Under CSR Support by ipca | Foundation

missiongyan

CLASS – 10

MATHEMATICS

CH – 4

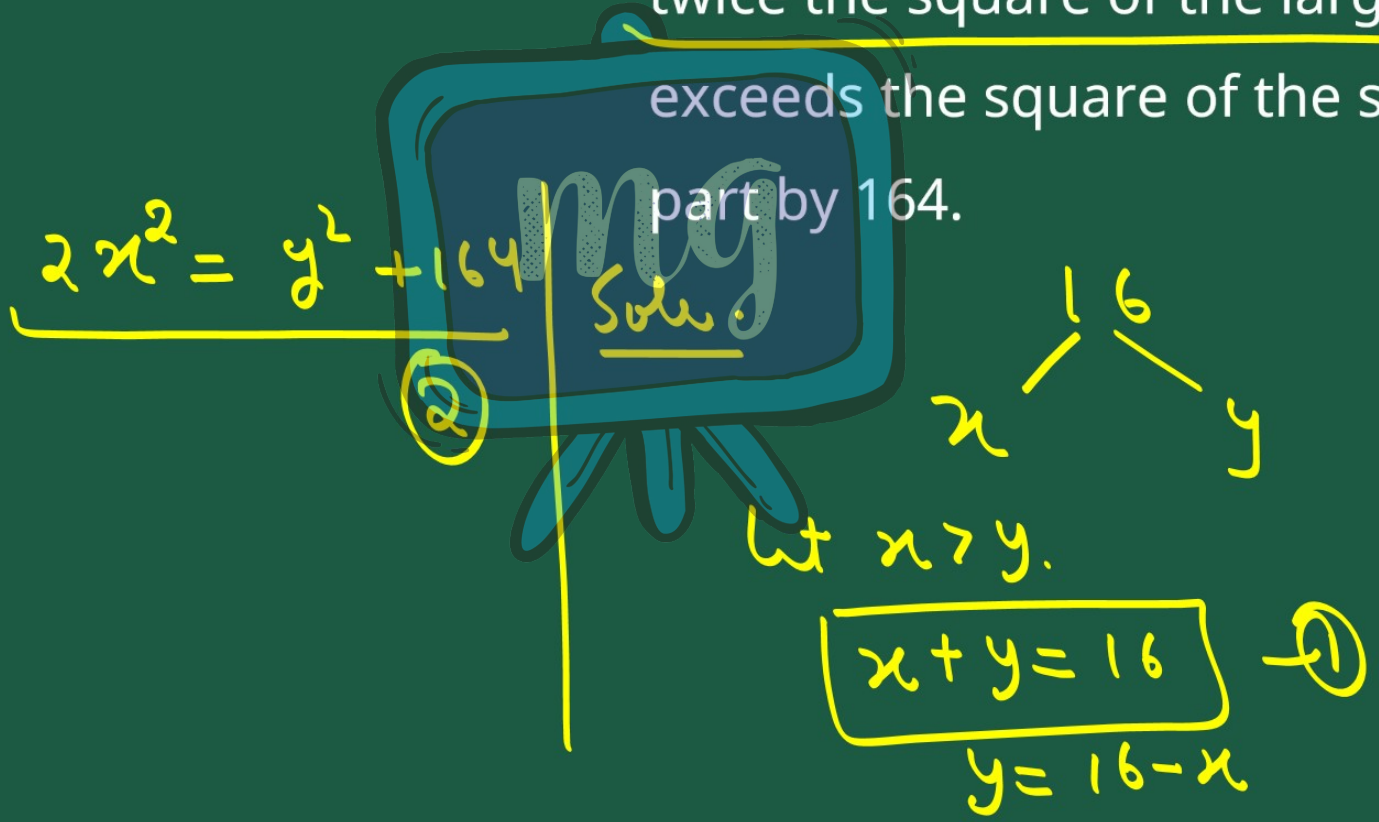
Quadratic Equations

CBSE Board

Most Important Questions – 2

Shubham Tiwari

9. Divide 16 into two parts such that twice the square of the larger part exceeds the square of the smaller part by 164.



From eq (1) and eq (2)

$$2x^2 = (16-x)^2 + 164$$

$$2x^2 = 16^2 + x^2 - 2 \times x \times 16 + 164$$

$$2x^2 - x^2 = 16^2 - 32x + 164$$

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

$$x^2 = 420 - 32x$$

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

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

420

42 10

$42 - 10 = 32$

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

$x[x+42] - 10[x+42] = 0$

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

$x + 42 = 0$

$x = -42$

$x - 10 = 0$

$x = 10$

-42 cannot be the solution of the given eq.

Hence the value of x is 10

$$x + y = 16$$

$$10 + y = 16$$

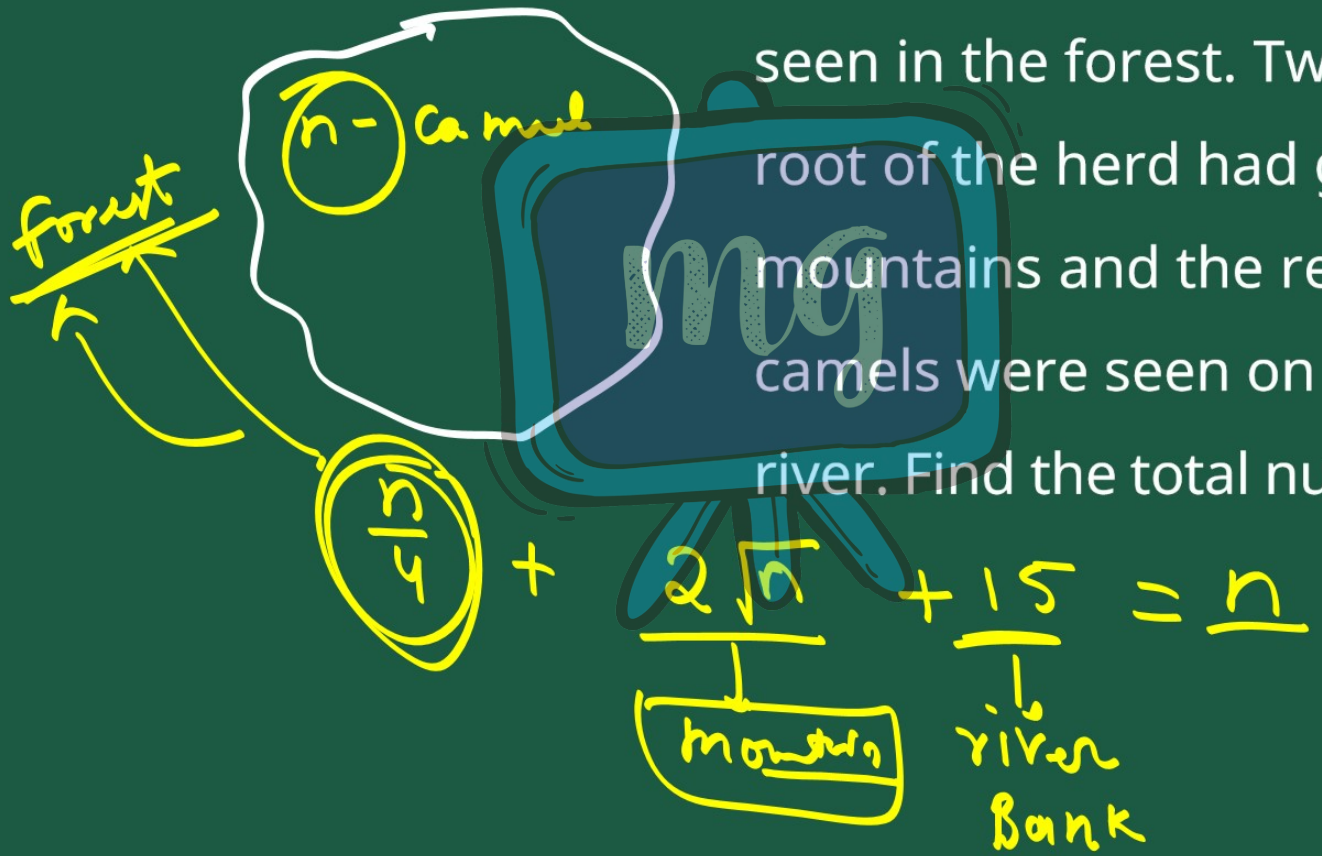
$$y = 16 - 10$$

$$\boxed{y = 6}$$

Hence the ports of 16 are

10 and 6.

10. One-fourth of a herd of camels was seen in the forest. Twice the square root of the herd had gone to mountains and the remaining 15 camels were seen on the bank of a river. Find the total number of camels.



Let $n = x^2$

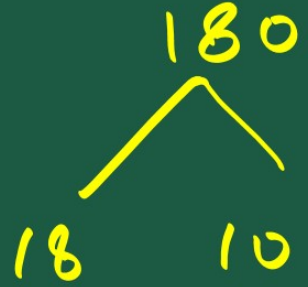
$$\frac{n}{4} + 2\sqrt{n} + 15 = n$$

$$\Rightarrow \frac{x^2}{4} + 2\sqrt{x^2} + 15 = x^2$$

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

$$\Rightarrow 4\left[\frac{x^2}{4} + 2x + 15\right] = 4x^2$$

$$\Rightarrow x^2 + 8x + 60 = 4x^2$$



$$x^2 + 8x + 60 = 4x^2$$

$$0 = 4x^2 - x^2 - 8x - 60$$

$$0 = 3x^2 - 8x - 60$$

$$0 = 3x^2 - 18x + 10x - 60$$

$$= 3x[x-6] + 10[x-6]$$

$$0 = (x-6)(3x+10)$$

$x - 6 = 0$

$x = 6$

$3x + 10 = 0$

$x = -\frac{10}{3}$

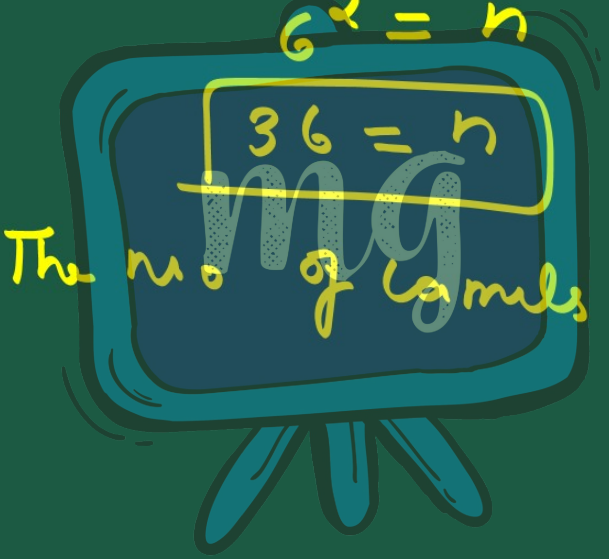
Hence $x = 6$ will be our Solution

$-\frac{10}{3}$ can not be a no of consul.

$x^2 = n$

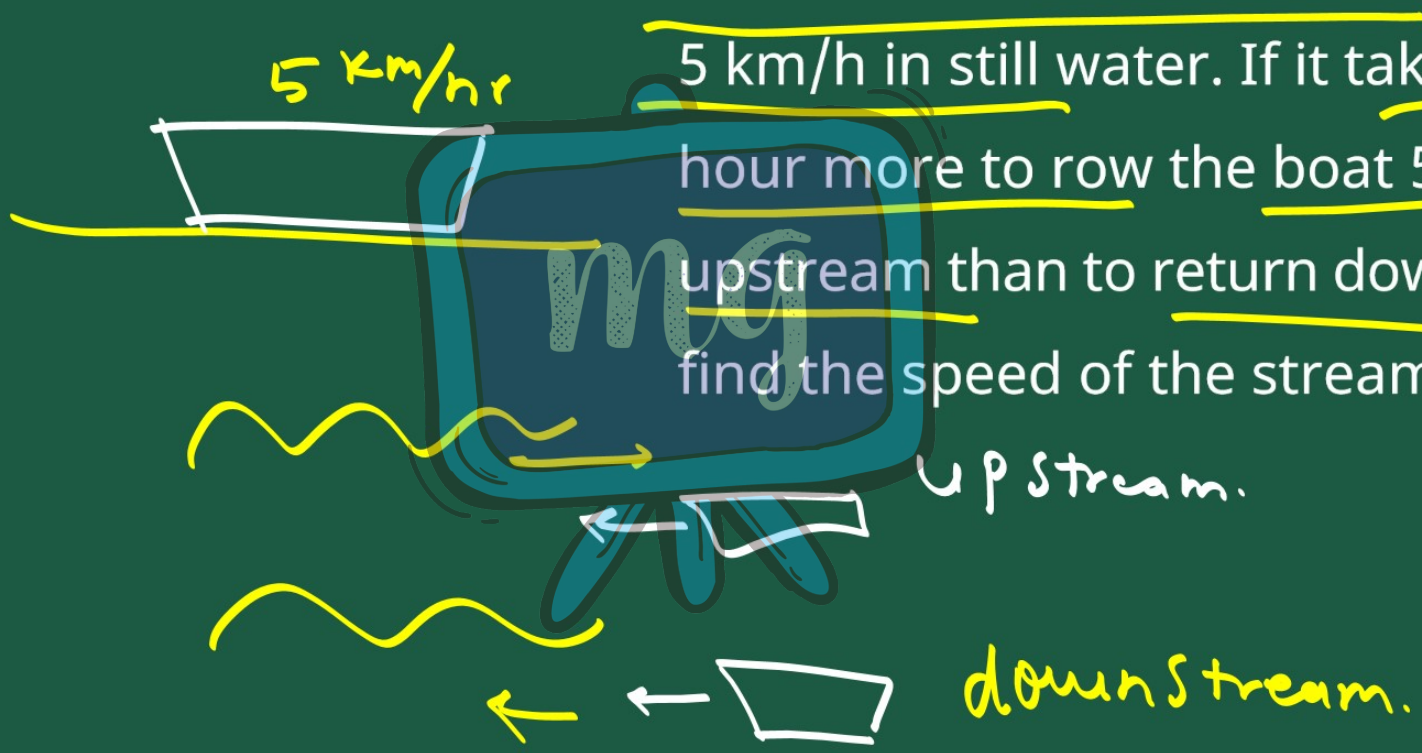
$6^2 = n$

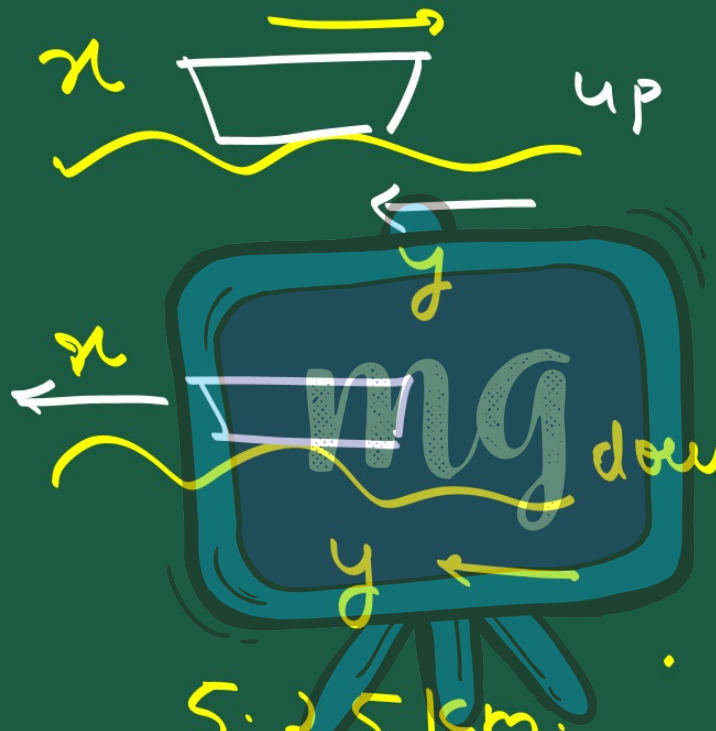
$36 = n$



The no. of camels in the herd are 36.

11. Swati can row her boat at a speed of 5 km/h in still water. If it takes her 1 hour more to row the boat 5.25 km upstream than to return downstream, find the speed of the stream.





up $= x - y$

$5 - 2 = 3$ km/hr

down $= x + y$

$5 + 2 = 7$ km/hr

5.25 km.

$$t_u - t_d = 1$$

$$\left\{ t = \frac{D}{s} \right\}$$

$$\frac{D}{s_u} - \frac{D}{s_d} = 1$$

$$\frac{D}{x-y} - \frac{D}{x+y} = 1$$

$$\frac{5.25}{5-y} - \frac{5.25}{5+y} = 1$$

$$5.25\left[\frac{1}{5-y}-\frac{1}{5+y}\right]=1$$

$$5.25\left[\frac{(5+y)-(5-y)}{(5-y)(5+y)}\right]$$

$$5.25\left[\frac{5+y-5+y}{5^2-y^2}\right]=1$$

$$5.25\left[\frac{2y}{25-y^2}\right]=1$$

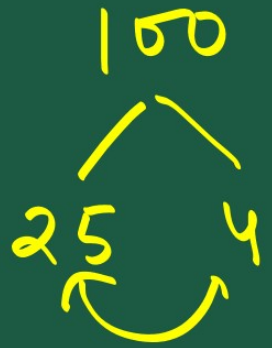
$$\Rightarrow \left[\frac{2y}{25-y^2}\right] = \frac{100}{5 \cdot 25} = \frac{\cancel{100}^{4}}{\cancel{5 \times 25}_{21}}$$

$$\Rightarrow \left[\frac{2y}{25-y^2}\right] = \frac{4}{21}$$

$$\Rightarrow 21 \times 2y = 4(25-y^2)$$

$$42y = 100 - 4y^2$$

$$4y^2 + 42y - 100 = 0$$



$$4y^2 + 42y - 100 = 0$$

$$2[2y^2 + 21y - 50] = 0$$

$$2y^2 + 21y - 50 = 0$$

$$2y^2 + 25y - 4y - 50 = 0$$

$$y[2y + 25] - 2[2y + 25] = 0$$

$$(2y + 25)(y - 2) = 0$$

$2y + 25 = 0$

$2y = -25$

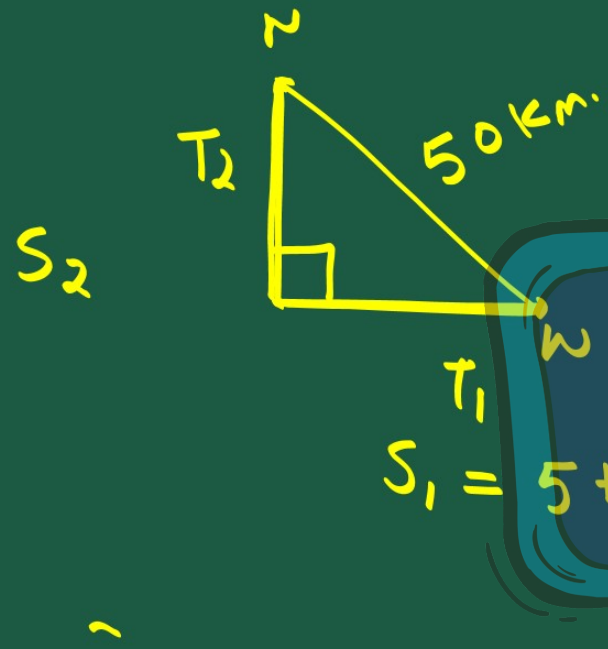
$y = \frac{-25}{2}$

$\frac{-25}{2}$ cannot be the speed

$y - 2 = 0$

$y = 2$

hence $y = 2$ km/hr will be the speed of the stream.



12. Two trains leave a railway station at the same time. The first train travels due west and the second train due north. The first train travels 5 km/h faster than the second train. If after two hours, they are 50 km apart, find the average speed of each train.

$$p^2 + b^2 = 50^2$$

$$(2s_2)^2 + (2s_1)^2 = 50^2$$

$$2^2 s_2^2 + 2^2 s_1^2 = 50^2$$

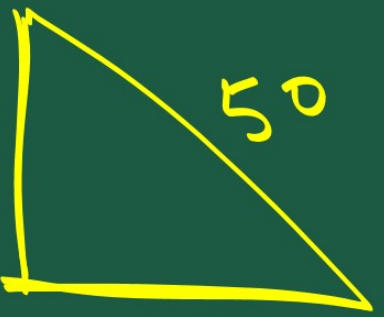
$$2^2 [s_2^2 + s_1^2] = (25 \times 2)^2$$

$$= 25^2 \times 2^2$$

$$s_1^2 + s_2^2 = 25^2$$

Let $s_1 = x$ and $s_2 = y$

$D_2 =$ T_2 ($s_2 \times 2$)



D_1 ($s_1 \times 2$)

$s_1 = s + s_2$

$x = s + y$

$$x^2 + y^2 = 25^2$$

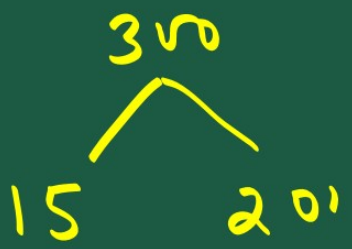
$$(5+y)^2 + y^2 = 25^2$$

$$25 + y^2 + 2 \times 5 \times y + y^2 = 25^2$$

$$25 + 2y^2 + 10y - 625 = 0$$

$$2y^2 + 10y - 600 = 0$$

$$2\left[y^2 + 5y - 300\right] = 0$$



$y^2 + 5y - 300 = 0$

$y^2 + 20y - 15y - 300 = 0$

$y(y+20) - 15(y+20) = 0$

$(y+20)(y-15) = 0$

$y + 20 = 0$

$y = -20$

$y - 15 = 0$

$y = 15$

-20 can not be the speed of a train

Hence $y = 15$ km/hr is the speed of the train (2).

$\therefore$ Speed of the first train is

$$x = y + 5$$

$$x = 15 + 5 = 20$$

$$\boxed{x = 20 \text{ km/hr}}$$

13. If twice the area of a smaller square is subtracted from the area of a larger square, the result is 14 cm^2. However, if twice the area of the larger square is added to three times the area of the smaller square, the result is 203 cm^2 . Determine the sides of the square.

14. Two pipes running together can fill a tank in $11\frac{1}{9}$ minutes. If one pipe takes 5 minutes more than the other to fill the tank separately, find the time in which each pipe would fill the tank separately.

15. A peacock is sitting on the top of a pillar, which is 9m high. From a point 27m away from the bottom of the pillar, a snake is coming to its hole at the base of the pillar. Seeing the snake the peacock pounces on it. If their speeds are equal, at what distance from the whole is the snake caught?

16. At t minutes past 2 pm the time needed by the minutes hand and a clock to show 3 pm was found to be 3 minutes less than $\frac{t^2}{4}$ minutes. Find t.