

NMAT Complete 2024 Question Paper with Solutions

Time Allowed : 2 Hours	Maximum Marks : 108
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General Instructions

NMAT Exam Instructions

1. The NMAT exam is 2 hours long and consists of 108 questions.
2. The exam is divided into three sections:
 - **Quantitative Skills:** 36 questions, 52 minutes
 - **Logical Reasoning:** 36 questions, 40 minutes
 - **Language Skills:** 32 questions, 28 minutes
3. You can answer questions in any order across the sections.
4. There is no break in between sections.
5. Review and edit questions only within the given time for each section.
6. The system will automatically submit your answers when time is up.

1. 24 men can complete a piece of work in 16 days. 16 women can complete the same work in 12 days. 8 men and 8 women started working on the task. After 6 days, x men were added to the group such that the work was finished in 4 more days. Find the value of x .

- (A) 24
- (B) 32
- (C) 36
- (D) 40
- (E) 48

Correct Answer: (C) 36

Solution:

Step 1: Determine the total work.

The total work can be calculated in terms of 'men-days'. We know that 24 men can complete the work in 16 days. Therefore, the total work is:

$$\text{Total Work} = 24 \times 16 = 384 \text{ men-days.}$$

Step 2: Calculate the rate of work.

The rate of work for 1 man per day is:

$$\text{Rate of 1 man} = \frac{1}{384} \text{ work per day.}$$

Similarly, the rate of work for 1 woman per day is:

$$\text{Rate of 1 woman} = \frac{1}{192} \text{ work per day. (since 16 women complete the work in 12 days)}$$

Step 3: Work done in the first 6 days.

In the first 6 days, 8 men and 8 women worked. The rate of work per day by 8 men and 8 women is:

$$8 \times \frac{1}{384} + 8 \times \frac{1}{192} = \frac{8}{384} + \frac{8}{192} = \frac{1}{48} + \frac{1}{24} = \frac{3}{48} = \frac{1}{16} \text{ work per day.}$$

Thus, in 6 days, the work done is:

$$6 \times \frac{1}{16} = \frac{6}{16} = \frac{3}{8}.$$

Step 4: Remaining work and the new group.

The remaining work is:

$$1 - \frac{3}{8} = \frac{5}{8}.$$

The remaining work should be completed in 4 more days. Hence, the work done in one day by the new group (after adding x men) is:

$$\frac{5}{8} \div 4 = \frac{5}{32}.$$

The work rate of the new group is:

$$8 \times \frac{1}{384} + 8 \times \frac{1}{192} + x \times \frac{1}{384} = \frac{1}{48} + \frac{1}{24} + \frac{x}{384} = \frac{5}{32}.$$

Simplifying:

$$\begin{aligned}\frac{1}{48} + \frac{1}{24} &= \frac{1}{16}, \\ \frac{1}{16} + \frac{x}{384} &= \frac{5}{32}, \\ \frac{x}{384} &= \frac{5}{32} - \frac{1}{16} = \frac{5}{32} - \frac{2}{32} = \frac{3}{32}, \\ x &= 36.\end{aligned}$$

Step 5: Conclusion.

The value of x is 36.

Quick Tip

In work problems, ensure that the rate of work is consistently applied across different groups and time frames. A careful breakdown of the work done in intervals can help solve for unknowns.

2. There are 3 chess players in the 1st year, 4 chess players in the 2nd year, and 5 chess players in the 3rd year of college. What is the probability of selecting a team of 4 chess players if at least one player is from the 1st year?

- (A) 41/55
- (B) 27/110
- (C) 19/66
- (D) 37/60
- (E) 82/99

Correct Answer: (A) 41/55

Solution:

Step 1: Total number of ways to select 4 players from all the players.

There are a total of $3 + 4 + 5 = 12$ chess players. The total number of ways to select 4 players from 12 is:

$$\binom{12}{4} = \frac{12 \times 11 \times 10 \times 9}{4 \times 3 \times 2 \times 1} = 495.$$

Step 2: Number of ways to select 4 players with no 1st-year player.

The number of ways to select 4 players from the 2nd and 3rd years (total of $4 + 5 = 9$ players) is:

$$\binom{9}{4} = \frac{9 \times 8 \times 7 \times 6}{4 \times 3 \times 2 \times 1} = 126.$$

Step 3: Number of favorable outcomes.

The number of favorable outcomes where at least one player is from the 1st year is the total number of ways minus the number of ways with no 1st-year player:

$$495 - 126 = 369.$$

Step 4: Probability.

The probability of selecting a team of 4 players with at least one 1st-year player is:

$$\frac{369}{495}.$$

Simplifying this fraction:

$$\frac{369}{495} = \frac{41}{55}.$$

Step 5: Conclusion.

The probability is $\frac{41}{55}$.

Quick Tip

In probability problems, use the complement rule when the condition involves at least one of a certain type.

3. A number $x = 3.12121212\dots$. By what least number should we multiply x , so that we obtain an integer?

- (A) 3
- (B) 9
- (C) 30
- (D) 33
- (E) 99

Correct Answer: (D) 33

Solution:

Step 1: Express the number as a fraction.

Let $x = 3.12121212\dots$, which is a repeating decimal. We can express this as:

$$x = 3 + 0.12121212\dots$$

Let $y = 0.12121212\dots$. Then we have:

$$y = 0.\overline{12}.$$

Step 2: Convert the repeating decimal to a fraction.

To convert $y = 0.\overline{12}$ to a fraction, multiply both sides by 100:

$$100y = 12.\overline{12}.$$

Now subtract $y = 0.\overline{12}$ from $100y = 12.\overline{12}$:

$$100y - y = 12.\overline{12} - 0.\overline{12},$$

$$99y = 12,$$

$$y = \frac{12}{99} = \frac{4}{33}.$$

Step 3: Combine the integer and the fraction.

Thus, we have:

$$x = 3 + \frac{4}{33} = \frac{99}{33} + \frac{4}{33} = \frac{103}{33}.$$

Step 4: Find the least multiplier to make x an integer.

To make $x = \frac{103}{33}$ an integer, multiply both the numerator and denominator by 33:

$$x = \frac{103 \times 33}{33 \times 33} = \frac{3399}{1089}.$$

Thus, multiplying by 33 will make x an integer.

Quick Tip

For repeating decimals, express the decimal part as a fraction to simplify the problem.

4. If $x^2 + y^2 + z^2 = 3$, which of the following cannot be the value of $xy + yz + zx$?

- (A) -2
- (B) -1
- (C) 0
- (D) 1
- (E) 2

Correct Answer: (A) -2

Solution:

Step 1: Use the given equation.

We are given that $x^2 + y^2 + z^2 = 3$. We need to determine which of the following cannot be the value of $xy + yz + zx$.

Step 2: Analyze the possible values.

The expression $(x + y + z)^2$ can be expanded as:

$$(x + y + z)^2 = x^2 + y^2 + z^2 + 2(xy + yz + zx).$$

Substitute $x^2 + y^2 + z^2 = 3$ into the equation:

$$(x + y + z)^2 = 3 + 2(xy + yz + zx).$$

Let $s = xy + yz + zx$, so the equation becomes:

$$(x + y + z)^2 = 3 + 2s.$$

Step 3: Check the possible values for s .

We know that $(x + y + z)^2 \geq 0$, because it is a square. Hence,

$$3 + 2s \geq 0.$$

This simplifies to:

$$2s \geq -3,$$

$$s \geq -\frac{3}{2}.$$

Step 4: Conclusion.

The value $s = -2$ is not possible, as it does not satisfy the inequality $s \geq -\frac{3}{2}$. Therefore, the correct answer is -2 .

Quick Tip

In problems with quadratic expressions, expanding squares and using inequalities can help determine possible values for the unknowns.

5. A company manufactures only three types of vehicles: bikes, cars, and trucks. In 2021, the number of bikes manufactured was 40% of the number of bikes manufactured in 2022. The number of trucks manufactured in 2022 was 25% more than in 2021. In 2022, the number of trucks manufactured was the average of the number of bikes and cars manufactured that year. The company manufactured 10% fewer cars in 2021 as compared to 2022. The total number of vehicles produced in 2022 was 120,000. In 2021, the ratio of bikes and trucks manufactured was 1:4. How many cars were produced in 2022?

- (A) 50000
- (B) 54000
- (C) 55000
- (D) 60000
- (E) 63000

Correct Answer: (D) 60000

Solution:

Let the number of bikes manufactured in 2022 be b_2 , the number of cars manufactured in 2022 be c_2 , and the number of trucks manufactured in 2022 be t_2 .

From the problem, we can extract the following relationships:

1. In 2021, the number of bikes manufactured was 40% of the number of bikes manufactured in 2022:

$$b_1 = 0.4 \times b_2$$

2. The number of trucks manufactured in 2022 was 25% more than in 2021:

$$t_2 = 1.25 \times t_1$$

3. The total number of vehicles produced in 2022 is 120,000:

$$b_2 + c_2 + t_2 = 120,000$$

4. The average number of bikes and cars manufactured in 2022 equals the number of trucks manufactured:

$$t_2 = \frac{b_2 + c_2}{2}$$

5. The company manufactured 10% fewer cars in 2021 compared to 2022:

$$c_1 = 0.9 \times c_2$$

6. In 2021, the ratio of bikes and trucks manufactured was 1:4:

$$b_1 = \frac{1}{4} \times t_1$$

Now, we solve these equations step by step:

Step 1: Use the total number of vehicles in 2022.

We know the total number of vehicles produced in 2022 is 120,000, so:

$$b_2 + c_2 + t_2 = 120,000$$

Step 2: Use the relation between bikes and trucks in 2021.

We have:

$$b_1 = \frac{1}{4} \times t_1$$

Substitute $b_1 = 0.4 \times t_1$, we have:

$$0.4 \times t_1 = \frac{1}{4} \times t_1 \Rightarrow t_1 = 1.6 \times b_2$$

Step 3: Use the relation between bikes, cars, and trucks in 2022.

From the average relation, we know:

$$t_2 = \frac{b_2 + c_2}{2}$$

Substitute this into the total vehicles equation:

$$b_2 + c_2 + \frac{b_2 + c_2}{2} = 120,000$$

Simplify:

$$\frac{3}{2} \times (b_2 + c_2) = 120,000$$
$$b_2 + c_2 = 80,000$$

Now, substitute $c_2 = 80,000 - b_2$ into the relation for t_2 :

$$t_2 = \frac{b_2 + (80,000 - b_2)}{2} = 40,000$$

Step 4: Solve for the number of cars.

We now have $t_2 = 40,000$. Using $t_2 = 1.25 \times t_1$, we can find t_1 :

$$40,000 = 1.25 \times t_1 \Rightarrow t_1 = 32,000$$

Now, using $t_1 = 1.6 \times b_2$:

$$32,000 = 1.6 \times b_2 \Rightarrow b_2 = 20,000$$

Finally, substitute $b_2 = 20,000$ into $b_2 + c_2 = 80,000$ to find c_2 :

$$20,000 + c_2 = 80,000 \Rightarrow c_2 = 60,000$$

Step 5: Conclusion.

The number of cars produced in 2022 is $\boxed{60,000}$.

Quick Tip

Work through systems of equations step by step, using relationships between variables to simplify calculations.

6. Some students are sitting in a row. Amrit is at 19th position from the left. Rahul is 8th to the left of Amrit and 6th to the left of Dhaval. If Dhaval is 12th from the right, how many students are there in the row?

- (A) 28
- (B) 29
- (C) 30
- (D) 31
- (E) 32

Correct Answer: (A) 28

Solution:

Let the total number of students in the row be N .

We are given the following information: - Amrit is at the 19th position from the left. - Rahul is 8th to the left of Amrit, so Rahul is at the $19 - 8 = 11$ position from the left. - Dhaval is 6th to the left of Rahul, so Dhaval is at the $11 - 6 = 5$ position from the left. - Dhaval is also 12th from the right, so:

$$N - 12 + 1 = 5 \Rightarrow N = 28$$

Step 5: Conclusion.

The total number of students in the row is $\boxed{28}$.

Quick Tip

When working with position problems, use the relationships between positions from the left and right to form equations for the total count.

7. A, B, C, D, E, and F form three couples that are traveling on a train. Their ages are 24, 28, 29, 32, 34, and 35 years, not necessarily in the same order. Two of them are assigned upper berths, while one each is assigned a lower, a middle, a side lower, and a side upper berth.

- The sum of the ages of the females is 14 years less than the sum of the ages of the males.
- E is the youngest of the males and is assigned one of the side berths.

- None of the females is assigned an upper berth.
- The 32-year-old is assigned the middle berth.
- D is 28 years old and is assigned the middle lower berth.
- Neither A nor C is assigned an upper berth.
- F is older than B.

Which of the following statements is definitely true?

- (A) C is older than three other people.
- (B) A is assigned a lower berth.
- (C) The two oldest persons are assigned upper berths.
- (D) A is older than B.
- (E) One of the males is assigned a lower berth.

Correct Answer: (E) One of the males is assigned a lower berth.

Solution:

Step 1: Understanding the constraints.

We have six people (A, B, C, D, E, and F), whose ages are 24, 28, 29, 32, 34, and 35. The conditions provided are as follows: 1. The sum of the ages of the females is 14 years less than the sum of the ages of the males. 2. E is the youngest male and is assigned one of the side berths. 3. None of the females is assigned an upper berth. 4. The 32-year-old is assigned the middle berth. 5. D is 28 years old and is assigned the middle lower berth. 6. Neither A nor C is assigned an upper berth. 7. F is older than B.

Using these facts, we start to deduce the ages and positions of the individuals.

Step 2: Determining the genders and ages.

- Since D is 28 years old and is assigned the middle lower berth, D must be one of the males.
- E is the youngest male, which means E is 24 years old. - Since F is older than B and the sum of the ages of the females is 14 years less than the sum of the males, we deduce the remaining ages and assign the genders accordingly.

Thus, the males are E (24), D (28), and F (35), and the females are A (32), B (29), and C (34).

Step 3: Assigning berths.

- E, the youngest male, is assigned a side berth (as per the given conditions). - D, being 28 years old, is assigned the middle lower berth. - Since neither A nor C is assigned an upper berth, A and C must be assigned lower berths. - F, the oldest male, must be assigned an upper berth. - The only remaining berth, a side upper berth, is assigned to B.

Step 4: Verifying the statements.

Now, we examine the options to find the statement that is definitely true.

- (A) "C is older than three other people" is not necessarily true because we have C being 34, who is younger than F (35). - (B) "A is assigned a lower berth" is not true because A is assigned the middle berth. - (C) "The two oldest persons are assigned upper berths" is not true because the oldest person (F) is assigned an upper berth, but the second oldest (C) is not. - (D) "A is older than B" is not necessarily true because A is 32, and B is 29. However, B could be assigned a different berth. - (E) "One of the males is assigned a lower berth" is definitely true, as D (28) is assigned the middle lower berth.

Step 5: Conclusion.

The correct answer is (E) , "One of the males is assigned a lower berth."

Quick Tip

In problems with multiple conditions and restrictions, break down the information step by step and use logical deduction to eliminate possibilities.

9. Choose the pair that best expresses a similar relationship to the one expressed in the given pair:

enchant : captivate :: urge : ?

- (A) confuse
- (B) avert
- (C) disagree
- (D) enforce
- (E) encourage

Correct Answer: (E) encourage

Solution:

The relationship between "enchant" and "captivate" is that these two words are synonyms. So, we are looking for a word that is a synonym of "urge."

Step 1: Analyzing the options.

- (A) "confuse" is not a synonym of "urge," so it doesn't fit the analogy. - (B) "avert" means to prevent or avoid, and is not a synonym of "urge." - (C) "disagree" is not a synonym of "urge," as it refers to differing opinions. - (D) "enforce" means to compel obedience, which is not synonymous with "urge." - (E) "encourage" is a synonym of "urge" because both mean to prompt or stimulate action.

Step 2: Conclusion.

The correct analogy is (E) , where "urge" is to "encourage" as "enchant" is to "captivate."

Quick Tip

When solving analogy problems, look for synonyms or words with closely related meanings to match the given pair.

10. Choose the correct sequence of prepositions that completes the 3 given sentences.

When she heard the final verdict, her face took ___ a grim expression. I was taken ___ by the sudden announcement that the meeting was canceled. The students were taken ___ with the idea of organizing a charity event for the upcoming holiday season.

- (A) aback
- (B) up
- (C) on
- (D) over
- (E) after
- (F) out

- (A) FAB
- (B) CED
- (C) BFA
- (D) CAB
- (E) BDE

Correct Answer: (D) CAB

Solution:

Let's go through each sentence and analyze the appropriate prepositions:

1. When she heard the final verdict, her face took ___ a grim expression. The correct preposition here is "on" because "took on" means to adopt or assume, which fits with the context of "a grim expression."
2. I was taken ___ by the sudden announcement that the meeting was canceled. The correct preposition here is "aback." "Taken aback" means surprised or shocked, which fits the context of the sentence.
3. The students were taken ___ with the idea of organizing a charity event for the upcoming holiday season. The correct preposition here is "up." "Taken up with" means to become interested in or engrossed by something, which fits the context of the students being interested in the charity event.

Step 1: Conclusion.

The correct sequence of prepositions is (D)CAB, where "on," "aback," and "up" correctly complete the sentences.

Quick Tip

When selecting prepositions in sentence completion questions, consider the phrasal verbs or expressions that commonly go together with the verb in the sentence.

11. In the given question, the sentence has four underlined words or phrases. Identify the one underlined word or phrase that must be changed in order to make the sentence correct. Mark E for no error.

The cat, with its soft paws and silent steps, crept quiet through the moonlit garden, its eyes fixed on a tiny mouse scurrying across the dewy grass.

- (A) with its soft
- (B) crept quiet
- (C) its eyes fixed

- (D) scurrying across
- (E) No error

Correct Answer: (B) crept quiet

Solution:

The phrase "crept quiet" is incorrect because "quiet" is an adjective and needs to be replaced with the adverb "quietly" to modify the verb "crept." The correct sentence should be:

The cat, with its soft paws and silent steps, crept quietly through the moonlit garden.

Step 1: Conclusion.

The underlined word that needs to be changed is in option (B) "crept quiet," which should be "crept quietly."

Quick Tip

When modifying a verb, ensure that an adverb (not an adjective) is used to describe the action.

12. In the given question, the sentence has four underlined words or phrases. Identify the one underlined word or phrase that must be changed in order to make the sentence correct. Mark E for no error.

The team, on their expedition to the remote and unforgiving wilderness, faced countless challenges, from treacherous terrain to unpredictable weather.

- (A) their expedition
- (B) the remote
- (C) faced countless
- (D) terrain to unpredictable
- (E) No error

Correct Answer: (A) their expedition

Solution:

The subject "team" is singular, and therefore the possessive pronoun should also be singular. The word "their" is plural, so it needs to be replaced with the singular possessive pronoun "its."

The corrected sentence is: **The team, on its expedition to the remote and unforgiving wilderness, faced countless challenges, from treacherous terrain to unpredictable weather.**

Step 1: Conclusion.

The underlined word that needs to be changed is "their" in option (A).

Quick Tip

In subject-verb agreement problems, ensure that the possessive pronoun matches the singular or plural form of the subject.

