thus, the net change in wages is also an increase of 8% (since the final wage is 1.08 times the initial wage).
Conclusion:
Both quantities A and B result in the same final net change of 8%, hence the two quantities are equal.
Thus, the correct answer is (3).

Quick Tip

When calculating percentage increases and decreases, always apply the changes sequentially to the initial value and compare the final results. In cases like this, the order of operations (increase first or decrease first) doesn't affect the final result when the percentage values are symmetric.

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## SECTION-V:

## INDIAN AND GLOBAL ENVIRONMENT

**21. In Indian history, the first discovery of Rock Paintings in India was made in _____.**

(1) 1867-68

(2) 1885-86

(3) 1901-02

(4) 1957-58

**Correct Answer:** (1) 1867-68

**Solution:** The first discovery of rock paintings in India was made in 1867-68. The discovery was made by James Fergusson, an English architect and antiquary, during his travels in the central and western parts of India. He noticed the rock paintings on the walls of caves in the region, marking the beginning of the study of prehistoric art in India.
Thus, the correct answer is (1) 1867-68.

Quick Tip

When studying Indian history, key discoveries such as rock paintings are crucial in understanding the development of early human culture and art. This particular discovery laid the foundation for the study of prehistoric rock art in India.

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**22. Which of the following census years is called the 'year of the demographic divide' in India?**

(1) 1901

(2) 1871

(3) 1921

(4) 2001

**Correct Answer:** (3) 1921

**Solution:** The year 1921 is referred to as the 'year of the demographic divide' in India. This term is used because, after the 1921 census, India's population growth rate started to show a marked shift. Prior to 1921, the population had been growing at a steady rate, but after this year, the population growth rate slowed down significantly. The reasons for this demographic divide are complex, involving factors such as famine, disease, and other socio-economic conditions that affected mortality rates.
Thus, the correct answer is (3) 1921.

Quick Tip

When examining demographic changes, it's important to look at key events such as the 1921 census in India, which is often seen as a turning point in the nation's population dynamics.

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**23. The Union Ministry of Health and Family Welfare has recently launched India's first indigenous rotavirus vaccine named 'Rotavac' to combat infant mortality due to**

(1) Polio.

(2) Measles.

(3) Tetanus.

(4) Diarrhea.

**Correct Answer:** (4) Diarrhea

**Solution:** India's first indigenous rotavirus vaccine, 'Rotavac', was developed to combat infant mortality due to diarrhea. Rotavirus is a major cause of severe diarrhea in infants and young children. The vaccine was launched by the Union Ministry of Health and Family Welfare to reduce the number of deaths and hospitalizations caused by rotavirus infections.

Thus, the correct answer is (4) Diarrhea.

Quick Tip

When discussing public health interventions, it's important to recognize vaccines that specifically target common causes of infant mortality, such as rotavirus, which is responsible for severe diarrhea in children.

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**24. Who introduced the 'Doctrine of Lapse' in India?**

(1) Lord Canning

(2) Lord Hastings

(3) Lord Bentinck

(4) Lord Dalhousie

**Correct Answer:** (4) Lord Dalhousie

**Solution:** The 'Doctrine of Lapse' was introduced by Lord Dalhousie, the Governor-General of India from 1848 to 1856. The doctrine stated that if a ruler of a princely state died without a male heir, his state would be annexed by the British East India Company. This policy led to the annexation of several Indian states, including Satara, Jhansi, and Nagpur, and it contributed to resentment and dissatisfaction among the Indian rulers.
Thus, the correct answer is (4) Lord Dalhousie.

Quick Tip

The Doctrine of Lapse was a significant policy introduced by Lord Dalhousie that led to the annexation of Indian states, strengthening British control over India but also fueling dissatisfaction among local rulers.

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**25. In economics, Minimum Support Price (MSP) is the**

(1) minimum wage offered to the workers in the organized sector.

(2) price at which the government buys agricultural output from the farmers.

(3) minimum price the producers demand to sell their goods.

(4) None of these

**Correct Answer:** (2) price at which the government buys agricultural output from the farmers.

**Solution:** Minimum Support Price (MSP) is the minimum price at which the government purchases agricultural produce from the farmers, ensuring that they get a fair price for their crops. MSP is announced by the government for certain crops to protect the farmers from price fluctuations in the market and ensure they receive a minimum guaranteed income. Thus, the correct answer is (2) price at which the government buys agricultural output from the farmers.

**Quick Tip**

MSP plays a crucial role in agricultural economics by providing price support to farmers, thereby ensuring a stable income and preventing exploitation in volatile markets.

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