Exercise 10D

Question 45:
Let the altitude of triangle be x cm
Then, base of triangle is (x + 10) cm

$\therefore Area = 600\,cm^2 \Rightarrow \dfrac{1}{2} \times base \times altitude = 600\,cm^2$

$\Rightarrow \dfrac{1}{2} \times (x + 10) \times x = 600 \Rightarrow x^2 + 10x = 1200$

$\Rightarrow x^2 + 10x - 1200 = 0 \Rightarrow x^2 + 40x - 30x - 1200 = 0$

$\Rightarrow x(x + 40) - 30(x + 40) = 0$

$\Rightarrow (x + 40)(x - 30) = 0$

$\Rightarrow x + 40 = 0 \quad or \quad x - 30 = 0$

$\qquad x = -40 \quad or \quad x = 30$

$\therefore x = 30 \left[\because length\ of\ altitude\ cannot\ be\ negative \right]$

Hence, altitude of triangle is 30 cm and base of triangle 40 cm

$(Hypotenuse)^2 = (30)^2 + (40)^2 = 900 + 1600 = 2500$

$\therefore Hypotenuse = 50$

Question 46:
Let the altitude of triangle be x meter
Hence, base = 3x meter

$\therefore Area\ of\ triangle = \dfrac{1}{2} \times (3x \times x)\,cm^2$

$\qquad\qquad = \dfrac{1}{2} \times 3x^2 = 96 \Rightarrow x^2 = \dfrac{96 \times 2}{3} \Rightarrow x^2 = 64$

$\Rightarrow \quad x = \sqrt{64} = x = \pm 8$

$\therefore \quad x = 8 \left[\because length\ of\ altitude\ can\ never\ be\ negative \right]$

Hence, altitude of triangle is 8 cm.
And base of triangle = 3x = (3 × 8) cm = 24 cm

Question 47:
Let the base of triangle be x meter
Then, altitude of triangle = (x + 7) meter

$\therefore$ Area of triangle $= \dfrac{1}{2} \times x \times (x+7)\, m^2$

$\therefore \dfrac{1}{2} \times (x^2 + 7x) = 165 \Rightarrow x^2 + 7x - 330 = 0$

$\Rightarrow x^2 + 22x - 15x - 330 = 0$

$\Rightarrow x(x+22) - 15(x+22) = 0$

$\Rightarrow x = -22 \text{ or } x = 15$

$\Rightarrow x = 15 \left[\because \text{base cannot be negative}\right]$

Thus, the base of the triangle = 15 m
And the altitude of triangle = (15 + 7) = 22 m

Question 48:
Let the other sides of triangle be x and (x -4) meters
By Pythagoras theorem, we have

$\Rightarrow x^2 + (x-4)^2 = 400$

$\Rightarrow x^2 + x^2 + 16 - 8x = 400$

$\Rightarrow 2x^2 - 8x - 384 = 0$

$\Rightarrow x^2 - 4x - 192 = 0$

$\Rightarrow x^2 - 16x + 12x - 192 = 0$

$\Rightarrow x(x-16) + 12(x-16) = 0$

$\Rightarrow (x-16)(x+12) = 0$

$\Rightarrow x = 16 \text{ or } x = -12$

$\Rightarrow x = 16 \left[\because \text{height cannot be neagtive}\right]$

Thus, height of triangle be = 16 cm
And the base of the triangle = (16 - 4) = 12 cm

Question 49:
Let the base of the triangle be x
Then, hypotenuse = (x + 2) cm

$\therefore (x+2) - (2 \times \text{altitude}) = 1 \Rightarrow \text{altitude} = \dfrac{1}{2}(x+1)$

By applying pythagoras theorem we have,

$\therefore (x+2)^2 = x^2 + \dfrac{1}{4}(x+1)^2$

$\Rightarrow x^2 + 4 + 4x = x^2 + \dfrac{x^2}{4} + \dfrac{1}{4} + \dfrac{1}{2}x$

$\Rightarrow 4 + 4x = \dfrac{x^2}{4} + \dfrac{1}{4} + \dfrac{x}{2}$

$\Rightarrow -\dfrac{x^2}{4} + \dfrac{7}{2}x + \dfrac{15}{4} = 0$

$\Rightarrow -x^2 + 15 + 14x = 0$

$\Rightarrow x^2 - 14x - 15 = 0 \Rightarrow x^2 - 15x + x - 15 = 0$

$\Rightarrow x(x-15) + 1(x-15) = 0$

$\Rightarrow (x-15)(x+1) = 0$

$\Rightarrow x = 15 \quad \text{or} \quad x = -1$

$\Rightarrow x = 15 \ \left[\because \text{base cannot be negative}\right]$

Thus, base of triangle = 15 cm
Then, hypotenuse of triangle = (15 +2)= 17 cm
And altitude of triangle = 1/2 × (15+1) = 8 cm

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