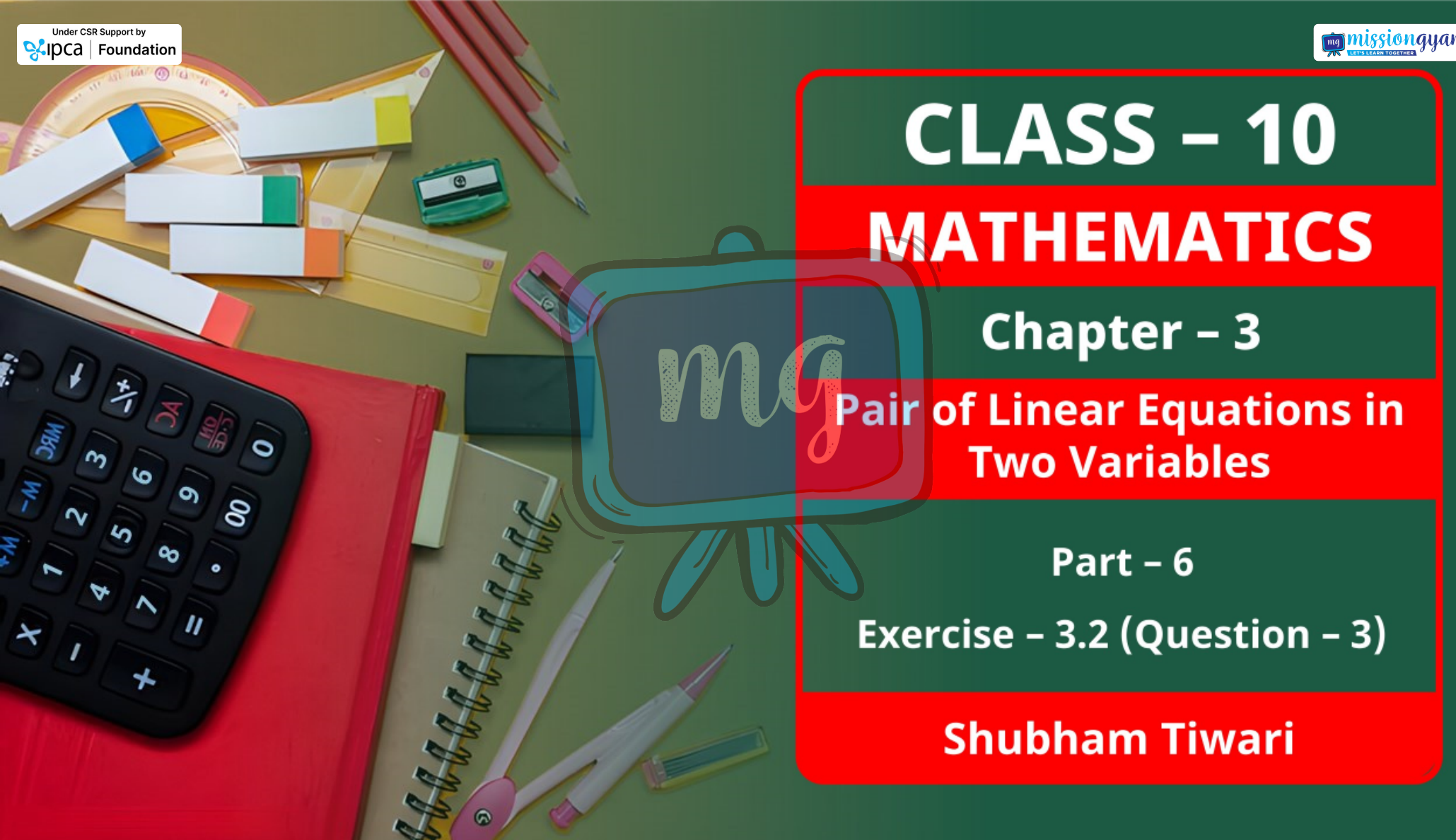


CLASS – 10

MATHEMATICS

Chapter – 3

Pair of Linear Equations in Two Variables

Part – 6

Exercise – 3.2 (Question – 3)

Shubham Tiwari

EXERCISE – 3.2

3. Form the pair of linear equations for the following problems and find their solution by substitution method.

(i) The difference between two numbers is 26 and one number is three times the other. Find them.

Let the larger no. is x the smaller is y.

$x - y = 26$ — (1)

$x = 3y$ — (2)

$x - y = 26$

$3y - y = 26$

$2y = 26$

$y = 13$

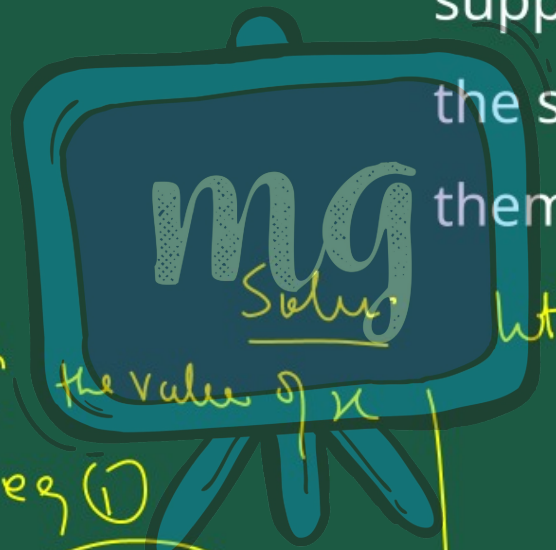
$x = 3y$

$x = 3 \times 13$

$x = 39$

Hence the required No. are 39 and 13.

(ii) The larger of two supplementary angles exceeds the smaller by 18 degrees. Find them.



Solution:

Let the larger no. be x and the smaller one be y.

$x + y = 180^\circ$ — (1)

$x = y + 18$ — (2)

By sub^{n} the value of x in eq (1)

$y + 18 + y = 180^\circ$

$2y + 18 = 180^\circ$

$$2y = 180 - 18$$

$$2y = 162$$

$$y = \frac{162}{2}$$

$$y = 81^\circ$$

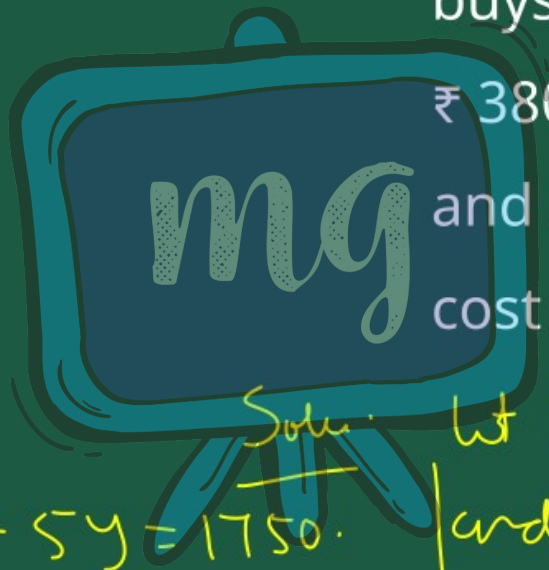
$$x = y + 18$$

$$x = 81 + 18$$

$$x = 99^\circ$$

Hence the larger Angle is 99° and the smaller angle is 81°

(iii) The coach of a cricket team buys 7 bats and 6 balls for ₹ 3800. Later, she buys 3 bats and 5 balls for ₹ 1750. Find the cost of each bat and each ball.



Solu: Let the cost of a bat is x and cost of a Ball is y.

$7x + 6y = 3800$ — (1)

$3x + 5y = 1750$.

$3x = 1750 - 5y$

$x = \frac{1750 - 5y}{3}$ — (2)

From eq (1) and eq (3)

$$7x + 6y = 3800$$

$$\Rightarrow 7\left[\frac{1750 - 5y}{3}\right] + 6y = 3800$$

$$\Rightarrow 7 \times 1750 - 35y + 18y = 3800 \times 3$$

$$7 \times 1750 - 17y = 3800 \times 3$$

$$7 \times 1750 - 3800 \times 3 = 17y$$

$$7 \times 7 \times 250 - 3800 \times 3 = 17y$$

38×100

$$50\left[49\times5-76\times3\right]=17y$$

$$50\left[245-228\right]=17y$$

$$50\left[17\right]=17y$$

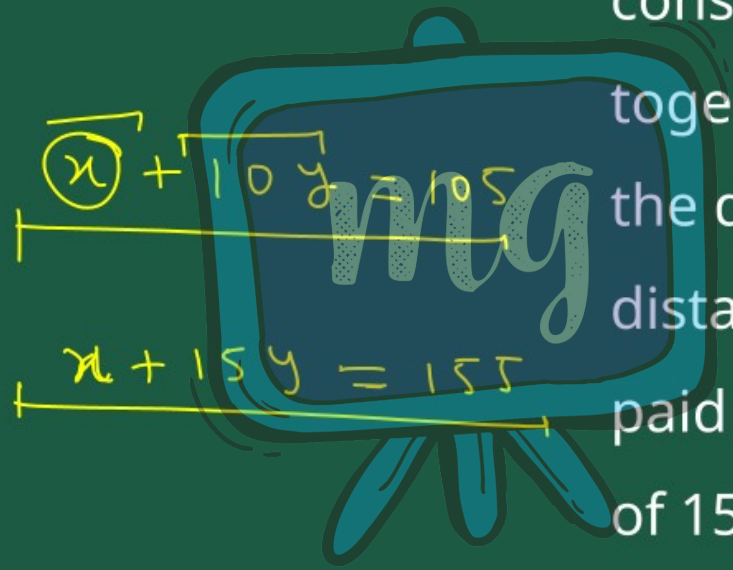
$$50=y$$

$$x=\frac{1750-5(50)}{3}=\frac{1750-250}{3}$$

$$x=\frac{1500}{3}=500$$

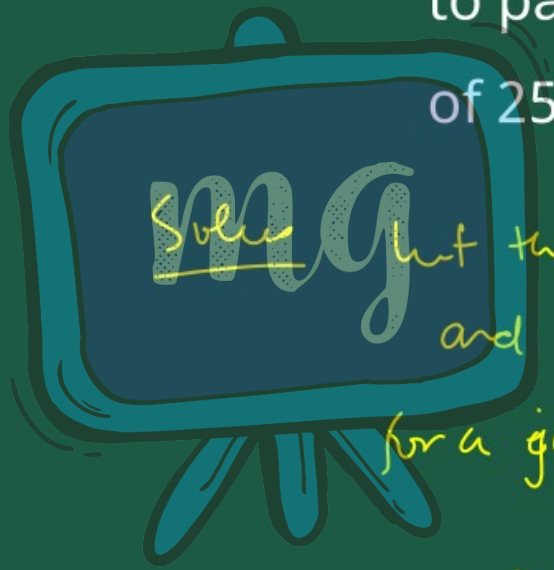
Hence the cost of one bat is 500 Rs.

and the cost of one ball is 50 Rs



(iv) The taxi charges in a city consist of a fixed charge together with the charge for the distance covered. For a distance of 10 km, the charge paid is ₹ 105 and for a journey of 15 km, the charge paid is ₹ 155. What are the fixed charges and the charge per km?

How much does a person have to pay or travelling a distance of 25 km?



Solve Let the fix charges are x and variable charges are y.

for a journey of 10 km.

$x + 10y = 105$ — (1)

" " 15 km,

$x + 15y = 155$ — (2)

$x + 10y = 105$ — (1)

$x = 105 - 10y$ — (3)

$x + 15y = 157$ — (2)

from eq (3) and eq (2)

$105 - 10y + 15y = 157$

$5y = 157 - 105$

$5y = 50$

$y = 10$

from eq (3)

$x = 105 - 10 \times 10$

$x = 105 - 100$

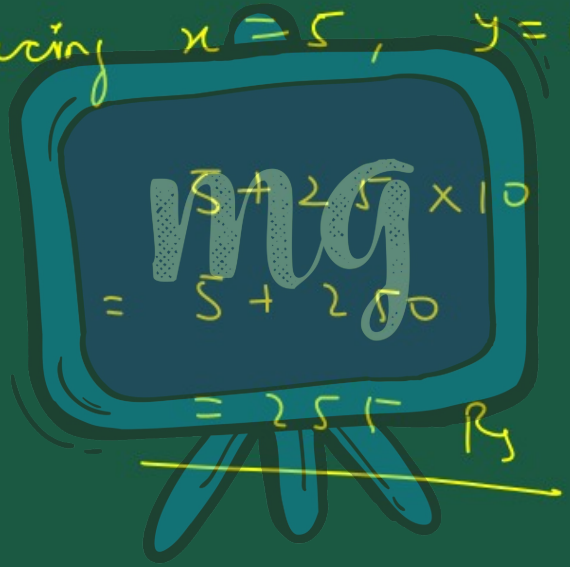
$x = 5$

Fixed charge = 5 Rs.

Variable charge = 10 Rs.

$x + 25y$

By Placing $x = 5$, $y = 10$ in the given eq.

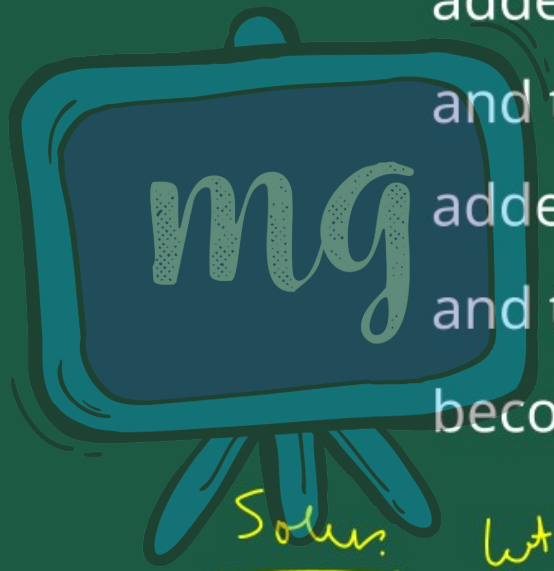


$5 + 25 \times 10$

$= 5 + 250$

$= 255$ Rs

(v) A fraction becomes $\frac{9}{11}$, if 2 is added to both the numerator and the denominator. If, 3 is added to both the numerator and the denominator it becomes $\frac{5}{6}$. Find the fraction.



Soln: Let the Num and denom are x and y respectively.

Then the Fraction $\frac{x}{y}$.

$$\frac{x+2}{y+2} = \frac{9}{11} \quad \text{— (1)}$$

$$11(x+2) = 9(y+2)$$

$$\frac{x+3}{y+3} = \frac{5}{6} \quad \text{— (2)}$$

$$11x + 22 = 9y + 18$$

$$11x - 9y + 4 = 0$$

$$11x + 4 = 9y$$

$$\frac{11x+4}{y} = y \quad \text{— (3)}$$

$$\frac{x+3}{y+3} = \frac{5}{6}$$

$$6(x+3) = 5(y+3)$$

$$6x + 18 = 5y + 15$$

$$6x - 5y + 3 = 0 \quad \text{— (4)}$$

from eq (3) and eq (4)

$$6x - 5\left[\frac{11x+4}{9}\right] + 3 = 0$$

$$9 \times 6x - \left[\frac{55x+20}{9}\right] + 3 \times 9 = 0$$

$54x - 55x - 20 + 27 = 0$

$-x + 7 = 0$

$7 = x$

$\frac{11x + 4}{9} = y$

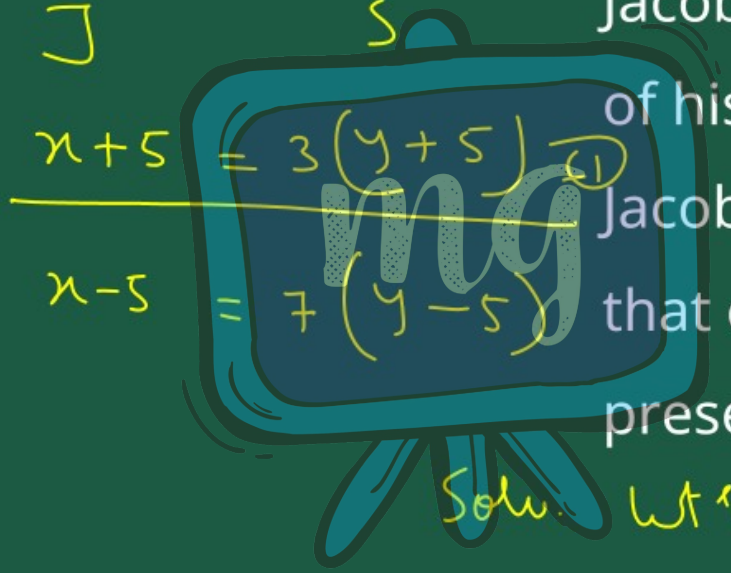
$y = 9$

$\frac{11 \times 7 + 4}{9} = y$

$\frac{81}{9} = y$

Hence the fraction becomes $\frac{7}{9}$

(vi) Five years hence, the age of Jacob will be three times that of his son. Five years ago, Jacob's age was seven times that of his son. What are their present ages ?



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$x+5 = 3(y+5)$ ... (1)

$x-5 = 7(y-5)$

Sol: Let's assume the present ages of Jacob and his son are x and y respectively.

$x + 5 = 3(y + 5)$

$x + 5 = 3y + 15$

$x - 3y = 15 - 5$

$x - 3y = 10$

$x = 3y + 10$

$x = 3 \times 10 + 10$

$x = 30 + 10$

$x = 40$

$x - 5 = 7(y - 5)$

$x - 5 = 7y - 35$

$x - 7y = -35 + 5$

$x - 7y = -30$

$3y + 10 - 7y = -30$

$-4y = -30 - 10$

$+4y = +40$

$y = 10$

Therefore Jacob's age is 40 year.

And his son's age is 10 year.