GMAT Quant Practise Question Paper 6 with Solutions

Time Allowed : 2 hours 15 minutes	Maximum Marks : 100

General Instructions

Read the following instructions very carefully and strictly follow them:

1. The GMAT exam is 2 hours and 15 minutes long (with one optional 10-minute break) and consists of 64 questions in total.
2. The GMAT exam is comprised of three sections:
3. Quantitative Reasoning: 21 questions, 45 minutes
4. Verbal Reasoning: 23 questions, 45 minutes
5. Data Insights: 20 questions, 45 minutes
6. You can answer the three sections in any order. As you move through a section, you can bookmark questions that you would like to review later.
7. When you have answered all questions in a section, you will proceed to the Question Review & Edit screen for that section.
8. If there is no time remaining in the section, you will NOT proceed to the Question Review & Edit screen and you will automatically be moved to your optional break screen or the next section (if you have already taken your optional break).
9. Each Question Review & Edit screen includes a numbered list of the questions in that section and indicates the questions you bookmarked.
10. Clicking a question number will take you to that specific question. You can review as many questions as you would like and can edit up to three (3) answers.

GMAT DATA SUFFICIENCY

1. Find the area of a right angle triangle whose base is 12 inches.
1. The hypotenuse is 13 inches.
2. The perpendicular height of the triangle is one less than half its base.

(A) Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient to answer the question asked.
(B) Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient to answer the question asked.
(C) BOTH statements (1) and (2) TOGETHER are sufficient to answer the question asked, but NEITHER statement ALONE is sufficient to answer the question ask
(D) EACH statement ALONE is sufficient to answer the question asked.

(E) Statements (1) and (2) TOGETHER are NOT sufficient to answer the question asked, and additional data specific to the problem are needed.

Correct Answer: (D) EACH statement ALONE is sufficient to answer the question asked.

Solution:

Step 1: Understanding the Concept:
To find the area of a right-angled triangle, we need the lengths of its base and perpendicular height. The question provides the base and asks for the area. Therefore, our goal is to determine if the given statements can help us find the height of the triangle.

Step 2: Key Formula or Approach:
The formula for the area of a triangle is:

$$\text{Area} = \frac{1}{2} \times \text{base} \times \text{height}$$

For a right-angled triangle, the Pythagorean theorem applies:

$$(\text{base})^2 + (\text{height})^2 = (\text{hypotenuse})^2$$

Step 3: Detailed Explanation:
The base of the triangle is given as 12 inches. Let the height be h. We need to find the value of h.

Analyzing Statement (1): The hypotenuse is 13 inches.
Using the Pythagorean theorem with base = 12 and hypotenuse = 13:

$$12^2 + h^2 = 13^2$$
$$144 + h^2 = 169$$
$$h^2 = 169 - 144$$
$$h^2 = 25$$
$$h = 5 \text{ inches}$$

Since we have found a unique value for the height, we can calculate the area:

$$\text{Area} = \frac{1}{2} \times 12 \times 5 = 30 \text{ square inches}$$

Thus, statement (1) alone is sufficient.

Analyzing Statement (2): The perpendicular height of the triangle is one less than half its base.
The base is 12 inches.
Half of the base is $\frac{12}{2} = 6$ inches.
One less than half its base is $6 - 1 = 5$ inches.
So, the height $h = 5$ inches.
Again, we have found a unique value for the height, and we can calculate the area:

$$\text{Area} = \frac{1}{2} \times 12 \times 5 = 30 \text{ square inches}$$

Thus, statement (2) alone is sufficient.

Step 4: Final Answer:
Since each statement independently provides enough information to find the area of the triangle, the correct answer is that each statement ALONE is sufficient.

> **Quick Tip**
>
> In Data Sufficiency questions, your goal is not to find the final numerical answer but to determine if you *can* find it. As soon as you determine that a unique value can be calculated from a statement, you know that statement is sufficient. You don't need to perform the final calculation.

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2. Is the number a prime number?
1. The number is divisible by a prime factor.
2. The number is positive.

(A) Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient to answer the question asked.
(B) Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient to answer the question asked.
(C) BOTH statements (1) and (2) TOGETHER are sufficient to answer the question asked, but NEITHER statement ALONE is sufficient to answer the question ask
(D) EACH statement ALONE is sufficient to answer the question asked.
(E) Statements (1) and (2) TOGETHER are NOT sufficient to answer the question asked, and additional data specific to the problem are needed.

Correct Answer: (E) Statements (1) and (2) TOGETHER are NOT sufficient to answer the question asked, and additional data specific to the problem are needed.

Solution:

Step 1: Understanding the Concept:
The question asks whether a given number is prime. A prime number is a natural number greater than 1 that has exactly two distinct positive divisors: 1 and itself. We need to check if the statements provide enough information to give a definitive 'yes' or 'no' answer.

Step 2: Detailed Explanation:
Let the number be n.

Analyzing Statement (1): The number is divisible by a prime factor.
By the fundamental theorem of arithmetic, every integer greater than 1 is either a prime number itself or can be represented as a product of prime numbers. This means every integer greater than 1 has at least one prime factor.
- **Case 1 (Yes):** Let $n = 7$. 7 is divisible by the prime factor 7. The number is prime.

- **Case 2 (No):** Let $n = 6$. 6 is divisible by the prime factors 2 and 3. The number is not prime (it's composite).
Since we can find examples where the answer is 'yes' and examples where the answer is 'no', statement (1) alone is not sufficient.

Analyzing Statement (2): The number is positive.
This tells us that $n > 0$.
- **Case 1 (Yes):** The number could be 5, which is positive and prime.
- **Case 2 (No):** The number could be 4, which is positive but not prime.
- **Case 3 (No):** The number could be 1, which is positive but not prime.
This statement also fails to give a definitive answer. Thus, statement (2) alone is not sufficient.

Analyzing Statements (1) and (2) Together:
Combining the statements, we know the number is positive and is divisible by a prime factor. This essentially describes any integer greater than 1.
- **Case 1 (Yes):** Let $n = 3$. It is positive and divisible by the prime factor 3. The number is prime.
- **Case 2 (No):** Let $n = 9$. It is positive and divisible by the prime factor 3. The number is not prime.
Even with both statements, we cannot determine if the number is prime.

Step 3: Final Answer:
Since both statements together are not enough to answer the question, additional data is needed.

> **Quick Tip**
>
> For a statement to be sufficient, it must lead to the same answer (always 'yes' or always 'no') in every possible case. If you can find one example that gives a 'yes' and another that gives a 'no', the statement is insufficient. This is the "test with different cases" strategy.

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3. Find the direction in which the parabola $y = ax^2 + bx - 2$ is facing.
1. a = b
2. a < 0

(A) Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient to answer the question asked.
(B) Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient to answer the question asked.
(C) BOTH statements (1) and (2) TOGETHER are sufficient to answer the question asked, but NEITHER statement ALONE is sufficient to answer the question ask
(D) EACH statement ALONE is sufficient to answer the question asked.
(E) Statements (1) and (2) TOGETHER are NOT sufficient to answer the question asked, and additional data specific to the problem are needed.

Correct Answer: (B) Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient to answer the question asked.

Solution:

Step 1: Understanding the Concept:
The direction a parabola opens is determined by the sign of the leading coefficient, which is the coefficient of the x^2 term. For a parabola given by the equation $y = ax^2 + bx + c$:
- If $a > 0$, the parabola opens upwards.
- If $a < 0$, the parabola opens downwards.
The question asks for the direction, so we need to determine the sign of a.

Step 2: Detailed Explanation:
Analyzing Statement (1): a = b
This statement tells us that the coefficients a and b are equal. However, it does not give any information about their sign.
- If $a = b = 3$, then $a > 0$, and the parabola opens upwards.
- If $a = b = -3$, then $a < 0$, and the parabola opens downwards.
Since the direction can be either upwards or downwards, this statement is not sufficient.

Analyzing Statement (2): a < 0
This statement directly tells us that the coefficient a is negative.
When $a < 0$, the parabola always opens downwards.
This provides a definitive answer to the question. Therefore, statement (2) alone is sufficient.

Step 3: Final Answer:
Statement (2) alone is sufficient to answer the question, but statement (1) alone is not.

> Quick Tip
>
> For quadratic functions of the form $y = ax^2 + bx + c$, remember: the 'a' value controls the vertical stretching/compression and the direction of opening. The 'b' value influences the position of the vertex, and 'c' is the y-intercept. To know the direction, you only need to know the sign of 'a'.

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4. Find the equation of a line.
1. Its x and y intercept is 2 and -2 respectively.
2. The slope of the line is 1.

(A) Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient to answer the question asked.
(B) Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient to answer the question asked.
(C) BOTH statements (1) and (2) TOGETHER are sufficient to answer the question asked,

but NEITHER statement ALONE is sufficient to answer the question ask
(D) EACH statement ALONE is sufficient to answer the question asked.
(E) Statements (1) and (2) TOGETHER are NOT sufficient to answer the question asked, and additional data specific to the problem are needed.

Correct Answer: (A) Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient to answer the question asked.

Solution:

Step 1: Understanding the Concept:
To uniquely determine the equation of a line, we need information that fixes its position and orientation on the coordinate plane. This can be achieved by knowing:
1. Two distinct points on the line.
2. One point on the line and its slope.
3. The slope and the y-intercept.

Step 2: Key Formula or Approach:
The slope-intercept form of a linear equation is $y = mx + c$, where m is the slope and c is the y-intercept.
The intercept form is $\frac{x}{a} + \frac{y}{b} = 1$, where a is the x-intercept and b is the y-intercept.

Step 3: Detailed Explanation:
Analyzing Statement (1): Its x and y intercept is 2 and -2 respectively.
This gives us two distinct points on the line:
- The x-intercept is 2, which corresponds to the point (2, 0).
- The y-intercept is -2, which corresponds to the point (0, -2).
Since we have two points, we can uniquely determine the line. We can find the slope:

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 - 0}{0 - 2} = \frac{-2}{-2} = 1$$

The y-intercept (c) is given as -2. So, the equation is $y = 1x - 2$ or $y = x - 2$.
Since a unique equation can be found, statement (1) is sufficient.

Analyzing Statement (2): The slope of the line is 1.
This tells us that $m = 1$. The equation of the line is of the form $y = x + c$.
However, the y-intercept c is unknown. There are infinitely many lines with a slope of 1 (e.g., $y = x + 1, y = x + 5, y = x - 10$). These are all parallel lines.
Since we cannot find a unique equation, statement (2) is not sufficient.

Step 4: Final Answer:
Statement (1) alone is sufficient, but statement (2) alone is not.

Quick Tip

Knowing the slope of a line only tells you its steepness or orientation. To pin down its exact location, you also need at least one point that the line passes through (like the y-intercept). Statement (1) provides two points, which is more than enough information.

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5. Determine the size of an interior angle of the polygon.
1. The ratio of its interior angle to the exterior angle is 2:1.
2. The polygon is a regular hexagon.

(A) Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient to answer the question asked.
(B) Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient to answer the question asked.
(C) BOTH statements (1) and (2) TOGETHER are sufficient to answer the question asked, but NEITHER statement ALONE is sufficient to answer the question ask
(D) EACH statement ALONE is sufficient to answer the question asked.
(E) Statements (1) and (2) TOGETHER are NOT sufficient to answer the question asked, and additional data specific to the problem are needed.

Correct Answer: (D) EACH statement ALONE is sufficient to answer the question asked.

Solution:

Step 1: Understanding the Concept:
The question asks for the size of "an interior angle". For this to be a single, unique value, we must assume the polygon is regular (all sides and angles are equal). Both statements will be evaluated to see if they lead to a unique value for the interior angle.

Step 2: Key Formula or Approach:
For any convex polygon:
- Interior Angle + Exterior Angle = 180°
For a regular polygon with n sides:
- Each Interior Angle = $\frac{(n-2)\times 180^\circ}{n}$
- Each Exterior Angle = $\frac{360^\circ}{n}$

Step 3: Detailed Explanation:
Analyzing Statement (1): The ratio of its interior angle to the exterior angle is 2:1.
Let the interior angle be I and the exterior angle be E.
We are given $\frac{I}{E} = \frac{2}{1}$, which means $I = 2E$.
We know that for any convex polygon, $I + E = 180^\circ$.
Substituting $I = 2E$ into the second equation:

$$2E + E = 180^\circ$$

$$3E = 180^\circ$$

$$E = 60^\circ$$

Now we can find the interior angle:

$$I = 2E = 2 \times 60^\circ = 120^\circ$$

This gives a unique value for the interior angle. Thus, statement (1) is sufficient.

Analyzing Statement (2): The polygon is a regular hexagon.
A hexagon is a polygon with $n = 6$ sides. The term "regular" means all its interior angles are equal.
Using the formula for the interior angle of a regular polygon:

$$I = \frac{(n-2) \times 180^\circ}{n}$$

$$I = \frac{(6-2) \times 180^\circ}{6} = \frac{4 \times 180^\circ}{6} = 4 \times 30^\circ = 120^\circ$$

This also gives a unique value for the interior angle. Thus, statement (2) is sufficient.

Step 4: Final Answer:
Since each statement alone is sufficient to determine the size of the interior angle, the correct choice is (D).

> Quick Tip
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> The relationship 'Interior Angle + Exterior Angle = 180°' is a powerful tool for problems involving polygon angles. Also, remember that the sum of all exterior angles of any convex polygon is always 360°. For a regular n-sided polygon, each exterior angle is simply 360/n. This is often faster than using the interior angle formula.

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6. Find out if t < 0.
1. $|t| > t$
2. $t^2 > 0$

(A) Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient to answer the question asked.
(B) Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient to answer the question asked.
(C) BOTH statements (1) and (2) TOGETHER are sufficient to answer the question asked, but NEITHER statement ALONE is sufficient to answer the question ask
(D) EACH statement ALONE is sufficient to answer the question asked.
(E) Statements (1) and (2) TOGETHER are NOT sufficient to answer the question asked, and additional data specific to the problem are needed.

Correct Answer: (A) Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient to answer the question asked.

Solution:

Step 1: Understanding the Concept:
The question is a 'Yes/No' data sufficiency problem. We need to determine if the variable t is negative. A statement is sufficient if it allows us to conclude with certainty that $t < 0$ (a 'Yes' answer) or that $t \geq 0$ (a 'No' answer).

Step 2: Detailed Explanation:
Analyzing Statement (1): $|t| > t$
Let's analyze the properties of the absolute value function $|t|$.
- If $t > 0$, then $|t| = t$. In this case, the inequality becomes $t > t$, which is false.
- If $t = 0$, then $|t| = 0$. In this case, the inequality becomes $0 > 0$, which is false.
- If $t < 0$, then $|t| = -t$. The inequality becomes $-t > t$. Since t is negative, $-t$ is positive, so a positive number is always greater than a negative number. This is true. For example, if $t = -5$, then $|-5| > -5$, which means $5 > -5$, which is true.
The only case where $|t| > t$ holds is when t is negative. Therefore, this statement guarantees that $t < 0$. The answer to the question "is t ¡ 0?" is a definitive 'Yes'.
Thus, statement (1) is sufficient.

Analyzing Statement (2): $t^2 > 0$
The square of any real number is non-negative. t^2 will be greater than 0 for any real number t except for $t = 0$.
So, this statement tells us that $t \neq 0$.
- t could be positive (e.g., $t = 2$, $2^2 = 4 > 0$). In this case, the answer to "is t ¡ 0?" is 'No'.
- t could be negative (e.g., $t = -2$, $(-2)^2 = 4 > 0$). In this case, the answer to "is t ¡ 0?" is 'Yes'.
Since the answer could be 'Yes' or 'No', this statement is not sufficient.

Step 3: Final Answer:
Statement (1) alone is sufficient, but statement (2) alone is not.

Quick Tip

Memorize the key properties of absolute values and squares for inequalities: - $|x| = x$ if $x \geq 0$. - $|x| = -x$ if $x < 0$. - The inequality $|x| > x$ is true only for $x < 0$. - $x^2 > 0$ is true for all real $x \neq 0$. - $x^2 \geq 0$ is true for all real x.

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7. Determine the value of t.
1. $2t + 6s = 8$
2. $t/2 - 2 = -3s/4$

(A) Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient to answer the question asked.
(B) Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient to answer the

question asked.
(C) BOTH statements (1) and (2) TOGETHER are sufficient to answer the question asked, but NEITHER statement ALONE is sufficient to answer the question ask
(D) EACH statement ALONE is sufficient to answer the question asked.
(E) Statements (1) and (2) TOGETHER are NOT sufficient to answer the question asked, and additional data specific to the problem are needed.

Correct Answer: (C) BOTH statements (1) and (2) TOGETHER are sufficient to answer the question asked, but NEITHER statement ALONE is sufficient to answer the question ask

Solution:

Step 1: Understanding the Concept:
To find a unique value for the variable t, we generally need a system of equations where the number of independent equations is equal to the number of variables. Here, we have two variables, t and s.

Step 2: Detailed Explanation:
Analyzing Statement (1): $2t + 6s = 8$
This is a single linear equation with two unknown variables, t and s. We can simplify it by dividing by 2:

$$t + 3s = 4$$

We cannot determine a unique value for t without knowing the value of s. For example, if $s = 0$, $t = 4$. If $s = 1$, $t = 1$. Since there are infinite possible values for t, this statement is not sufficient.

Analyzing Statement (2): $t/2 - 2 = -3s/4$
This is also a single linear equation with two variables. Let's simplify it to make it easier to analyze.
First, move the constant to the right side:

$$\frac{t}{2} = 2 - \frac{3s}{4}$$

Multiply the entire equation by 4 to eliminate the denominators:

$$4\left(\frac{t}{2}\right) = 4(2) - 4\left(\frac{3s}{4}\right)$$

$$2t = 8 - 3s$$

$$2t + 3s = 8$$

Again, this is one equation with two unknowns. We cannot find a unique value for t. This statement is not sufficient.

Analyzing Statements (1) and (2) Together:
Now we have a system of two independent linear equations:
1. $2t + 6s = 8$
2. $2t + 3s = 8$

We can solve this system. Let's use the elimination method. Subtract equation (2) from equation (1):

$$(2t + 6s) - (2t + 3s) = 8 - 8$$
$$2t + 6s - 2t - 3s = 0$$
$$3s = 0$$
$$s = 0$$

Now substitute $s = 0$ back into either equation to find t. Using the simplified version of equation (1), $t + 3s = 4$:

$$t + 3(0) = 4$$
$$t = 4$$

Since we have found a unique value for t, the two statements together are sufficient.

Step 3: Final Answer:
Neither statement alone is sufficient, but both statements together are sufficient to find the value of t.

Quick Tip

In Data Sufficiency, when you see two statements that are both linear equations with the same two variables, quickly check if they are independent. If one equation is just a multiple of the other, they are dependent and won't give a unique solution. Here, the ratios of coefficients (2/2 vs 6/3) are different, so the lines are independent and will intersect at a single point, providing a unique solution.

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8. Find the percentage change in the volume of a cylinder.
1. The diameter is increased by 20%.
2. The height is increased by 21%.

(A) Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient to answer the question asked.
(B) Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient to answer the question asked.
(C) BOTH statements (1) and (2) TOGETHER are sufficient to answer the question asked, but NEITHER statement ALONE is sufficient to answer the question ask
(D) EACH statement ALONE is sufficient to answer the question asked.
(E) Statements (1) and (2) TOGETHER are NOT sufficient to answer the question asked, and additional data specific to the problem are needed.

Correct Answer: (C) BOTH statements (1) and (2) TOGETHER are sufficient to answer the question asked, but NEITHER statement ALONE is sufficient to answer the question ask

Solution:

Step 1: Understanding the Concept:
The volume of a cylinder depends on two variables: its radius (or diameter) and its height. To find the percentage change in volume, we need to know how both of these dimensions have changed.

Step 2: Key Formula or Approach:
The volume V of a cylinder is given by $V = \pi r^2 h$, where r is the radius and h is the height. The percentage change is calculated as:

$$\text{Percentage Change} = \frac{\text{New Volume} - \text{Original Volume}}{\text{Original Volume}} \times 100\%$$

Step 3: Detailed Explanation:
Let the original radius be r_1, original height be h_1, and original volume be $V_1 = \pi r_1^2 h_1$.
Let the new radius be r_2, new height be h_2, and new volume be $V_2 = \pi r_2^2 h_2$.

Analyzing Statement (1): The diameter is increased by 20%.
An increase in diameter by 20% means the new diameter is 1.2 times the old one. Since the radius is half the diameter, the new radius r_2 is also 1.2 times the old radius r_1. So, $r_2 = 1.2r_1$.
The new volume would be $V_2 = \pi(1.2r_1)^2 h_2 = \pi(1.44r_1^2)h_2$.
The percentage change would be $\frac{1.44\pi r_1^2 h_2 - \pi r_1^2 h_1}{\pi r_1^2 h_1}$. This simplifies to $1.44\frac{h_2}{h_1} - 1$.
Since we don't know the relationship between h_2 and h_1, we cannot find the percentage change. Statement (1) is not sufficient.

Analyzing Statement (2): The height is increased by 21%.
This means the new height h_2 is 1.21 times the old height h_1. So, $h_2 = 1.21h_1$.
The new volume would be $V_2 = \pi r_2^2(1.21h_1)$.
The percentage change depends on the change in radius (r_2), which is unknown. Statement (2) is not sufficient.

Analyzing Statements (1) and (2) Together:
From statement (1), we have $r_2 = 1.2r_1$.
From statement (2), we have $h_2 = 1.21h_1$.
Now we can express the new volume V_2 in terms of the original volume V_1:

$$V_2 = \pi r_2^2 h_2 = \pi(1.2r_1)^2(1.21h_1)$$
$$V_2 = \pi(1.44r_1^2)(1.21h_1)$$
$$V_2 = 1.44 \times 1.21 \times (\pi r_1^2 h_1)$$
$$V_2 = 1.7424V_1$$

Now we can calculate the percentage change:

$$\text{Percentage Change} = \frac{V_2 - V_1}{V_1} \times 100\% = \frac{1.7424V_1 - V_1}{V_1} \times 100\%$$
$$= \frac{0.7424V_1}{V_1} \times 100\% = 74.24\%$$

Since we can find a unique value for the percentage change, the two statements together are sufficient.

Step 4: Final Answer:
Neither statement alone is sufficient, but together they are sufficient.

Quick Tip

For percentage change problems with formulas involving products of variables (like V = r^2h), you can analyze the multipliers. A 20

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9. a < b. Is a positive?
1. b = 0.
2. $\sqrt{a} < a$

(A) Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient to answer the question asked.
(B) Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient to answer the question asked.
(C) BOTH statements (1) and (2) TOGETHER are sufficient to answer the question asked, but NEITHER statement ALONE is sufficient to answer the question ask
(D) EACH statement ALONE is sufficient to answer the question asked.
(E) Statements (1) and (2) TOGETHER are NOT sufficient to answer the question asked, and additional data specific to the problem are needed.

Correct Answer: (D) EACH statement ALONE is sufficient to answer the question asked.

Solution:

Step 1: Understanding the Concept:
We are given the condition $a < b$ and asked a 'Yes/No' question: "Is $a > 0$?". A statement will be sufficient if it forces the answer to be always 'Yes' or always 'No'.

Step 2: Detailed Explanation:
Analyzing Statement (1): b = 0.
We combine this with the given information $a < b$.
Substituting $b = 0$ into the inequality, we get:

$$a < 0$$

This definitively tells us that a is negative. Therefore, the answer to the question "Is a positive?" is a definite 'No'.
Since we have a conclusive answer, statement (1) is sufficient.

Analyzing Statement (2): $\sqrt{a} < a$
First, for $\sqrt{a}$ to be a real number, we must have $a \geq 0$. This already eliminates the possibility of a being negative.
Now let's analyze the inequality $\sqrt{a} < a$. We can square both sides since both sides are non-negative:

$$a < a^2$$
$$a^2 - a > 0$$
$$a(a-1) > 0$$

This inequality is true when both factors are positive or both are negative.
- Case (i): $a > 0$ and $a - 1 > 0$, which means $a > 1$.
- Case (ii): $a < 0$ and $a - 1 < 0$, which means $a < 0$. However, this contradicts our initial condition that $a \geq 0$ for the square root to be real.
So, the only solution is $a > 1$.
If $a > 1$, then a is definitely positive. The answer to the question "Is a positive?" is a definite 'Yes'.
Thus, statement (2) is sufficient.

Step 3: Final Answer:
Each statement alone provides enough information to definitively answer the question.

> Quick Tip
>
> The behavior of functions like $\sqrt{x}$ and x^2 changes at key points like 0 and 1. Remember these rules for a positive number x: - If $0 < x < 1$, then $x^2 < x < \sqrt{x}$. (e.g., for $x = 1/4$, $1/16 < 1/4 < 1/2$). - If $x > 1$, then $\sqrt{x} < x < x^2$. (e.g., for $x = 4$, $2 < 4 < 16$). The inequality $\sqrt{a} < a$ immediately tells you that $a > 1$.

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10. Determine the equation of the circle passing through (-4,-2).
1. (1,-1) lies in the circle.
2. The center of the circle is the origin.

(A) Statement (1) ALONE is sufficient, but statement (2) alone is not sufficient to answer the question asked.
(B) Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient to answer the question asked.
(C) BOTH statements (1) and (2) TOGETHER are sufficient to answer the question asked, but NEITHER statement ALONE is sufficient to answer the question ask
(D) EACH statement ALONE is sufficient to answer the question asked.
(E) Statements (1) and (2) TOGETHER are NOT sufficient to answer the question asked, and additional data specific to the problem are needed.

Correct Answer: (B) Statement (2) ALONE is sufficient, but statement (1) alone is not sufficient to answer the question asked.

Solution:

Step 1: Understanding the Concept:
To determine the unique equation of a circle, we need to know its center (h, k) and its radius (r). The standard equation of a circle is $(x-h)^2+(y-k)^2 = r^2$. We are given that one point, (-4, -2), is on the circle.

Step 2: Detailed Explanation:
Analyzing Statement (1): (1,-1) lies in the circle.
Assuming "lies in the circle" means "lies on the circumference", this gives us a second point on the circle. So we know two points on the circle are P1(-4, -2) and P2(1, -1).
Let the center be C(h, k). The distance from the center to any point on the circle is the radius. Therefore, CP1 = CP2.

$$\sqrt{(-4-h)^2+(-2-k)^2} = \sqrt{(1-h)^2+(-1-k)^2}$$

Squaring both sides:

$$(-4-h)^2+(-2-k)^2 = (1-h)^2+(-1-k)^2$$
$$16+8h+h^2+4+4k+k^2 = 1-2h+h^2+1+2k+k^2$$
$$20+8h+4k = 2-2h+2k$$
$$18+10h+2k = 0$$
$$5h+k = -9$$

This is a single linear equation with two variables (h, k). There are infinitely many possible centers that satisfy this equation (all lying on the line $k = -9-5h$). Since we cannot find a unique center, we cannot find a unique equation for the circle. Thus, statement (1) is not sufficient.

Analyzing Statement (2): The center of the circle is the origin.
This statement directly gives us the center of the circle: $(h, k) = (0, 0)$.
The equation of the circle is $(x-0)^2+(y-0)^2 = r^2$, which simplifies to $x^2+y^2 = r^2$.
We know the circle passes through the point (-4, -2). We can substitute these coordinates into the equation to find the radius r.

$$(-4)^2+(-2)^2 = r^2$$
$$16+4 = r^2$$
$$r^2 = 20$$

Now we have both the center and the radius squared, so we can write the unique equation of the circle:

$$x^2+y^2 = 20$$

Since we can determine the unique equation, statement (2) is sufficient.

Step 3: Final Answer:
Statement (2) alone is sufficient, but statement (1) alone is not.

> **Quick Tip**
>
> Remember that it takes three non-collinear points to uniquely define a circle. Statement (1) only provides a total of two points, which is not enough. Statement (2) provides the center, which is a very powerful piece of information. Once you have the center, you only need one point on the circumference to find the radius and complete the equation.

GMAT PROBLEM SOLVING

1. A racecar driver has completed 12 1/2 laps of a 50 lap race. What fractional part of the race remains?

(A) 1/4
(B) 1/5
(C) 3/4
(D) 4/5
(E) 75/2

Correct Answer: (C) 3/4

Solution:

Step 1: Understanding the Concept:
The problem asks for the remaining part of the race to be expressed as a fraction of the total race distance. We need to find the number of laps remaining and divide it by the total number of laps.

Step 2: Detailed Explanation:
First, identify the total number of laps and the number of laps completed.
Total laps = 50.
Laps completed = 12 1/2 = 12.5.

Next, calculate the number of laps remaining.

$$\text{Laps remaining} = \text{Total laps} - \text{Laps completed}$$

$$\text{Laps remaining} = 50 - 12.5 = 37.5$$

Now, express the remaining laps as a fraction of the total laps.

$$\text{Fraction remaining} = \frac{\text{Laps remaining}}{\text{Total laps}} = \frac{37.5}{50}$$

To simplify this fraction, we can multiply the numerator and denominator by 10 to remove the decimal.

$$\frac{37.5 \times 10}{50 \times 10} = \frac{375}{500}$$

Now, find the greatest common divisor (GCD) of 375 and 500 to simplify the fraction. Both numbers are divisible by 25.

$$375 = 25 \times 15$$

$$500 = 25 \times 20$$

So, $\frac{375}{500} = \frac{15}{20}$.

This fraction can be simplified further by dividing both the numerator and denominator by 5.

$$\frac{15 \div 5}{20 \div 5} = \frac{3}{4}$$

Step 3: Final Answer:
The fractional part of the race that remains is 3/4.

> **Quick Tip**
>
> When dealing with fractions involving decimals, it's often easiest to convert them to whole numbers first. Also, remember that 0.5 is 1/2, 0.25 is 1/4, and 0.75 is 3/4. Recognizing that 37.5 is 3/4 of 50 could lead to a very quick answer.

---

2. If M is the set of positive multiples of 2 less than 150 and N is the set of positive multiples of 9 less than 150, how many members are there in M ∩ N?

(A) 0
(B) 8
(C) 9
(D) 18
(E) 74

Correct Answer: (B) 8

Solution:

Step 1: Understanding the Concept:
The question asks for the number of elements in the intersection of two sets, M and N. The intersection M ∩ N contains elements that are common to both set M and set N.
Set M contains positive multiples of 2 less than 150.
Set N contains positive multiples of 9 less than 150.
Therefore, M ∩ N contains numbers that are multiples of both 2 and 9, and are positive and

less than 150.

Step 2: Key Formula or Approach:
A number that is a multiple of both 2 and 9 must be a multiple of their least common multiple (LCM).

$$\text{LCM}(2, 9) = 18$$

So, we need to find the number of positive multiples of 18 that are less than 150.

Step 3: Detailed Explanation:
We need to find how many integers k exist such that $18k < 150$ and $k > 0$.
To find the number of multiples, we can divide 150 by 18.

$$\frac{150}{18}$$

We can simplify the fraction first:

$$\frac{150 \div 6}{18 \div 6} = \frac{25}{3}$$

$$\frac{25}{3} = 8\frac{1}{3} \approx 8.33$$

Since the number of multiples must be an integer, we take the integer part of this result. This means there are 8 multiples of 18 that are less than 150.
Let's list them to verify: 18, 36, 54, 72, 90, 108, 126, 144.
The next multiple would be $144 + 18 = 162$, which is greater than 150.
There are indeed 8 such numbers.

Step 4: Final Answer:
There are 8 members in the set M ∩ N.

Quick Tip

To find the number of multiples of a number 'n' up to a limit 'L', simply calculate L/n and take the integer part (floor) of the result. In this case, it was floor(149/18) or floor(150/18) since 150 is not a multiple.

---

3. At Bruno's Video World, the regular price for a DVD is d dollars. How many DVDs can be purchased for x dollars when the DVDs are on sale at 20% off the regular price?

(A) 4/5x
(B) 5/4x
(C) 4/5d

(D) 4x/5d
(E) 5x/4d

Correct Answer: (E) 5x/4d

Solution:

Step 1: Understanding the Concept:
This is a word problem involving percentages. We first need to calculate the sale price of a single DVD and then determine how many of them can be bought with a given amount of money.

Step 2: Detailed Explanation:
First, find the sale price of one DVD.
The regular price is d dollars.
The discount is 20% of the regular price.

$$\text{Discount amount} = 20\% \text{ of } d = 0.20 \times d = 0.2d$$

The sale price is the regular price minus the discount amount.

$$\text{Sale Price} = d - 0.2d = 0.8d$$

We can also express this price as a fraction:

$$0.8d = \frac{8}{10}d = \frac{4}{5}d$$

Next, find how many DVDs can be purchased for x dollars.
The number of items that can be purchased is the total amount of money available divided by the price per item.

$$\text{Number of DVDs} = \frac{\text{Total money}}{\text{Sale Price per DVD}}$$
$$\text{Number of DVDs} = \frac{x}{\frac{4}{5}d}$$

To divide by a fraction, we multiply by its reciprocal.

$$\text{Number of DVDs} = x \times \frac{5}{4d} = \frac{5x}{4d}$$

Step 3: Final Answer:
The number of DVDs that can be purchased is $\frac{5x}{4d}$.

Quick Tip

A 20

---

4. If $x \neq 2y$, then $\frac{x-2y}{2y-x} + \frac{2y-x}{x-2y} =$

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

Correct Answer: (E) -2

Solution:

Step 1: Understanding the Concept:
The problem involves simplifying an algebraic expression. The key is to recognize the relationship between the numerator and denominator in each fraction.

Step 2: Detailed Explanation:
Let's analyze the terms in the expression: $x - 2y$ and $2y - x$.
Notice that one is the negative of the other. We can show this by factoring out -1.

$$2y - x = -(-2y + x) = -(x - 2y)$$

Now, let's substitute this into the given expression.

$$\frac{x-2y}{2y-x} + \frac{2y-x}{x-2y} = \frac{x-2y}{-(x-2y)} + \frac{-(x-2y)}{x-2y}$$

The condition $x \neq 2y$ ensures that the denominators are not zero, so the fractions are well-defined.
Now, we can simplify each fraction.

$$\frac{x-2y}{-(x-2y)} = -1$$
$$\frac{-(x-2y)}{x-2y} = -1$$

So the expression becomes:

$$-1 + (-1) = -2$$

Step 3: Final Answer:
The value of the expression is -2.

Quick Tip

Whenever you see expressions of the form (a-b) and (b-a) in a fraction, remember that (b-a) = -(a-b). This means the fraction (a-b)/(b-a) will always simplify to -1 (as long as a b).

---

5. If Dave drove one-third of the distance of his trip on the first day, and 60 miles on the second day, he figured out that he still had 1/2 of the trip to drive. What was the total length, in miles, of his trip?

(A) 360
(B) 180
(C) 120
(D) 60
(E) 90

Correct Answer: (A) 360

Solution:

Step 1: Understanding the Concept:
This is a word problem that can be solved by setting up an algebraic equation based on the fractions of the total distance. The total distance is the sum of the parts driven and the part remaining.

Step 2: Detailed Explanation:
Let D be the total length of the trip in miles.

On the first day, Dave drove one-third of the distance.
Distance driven on Day 1 $= \frac{1}{3}D$.

On the second day, he drove 60 miles.
Distance driven on Day 2 $= 60$.

The total distance driven so far is the sum of the distances from Day 1 and Day 2.
Total distance driven $= \frac{1}{3}D + 60$.

The remaining distance is one-half of the total trip.
Remaining distance $= \frac{1}{2}D$.

The sum of the distance driven and the distance remaining must equal the total distance of the trip.

$$\text{(Distance driven)} + \text{(Remaining distance)} = \text{Total distance}$$
$$\left(\frac{1}{3}D + 60\right) + \frac{1}{2}D = D$$

Now, we solve this equation for D.
Combine the terms with D:

$$\frac{1}{3}D + \frac{1}{2}D + 60 = D$$

To add the fractions, find a common denominator, which is 6.

$$\frac{2}{6}D + \frac{3}{6}D + 60 = D$$

$$\frac{5}{6}D + 60 = D$$

Subtract $\frac{5}{6}D$ from both sides to isolate the constant term.

$$60 = D - \frac{5}{6}D$$
$$60 = \frac{6}{6}D - \frac{5}{6}D$$
$$60 = \frac{1}{6}D$$

Multiply both sides by 6 to find D.

$$D = 60 \times 6 = 360$$

Step 3: Final Answer:
The total length of the trip was 360 miles.

> **Quick Tip**
>
> An alternative way to set up the equation is to consider the fraction of the trip covered. Dave drove 1/3 and had 1/2 left. The fraction of the trip he drove on the second day must be the difference: $1 - \frac{1}{3} - \frac{1}{2} = \frac{6-2-3}{6} = \frac{1}{6}$. So, 60 miles represents 1/6 of the total trip. If $\frac{1}{6}D = 60$, then $D = 360$.

---

6. If $x^2 - y^2 = 48$, then $\frac{2}{3}(x + y)(x - y) =$

(A) 16
(B) 72
(C) 96
(D) 32
(E) 64

Correct Answer: (D) 32

Solution:

Step 1: Understanding the Concept:
This problem uses the "difference of squares" factorization, which is a fundamental identity in algebra.

Step 2: Key Formula or Approach:
The difference of squares formula is:

$$x^2 - y^2 = (x + y)(x - y)$$

Step 3: Detailed Explanation:
We are given the value of $x^2 - y^2$.

$$x^2 - y^2 = 48$$

We need to find the value of the expression $\frac{2}{3}(x + y)(x - y)$.
Using the difference of squares formula, we can substitute $(x + y)(x - y)$ with $x^2 - y^2$.

$$\frac{2}{3}(x + y)(x - y) = \frac{2}{3}(x^2 - y^2)$$

Now, substitute the given value of 48 into the expression.

$$\frac{2}{3}(48)$$

To calculate this, we can first divide 48 by 3 and then multiply by 2.

$$\frac{48}{3} = 16$$

$$\frac{2}{3}(48) = 2 \times 16 = 32$$

Step 4: Final Answer:
The value of the expression is 32.

> Quick Tip
>
> Recognizing algebraic identities like the difference of squares $(a^2 - b^2 = (a - b)(a + b))$ is crucial for speed and accuracy. When you see one form, immediately think of the other. This question is a direct application of this identity.

---

7. Eddie is 7 years older than Brian. If Brian is x years old, then how old was Eddie 11 years ago?

(A) x - 18
(B) x - 4
(C) x - 7
(D) 7x - 11
(E) x + 18

Correct Answer: (B) x - 4

Solution:

Step 1: Understanding the Concept:
This is a word problem that requires translating sentences into algebraic expressions. We need to represent Eddie's current age in terms of x and then find his age in the past.

Step 2: Detailed Explanation:
First, let's write down the given information as expressions.
Brian's current age is x years.
Eddie is 7 years older than Brian. So, Eddie's current age is Brian's age plus 7.

$$\text{Eddie's current age} = x + 7$$

The question asks for Eddie's age 11 years ago. To find this, we subtract 11 years from his current age.

$$\text{Eddie's age 11 years ago} = (\text{Eddie's current age}) - 11$$

$$\text{Eddie's age 11 years ago} = (x + 7) - 11$$

Now, simplify the expression.

$$x + 7 - 11 = x - 4$$

Step 3: Final Answer:
Eddie's age 11 years ago was $x - 4$.

Quick Tip

In age problems, it's helpful to create a small table for current and past/future ages to keep track of the information. Always start by defining the variables for the current ages before calculating past or future ages.

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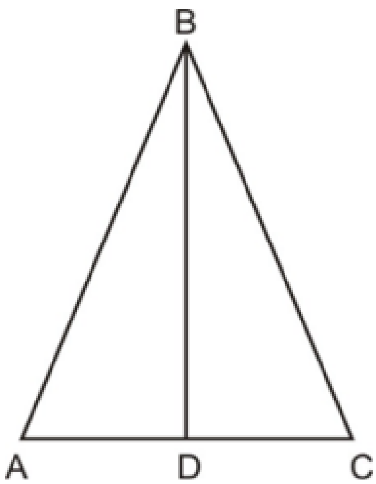
8. Find the perimeter of Isosceles triangle ABC (below) if mAD = 3 and m∠BAC = 55 degrees. Round to the nearest hundredth.



(A) 5.21
(B) 10.42

(C) 13.48
(D) 16.46
(E) 13.39

Correct Answer: (D) 16.46

Solution:

Step 1: Understanding the Concept:
The problem asks for the perimeter of an isosceles triangle. The perimeter is the sum of the lengths of all three sides. We are given the length of a segment of the base and a base angle. We will use properties of isosceles triangles and trigonometry to find the lengths of the sides.

Step 2: Key Formula or Approach:
- Perimeter $P = AB + BC + AC$.
- In an isosceles triangle ABC with vertex B, $AB = BC$.
- The altitude from the vertex angle to the base (BD) bisects the base. So, $AC = 2 \times AD$.
- Basic trigonometric ratio (SOH-CAH-TOA): In a right-angled triangle, $\cos(\theta) = \frac{\text{Adjacent}}{\text{Hypotenuse}}$.

Step 3: Detailed Explanation:
The triangle ABC is isosceles. The altitude BD is drawn from the vertex B to the base AC. In an isosceles triangle, this altitude is also the median, so it bisects the base AC at point D.
We are given that the length of segment AD is 3.

$$AD = 3$$

Therefore, the length of the full base AC is:

$$AC = 2 \times AD = 2 \times 3 = 6$$

Now we need to find the length of the equal sides, AB and BC. Let's focus on the right-angled triangle △ABD.
We are given $\angle BAC$ (which is the same as $\angle BAD$) is 55 degrees.
We know the length of the side adjacent to this angle, $AD = 3$.
We want to find the length of the hypotenuse, AB.
Using the cosine ratio:

$$\cos(\angle BAD) = \frac{AD}{AB}$$
$$\cos(55^\circ) = \frac{3}{AB}$$

Rearrange the formula to solve for AB:

$$AB = \frac{3}{\cos(55^\circ)}$$

Using a calculator, find the value of $\cos(55^\circ)$.

$$\cos(55^\circ) \approx 0.573576$$

$$AB \approx \frac{3}{0.573576} \approx 5.231$$

Since triangle ABC is isosceles, $BC = AB \approx 5.231$.

Finally, calculate the perimeter of $\triangle$ABC.

$$P = AB + BC + AC$$
$$P \approx 5.231 + 5.231 + 6$$
$$P \approx 10.462 + 6$$
$$P \approx 16.462$$

Rounding to the nearest hundredth, we get 16.46.

Step 4: Final Answer:
The perimeter of the isosceles triangle is approximately 16.46.

Quick Tip

For isosceles triangle problems, dropping an altitude from the vertex angle is a very common and useful strategy. It creates two congruent right-angled triangles, allowing you to use the Pythagorean theorem and trigonometric ratios.

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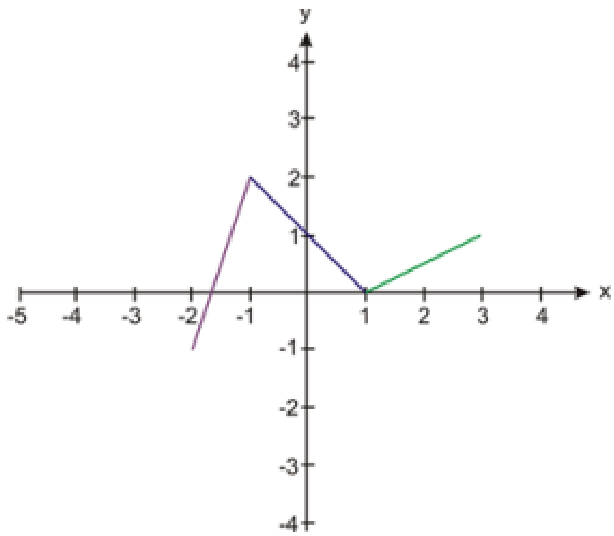
9. What is f(2) for the graph of f(x) below?



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

Correct Answer: (D) 2

Solution:

Step 1: Understanding the Concept:
The notation f(2) asks for the value of the function (the y-coordinate) when the input variable (the x-coordinate) is 2. We need to locate x=2 on the horizontal axis and find the corresponding y-value on the graph.

Step 2: Detailed Explanation:
First, let's analyze the graph. It is a piecewise function made of straight line segments. We are interested in the segment that contains the x-value of 2.
By observing the graph, we can identify the coordinates of the "corners" or vertices of the function.
The relevant segment for our question starts at the point (1, 1) and ends at the point (3, 2).

To find f(2), we need the y-value on the line segment connecting (1, 1) and (3, 2) at x=2.
We can find the equation of the line passing through these two points.
First, calculate the slope (m):

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2-1}{3-1} = \frac{1}{2}$$

Now, use the point-slope form of a linear equation, $y - y_1 = m(x - x_1)$, using the point (1, 1).

$$y - 1 = \frac{1}{2}(x - 1)$$

To find f(2), we substitute x = 2 into this equation:

$$y - 1 = \frac{1}{2}(2 - 1)$$

$$y - 1 = \frac{1}{2}(1)$$

$$y - 1 = \frac{1}{2}$$

$$y = 1 + \frac{1}{2} = 1.5$$

So, the mathematically correct value for f(2) based on the graph is 1.5.

Note on the provided options:
The calculated value of 1.5 is not among the options (1, 1/2, 0, 2, -1). This indicates a likely error in the question's graph or the provided options. In an exam situation, one must choose the best possible answer. Let's analyze the possibility of a typo in the graph's points. If the line segment connected (1,1) and (3,3), the slope would be $m = (3-1)/(3-1) = 1$, and the equation would be $y - 1 = 1(x - 1)$. In that case, f(2) would be $2 - 1 + 1 = 2$. This is a plausible intended question, as a line with a slope of 1 is common in test problems. Given the discrepancy, option (D) 2 is the most likely intended answer, assuming a typo in the endpoint of the line segment.

Step 3: Final Answer:
Based on the assumption of a typo in the graph (endpoint being (3,3) instead of (3,2)), the intended answer is 2.

> **Quick Tip**
>
> When reading from a graph, first identify the key points (intercepts, vertices). If the required point is between two key points on a straight line, you can find the equation of that line to get an exact value. If you find a discrepancy between your result and the options, double-check your reading of the graph, and then consider common types of errors in question design (e.g., simple slopes like 1 or -1).

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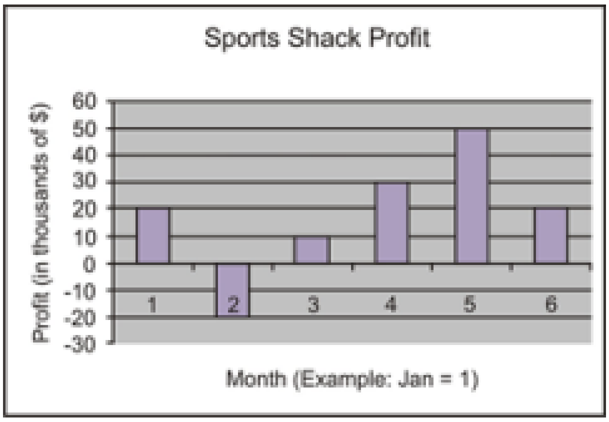
10. According to the graph below, the greatest change in the profit of the Sports Shack occurred between which two consecutive months?



(A) January and February
(B) February and March
(C) March and April
(D) April and May
(E) May and June

Correct Answer: (C) March and April

Solution:

Step 1: Understanding the Concept:
The question asks for the greatest *change* in profit between consecutive months. This means we need to calculate the difference in profit from one month to the next and find the largest of these differences (in absolute value).

Step 2: Detailed Explanation:
Let's read the profit value for each month from the bar chart. The profit is given in thousands

of dollars.
- Month 1 (January): -10
- Month 2 (February): +10
- Month 3 (March): -20
- Month 4 (April): +20
- Month 5 (May): +50
- Month 6 (June): +40

Now, let's calculate the change in profit for each consecutive pair of months. The change is the profit of the later month minus the profit of the earlier month. We are interested in the magnitude (absolute value) of this change.

- **January to February:**
Change = (Profit Feb) - (Profit Jan) = 10 - (-10) = 20.
Absolute change = —20— = 20.

- **February to March:**
Change = (Profit Mar) - (Profit Feb) = -20 - 10 = -30.
Absolute change = —-30— = 30.

- **March to April:**
Change = (Profit Apr) - (Profit Mar) = 20 - (-20) = 40.
Absolute change = —40— = 40.

- **April to May:**
Change = (Profit Apr) - (Profit May) = 50 - 20 = 30.
Absolute change = —30— = 30.

- **May to June:**
Change = (Profit Jun) - (Profit May) = 40 - 50 = -10.
Absolute change = —-10— = 10.

Comparing the absolute changes: 20, 30, 40, 30, 10.
The greatest change is 40.

Step 3: Final Answer:
The greatest change of 40 (thousand dollars) occurred between March and April.

Quick Tip

Visually, the "greatest change" on a bar chart corresponds to the largest vertical jump between two adjacent bars. Notice the large gap between the bar for March (at -20) and the bar for April (at +20). This visual inspection can quickly point you to the correct answer, which you can then confirm with calculation.