

Chapter-3

Exercise-3.1

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Class: X
Subject: Mathematics

1. Aftab tells his daughter, "Seven years ago, I was seven times as old as you were then. Also, three years from now, I shall be three times as old as you will be." (Isn't this interesting?) Represent this situation algebraically and graphically.

Solution: Let the present age of Aftab be x and ,present age of his daughter be y

Seven years ago,

Age of Aftab = $x - 7$

Age of his daughter = $y - 7$

According to the question,

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

$$\Rightarrow x - 7 = 7y - 49$$

$$\Rightarrow x - 7y = -42 \dots\dots\dots (1)$$

Three years hence,

$$\text{Age of Aftab} = x + 3$$

$$\text{Age of his daughter} = y + 3$$

According to the question,

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

$$\Rightarrow x + 3 = 3y + 9$$

$$\Rightarrow x - 3y = 9 - 3$$

$$\Rightarrow x - 3y = 6 \dots\dots\dots(2)$$

Thus, the two algebraic expressions are:

$$\Rightarrow x - 7y = -42 \dots\dots\dots(1)$$

$$\Rightarrow x - 3y = 6 \dots\dots\dots(2)$$

For solving first equation $x - 7y = -42$ or $x = -42 + 7y$ (1)

Now, let's put $x = 0$ in eqn. (1)

$$\Rightarrow 0 = -42 + 7y$$

$$\Rightarrow 42 = 7y$$

$$\Rightarrow \frac{42}{7} = y = 6 \text{ hence, for } \underline{x = 0, y = 6}$$

Now, let's put $y = 5$ in eqn. (1)

$$\Rightarrow x = -42 + 7(5)$$

$$\Rightarrow x = -42 + 35 \Rightarrow x = -7$$

hence, for $y = 5, x = -7$

Now, let's put $y = 7$ in eqn. (1)

$$\Rightarrow x = -42 + 7(7)$$

$$\Rightarrow x = -42 + 49 \Rightarrow x = 7$$

hence, for $y = 7, x = 7$

Solution Table for (1) Equation

x	0	- 7	7
y	6	5	7

For solving second equation $x - 3y = 6$ or $x = 6 + 3y$ (2)

Now, let's put $x = 0$ in eqn. (2)

$$\Rightarrow 0 = 6 + 3y$$

$$\Rightarrow -6 = 3y$$

$$\Rightarrow \frac{-6}{3} = y = -2 \text{ hence, for } \underline{x = 0, y = -2}$$

Now, let's put $y = 0$ in eqn. (2)

$$\Rightarrow x = 6 + 3(0)$$

$$\Rightarrow x = 6 + 0$$

$$\Rightarrow x = 6$$

hence, for $y = 0, x = 6$

Now, let's put $x = 3$ in eqn. (2)

$$\Rightarrow 3 = 6 + 3y$$

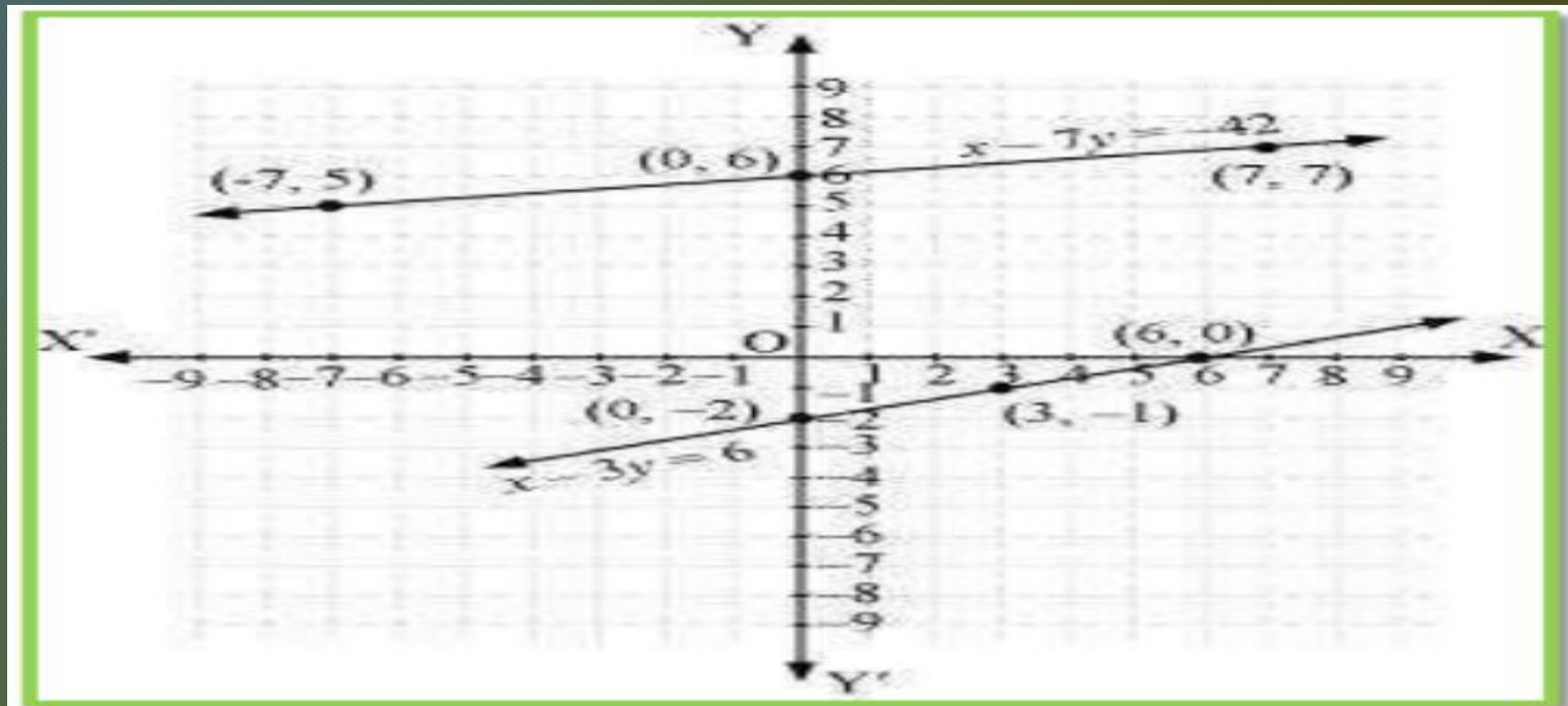
$$\Rightarrow 3 - 6 = 3y$$

$$\Rightarrow -3 = 3y$$

Solution Table for (2) Equation

x	0	6	3
y	-2	0	-1

The graphical representation of the two equations is as follows.



2. The coach of a cricket team buys 3 bats and 6 balls for Rs 3900. Later, she buys another bat and 3 more balls of the same kind for Rs 1300. Represent this situation algebraically and geometrically.

Solution: Let the cost of a bat be Rs x $\therefore$ the cost of 3 bats = Rs $3x$
cost of a ball = Rs y $\therefore$ the cost of 6 balls = Rs $6y$

A/c to the question, cost of 3 bats and 6 balls = Rs 3900

$$3x + 6y = 3900 \quad \dots\dots\dots (1)$$

Later, a/c to the question, cost of 1 bat and 3 balls = Rs 1300

$$1x + 3y = 1300 \quad \dots\dots\dots (2)$$

Thus the two algebraic expressions are:

$$3x + 6y = 3900 \quad \dots\dots\dots (1)$$

$$1x + 3y = 1300 \quad \dots\dots\dots (2)$$

For solving first equation $3x + 6y = 3900$ or $x = \frac{3900 - 6y}{3}$ (1)

Now, let's put $y = 0$ in eqn. (1)

Solution Table for (1) Equation

$$\Rightarrow x = \frac{3900 - 6(0)}{3}$$

$$\Rightarrow x = \frac{3900}{3} = 1300$$

hence, for $x = 1300, y = 0$

x	1300	0
y	0	650

Now, let's put $x = 0$ in eqn. (1)

$$\Rightarrow 0 = \frac{3900 - 6y}{3}$$

$$\Rightarrow 0 \times 3 = 3900 - 6y$$

$$\Rightarrow 0 = 3900 - 6y \Rightarrow 6y = 3900$$

$$\Rightarrow y = \frac{3900}{6} = 650$$

hence, for $y = 650, x = 0$

For solving second equation $1x + 3y = 1300$ or $x = 1300 - 3y$ (2)

Now, let's put $y = 0$ in eqn. (2)

Solution Table for (2) Equation

$$\Rightarrow x = 1300 - 3(0)$$

$$\Rightarrow x = 1300$$

hence, for $x = 1300, y = 0$

x	1300	0
y	0	$\frac{1300}{3}$

Now, let's put $x = 0$ in eqn. (2)

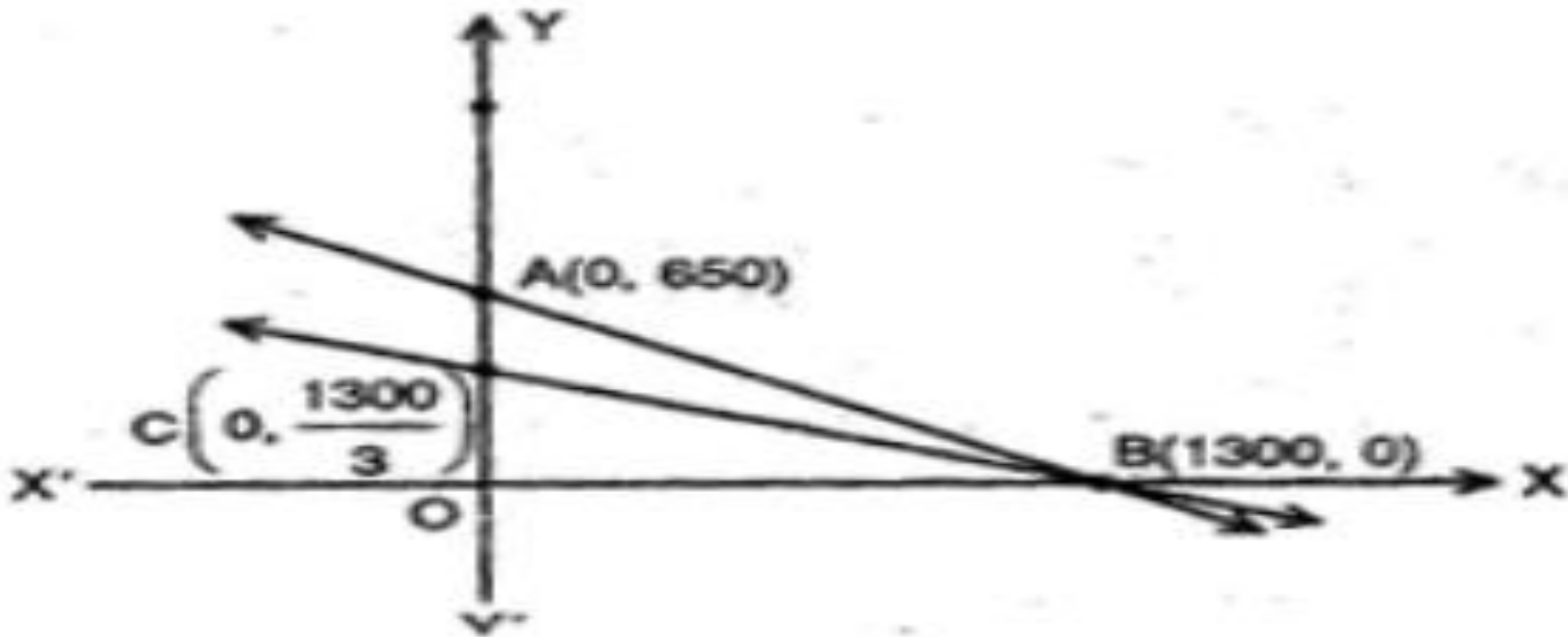
$$\Rightarrow 0 = 1300 - 3y$$

$$\Rightarrow -1300 = -3y$$

$$\Rightarrow \frac{1300}{3} = y$$

hence, for $y = \frac{1300}{3}$, $x = 0$

The graphical representation of the two equation is as follows.



3. The cost of 2 kg of apples and 1kg of grapes on a day was found to be ₹ 160. After a month, the cost of 4 kg of apples and 2 kg of grapes is ₹ 300. Represent the situation algebraically and geometrically.

Solution:

Let the cost of 1 kg of apples be Rs x $\therefore$ the cost of 2kg apples = $2x$

And, cost of 1 kg of grapes be Rs y $\therefore$ the cost of 1 kg grapes = $1y$

A/c to the question, the cost of 2 kg of apples and 1 kg of grapes is ₹160 , so the equation is

$$2x + 1y = 160 \text{ (1)}$$

After a month, the cost of 4 kg of apples and 2 kg of grapes is ₹ 300, so the equation is

$$4x + 2y = 300 \text{ (2)}$$

Thus, two equations are:

$$2x + 1y = 160 \text{ (1)}$$

$$4x + 2y = 300 \text{ (2) or } 2x + 1y = 150$$

For solving first equation $2x + 1y = 160$ or $y = 160 - 2x$ (1)

Now, let's put $x = 50$

$$\Rightarrow y = 160 - 2(50)$$

$$\Rightarrow y = 160 - 100 = 60$$

hence, for $x = 50, y = 60$

Now, let's put $x = 45$

$$\Rightarrow y = 160 - 2(45)$$

$$\Rightarrow y = 160 - 90 = 70$$

hence, for $x = 45, y = 70$

Solution table for eqn. (1)

x	50	45
y	60	70

For solving second equation $4x + 2y = 300$ or $y = \frac{300 - 4x}{2}$ (2)

Now, let's put $x = 50$ in eqn. (2)

$$y = \frac{300 - 4(50)}{2} = \frac{300 - 200}{2} = \frac{100}{2}$$

$$y = 50$$

hence, for $x = 50, y = 50$

Now, let's put $x = 40$ in eqn. (2)

$$y = \frac{300 - 4(40)}{2} = \frac{300 - 160}{2} = \frac{140}{2}$$

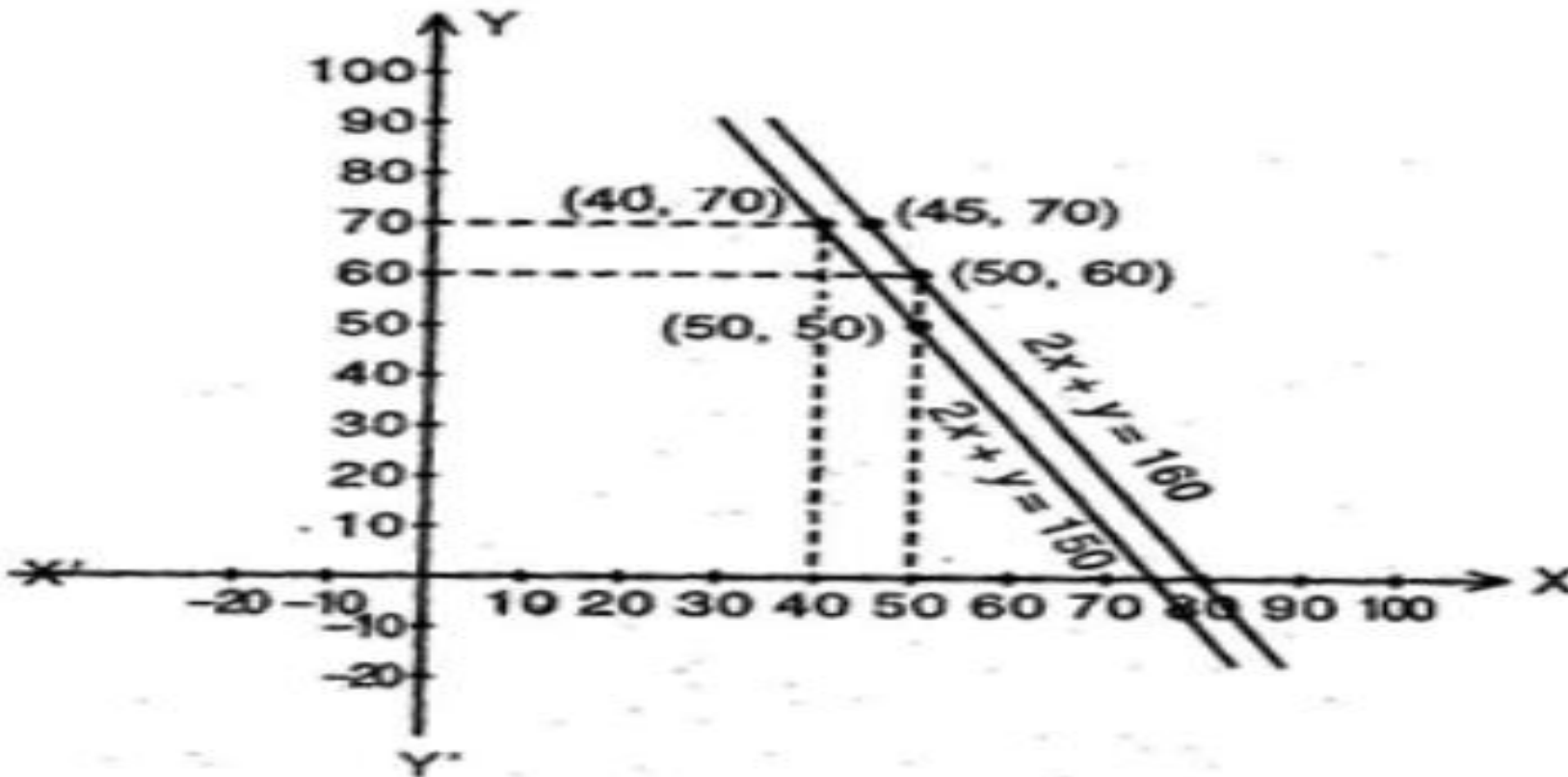
$$y = 70$$

hence, for $x = 40, y = 70$

Solution Table for (2) Equation

X	50	40
Y	50	70

The graphical representation of the two equations is as follows.



NEXT EXERCISE-3.2
To be continued...