

COMPOSITE TEST SOLUTIONS 33-36**Question 33**

The relationship between income (x) and food expenditure (y), both in R100s, was studied for seven households using least squares regression. The following regression equation was obtained from this study: $y = 1,5050 + 0,2525x$. Which is the best interpretation of this equation?

- A. each R100 of income increases food expenditure by R150,50
- B. on average, it takes R252,50 to increase food expenditure by 1%
- C. each R100 of income increases food expenditure by 25,25%
- D. each R100 of income increases food expenditure by R25,25

Solution

The regression equation is $y = a + bx$. The y -intercept is a and the gradient of the line is b .

In this case, the y -intercept = 1,5050.

This means that a household with no income is expected to spend R150,50 on food.

The gradient of the line is 0,2525.

This means that a R100 increase in income is expected to result in an increase of R25,25 in food expenditure.

Compare these two statements with the four given in A, B, C and D.

So, the correct answer is D

Question 34

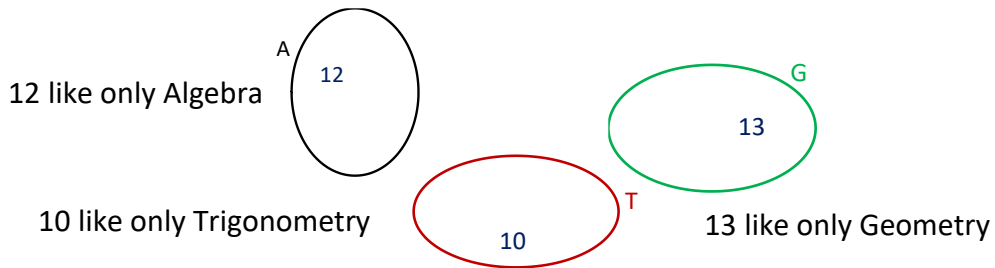
Among a group of 60 Grade 12 learners, 12 like only algebra, 13 like only geometry, 10 like only trigonometry, 5 like both algebra and trigonometry, 8 like only statistics, 5 like both statistics and geometry and the remainder like both algebra and statistics. How many learners like statistics but not geometry?

- A. 8 B. 13 C. 15 D. 17

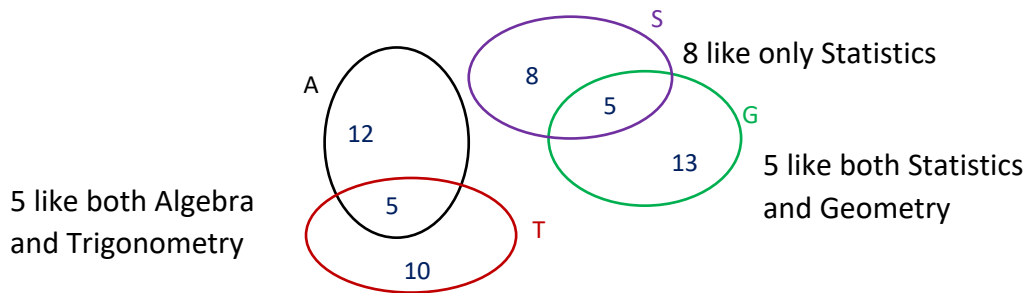
Solution

Draw a Venn diagram step-by-step, sentence by sentence.

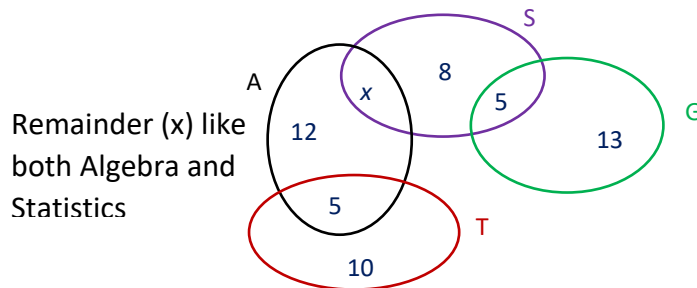
Step 1



Step 2



Step 3



$$\begin{aligned}
 x &= 60 - (10 + 5 + 12 + 8 + 5 + 13) \\
 &= 60 - 53 \\
 &= 7
 \end{aligned}$$

This means that the number who like Statistics but not Geometry = 7 + 8 = 15

So, the correct answer is C.

Question 35

Which of the following values of x satisfy the equation $ax^2 + bx + c = 0$ if $abc \neq 0$ and $a + b + c = 0$

- A. $\frac{c}{a}$ B. $\frac{b}{a}$ C. $-\frac{c}{a}$ D. $-\frac{b}{a}$

Solution

$$\text{Let } f(x) = ax^2 + bx + c$$

$$\therefore f(1) = a + b + c = 0 \text{ (given)}$$

$$\therefore (x - 1) \text{ is a factor of } f(x) \text{ (factor theorem)}$$

$$\therefore ax^2 + bx + c = (x - 1)(\square + \square)$$

$$= (x - 1)(ax + \square) \qquad x \times ax = ax^2$$

$$= (x - 1)(ax - c) \qquad (-1) \times (-c) = c$$

$$\therefore x = 1 \text{ or } x = \frac{c}{a}$$

So, the correct answer is A.

Question 36

If $\sqrt{2 - \frac{1}{x}} < \frac{1}{\sqrt{x}}$, what are the values of x ?

- A. $x \leq 1$ B. $0 < x < \frac{1}{2}$ C. $\frac{1}{2} \leq x \leq 1$ D. $\frac{1}{2} \leq x < 1$

Solution

$$\text{For } \sqrt{x}, x \geq 0$$

$$\text{For } \frac{1}{x}, x > 0$$

$$\text{For } \sqrt{2 - \frac{1}{x}}, 2 - \frac{1}{x} \geq 0$$

$$\therefore x \geq \frac{1}{2}$$

$$\text{For } \sqrt{2 - \frac{1}{x}} < \frac{1}{\sqrt{x}}$$

$$\therefore 2 - \frac{1}{x} < \frac{1}{x}$$

$$\therefore x < 1$$

This means that $\frac{1}{2} \leq x < 1$

So, the correct answer is D.