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The Learning App

GMAT

Quant Section Test
[LINEAR AND QUADRATIC EQUATIONS]
- Solutions

1. **Solution:**

Topic: Algebra

Concept Tested: Quadratic Equations

Type of Question: Problem Solving (PS)

Given:

Number of chocolates= 12

The number of chocolates per person is one more than the number of friends.

Question: How many friends are there?

Approach: Use translation from English to Math.

Let x be the number of friends.

Then, the number of chocolates per person $=\frac{12}{x}$

Since, the number of chocolates per person is one more than the number of friends, we can write the following relation.

$\frac{12}{x} = x + 1$

Solving, we get $x^2 + x - 12 = 0$

Use factorization as below.

$\Rightarrow x^2 + 4x - 3x - 12 = 0$

$\Rightarrow x(x + 4) - 3(x + 4) = 0$

$\Rightarrow (x - 3)(x + 4) = 0$

$\Rightarrow x = 3 \; or \; x = -4$

Since, the number of friends cannot be negative, $x = 3$

So, the answer is A.

Alternate Method: Use back solving.

If number of friends is 3 (option A), then the number of chocolates per person$=\frac{12}{3} = 4$. This satisfies the condition that the number of chocolates per person is one more than the number of friends.

Hence, the answer is A.

2. **Solution:**

Topic: Algebra

Concept Tested: Linear Equations

Type of Question: Problem Solving (PS)

Given: The number of questions the test contains= 30

Each correct answer will worth 5 points.

Each incorrect answer will worth -3 points.

Each blank questions will worth 0 points**.**

Melvin scores a total of 63 points.

Questions: The number of questions that Melvin answered correctly.

Approach: Use translation from English to Math.

Let the number of questions answered correctly $= x$

Let the number of questions answered wrongly $= y$

Let the number of questions which are left blank $= z$

So, $x + y + z = 30$

Total Score earned by Melvin $= 5x - 3y = 63$

Since, there are two equations and three unknowns, make use of options (back solving) to see which option will satisfy.

Note: x, y and z are non-negative integers. And the question is asking for possible value of x.

While doing back solving, it is always better to start with option C, as in GRE, the options will be in ascending or descending order.

If $x = Option\ C = 20,$ Using $5x - 3y = 63$

$\Rightarrow 5x = 100$

$\Rightarrow 3y = 37$

$\Rightarrow y = \frac{37}{3} \neq integer$

Therefore, eliminate C.

Also, we can eliminate D and E.

Now, if $x = Option\ B = 18,$

$\Rightarrow 5x = 90$

$\Rightarrow 3y = 27$

$\Rightarrow y = 9 = integer$

This means, 18 could be the value of x.

Hence, the answer is B.

3. **Solution:**

Topic: Algebra

Concept Tested: Quadratic Equations

Type of Question: Data Sufficiency (DS)

Given: Nicolas convinced x colleagues to donate \$500 each to his old age home, and then each of these x colleagues convinced x more member to donate \$500 each to Nicolas's old age home.

Question: What is the value of x?

Everyone donated only once and there were no other donations.

Approach: Conversion from English to Math.

The total number of members who donated for old age home $= x + (x \times x)$

$\Longrightarrow x + x^2$

$\Longrightarrow x(x + 1)$

Since every member donates \$500,

$\Longrightarrow$ Total amount donated $500x(x + 1)$

We need total amount donated from the statements to say they are sufficient or insufficient.

Statement I is sufficient:

Given that the first x members donated $\frac{1}{16}$ of the total amount donated.

$\Longrightarrow 500x = \frac{1}{16}[500x(x + 1)]$

Solving, we get, $x = 15$

Therefore, Statement I by itself is sufficient to answer the question asked.

So, eliminate B, C and E.

The answer will be either A or D.

Statement II is sufficient:

Given that the total amount donated was 120000.

$$\Longrightarrow 500x(x + 1) = 120000$$

$$\Longrightarrow x(x + 1) = 240$$

$\Longrightarrow x^2 + x - 240 = 0$ Solve using factorization, you will get $x = 15$ and $x = -16$

Since the number of members cannot be negative, $x = 15$

Therefore, Statement II by itself is sufficient to answer the question asked.

So, eliminate A.

Hence, the answer is D.

4. **Solution:**

Topic: Algebra

Concept Tested: Linear Equations

Type of Question: Data Sufficiency (DS)

Given: $4a + 3b = 7$

Question: What is the value of c?

To get c, we need relation between a, b and c.

Statement I is insufficient:

Given that $2a + b = 1$

From this statement, we can just get a and b as we have two simultaneous equations with two unknowns. But, we will not be able to get the value if c.

Therefore, Statement I by itself is insufficient to answer the question asked.

So, eliminate A and D.

The answer will be either B, C or E.

Statement II is insufficient:

Given that $2a + 2b = c - 4$

Using the above equation and the equation given in the question stem, we get two linear equations with three unknowns, which implies that, the value of c cannot be determined.

Therefore, Statement II by itself is insufficient to answer the question asked.

So, eliminate option B.

Combine both statements:

$4a + 3b = 7$ (Given in question stem) $\longrightarrow Eqn\ 1$

$2a + b = 1$ (Given in statement I) $\longrightarrow Eqn\ 2$

Subtract $Eqn\ 2$ from $Eqn\ 1$,

We get,

$2a + 2b = 6$

From statement II we know that $2a + 2b = c - 4$.

$\Longrightarrow c - 4 = 6$

$c = 10$

Therefore, combining the statements I and II is sufficient to answer the question asked.

So, eliminate E.

Hence, the answer is C.

5. Solution:

Topic: Algebra

Concept Tested: Linear Equations

Type of Question: Data Sufficiency (DS)

Given: p is a positive integer.

Question: Is the value of p = 1?

Approach: As it is a Yes/No Data Sufficiency Question, if we get a definite Yes or Definite No for the questions using the statements, then it is sufficient. Otherwise, it is insufficient.

Statement I is insufficient:

Given that $\frac{r}{p} = r$

$\Rightarrow r = pr$

$\Rightarrow r - pr = 0$

$\Rightarrow r(1 - p) = 0$

$\Rightarrow r = 0 \ or \ 1 - p = 0$ If $r = 0$, $1 - p$ need not be equal to zero. That means, value of p is not fixed.

Therefore, Statement I by itself is insufficient to answer the question asked.

So, eliminate A and D.

The answer will be either B, C or E.

Statement II is sufficient:

(1) $p^2 = \sqrt{p}$

This is possible only for 0 and 1. But question stem says p is positive.

So, $p = 1$

Therefore, Statement II by itself is sufficient to answer the question asked.

So, eliminate C and E.

Hence, the answer is B.