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(Affiliated to CBSE up to +2 Level)

CLASS: X

SUB.: MATHS

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Linear Equations in two variables

2. Solve $2x + 3y = 11$ and $2x - 4y = -24$ and hence find the value of 'm' for which $y = mx + 3$.

Ans. $2x + 3y = 11$ (i)

Subtracting $3y$ both side we get

$$2x = 11 - 3y \text{ (ii)}$$

Putting this value in equation second, we get

$$2x - 4y = -24 \text{ (iii)}$$

$$11 - 3y - 4y = -24$$

$$7y = -24 - 11$$

$$-7y = -35$$

$$y = -35/-7$$

$$y = 5$$

Putting this value in equation (iii) we get

$$2x = 11 - 3 \times 5$$

$$2x = 11 - 15$$

$$2x = -4$$

Dividing by 2 we get

$$x = -2$$

Putting the value of x and y

$$y = mx + 3.$$

$$5 = -2m + 3$$

$$2m = 3 - 5$$

$$m = -2/2$$

$$m = -1$$

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.

Ans. Let the larger number be = x

Let the smaller number be = y

The difference between the two numbers is 26

$$x - y = 26$$

$$x = 26 + y$$

Given that one number is three times the other

$$\text{So } x = 3y$$

Putting the value of x we get

$$26 + y = 3y$$

$$-2y = -26$$

$$y = 13$$

So value of $x = 3y$

Putting value of y, we get

$$x = 3 \times 13 = 39$$

Therefore, the numbers are 13 and 39.

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

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

(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 Rs 105 and for a journey of 15 km, the charge paid is Rs 155. What are the fixed charges and the charge per km? How much does a person have to pay for traveling a distance of 25 km?

Ans. Let the fixed charge for taxi = Rs x

And variable cost per km = Rs y

Total cost = fixed charge + variable charge

Given that for a distance of 10 km, the charge paid is Rs 105

$$x + 10y = 105 \text{ (i)}$$

$$x = 105 - 10y$$

Given that for a journey of 15 km, the charge paid is Rs 155

$$x + 15y = 155$$

Putting the value of x we get

$$105 - 10y + 15y = 155$$

$$5y = 155 - 105$$

$$5y = 50$$

Dividing by 5, we get

$$y = 50/5 = 10$$

Putting this value in equation (i) we get

$$x = 105 - 10 \times 10$$

$$x = 5$$

Cost for traveling a distance of 25 km

$$= x + 25y$$

$$= 5 + 25 \times 10$$

$$= 5 + 250 = 255$$

A person has to pay Rs 255 for 25 Km.

(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.

(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?