



Exercise 10D

Question 12:

Let the two consecutive positive integers be $x, x + 1$

$$\text{Then, } x^2 + (x + 1)^2 = 365$$

$$\Rightarrow x^2 + x^2 + 1 + 2x = 365$$

$$\Rightarrow 2x^2 + 2x + 1 - 365 = 0$$

$$\Rightarrow 2x^2 + 2x - 364 = 0$$

$$\Rightarrow x^2 + x - 182 = 0$$

$$\Rightarrow x^2 + 14x - 13x - 182 = 0$$

$$\Rightarrow x(x + 14) - 13(x + 14) = 0$$

$$\Rightarrow (x + 14)(x - 13) = 0$$

$$\Rightarrow x + 14 = 0 \quad \text{or} \quad x - 13 = 0$$

$$x = -14 \quad \text{or} \quad x = 13$$

But, -14 is not a positive integer

Hence, the required numbers are 13, 14.

Question 13:

Let x, y be the two natural numbers and $x > y$

$$\therefore x^2 - y^2 = 45 \text{ -----(1)}$$

Also, square of smaller number = 4 \times larger number

$$\Rightarrow y^2 = 4x \text{ -----(2)}$$

Putting y^2 value of from (1), we get

$$x^2 - 4x = 45$$

$$x^2 - 4x - 45 = 0$$

$$\Rightarrow x^2 - 9x + 5x - 45 = 0 \quad \text{or} \quad x(x - 9) + 5(x - 9) = 0$$

$$\Rightarrow (x - 9)(x + 5) = 0 \Rightarrow x = 9, -5$$

$$\text{But } x \neq -5 \quad \therefore x = 9$$

$$\text{from (2), } y^2 = 4x = 4 \times 9 = 36$$

$$\therefore y = 6$$

Thus, the two required numbers are 9 and 6.

Question 14:

Let the required number be x and y , hen

$$x^2 + y^2 = 25(x + y) \text{ --- (1)}$$

$$x^2 + y^2 = 50(x - y) \text{ --- (2)}$$

$$\Rightarrow 25(x + y) = 50(x - y) \Rightarrow x + y = 2(x - y)$$

$$\Rightarrow x = 3y$$

putting $x = 3y$ in (1), we get

$$9y^2 + y^2 = 100y \Rightarrow 10y^2 - 100y = 0$$

$$10y(y - 10) = 0$$

$$\Rightarrow y = 10$$

Hence, $x = 30$ and $y = 10$

Question 15:

Let the smaller part and larger part be $x, 16 - x$

Then,

$$\Rightarrow 2x^2 - (16 - x)^2 = 164$$

$$\Rightarrow 2x^2 - (256 + x^2 - 32x) = 164$$

$$\Rightarrow 2x^2 - 256 - x^2 + 32x = 164$$

$$\Rightarrow x^2 + 32x - 256 - 164 = 0$$

$$\Rightarrow x^2 + 32x - 420 = 0$$

$$\Rightarrow x^2 + 42x - 10x - 420 = 0$$

$$\Rightarrow x(x + 42) - 10(x + 42) = 0$$

$$(x + 42)(x - 10) = 0$$

$$x + 42 = 0 \quad \text{or} \quad x - 10 = 0$$

$$x = -42 \quad \text{or} \quad x = 10$$

-42 is not a positive part

Hence, the larger and smaller parts are 10, 6 respectively.

Question 16:

Let the numerator and denominator be $x, x + 3$

Then,

$$\begin{aligned}
& \frac{x}{(x+3)} + \frac{(x+3)}{x} = 2\frac{9}{10} \Rightarrow \frac{x^2 + (x+3)^2}{x(x+3)} = \frac{29}{10} \\
& \Rightarrow \frac{x^2 + x^2 + 9 + 6x}{x^2 + 3x} = \frac{29}{10} \Rightarrow 20x^2 + 90 + 60x = 29x^2 + 87x \\
& \Rightarrow 20x^2 - 29x^2 + 60x - 87x + 90 = 0 \\
& \Rightarrow -9x^2 - 27x + 90 = 0 \\
& \Rightarrow x^2 + 3x - 10 = 0 \\
& \Rightarrow x^2 + (5x - 2x) - 10 = 0 \\
& \Rightarrow x(x+5) - 2(x+5) = 0 \\
& \Rightarrow (x+5)(x-2) = 0 \\
& \Rightarrow x+5 = 0 \quad \text{or} \quad x-2 = 0 \\
& \quad \quad \quad x = -5 \quad \text{or} \quad x = 2
\end{aligned}$$

Hence, numerator and denominator are 2 and 5 respectively and fraction is $\frac{2}{5}$.

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