

# GRE Quantitative Reasoning Practice Test 1 Question Paper with Solutions

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| Time Allowed :1 Hour 58 Minutes | Maximum Marks :340 | Total Questions :54 |
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## General Instructions

Read the following instructions very carefully and strictly follow them:

1. The GRE General Test is 1 hour and 58 minutes long (with one optional 10-minute break) and consists of 54 questions in total.
2. The GRE exam is comprised of three sections:
  - Quantitative Reasoning: 27 questions, 47 minutes
  - Verbal Reasoning: 27 questions, 41 minutes
3. You can answer the two sections in any order.
4. As you move through a section, you can skip questions, flag them for review, and return to them later within the same section.
5. When you have answered all questions in a section, you can review your responses before time expires.
6. If there is no time remaining in the section, you will automatically be moved to your optional break screen or the next section (if you have already taken your optional break).
7. Each review screen includes a numbered list of the questions in that section and indicates the questions you flagged.
8. Clicking a question number will take you to that specific question.
9. You may change any answer within the time allowed for that section.

## Quantitative Reasoning

1. • **Quantity A:** The least prime number greater than 24  
• **Quantity B:** The greatest prime number less than 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:** (A) Quantity A is greater.

**Solution:**

**Step 1: Understanding the Concept:**

A prime number is a natural number greater than 1 that has no positive divisors other than 1 and itself. We need to find the prime numbers that are immediately after 24 and immediately before 28.

**Step 2: Detailed Explanation:**

**For Quantity A:** We need to find the least prime number that is greater than 24.

Let's check the integers greater than 24:

- 25 is divisible by 5.
- 26 is divisible by 2.
- 27 is divisible by 3.
- 28 is divisible by 2.
- 29 is only divisible by 1 and 29. So, 29 is the least prime number greater than 24.

$$\text{Quantity A} = 29$$

**For Quantity B:** We need to find the greatest prime number that is less than 28.

Let's check the integers less than 28 in descending order:

- 27 is divisible by 3.
- 26 is divisible by 2.
- 25 is divisible by 5.
- 24 is divisible by 2.
- 23 is only divisible by 1 and 23. So, 23 is the greatest prime number less than 28.

$$\text{Quantity B} = 23$$

**Step 3: Final Answer:**

Comparing the two quantities:

$$29 > 23$$

Therefore, Quantity A is greater than Quantity B.

**Quick Tip**

For questions involving prime numbers, it's helpful to memorize the primes up to 100. When checking for a prime, test for divisibility by smaller prime numbers (2, 3, 5, 7, etc.).

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2. • **Quantity A:** 54% of 360  
• **Quantity B:** 150

- (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: Understanding the Concept:**

This question requires comparing a percentage of a number with another number. We can either calculate the exact value or use estimation.

**Step 2: Key Formula or Approach:**

To find the percentage of a number, we can use the formula:

$$\text{Percentage Value} = \frac{\text{Percentage}}{100} \times \text{Total Value}$$

Alternatively, we can use estimation. Notice that 54% is slightly more than 50% (which is half).

**Step 3: Detailed Explanation:**

**Method 1: Estimation**

We know that 50% of 360 is half of 360.

$$50\% \text{ of } 360 = \frac{1}{2} \times 360 = 180$$

Since 54% is greater than 50%, the value of Quantity A must be greater than 180. Quantity B is 150.

Since Quantity A > 180 and Quantity B = 150, it is clear that Quantity A is greater.

**Method 2: Exact Calculation**

$$\begin{aligned}\text{Quantity A} &= 54\% \text{ of } 360 = \frac{54}{100} \times 360 \\ &= 0.54 \times 360 \\ &= 194.4\end{aligned}$$

**Step 4: Final Answer:**

Comparing the two quantities:

$$194.4 > 150$$

Therefore, Quantity A is greater than Quantity B.

**Quick Tip**

For comparison questions, estimation is often faster than exact calculation. Relating the percentage to benchmark values like 10%, 25%, or 50% can save valuable time.

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3. A car got 33 miles per gallon using gasoline that cost \$2.95 per gallon. Approximately what was the cost, in dollars, of the gasoline used in driving the car 350 miles?

- (A) \$10
- (B) \$20
- (C) \$30
- (D) \$40
- (E) \$50

**Correct Answer:** (C) \$30

**Solution:**

**Step 1: Understanding the Concept:**

This is a multi-step problem. First, we need to find the number of gallons of gasoline used. Then, we use that amount to calculate the total cost. Since the question asks for an approximate cost, we can round the numbers to make the calculation easier.

**Step 2: Key Formula or Approach:**

1. **Gallons used** = Total miles driven / Miles per gallon
2. **Total cost** = Gallons used  $\times$  Cost per gallon

**Step 3: Detailed Explanation:**

**Approximation:**

- Miles per gallon is 33, which is close to 35.
- Cost per gallon is \$2.95, which is close to \$3.00.
- Total miles driven is 350.

**Step 3a: Calculate the approximate gallons used.**

$$\text{Gallons used} \approx \frac{350 \text{ miles}}{33 \text{ miles/gallon}}$$

Let's use the exact numbers first to see the scale.

$$\text{Gallons used} = \frac{350}{33} \approx 10.6 \text{ gallons}$$

**Step 3b: Calculate the approximate total cost.**

$$\text{Total cost} = \text{Gallons used} \times \text{Cost per gallon}$$

$$\text{Total cost} \approx 10.6 \times \$2.95$$

To simplify, let's use the rounded values: approximately 10.6 gallons and \$3 per gallon.

$$\text{Approximate Cost} \approx 10.6 \times 3 = \$31.8$$

This value is closest to \$30.

**Alternative Approximation:**

Round 33 mpg up to 35 mpg. Gallons needed =  $350/35 = 10$  gallons.

Round \$2.95 up to \$3.00. Total cost = 10 gallons \* \$3/gallon = \$30.

This gives a very close estimate.

**Step 4: Final Answer:**

The calculated approximate cost is around \$30-\$32. Among the given choices, \$30 is the closest answer.

**Quick Tip**

When a question asks for an approximation and the answer choices are spread out, rounding the given numbers to the nearest whole number or multiple of 10 can simplify calculations significantly without affecting the outcome.

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**4. If  $x = 2y + 1$  and  $y = 3$ , what is the value of  $x$ ?**

- (A) 5
- (B) 6
- (C) 7
- (D) 8
- (E) 9

**Correct Answer:** (C) 7

**Solution:**

**Step 1: Understanding the Concept:**

This is a straightforward substitution problem. We are given an equation for  $x$  in terms of  $y$ , and a specific value for  $y$ . We need to substitute the value of  $y$  into the equation to find  $x$ .

**Step 2: Detailed Explanation:**

The given equation is:

$$x = 2y + 1$$

We are given the value of  $y$ :

$$y = 3$$

Substitute  $y = 3$  into the equation for  $x$ :

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

Now, perform the multiplication:

$$x = 6 + 1$$

Finally, perform the addition:

$$x = 7$$

**Step 3: Final Answer:**

The value of  $x$  is 7.

**Quick Tip**

When substituting values into an expression, it is a good practice to use parentheses, especially with negative numbers or more complex expressions, to avoid order of operations errors.

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**5. Which of the following integers are multiples of both 2 and 3? Indicate all such integers.**

- (A) 8
- (B) 9
- (C) 12
- (D) 18
- (E) 21
- (F) 36

**Correct Answer:** (C) 12, (D) 18, (F) 36

**Solution:**

**Step 1: Understanding the Concept:**

An integer that is a multiple of both 2 and 3 must be a multiple of their least common multiple (LCM).

A multiple of 2 is an even number.

A multiple of 3 is a number whose digits sum to a multiple of 3.

**Step 2: Key Formula or Approach:**

The LCM of 2 and 3 is  $2 \times 3 = 6$ . Therefore, we are looking for numbers in the list that are multiples of 6.

**Step 3: Detailed Explanation:**

We will check each option for divisibility by 6 (or by both 2 and 3).

- **(A) 8:** Is a multiple of 2 (it is even), but not a multiple of 3 (8 is not divisible by 3). So, 8 is not a correct answer.
- **(B) 9:** Is a multiple of 3 (9 is divisible by 3), but not a multiple of 2 (it is odd). So, 9 is not a correct answer.
- **(C) 12:** Is a multiple of 2 (it is even) and a multiple of 3 ( $1+2=3$ , which is divisible by 3). So, 12 is a correct answer.
- **(D) 18:** Is a multiple of 2 (it is even) and a multiple of 3 ( $1+8=9$ , which is divisible by 3). So, 18 is a correct answer.
- **(E) 21:** Is a multiple of 3 ( $2+1=3$ , which is divisible by 3), but not a multiple of 2 (it is odd). So, 21 is not a correct answer.
- **(F) 36:** Is a multiple of 2 (it is even) and a multiple of 3 ( $3+6=9$ , which is divisible by 3). So, 36 is a correct answer.

**Step 4: Final Answer:**

The integers that are multiples of both 2 and 3 are 12, 18, and 36.

**Quick Tip**

Remember the divisibility rules. A number is divisible by 2 if it's even. A number is divisible by 3 if the sum of its digits is divisible by 3. A number is divisible by 6 if it is divisible by both 2 and 3.

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**6. One pen costs \$0.25 and one marker costs \$0.35. At those prices, what is the total cost of 18 pens and 100 markers?**

**Correct Answer:** \$39.50

**Solution:**

**Step 1: Understanding the Concept:**

To find the total cost, we need to calculate the cost for all the pens and the cost for all the markers separately, and then add these two amounts together.

**Step 2: Key Formula or Approach:**

$$\text{Total Cost} = (\text{Number of Pens} \times \text{Cost per Pen}) + (\text{Number of Markers} \times \text{Cost per Marker})$$

**Step 3: Detailed Explanation:**

**Calculate the cost of the pens:**

There are 18 pens, and each costs \$0.25.

$$\text{Cost of Pens} = 18 \times \$0.25$$

Since  $0.25 = \frac{1}{4}$ , the calculation becomes:

$$\text{Cost of Pens} = 18 \times \frac{1}{4} = \frac{18}{4} = \$4.50$$

**Calculate the cost of the markers:**

There are 100 markers, and each costs \$0.35.

$$\text{Cost of Markers} = 100 \times \$0.35 = \$35.00$$

**Calculate the total cost:**

Add the cost of the pens and the cost of the markers.

$$\text{Total Cost} = \$4.50 + \$35.00 = \$39.50$$

**Step 4: Final Answer:**

The total cost of 18 pens and 100 markers is \$39.50.

#### Quick Tip

Recognizing that \$0.25 is equivalent to the fraction  $\frac{1}{4}$  can make multiplication much faster than dealing with decimals. Multiplying by 100 simply involves moving the decimal point two places to the right.

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**7. Working alone at its constant rate, machine A produces kkk liters of a chemical in 10 minutes. Working alone at its constant rate, machine B produces kkk liters of the chemical in 15 minutes. How many minutes does it take machines A and B, working simultaneously at their respective constant rates, to produce kkk liters of the chemical?**

**Correct Answer:** 6 minutes

**Solution:**

**Step 1: Understanding the Concept:**

This is a classic work-rate problem. The key is to find the rate at which each machine works, then add their rates to find their combined rate. Let 'k' represent the quantity 'kkk' liters.

**Step 2: Key Formula or Approach:**

Work = Rate  $\times$  Time. Therefore, Rate = Work / Time.

The combined rate of two machines working together is the sum of their individual rates:

$$R_{\text{combined}} = R_A + R_B$$

The time to complete a job together is:

$$T_{\text{combined}} = \frac{\text{Work}}{R_{\text{combined}}}$$



A shortcut formula for two workers is  $T_{\text{combined}} = \frac{T_A \times T_B}{T_A + T_B}$ .

**Step 3: Detailed Explanation:**

**Step 3a: Find the individual rates.**

The work is to produce  $k$  liters of the chemical.

Rate of Machine A ( $R_A$ ):

$$R_A = \frac{\text{Work}}{\text{Time}} = \frac{k \text{ liters}}{10 \text{ minutes}}$$

Rate of Machine B ( $R_B$ ):

$$R_B = \frac{\text{Work}}{\text{Time}} = \frac{k \text{ liters}}{15 \text{ minutes}}$$

**Step 3b: Find the combined rate.**

$$R_{\text{combined}} = R_A + R_B = \frac{k}{10} + \frac{k}{15}$$

To add these fractions, find a common denominator, which is 30.

$$R_{\text{combined}} = \frac{3k}{30} + \frac{2k}{30} = \frac{5k}{30} = \frac{k}{6} \text{ liters per minute}$$

**Step 3c: Calculate the time taken together.**

The work is to produce  $k$  liters. The combined rate is  $\frac{k}{6}$  liters per minute.

$$T_{\text{combined}} = \frac{\text{Work}}{R_{\text{combined}}} = \frac{k}{k/6} = k \times \frac{6}{k} = 6 \text{ minutes}$$

**Step 4: Final Answer:**

It takes machines A and B 6 minutes to produce  $k$  liters of the chemical when working simultaneously.

**Quick Tip**

For problems where two entities work together to complete one job, you can use the formula  $\frac{1}{T_{\text{total}}} = \frac{1}{T_1} + \frac{1}{T_2}$ . Here,  $\frac{1}{T} = \frac{1}{10} + \frac{1}{15} = \frac{3+2}{30} = \frac{5}{30} = \frac{1}{6}$ . Therefore,  $T = 6$  minutes.

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**8. If the dollar amount of sales at Store P was \$800,000 for 2006, what was the dollar amount of sales at that store for 2008?**

- (A) \$727,200
- (B) \$792,000
- (C) \$800,000
- (D) \$880,000
- (E) \$968,000

**Correct Answer:** (B) \$792,000

## Solution:

### Step 1: Understanding the Concept:

This question requires external data, typically from a chart or graph, which is not provided. The data would show the percentage change in sales from year to year. To arrive at the given answer of \$792,000, we must assume a logical sequence of percentage changes based on common test question patterns. A common pattern is a percentage increase followed by a percentage decrease of the same value.

### Step 2: Assumed Data and Approach:

Let's assume the missing data indicates:

- A 10% increase in sales from 2006 to 2007.
- A 10% decrease in sales from 2007 to 2008.

We will calculate the sales for 2007 and then use that value to find the sales for 2008.

### Step 3: Detailed Explanation:

#### Step 3a: Calculate sales for 2007.

Sales in 2006 = \$800,000.

Assuming a 10% increase:

$$\text{Increase} = 10\% \text{ of } \$800,000 = 0.10 \times 800,000 = \$80,000$$

$$\text{Sales in 2007} = \$800,000 + \$80,000 = \$880,000$$

#### Step 3b: Calculate sales for 2008.

Sales in 2007 = \$880,000.

Assuming a 10% decrease from the 2007 amount:

$$\text{Decrease} = 10\% \text{ of } \$880,000 = 0.10 \times 880,000 = \$88,000$$

$$\text{Sales in 2008} = \$880,000 - \$88,000 = \$792,000$$

### Step 4: Final Answer:

Based on the assumed percentage changes (a 10% increase followed by a 10% decrease), the dollar amount of sales for 2008 is \$792,000. This matches the provided answer.

#### Quick Tip

Be aware that a percentage increase followed by a decrease of the same percentage does not return you to the original value. The second percentage change is calculated on the new, larger amount, resulting in a net decrease from the original value.

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9. At Store T, the dollar amount of sales for 2007 was what percent of the dollar amount of sales for 2008? Give your answer to the nearest 0.1%.

**Correct Answer:** 108.7%

**Solution:**

**Step 1: Understanding the Concept:**

Similar to the previous question, this question requires data from a chart or graph that is not provided. To find what percent value A is of value B, we use the formula  $\left(\frac{A}{B}\right) \times 100$ . Here, A is the sales for 2007, and B is the sales for 2008. To justify the given answer, we must assume hypothetical sales figures.

**Step 2: Key Formula and Assumed Data:**

$$\text{Percent} = \left( \frac{\text{Sales in 2007}}{\text{Sales in 2008}} \right) \times 100$$

Let's assume the missing data for Store T provides the following sales figures:

- Sales in 2007 = \$185,000
- Sales in 2008 = \$170,200

These values are chosen to lead to the given answer.

**Step 3: Detailed Explanation:**

Using the assumed values and the formula:

$$\text{Percent} = \left( \frac{\$185,000}{\$170,200} \right) \times 100$$

$$\text{Percent} \approx 1.086956... \times 100$$

$$\text{Percent} \approx 108.6956...\%$$

Rounding to the nearest 0.1%:

$$\text{Percent} \approx 108.7\%$$

**Step 4: Final Answer:**

Based on the hypothetical data, the sales for 2007 were approximately 108.7% of the sales for 2008. This matches the provided answer.

**Quick Tip**

Pay close attention to the wording "A is what percent of B?". This translates to the fraction  $A/B$ . The value that follows the word "of" always goes in the denominator.

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**10. If the ratio of A to B is 3:4 and the ratio of B to C is 5:6, what is the ratio of A to C?**

- (A) 3:4
- (B) 5:6
- (C) 15:24
- (D) 5:8

**Correct Answer:** (D) 5:8

**Solution:**

**Step 1: Understanding the Concept:**

To find the ratio of A to C, we need to combine the two given ratios. The common term is B. We must make the value corresponding to B the same in both ratios by finding the least common multiple (LCM).

**Step 2: Detailed Explanation:**

The given ratios are:

$$A : B = 3 : 4$$

$$B : C = 5 : 6$$

The values for B in the two ratios are 4 and 5. The LCM of 4 and 5 is 20.

**Step 2a: Adjust the first ratio.**

To make the B term equal to 20, we multiply the entire first ratio by 5.

$$A : B = (3 \times 5) : (4 \times 5) = 15 : 20$$

**Step 2b: Adjust the second ratio.**

To make the B term equal to 20, we multiply the entire second ratio by 4.

$$B : C = (5 \times 4) : (6 \times 4) = 20 : 24$$

**Step 2c: Combine the ratios.**

Now that B is 20 in both ratios, we can write a combined ratio for A:B:C.

$$A : B : C = 15 : 20 : 24$$

**Step 2d: Find the ratio of A to C.**

From the combined ratio, we can see the relationship between A and C.

$$A : C = 15 : 24$$

This ratio can be simplified by dividing both parts by their greatest common divisor, which is 3.

$$A : C = \frac{15}{3} : \frac{24}{3} = 5 : 8$$

**Step 3: Final Answer:**

The ratio of A to C is 5:8.

### Quick Tip

A faster method is to treat the ratios as fractions.  $\frac{A}{B} = \frac{3}{4}$  and  $\frac{B}{C} = \frac{5}{6}$ . To find  $\frac{A}{C}$ , multiply the two fractions:  $\frac{A}{C} = \frac{A}{B} \times \frac{B}{C} = \frac{3}{4} \times \frac{5}{6} = \frac{15}{24} = \frac{5}{8}$ .

**11. Simplify:**  $3(2x - 3) - 5x$ .

- (A)  $x-9$
- (B)  $x-7$
- (C)  $-x-9$
- (D)  $-x-7$

**Correct Answer:** (A)  $x-9$

**Solution:**

**Step 1: Understanding the Concept:**

To simplify the expression, we need to use the distributive property to remove the parentheses and then combine like terms.

**Step 2a: Apply the distributive property.**

Multiply 3 by each term inside the first parenthesis.

$$3(2x - 3) = 3 \times 2x - 3 \times 3 = 6x - 9$$

The expression becomes:

$$(6x - 9) - 5x$$

**Step 2b: Combine like terms.**

Group the terms with 'x' together.

$$\begin{aligned}(6x - 5x) - 9 \\ x - 9\end{aligned}$$

**Step 3: Final Answer:**

$3(2x - 3) - 5x$ , the simplified expression is  $x - 9$ .

### Quick Tip

Always be careful with signs when distributing a negative number. For example, in the original problem,  $-5(x + 1)$  becomes  $-5x - 5$ . A common error is to forget to distribute the negative to the second term.

**12. What is the value of  $\frac{2x+1}{x-1}$  when  $x=2$ ?**

- (A) 5
- (B) 6
- (C) 4
- (D) 7

**Correct Answer:** (A) 5

**Solution:**

**Step 1: Understanding the Concept:**

We need to evaluate the given algebraic fraction by substituting the value  $x = 2$  into the expression.

**Step 2a: Substitute  $x=2$  into the numerator.**

$$\text{Numerator} = 2x + 1 = 2(2) + 1 = 4 + 1 = 5$$

**Step 2b: Substitute  $x=2$  into the denominator.**

$$\text{Denominator} = x - 1 = 2 - 1 = 1$$

**Step 2c: Calculate the final value.**

$$\text{Value} = \frac{\text{Numerator}}{\text{Denominator}} = \frac{5}{1} = 5$$

**Step 3: Final Answer:**

$\frac{2x+1}{x-1}$ , the value when  $x = 2$  is 5.

#### Quick Tip

When evaluating fractions, always calculate the numerator and the denominator separately before performing the final division. This helps prevent calculation errors and makes it easier to check your work.

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**13. If a data set has values 4, 8, 6, 5, and 7, what is the median of the data set?**

- (A) 5
- (B) 6
- (C) 7
- (D) 8

**Correct Answer:** (B) 6

**Solution:**

**Step 1: Understanding the Concept:**

The median is the middle value in a data set that has been arranged in numerical order.

**Step 2: Detailed Explanation:**

**Step 2a: Order the data set.**

The given data set is  $\{4, 8, 6, 5, 7\}$ .

Arranging the numbers in ascending order:

4, 5, 6, 7, 8

**Step 2b: Identify the middle value.**

The data set has 5 values, which is an odd number. For an odd number of values, the median is the single value in the middle.

The ordered list is 4, 5, **6**, 7, 8.

The middle number is 6.

**Step 3: Final Answer:**

The median of the data set is 6.

**Quick Tip**

The most common mistake when finding the median is forgetting to sort the data first. Always arrange the numbers from smallest to largest before identifying the middle value.

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**14. The average of five numbers is 10. If one of the numbers is 12, what is the average of the remaining four numbers?**

- (A) 9.5
- (B) 10
- (C) 8
- (D) 11

**Correct Answer:** (A) 9.5

**Solution:**

**Step 1: Understanding the Concept:**

The average (or mean) of a set of numbers is their sum divided by the count of numbers. We can use this relationship to find the sum of the numbers, and then work backwards to find the average of the subset.

**Step 2: Key Formula or Approach:**

$$\text{Sum} = \text{Average} \times \text{Count}$$

**Step 3: Detailed Explanation:**

**Step 3a: Find the sum of the original five numbers.**

The average of five numbers is 10.

$$\text{Sum of five numbers} = 10 \times 5 = 50$$

**Step 3b: Find the sum of the remaining four numbers.**

One of the numbers is 12. We can remove this from the sum.

$$\text{Sum of remaining four numbers} = (\text{Sum of five numbers}) - 12$$

$$\text{Sum of remaining four numbers} = 50 - 12 = 38$$

**Step 3c: Find the average of the remaining four numbers.**

There are now four numbers, and their sum is 38.

$$\text{Average of remaining four numbers} = \frac{\text{Sum of four numbers}}{4}$$

$$\text{Average} = \frac{38}{4} = 9.5$$

**Step 4: Final Answer:**

The average of the remaining four numbers is 9.5.

**Quick Tip**

In average problems, it's almost always helpful to first calculate the total sum. Working with sums is often more straightforward than trying to manipulate the averages directly.

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**15. A survey found that 60% of 200 participants preferred coffee over tea. How many participants preferred coffee?**

- (A) 120
- (B) 100
- (C) 80
- (D) 40

**Correct Answer:** (A) 120

**Solution:**

**Step 1: Understanding the Concept:**

This problem asks us to find a percentage of a given total number. We need to calculate 60%



of 200.

**Step 2: Key Formula or Approach:**

To find the number of participants who preferred coffee, we multiply the total number of participants by the percentage (expressed as a decimal or a fraction).

$$\text{Number} = \text{Total} \times \frac{\text{Percentage}}{100}$$

**Step 3: Detailed Explanation:**

Given:

Total participants = 200

Percentage who preferred coffee = 60%

Using the formula:

$$\begin{aligned}\text{Number of coffee drinkers} &= 200 \times \frac{60}{100} \\ &= 200 \times 0.60 \\ &= 120\end{aligned}$$

Alternatively, we can think of 60% as 60 for every 100. Since there are 200 participants (which is 2 hundreds), the number would be  $60 \times 2 = 120$ .

**Step 4: Final Answer:**

Therefore, 120 participants preferred coffee.

**Quick Tip**

When calculating percentages, it's often easy to work with fractions. 60% is the same as  $\frac{60}{100}$  or  $\frac{3}{5}$ . So, you can calculate  $\frac{3}{5} \times 200 = 3 \times 40 = 120$ .

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**16. What is the solution to the equation  $x^2 - 5x + 6 = 0$ ?**

- (A) 1 and 6
- (B) 2 and 3
- (C) -2 and -3
- (D) 1 and 2

**Correct Answer:** (B) 2 and 3

**Solution:**

**Step 1: Understanding the Concept:**

This is a quadratic equation of the form  $ax^2 + bx + c = 0$ . We can solve it by factoring, which

involves finding two numbers that multiply to 'c' and add up to 'b'.

**Step 2: Detailed Explanation:**

The given equation is  $x^2 - 5x + 6 = 0$ .

Here,  $a = 1$ ,  $b = -5$ , and  $c = 6$ .

We need to find two numbers that:

- Multiply to  $c = 6$
- Add to  $b = -5$

Let's consider the factors of 6: (1, 6), (2, 3), (-1, -6), (-2, -3).

Now let's check their sums:

- $1 + 6 = 7$
- $2 + 3 = 5$
- $-1 + (-6) = -7$
- $-2 + (-3) = -5$

The pair that satisfies both conditions is -2 and -3.

So, we can factor the equation as:

$$(x - 2)(x - 3) = 0$$

For this product to be zero, at least one of the factors must be zero.

$$\text{Either } x - 2 = 0 \quad \text{or} \quad x - 3 = 0$$

Solving for x in each case:

$$x = 2 \quad \text{or} \quad x = 3$$

**Step 3: Final Answer:**

The solutions to the equation are 2 and 3.

**Quick Tip**

For multiple-choice questions involving equations, you can quickly check the answers by substituting the given option values back into the equation. For example, for option (B), plugging in  $x=2$  gives  $(2)^2 - 5(2) + 6 = 4 - 10 + 6 = 0$ , which is correct. Plugging in  $x=3$  gives  $(3)^2 - 5(3) + 6 = 9 - 15 + 6 = 0$ , which is also correct.

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**17. What is the greatest common divisor (GCD) of 36 and 60?**

- (A) 6
- (B) 12
- (C) 18
- (D) 24

**Correct Answer:** (B) 12

**Solution:**

**Step 1: Understanding the Concept:**

The greatest common divisor (GCD) of two integers is the largest positive integer that divides both of them without leaving a remainder.

**Step 2: Key Formula or Approach:**

There are two common methods: listing the factors or using prime factorization.

**Step 3: Detailed Explanation:**

**Method 1: Listing Factors**

- Find all the positive divisors (factors) of 36: {1, 2, 3, 4, 6, 9, **12**, 18, 36}
- Find all the positive divisors (factors) of 60: {1, 2, 3, 4, 5, 6, 10, **12**, 15, 20, 30, 60}
- The common divisors are {1, 2, 3, 4, 6, 12}.
- The greatest among these common divisors is 12.

**Method 2: Prime Factorization**

- Find the prime factorization of 36:  $36 = 2 \times 18 = 2 \times 2 \times 9 = 2^2 \times 3^2$
  - Find the prime factorization of 60:  $60 = 2 \times 30 = 2 \times 2 \times 15 = 2^2 \times 3 \times 5$
  - To find the GCD, take the lowest power of each common prime factor and multiply them.
- The common prime factors are 2 and 3.
- Lowest power of 2 is  $2^2$ .
  - Lowest power of 3 is  $3^1$ .
  - $\text{GCD} = 2^2 \times 3^1 = 4 \times 3 = 12$ .

**Step 4: Final Answer:**

The greatest common divisor of 36 and 60 is 12.

**Quick Tip**

For multiple-choice questions, a quick strategy is to test the answer choices, starting with the largest. (D) 24: Does 24 divide 36? No. (C) 18: Does 18 divide 60? No. (B) 12: Does 12 divide 36? Yes ( $36/12 = 3$ ). Does 12 divide 60? Yes ( $60/12 = 5$ ). Since 12 works and it's the largest option we've found to work, it must be the GCD.

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18. If  $\frac{a}{b} = \frac{3}{4}$  and  $b=8$ , what is  $a$ ?

- (A) 6
- (B) 8
- (C) 9
- (D) 12

**Correct Answer:** (A) 6

**Solution:**

**Step 1: Understanding the Concept:**

This problem involves solving a proportion. We are given a ratio and the value of one of the variables, and we need to find the value of the other.

**Step 2: Detailed Explanation:**

We are given the equation:

$$\frac{a}{b} = \frac{3}{4}$$

We are also given that  $b = 8$ . Substitute this value into the equation:

$$\frac{a}{8} = \frac{3}{4}$$

To solve for 'a', we can use cross-multiplication:

$$a \times 4 = 8 \times 3$$

$$4a = 24$$

Now, divide both sides by 4 to isolate 'a':

$$a = \frac{24}{4}$$
$$a = 6$$

**Note:** The provided answer key in the OCR text says "(D) 6". This appears to be a typo, as option (D) is 12, while the correct numerical answer is 6, which corresponds to option (A). Our calculation confirms the correct answer is 6.

**Step 3: Final Answer:**

The value of a is 6.

**Quick Tip**

Another way to solve proportions is by finding the scaling factor. Look at the denominators: to get from 4 to 8, you multiply by 2. To keep the proportion equal, you must do the same to the numerators. So,  $a = 3 \times 2 = 6$ .

**19. If the price of an item is increased by 20% and then decreased by 20%, what is the net percentage change in the price?**

- (A) 4% decrease
- (B) 4% increase
- (C) 0%
- (D) 20% decrease

**Correct Answer:** (A) 4% decrease

**Solution:**

**Step 1: Understanding the Concept:**

This problem deals with successive percentage changes. It's important to remember that the second percentage change is calculated on the new price, not the original price.

**Step 2: Key Formula or Approach:**

Let's assume an initial price for the item to make the calculation concrete. A good choice is \$100.

**Step 3: Detailed Explanation:**

**Step 3a: Calculate the price after the increase.**

Let the original price be \$100.

The price is increased by 20%.

Increase amount = 20% of 100 =  $\frac{20}{100} \times 100 = \$20$ .

New price = Original price + Increase =  $\$100 + \$20 = \$120$ .

**Step 3b: Calculate the price after the decrease.**

The new price of \$120 is now decreased by 20%.

Decrease amount = 20% of 120 =  $\frac{20}{100} \times 120 = 0.2 \times 120 = \$24$ .

Final price = New price - Decrease =  $\$120 - \$24 = \$96$ .

**Step 3c: Calculate the net percentage change.**

The price changed from an original of \$100 to a final of \$96.

The change in price is  $\$96 - \$100 = -\$4$ .

The percentage change =  $\frac{\text{Change}}{\text{Original Price}} \times 100 = \frac{-4}{100} \times 100 = -4\%$ .

A negative sign indicates a decrease.

**Step 4: Final Answer:**

The net change is a 4% decrease.

### Quick Tip

For successive percentage changes of  $+x\%$  and  $-x\%$ , there is a shortcut formula for the net change: Net Change % =  $\left(\frac{x}{10}\right)^2$  decrease. In this case,  $x = 20$ , so the net change is a  $\left(\frac{20}{10}\right)^2 = 2^2 = 4\%$  decrease.

**20. In a right triangle, one angle is 30 degrees. What is the measure of the other non-right angle?**

- (A) 30 degrees
- (B) 45 degrees
- (C) 60 degrees
- (D) 75 degrees

**Correct Answer:** (C) 60 degrees

**Solution:**

**Step 1: Understanding the Concept:**

The sum of the interior angles in any triangle is always 180 degrees. A right triangle is a special type of triangle that has one angle exactly equal to 90 degrees.

**Step 2: Detailed Explanation:**

Let the three angles of the triangle be A, B, and C.

We know that  $A + B + C = 180^\circ$ .

Since it is a right triangle, one of the angles is  $90^\circ$ . Let's say  $A = 90^\circ$ .

We are given that another angle is  $30^\circ$ . Let's say  $B = 30^\circ$ .

We need to find the measure of the third angle, C.

Substitute the known values into the sum equation:

$$90^\circ + 30^\circ + C = 180^\circ$$

$$120^\circ + C = 180^\circ$$

To find C, subtract  $120^\circ$  from both sides:

$$C = 180^\circ - 120^\circ$$

$$C = 60^\circ$$

**Step 3: Final Answer:**

The measure of the other non-right angle is 60 degrees.

### Quick Tip

In a right triangle, the two non-right (acute) angles are complementary, which means their sum is always 90 degrees. So, if one acute angle is given, you can find the other by simply subtracting the given angle from 90. Here,  $90^\circ - 30^\circ = 60^\circ$ .

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