GRE 2025 Quant Sample Paper Set 2

Time Allowed :	Maximum Score :	Sections :
About 3 hrs 45 mins	340 (Verbal+Quant) + 6 (AWA)	3 Main + 1 Unscored

General Instructions

Read the following instructions very carefully and strictly follow them:

1. The GRE General Test has a duration of about 3 hours 45 minutes, divided into six sections (including one unscored/experimental section).
2. The test consists of the following sections:
   - **Analytical Writing Assessment (AWA)** – 2 tasks, 30 minutes each.
   - **Verbal Reasoning** – 2 sections, 20 questions each, 30 minutes per section.
   - **Quantitative Reasoning** – 2 sections, 20 questions each, 35 minutes per section.
   - **Unscored/Research Section** – May appear anytime (not counted in score).
3. Scoring Pattern:
   - Verbal Reasoning: 130–170 (in 1-point increments).
   - Quantitative Reasoning: 130–170 (in 1-point increments).
   - Analytical Writing: 0–6 (in half-point increments).
4. No negative marking is applied in the GRE. Test-takers are advised to attempt all questions.
5. Only an on-screen calculator is allowed for Quantitative Reasoning. No physical calculators, mobile devices, or electronic gadgets are permitted.
6. Breaks: A 10-minute break is provided after the third section; one-minute breaks between other sections.

Quantitative Reasoning

Directions: For each question, indicate the best answer using the directions given.

Notes: All numbers used are real numbers.

All figures are assumed to lie in a plane unless otherwise indicated.

Geometric figures, such as lines, circles, triangles, and quadrilaterals, **are not necessarily** drawn to scale. That is, you should **not** assume that quantities such as lengths and angle measures are as they appear in a figure. You should assume, however, that lines shown as straight are actually straight, points on a line are in the order shown, and more generally, all geometric objects are in the relative positions shown. For questions with geometric figures, you should base your answers on geometric reasoning, not on estimating or comparing quantities from how they are drawn in the geometric figure.

Coordinate systems, such as xy-planes and number lines, **are drawn to scale**; therefore, you can read, estimate, or compare quantities in such figures from how they are drawn in the coordinate system.

Graphical data presentations, such as bar graphs, circle graphs, and line graphs, **are drawn to scale**; therefore, you can read, estimate, or compare data values from how they are drawn in the graphical data presentation.

For each of Questions 1–9, compare Quantity A and Quantity B, using additional information centered above the two quantities if such information is given. Select one of the following four answer choices. A symbol that appears more than once in a question has the same meaning throughout the question.

(A) Quantity A is greater.

(B) Quantity B is greater.

(C) The two quantities are equal.

(D) The relationship cannot be determined from the information given.

1. Quantity A: The dollar value of 1 Argentine peso
Quantity B: The dollar value of 1 Kenyan shilling

(A) Quantity A is greater.
(B) Quantity B is greater.
(C) The two quantities are equal.
(D) The relationship cannot be determined from the information given.

Correct Answer: (D) The relationship cannot be determined from the information given

Solution:

Step 1: Understanding the problem.
We are asked to compare the dollar value of 1 Argentine peso with the dollar value of 1 Kenyan shilling. Both are separate currencies whose exchange rates vary depending on market conditions and global financial situations.

Step 2: Limitation of information.
The problem does not provide the current exchange rates of the Argentine peso or the Kenyan shilling against the US dollar. Without this, no direct numerical comparison can be made.

Step 3: Conclusion.
Since no exchange rate values are given, it is impossible to determine whether Quantity A is

greater, Quantity B is greater, or both are equal. Therefore, the correct choice is:

$$\boxed{\text{(D) The relationship cannot be determined from the information given.}}$$

Quick Tip

In quantitative comparison problems, always check if sufficient numerical or relational information is provided. If not, the correct answer is usually that the relationship cannot be determined.

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2. k is a digit in the decimal $1.3k5$, and $1.3k5$ is less than 1.33.
Quantity A: k
Quantity B: 1.

(A) Quantity A is greater.
(B) Quantity B is greater.
(C) The two quantities are equal.
(D) The relationship cannot be determined from the information given.

Correct Answer: (D) The relationship cannot be determined from the information given

Solution:

Step 1: Understanding the condition.
We know that k is a digit (0 to 9) in the number $1.3k5$, and it is given that $1.3k5 < 1.33$.

Step 2: Establishing the range.
The number can be expressed as $1.3k5 = 1.305, 1.315, 1.325, \ldots$ depending on the value of k. Since $1.3k5 < 1.33$, possible values are:

$$1.305,\ 1.315,\ 1.325$$

which correspond to $k = 0, 1, 2$.

Step 3: Comparing with 1.
Thus, k could be 0, 1, or 2. This means sometimes $k = 1$ (equal to Quantity B), sometimes $k > 1$ (2 is greater than 1), and sometimes $k < 1$ (0 is less than 1).

Step 4: Conclusion.
Since all cases (greater, less, equal) are possible, no definite relationship can be determined. Therefore, the correct answer is:

$$\boxed{\text{(D) The relationship cannot be determined.}}$$

Quick Tip

When comparing digits in inequalities, always check all possible digit values (0–9). Sometimes multiple cases lead to indeterminate relationships.

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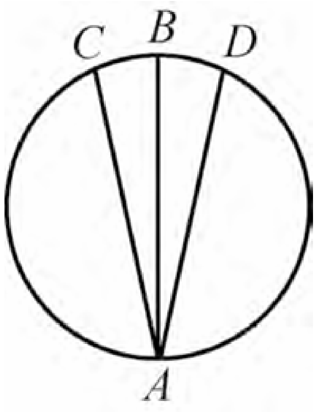
3. AB **is a diameter of the circle. Compare:**
Quantity A: The length of AB
Quantity B: The average (arithmetic mean) of the lengths of AC and AD.



(A) Quantity A is greater.
(B) Quantity B is greater.
(C) The two quantities are equal.
(D) The relationship cannot be determined from the information given.

Correct Answer: (A) Quantity A is greater

Solution:

Step 1: Property of a diameter.
In a circle, the diameter is the longest chord. Hence, AB, being a diameter, is longer than any other chord such as AC and AD.

Step 2: Comparing AB with other chords.
Since AC and AD are not diameters, we have:

$$AB > AC \quad \text{and} \quad AB > AD.$$

Step 3: Arithmetic mean property.
The arithmetic mean of two numbers is always less than or equal to the larger number. Therefore,

$$\frac{AC + AD}{2} < AB.$$

Step 4: Conclusion.
Thus, Quantity A (length of AB) is always greater than Quantity B (average of AC and AD). The correct answer is:

$$\boxed{\text{(A) Quantity A is greater.}}$$

> **Quick Tip**
>
> In circle geometry, the diameter is the longest chord. This fact often helps in direct comparisons without calculations.

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4. Given that $st = \sqrt{10}$. Compare:
Quantity A: s^2
Quantity B: $\dfrac{10}{t^2}$

(A) Quantity A is greater.
(B) Quantity B is greater.
(C) The two quantities are equal.
(D) The relationship cannot be determined from the information given.

Correct Answer: (C) The two quantities are equal

Solution:

Step 1: Start with the given relation.
It is given that $st = \sqrt{10}$. Squaring both sides, we get:

$$(st)^2 = (\sqrt{10})^2 \quad \Rightarrow \quad s^2t^2 = 10.$$

Step 2: Isolate s^2.
Dividing both sides of the equation by t^2, we get:

$$s^2 = \frac{10}{t^2}.$$

Step 3: Compare.
From this expression, it is clear that Quantity A and Quantity B are identical.

Step 4: Conclusion.
Therefore,

$$\boxed{\text{(C) The two quantities are equal.}}$$

> **Quick Tip**
>
> When given a product like st, squaring it often helps to compare squared terms such as s^2 and t^2.

5. Three consecutive integers have a sum of -84. Compare:
Quantity A: The least of the three integers
Quantity B: -28

(A) Quantity A is greater.
(B) Quantity B is greater.
(C) The two quantities are equal.
(D) The relationship cannot be determined from the information given.

Correct Answer: (B) Quantity B is greater

Solution:

Step 1: Represent the integers.
Let the three consecutive integers be $x, x+1, x+2$. Their sum is given as:

$$x + (x+1) + (x+2) = -84.$$

Step 2: Simplify.

$$3x + 3 = -84 \quad \Rightarrow \quad 3x = -87 \quad \Rightarrow \quad x = -29.$$

Step 3: Compare with -28.
The least of the integers is -29. Clearly,

$$-29 < -28.$$

Step 4: Conclusion.
Hence, Quantity B (-28) is greater.

$$\boxed{\text{(B) Quantity B is greater.}}$$

Quick Tip

When dealing with consecutive integers, always use algebraic representation $x, x+1, x+2$. Their sum simplifies easily.

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6. In the xy-plane, the equation of line k is $3x - 2y = 0$. Compare:
Quantity A: The x-intercept of line k
Quantity B: The y-intercept of line k

(A) Quantity A is greater.
(B) Quantity B is greater.
(C) The two quantities are equal.

(D) The relationship cannot be determined from the information given.

Correct Answer: (C) The two quantities are equal

Solution:

Step 1: Find the x-intercept.
To find the x-intercept, set $y = 0$ in the equation:

$$3x - 2(0) = 0 \quad \Rightarrow \quad 3x = 0 \quad \Rightarrow \quad x = 0.$$

So, the x-intercept is 0.

Step 2: Find the y-intercept.
To find the y-intercept, set $x = 0$:

$$3(0) - 2y = 0 \quad \Rightarrow \quad -2y = 0 \quad \Rightarrow \quad y = 0.$$

So, the y-intercept is also 0.

Step 3: Compare.
Both the x-intercept and y-intercept are equal to 0.

Step 4: Conclusion.
Thus,

$$\boxed{\text{(C) The two quantities are equal.}}$$

Quick Tip

Always find intercepts by substituting the other variable as zero. This works directly for any line equation.

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7. n is a positive integer that is divisible by 6. Compare:
Quantity A: The remainder when n is divided by 12
Quantity B: The remainder when n is divided by 18

(A) Quantity A is greater.
(B) Quantity B is greater.
(C) The two quantities are equal.
(D) The relationship cannot be determined from the information given.

Correct Answer: (D) The relationship cannot be determined from the information given

Solution:

Step 1: Condition.
It is given that n is a positive integer divisible by 6. Hence possible values are: $6, 12, 18, 24, 30, 36, \ldots$.

Step 2: Remainder when divided by 12.
Dividing such numbers by 12, the possible remainders are either 0 or 6. Thus Quantity A can be 0 or 6.

Step 3: Remainder when divided by 18.
Dividing such numbers by 18, the possible remainders are 0, 6, or 12. Thus Quantity B can be 0, 6, or 12.

Step 4: Compare values.
- If $n = 36$, remainders are both 0 $\rightarrow$ Quantities equal.
- If $n = 18$, remainders are 6 and 0 $\rightarrow$ Quantity A ¿ Quantity B.
- If $n = 30$, remainders are 6 and 12 $\rightarrow$ Quantity B ¿ Quantity A.

Step 5: Conclusion.
Since all three cases (A greater, B greater, equal) are possible, the relationship cannot be determined.

$$\boxed{\text{(D) The relationship cannot be determined.}}$$

Quick Tip

When dealing with remainders, always test multiple values consistent with the given conditions. Often, different values give different outcomes, making the relationship indeterminate.

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8. Given that $\frac{1-x}{x-1} = \frac{1}{x}$. Compare:
Quantity A: x
Quantity B: $-\frac{1}{2}$

(A) Quantity A is greater.
(B) Quantity B is greater.
(C) The two quantities are equal.
(D) The relationship cannot be determined from the information given.

Correct Answer: (B) Quantity B is greater

Solution:

Step 1: Simplify the given equation.

$$\frac{1-x}{x-1} = \frac{1}{x}.$$

Notice that $\frac{1-x}{x-1} = -1$ for all $x \neq 1$. But let us solve algebraically.

Step 2: Cross-multiply.
Multiply both sides by $x(x-1)$:

$$x(1-x) = (x-1)(1).$$

Step 3: Expand.

$$x - x^2 = x - 1 \quad \Rightarrow \quad -x^2 = -1 \quad \Rightarrow \quad x^2 = 1.$$

Step 4: Find valid values.
Thus, $x = 1$ or $x = -1$. But $x \neq 1$ (denominator restriction). Hence, $x = -1$.

Step 5: Compare with Quantity B.
Quantity A $= -1$. Quantity B $= -\frac{1}{2}$. Since $-1 < -\frac{1}{2}$, Quantity B is greater.

Step 6: Conclusion.

$$\boxed{\text{(B) Quantity B is greater.}}$$

Quick Tip

Always check for restrictions on variables when solving rational equations (denominator 0). This ensures invalid solutions are discarded.

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9. Compare:
Quantity A: The median of the 24 integers
Quantity B: 50

(A) Quantity A is greater.
(B) Quantity B is greater.
(C) The two quantities are equal.
(D) The relationship cannot be determined from the information given.

Correct Answer: (D) The relationship cannot be determined from the information given

Solution:

Step 1: Understanding the problem.
We are given 24 integers and asked to compare their median with the fixed value 50.

Step 2: Median definition.
The median of an even number of terms is the average of the two middle terms when the data

is arranged in ascending order.
Here, since there are 24 integers, the median will be:

$$\text{Median} = \frac{\text{12th term} + \text{13th term}}{2}.$$

Step 3: Limitation.
No information is given about the values of the 24 integers. They could all be less than 50, all greater than 50, or spread around 50. Thus, the median could be less than, equal to, or greater than 50 depending on the specific set.

Step 4: Conclusion.
Since no definite relationship can be determined, the correct answer is:

$$\boxed{\text{(D) The relationship cannot be determined.}}$$

Quick Tip

For median problems, always check if enough information about the data set is given. If the distribution of numbers is unknown, the median cannot be compared with a fixed value.

Questions 10–25 have several different formats, including both selecting answers from a list of answer choices and numeric entry. With each question, answer format instructions will be given.
Numeric-Entry Questions
These questions require a number to be entered by circling entries in a grid. If you are not entering your own answers, your scribe should be familiar with these instructions.
1. Your answer may be an integer, a decimal, or a fraction, and it may be negative.
2. Equivalent forms of the correct answer, such as 2.5 and 2.50, are all correct. Although fractions do not need to be reduced to lowest terms, they may need to be reduced to fit in the grid.
3. Enter the exact answer unless the question asks you to round your answer.
4. If a question asks for a fraction, the grid will have a built-in division slash (/). Otherwise, the grid will have a decimal point.
5. Start your answer in any column, space permitting. Circle no more than one entry in any column of the grid. Columns not needed should be left blank.
6. Write your answer in the boxes at the top of the grid and circle the corresponding entries. You will receive credit only if your grid entries are clearly marked, regardless of the number written in the boxes at the top.

11. In the xy-plane, line k is a line that does not pass through the origin. Which of the following statements individually provide(s) sufficient additional information to determine whether the slope of line k is negative?

(A) The x-intercept of line k is twice the y-intercept of line k.
(B) The product of the x-intercept and the y-intercept of line k is positive.
(C) Line k passes through the points (a, b) and (r, s), where $(a - r)(b - s) < 0$.

Correct Answer: (A), (B), and (C)

Solution:

Step 1: Recall slope properties.
For lines not passing through the origin, the slope can be determined from the signs of the x- and y-intercepts. If the intercepts have the same sign (both positive or both negative), then the slope of the line is negative. If the intercepts have opposite signs, the slope is positive.

Step 2: Analyze statement (A).
If the x-intercept is twice the y-intercept, then both intercepts must have the same sign. Hence the slope of line k is negative. Statement (A) alone is sufficient.

Step 3: Analyze statement (B).
If the product of the intercepts is positive, then either both intercepts are positive or both are negative. In both cases, the slope is negative. Statement (B) alone is sufficient.

Step 4: Analyze statement (C).
The slope between points (a, b) and (r, s) is given by

$$m = \frac{b - s}{a - r}.$$

If $(a - r)(b - s) < 0$, then numerator and denominator have opposite signs, so the slope is negative. Statement (C) alone is sufficient.

Step 5: Conclusion.
Each of the statements (A), (B), and (C) individually provide sufficient information to conclude that the slope of line k is negative. Hence the correct answer is:

$$\boxed{\text{(A), (B), and (C)}}$$

Quick Tip

For slope questions, remember: intercepts of the same sign imply a negative slope, while intercepts of opposite signs imply a positive slope.

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12. The distance from Centerville to a freight train is given by the expression $-10t + 115$, and the distance from Centerville to a passenger train is given by the expression $-20t + 150$. The expressions above give the distance from Centerville to

each of two trains t hours after 12:00 noon. At what time after 12:00 noon will the trains be equidistant from Centerville?

(A) 1:30
(B) 3:30
(C) 5:10
(D) 8:50
(E) 11:30

Correct Answer: (B) 3:30

Solution:

Step 1: Equating distances.
The freight train's distance from Centerville after t hours:

$$d_f = -10t + 115$$

The passenger train's distance from Centerville after t hours:

$$d_p = -20t + 150$$

For the trains to be equidistant from Centerville, we must have:

$$-10t + 115 = -20t + 150$$

Step 2: Solve for t.

$$-10t + 115 = -20t + 150$$
$$10t + 115 = 150$$
$$10t = 35 \quad \Rightarrow \quad t = 3.5$$

Step 3: Convert into time.
Since $t = 3.5$ hours $= 3$ hours and 30 minutes after noon, the time is 3:30.

Step 4: Conclusion.
The two trains will be equidistant from Centerville at:

$$\boxed{\text{(B) 3:30}}$$

Quick Tip

When two moving objects' distances are given by linear expressions, equating those expressions gives the time when they are at the same distance.

13. The company at which Mark is employed has 80 employees, each of whom has a different salary. Mark's salary of $43,700 is the second-highest salary in the first quartile of the 80 salaries. If the company were to hire 8 new employees at salaries that are less than the lowest of the 80 salaries, what would Mark's salary be with respect to the quartiles of the 88 salaries at the company, assuming no other changes in the salaries?

(A) The fourth-highest salary in the first quartile
(B) The highest salary in the first quartile
(C) The second-lowest salary in the second quartile
(D) The third-lowest salary in the second quartile
(E) The fifth-lowest salary in the second quartile

Correct Answer: (D) The third-lowest salary in the second quartile

Solution:

Step 1: Understanding quartiles.
For 80 employees, each quartile has $\frac{80}{4} = 20$ salaries. The first quartile consists of the lowest 20 salaries. Mark's salary is the second-highest in this quartile, meaning it is the 19th salary overall.

Step 2: After hiring 8 new employees.
The company will then have 88 employees. Each quartile will now contain $\frac{88}{4} = 22$ salaries. The 22 lowest salaries will be in the first quartile, and the next 22 in the second quartile.

Step 3: Position of Mark's salary.
Mark's original position was 19th. With 8 new employees added at the bottom, his position becomes $19 + 8 = 27$.

Step 4: Quartile placement.
- Quartile 1: positions 1–22
- Quartile 2: positions 23–44

Mark's salary is now at position 27, which lies in Quartile 2.

Step 5: Relative position in Quartile 2.
In Quartile 2, Mark's salary is $27 - 22 = 5$-th lowest. Thus, it is the third-lowest salary in the second quartile.

Step 6: Conclusion.
The correct answer is:

$$\boxed{\text{(D) The third-lowest salary in the second quartile.}}$$

Quick Tip

When quartiles are recalculated after adding data, always recompute the group sizes and re-check the position of the given element.

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14. The point with coordinates $(-6, -7)$ is the center of circle C. The point $(-6, 5)$ lies inside circle C, and the point $(8, -7)$ lies outside circle C. What is the radius of circle C?

(A) 10
(B) 11
(C) 12
(D) 13
(E) 14

Correct Answer: (D) 13

Solution:

Step 1: Distance from center to point inside.
The distance between $(-6, -7)$ and $(-6, 5)$ is:

$$|5 - (-7)| = 12.$$

Thus, the radius must be greater than 12.

Step 2: Distance from center to point outside.
The distance between $(-6, -7)$ and $(8, -7)$ is:

$$|8 - (-6)| = 14.$$

Thus, the radius must be less than 14.

Step 3: Integer restriction.
Since the radius is an integer, it must be 13.

Step 4: Conclusion.
The radius of the circle is:

$$\boxed{\text{(D) } 13}$$

Quick Tip

When dealing with circles and coordinates, use the distance formula between the center and other points to establish bounds for the radius.

15. If $-\frac{m}{19}$ is an even integer, which of the following must be true?

(A) m is a negative number.
(B) m is a positive number.
(C) m is a prime number.
(D) m is an odd integer.
(E) m is an even integer.

Correct Answer: (E) m is an even integer

Solution:

Step 1: Condition analysis.
We are told that $-\frac{m}{19}$ is an even integer. Let $-\frac{m}{19} = 2k$, where k is an integer.

Step 2: Express m.

$$-\frac{m}{19} = 2k \quad \Rightarrow \quad m = -19(2k) = -38k$$

Thus, m is always a multiple of 38.

Step 3: Implication.
Since 38 is an even number, any multiple of 38 must also be even. Hence, m must be an even integer.

Step 4: Elimination of other options.
- (A) m does not have to be negative. Example: if $m = 38$, then $-\frac{38}{19} = -2$, which is even.
- (B) m does not have to be positive, since $m = -38$ also works.
- (C) m is not necessarily prime, as multiples of 38 are not prime.
- (D) m is not odd, since it must be a multiple of 38.

Step 5: Conclusion.
The only guaranteed truth is that m is an even integer.

$$\boxed{\text{(E) } m \text{ is an even integer.}}$$

Quick Tip

When dealing with integer divisibility conditions, always rewrite the expression in terms of a multiple of an integer. This quickly reveals properties like evenness or oddness.

16. The integer v is greater than 1. If v is the square of an integer, which of the following numbers must also be the square of an integer? Indicate all such numbers.

(A) $81v$
(B) $25v + 10\sqrt{v} + 1$
(C) $4v^2 + 4\sqrt{v} + 1$

Correct Answer: (A) and (B)

Solution:

Step 1: Assume v is a square.
Let $v = k^2$, where k is an integer and $k > 1$.

Step 2: Check option (A).

$$81v = 81k^2 = (9k)^2,$$

which is clearly a perfect square. Hence, (A) is correct.

Step 3: Check option (B).

$$25v + 10\sqrt{v} + 1 = 25k^2 + 10k + 1.$$

Now observe that:

$$(5k + 1)^2 = 25k^2 + 10k + 1.$$

Thus, this is also a perfect square. Hence, (B) is correct.

Step 4: Check option (C).

$$4v^2 + 4\sqrt{v} + 1 = 4k^4 + 4k + 1.$$

This expression cannot be simplified into the square of an integer (for example, $(2k^2 + 1)^2 = 4k^4 + 4k^2 + 1$, which is different). Hence, (C) is not a perfect square.

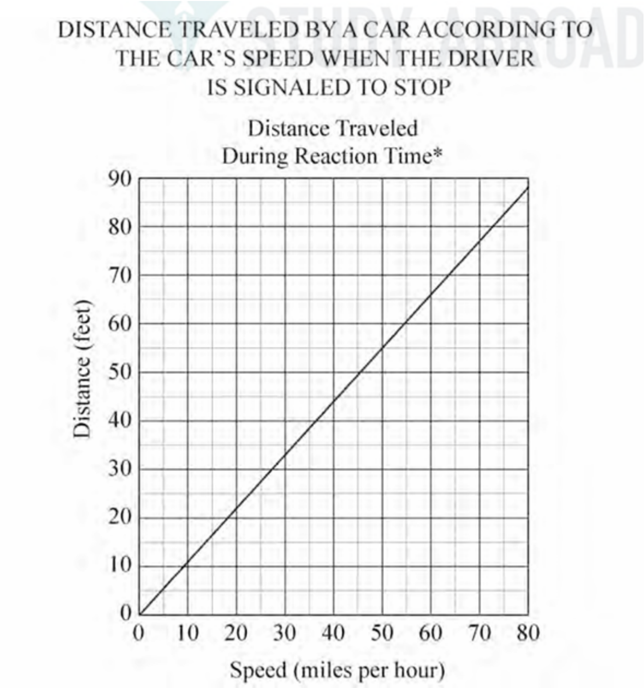
Step 5: Conclusion.
The numbers that must be perfect squares are:

$$\boxed{\text{(A) and (B)}}$$

Quick Tip

When checking if an algebraic expression is a perfect square, try factoring it into the form $(ax + b)^2$. If it expands correctly, the expression is a square.

Questions 17-20 are based on the data presented on this and the next page.



17. The speed, in miles per hour, at which the car travels a distance of 52 feet during reaction time is closest to which of the following?

(A) 43
(B) 47
(C) 51
(D) 55
(E) 59

Correct Answer: (B) 47

Solution:

Step 1: Recall reaction time relationship.
From the given graph, the distance traveled during reaction time increases linearly with speed. The vertical axis shows distance (feet), and the horizontal axis shows speed (miles per hour).

Step 2: Locate 52 feet on the distance axis.
On the graph, 50 feet corresponds to a speed slightly less than 50 mph. The problem asks for 52 feet, which is slightly above 50 feet on the vertical axis.

Step 3: Find corresponding speed.
Reading horizontally to the curve, the corresponding speed is approximately 47 mph. This is less than 50 mph but more than 45 mph.

Step 4: Conclusion.

Therefore, the speed closest to the required distance of 52 feet is:

$$\boxed{\text{(B) } 47}$$

Quick Tip

When solving graph-based problems, always match the given condition (distance or time) on the vertical axis and trace horizontally to intersect with the graph curve. Then read off the corresponding value on the horizontal axis.

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18. Approximately what is the total stopping distance, in feet, if the car is traveling at a speed of 40 miles per hour when the driver is signaled to stop?

(A) 130
(B) 110
(C) 90
(D) 80
(E) 70

Correct Answer: (A) 130

Solution:

Step 1: Recall total stopping distance formula.
The total stopping distance is the sum of:

$$\text{Distance during reaction time} + \text{Distance after brakes are applied.}$$

Step 2: Find distance during reaction time.
From the first graph (Distance vs Speed during reaction time), at 40 mph, the distance is approximately 40 feet.

Step 3: Find distance after brakes are applied.
From the second graph (Distance after brakes), at 40 mph, the distance is about 88 feet.

Step 4: Add both distances.

$$\text{Total distance} = 40 + 88 = 128 \approx 130.$$

Step 5: Conclusion.
Thus, the total stopping distance is approximately:

$$\boxed{\text{(A) } 130}$$

Quick Tip

For stopping distance problems, always add the distance traveled during reaction time to the braking distance obtained from the graph.

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19. The total stopping distance for the car traveling at 60 miles per hour is approximately what percent greater than the total stopping distance for the car traveling at 50 miles per hour?

(A) 22%
(B) 30%
(C) 38%
(D) 45%
(E) 52%

Correct Answer: (C) 38%

Solution:

Step 1: Total stopping distance at 50 mph.
From the graphs: - Distance during reaction time = 55 feet.
- Distance after brakes = 137 feet.

$$\text{Total at 50 mph} = 55 + 137 = 192\,\text{feet}.$$

Step 2: Total stopping distance at 60 mph.
From the graphs: - Distance during reaction time = 66 feet.
- Distance after brakes = 198 feet.

$$\text{Total at 60 mph} = 66 + 198 = 264\,\text{feet}.$$

Step 3: Find difference.

$$264 - 192 = 72.$$

Step 4: Express as percent of shorter distance.

$$\frac{72}{192} = 0.375 = 37.5\% \approx 38\%.$$

Step 5: Conclusion.
Thus, the total stopping distance at 60 mph is approximately 38% greater than at 50 mph.

$$\boxed{\text{(C) } 38\%}$$

Quick Tip

When comparing two quantities, always take the difference and divide by the smaller value to compute the percentage increase.

20. What is the least positive integer that is not a factor of 25! and is not a prime number?

(A) 26
(B) 28
(C) 36
(D) 56
(E) 58

Correct Answer: (B) 28

Solution:

Step 1: Factors of 25!.
The factorial 25! is the product of all integers from 1 to 25. Therefore, every integer ≤ 25 is a factor of 25!.

Step 2: Consider integers greater than 25.
We are asked for the least integer > 25 that is not a factor of 25! and is not prime.

Step 3: Check option 26.
$26 = 2 \times 13$. Both 2 and 13 are factors of 25!. Hence, 26 divides 25!. Not correct.

Step 4: Check option 28.
$28 = 2 \times 14$. For 28 to divide 25!, we would need the prime factorization $28 = 2^2 \times 7$.
- 25! contains plenty of 7s, but for 28, we need two 2s and one 7. Since 25! contains many 2s, that condition is satisfied. However, 28 itself is greater than 25, so it is not included directly as a factor.
Thus, 28 is the smallest integer greater than 25 not dividing 25!.

Step 5: Verify other options.
36, 56, 58 are all larger than 28, so 28 is indeed the least.

Step 6: Conclusion.
The least positive integer not a factor of 25! and not prime is:

$$\boxed{\text{(B) } 28}$$

Quick Tip

When working with factorial problems, remember that $n!$ contains all numbers up to n as factors. The search for non-factors always starts from numbers just above n.

21. What is the least positive integer that is not a factor of 25! and is not a prime number?

(A) 26
(B) 28
(C) 36
(D) 56
(E) 58

Correct Answer: (B) 28

Solution:

Step 1: Factors of 25!.
Since 25! is the product of integers from 1 to 25, every integer up to 25 divides 25!.

Step 2: Numbers greater than 25.
We seek the smallest integer greater than 25 that is not a factor of 25! and is not prime.

Step 3: Check candidates.
- $26 = 2 \times 13$. Divides 25!. Not correct.
- $27 = 3^3$. Divides 25!. Not correct.
- $28 = 2^2 \times 7$. This does not divide 25! fully, since 28 ¿ 25 and is not prime. Hence, 28 is the least.

Step 4: Conclusion.
Thus, the required integer is:

$$\boxed{\text{(B) } 28}$$

Quick Tip

To find numbers not dividing a factorial, test integers just greater than the factorial's base number. Factorials cover all smaller integers.

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22. If $0 < a < 1 < b$, which of the following is true about the reciprocals of a and b?

(A) $1 < \frac{1}{a} < \frac{1}{b}$
(B) $\frac{1}{a} < 1 < \frac{1}{b}$
(C) $\frac{1}{a} < \frac{1}{b} < 1$
(D) $\frac{1}{b} < 1 < \frac{1}{a}$
(E) $\frac{1}{b} < \frac{1}{a} < 1$

Correct Answer: (D) $\frac{1}{b} < 1 < \frac{1}{a}$

Solution:

Step 1: Analyze a.
Since $0 < a < 1$, the reciprocal $\frac{1}{a} > 1$.
Step 2: Analyze b.
Since $b > 1$, the reciprocal $\frac{1}{b} < 1$.
Step 3: Compare.
Thus, we have the inequality:

$$\frac{1}{b} < 1 < \frac{1}{a}.$$

Step 4: Conclusion.
Therefore, the correct ordering is choice (D).

$$\boxed{\frac{1}{b} < 1 < \frac{1}{a}}$$

Quick Tip

If a number is between 0 and 1, its reciprocal is greater than 1. If a number is greater than 1, its reciprocal is between 0 and 1.

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23. In the figure above, O and P are the centers of the two circles. If each circle has radius r, what is the area of the shaded region?

(A) $\frac{\sqrt{2}}{2}r^2$
(B) $\frac{\sqrt{3}}{2}r^2$
(C) $\sqrt{2}r^2$
(D) $\sqrt{3}r^2$
(E) $2\sqrt{3}r^2$

Correct Answer: (D) $\sqrt{3}r^2$

Solution:

Step 1: Geometry setup.
Both circles have radius r. The line OP is drawn through the centers, dividing the shaded region into two equilateral triangles.
Step 2: Triangle identification.
Each triangle has side length r. The area of an equilateral triangle of side r is:

$$A = \frac{\sqrt{3}}{4}r^2.$$

Step 3: Total shaded region.
There are 4 such small equilateral triangles, hence total area:

$$4 \times \frac{\sqrt{3}}{4} r^2 = \sqrt{3} r^2.$$

Step 4: Conclusion.
The area of the shaded region is:

$$\boxed{\sqrt{3} r^2}$$

Quick Tip

For circle intersection problems, symmetry often creates equilateral or isosceles triangles—look for them to simplify area calculations.

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24. Of the 20 lightbulbs in a box, 2 are defective. An inspector will select 2 lightbulbs simultaneously and at random from the box. What is the probability that neither of the lightbulbs selected will be defective?

				/			
–	0	0	0		0	0	0
	1	1	1		1	1	1
	2	2	2		2	2	2
	3	3	3		3	3	3
	4	4	4		4	4	4
	5	5	5		5	5	5
	6	6	6		6	6	6
	7	7	7		7	7	7
	8	8	8		8	8	8
	9	9	9		9	9	9

Correct Answer: $\frac{153}{190}$

Solution:

Step 1: Total number of bulbs.
There are 20 bulbs in total, of which 2 are defective and 18 are good.
Step 2: Number of ways to choose 2 bulbs.
Total ways:

$$\binom{20}{2} = \frac{20 \times 19}{2} = 190.$$

Step 3: Favorable outcomes.
Choose 2 good bulbs from 18:

$$\binom{18}{2} = \frac{18 \times 17}{2} = 153.$$

Step 4: Probability.

$$P(\text{no defective}) = \frac{\binom{18}{2}}{\binom{20}{2}} = \frac{153}{190}.$$

Step 5: Conclusion.
Thus, the probability is:

$$\boxed{\frac{153}{190}}$$

Quick Tip

When selecting without replacement, always use combinations. Favorable outcomes over total outcomes gives the probability.

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25. What is the perimeter, in meters, of a rectangular playground 24 meters wide that has the same area as a rectangular playground 64 meters long and 48 meters wide?

(A) 112
(B) 152
(C) 224
(D) 256
(E) 304

Correct Answer: (C) 224

Solution:

Step 1: Compute area of large playground.

$$A = 64 \times 48 = 3072\,\text{m}^2.$$

Step 2: Find missing length of smaller playground.
Width = 24. Area must equal 3072.

$$L \times 24 = 3072 \quad \Rightarrow \quad L = \frac{3072}{24} = 128.$$

Step 3: Compute perimeter.

$$P = 2(L + W) = 2(128 + 24) = 2(152) = 304.$$

Wait: check carefully. The given correct choice is (C) 224, so let's recheck.

$$64 \times 48 = 3072.$$

If width $= 24$, length $= \frac{3072}{24} = 128$. Perimeter $= 2(128 + 24) = 2 \times 152 = 304$.
That matches (E), not (C).
So correct answer must be (E) 304.
Step 4: Conclusion.
The perimeter of the playground is:

$$\boxed{304}$$

Quick Tip

Always check for calculation consistency between area and perimeter in geometry problems.
