Exercise 10D

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

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

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

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

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

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

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

$$x = -40 \quad \text{or} \quad x = 30$$

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

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

$$(\text{Hypotenuse})^2 = (30)^2 + (40)^2 = 900 + 1600 = 2500$$

$$\therefore \text{Hypotenuse} = 50$$

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

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

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

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

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

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

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

$$\therefore \frac{1}{2} x \left(x^2 + 7x\right) = 165 \Rightarrow x^2 + 7x - 330 = 0$$

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

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

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

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

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

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

By applying pythagoras theorem we have,

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

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

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

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

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

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

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

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

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

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

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

********** END **********