## Quadratic Equations Ex 8.10 Q1

**Answer :**

Let the length of one side of right triangle be $= x$ cm then other side be $= (x+5)$ cm

And given that hypotenuse $= 25$ cm

As we know that by Pythagoras theorem,

$$x^2 + (x+5)^2 = (25)^2$$
$$x^2 + x^2 + 10x + 25 = 625$$
$$2x^2 + 10x + 25 - 625 = 0$$
$$2x^2 + 10x - 600 = 0$$
$$x^2 + 5x - 300 = 0$$
$$x^2 - 15x + 20x - 300 = 0$$
$$x(x-15) + 20(x-15) = 0$$
$$(x-15)(x+20) = 0$$

So, either

$$(x-15) = 0$$
$$x = 15$$

Or

$$(x+20) = 0$$
$$x = -20$$

But the side of right triangle can never be negative

Therefore, when $x = 15$ then

$$x + 5 = 15 + 5$$
$$= 20$$

Hence, length of one side of right triangle be $= \boxed{15 \text{ cm}}$ then other side be $\boxed{= 20 \text{ cm}}$

## Quadratic Equations Ex 8.10 Q2

**Answer :**

Let the length of smaller side of right triangle be $= x$ cm then larger side be $= y$ cm

Then, as we know that by Pythagoras theorem

$$x^2 + y^2 = \left(3\sqrt{10}\right)^2$$

$x^2 + y^2 = 90$ ..... (1)

If the smaller side is triple and the larger side be doubled, the new hypotenuse is $9\sqrt{5}$ cm

Therefore,

$$(3x)^2 + (2y)^2 = \left(9\sqrt{5}\right)^2$$

$9x^2 + 4y^2 = 405$ ..... (2)

From equation (1) we get $y^2 = 90 - x^2$

Now putting the value of $y^2$ in equation (2)

$$9x^2 + 4\left(90 - x^2\right) = 405$$
$$9x^2 + 360 - 4x^2 - 405 = 0$$
$$5x^2 - 45 = 0$$
$$5\left(x^2 - 9\right) = 0$$

$$x^2-9=0$$
$$x^2=9$$
$$x=\sqrt{9}$$
$$=\pm 3$$

But, the side of right triangle can never be negative

Therefore, when $x=3$ then

$$y^2=90-x^2$$
$$=90-(3)^2$$
$$=90-9$$
$$=81$$
$$y=\sqrt{81}$$
$$=\pm 9$$

Hence, length of smaller side of right triangle be $=\boxed{3\text{ cm}}$ then larger side be $\boxed{=9\text{ cm}}$

## Quadratic Equations Ex 8.10 Q3

**Answer :**

Let $P$ be the required location on the boundary of a circular park such that its distance from gate $B$ is $=x$ metres that is $BP=x$ metres

Then, $AP=x+7$

In the right triangle $ABP$ we have by using Pythagoras theorem

$$AP^2+BP^2=AB^2$$
$$(x+7)^2+x^2=(13)^2$$
$$x^2+14x+49+x^2=169$$
$$2x^2+14x+49-169=0$$
$$2x^2+14x-120=0$$
$$2(x^2+7x-60)=0$$
$$x^2+7x-60=0$$
$$x^2+12x-5x-60=0$$
$$x(x+12)-5(x+12)=0$$
$$(x+12)(x-5)=0$$
$$(x+12)=0$$
$$x=-12$$

or

$$(x-5)=0$$
$$x=5$$

But the side of right triangle can never be negative

Therefore, $x=5$

Hence, $P$ is at a distance of $\boxed{5\text{ meters}}$ from the gate $B$.

## Quadratic Equations Ex 8.10 Q4

**Answer :**

Let the length of smaller side of rectangle be $=x$ metres then larger side be $=x+30$ metres and their diagonal be $=x+60$ metres

Then, as we know that Pythagoras theorem

$$x^2+(x+30)^2=(x+60)^2$$
$$x^2+(x+30)^2=(x+60)^2$$
$$x^2+x^2+60x+900=x^2+120x+3600$$
$$2x^2+60x+900-x^2-120x-3600=0$$
$$x^2-60x-2700=0$$
$$x^2-90x+30x-2700=0$$
$$x(x-90)+30(x-90)=0$$
$$(x-90)(x+30)=0$$
$$(x-90)=0$$
$$x=90$$

or

$$(x+30)=0$$
$$x=-30$$

But, the side of rectangle can never be negative.

Therefore, when $x=90$ then

$$x+30=90+30$$
$$=120$$

Hence, length of smaller side of rectangle be $=\boxed{90\text{ metres}}$ and larger side be $\boxed{=120\text{ metres}}$

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