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.

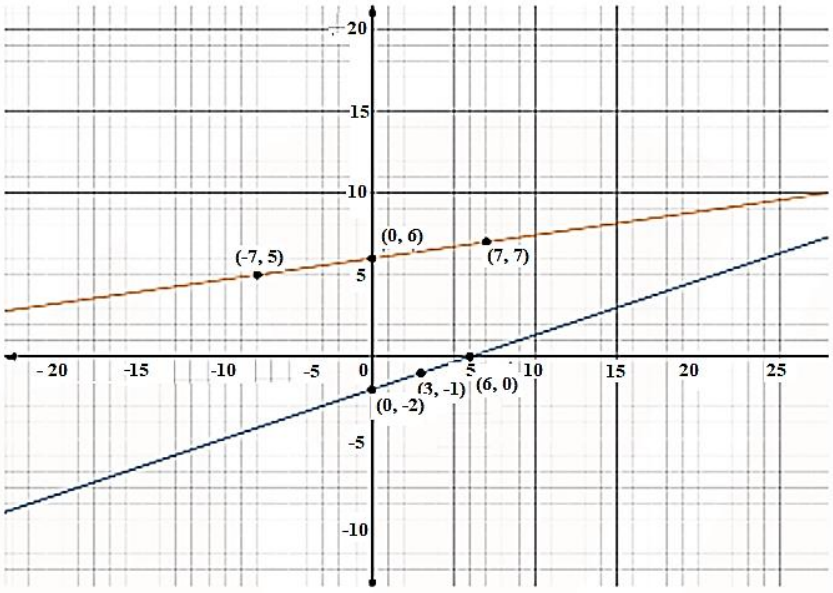
Sol. Let the present age of Aftab be x.
And, present age of his daughter = y
Seven years ago,
Age of Aftab $= x-7$
According to the question,
$(x-7)=7(y-7)$
$x-7=7y-49$
$x-7y=-42$ (1)
Three years hence
Age of Aftab $= x+3$
Age of his daughter $= y+3$
According to the question,
$x+3=3y+9$
$x-3y=6$ (2)
Therefore, the algebraic representation is
For $x-7y=-42$,
$x=-42+7y$
The solution table is

x	-7	0	7
y	5	6	7

For $x-3y=6$
$x=6+3y$
The solution table is

x	6	3	0
y	0	-1	-2

The graphical representation 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 2 more balls of the same kind for Rs. 1300. Represent this situation algebraically and geometrically.

Sol. Let the cost of a bat be Rs. x.

And, cost of a ball = Rs y

According to the question, the algebraic representation is

$3x+6y=3900$

$x+2y=1300$

For $3x+6y=3900$

$$x=\frac{3900-6y}{3}$$

The solution table is

x	300	100	- 100
y	500	600	700

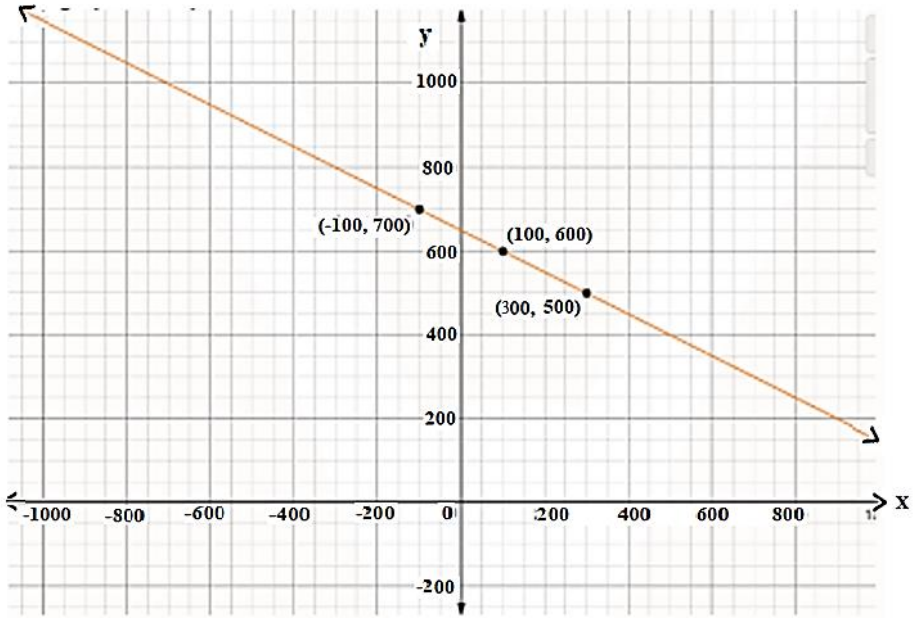
For $x+2y=1300$

$x=1300-2y,$

The solution table is

x	300	100	- 100
y	500	600	700

The graphical representation is as follows.



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

Sol. Let the cost of 1 kg of apples be Rs. x

And, cost of 1 kg of grapes = Rs. y

According to the question, the algebraic representation is

$2x + y = 160$

$4x + 2y = 300$

For $2x + y = 160$,

$y = 160 - 2x$

The solution table is

x	50	60	70
y	60	40	20

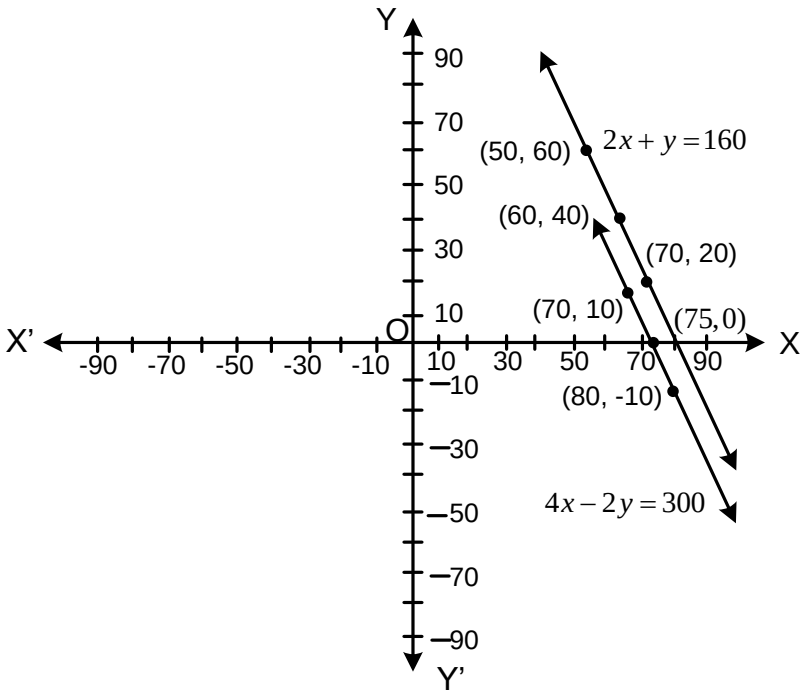
For $4x + 2y = 300$,

$y = \frac{300 - 4x}{2}$

The solution table is

x	70	80	75
y	10	−10	0

The graphical representation is as follows.



4. On comparing the ratios $\frac{a_1}{a_2}, \frac{b_1}{b_2}$ and $\frac{c_1}{c_2}$, find out whether the following pair of linear equations are consistent, or inconsistent.

(i) $3x+2y=5; \quad 2x-3y=7$ (ii) $2x-3y=8; \quad 4x-6y=9$

(iii) $\frac{3}{2}x+\frac{5}{3}y=7; 9x-10y=14$ (iv) $5x-3y=11; -10x+6y=-22$

(v) $\frac{4}{3}x+2y=8; 2x+3y=12$

Sol. **(i)** $3x+2y=5; \quad 2x-3y=7$

$\frac{a_1}{a_2}=\frac{3}{2}, \frac{b_1}{b_2}=\frac{-2}{3}, \frac{c_1}{c_2}=\frac{5}{7}$

$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

These linear equations are intersecting each other at one point and thus have only one possible solution. Hence, the pair of linear equations is consistent.

(ii) $2x-3y=8; \quad 4x-6y=9$

$\frac{a_1}{a_2}=\frac{2}{4}=\frac{1}{2}, \frac{b_1}{b_2}=\frac{-3}{-6}=\frac{1}{2}, \frac{c_1}{c_2}=\frac{8}{9}$

Since $\frac{a_1}{a_2}=\frac{b_1}{b_2}\neq\frac{c_1}{c_2}$,

Therefore, these linear equations are parallel to each other and thus have no possible solution. Hence, the pair of linear equation is inconsistent.

(iii) $\frac{3}{2}x+\frac{5}{3}y=7;\ 9x-10y=14$

$\frac{a_1}{a_2}=\frac{\frac{3}{2}}{9}=\frac{1}{6},\ \frac{b_1}{b_2}=\frac{\frac{5}{3}}{-10}=\frac{-1}{6},\frac{c_1}{c_2}=\frac{7}{14}=\frac{1}{2}$

Since $\frac{a_1}{a_2}\neq\frac{a_1}{b_2}$

Therefore, these linear equations are intersecting each other at one point and thus have only one possible solution. Hence, the pair of linear equations is consistent.

(iv) $5x-3y=11;\ -10x+6y=-22$

$\frac{a_1}{a_2}=\frac{5}{-10}=\frac{-1}{2},\frac{b_1}{b_2}=\frac{-3}{6}=\frac{-1}{2},\frac{c_1}{c_2}=\frac{11}{-22}=\frac{-1}{2}$

Since $\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$

Therefore, these linear equations are coincident pair of lines and thus have infinite number of possible solutions. Hence, the pair of linear equations is consistent.

(v) $\frac{4}{3}x+2y=8;\ 2x+3y=12$

$\frac{a_1}{a_2}=\frac{2}{3},\frac{b_1}{b_2}=\frac{2}{3},\frac{c_1}{c_2}=\frac{8}{12}=\frac{2}{3}$

Since $\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$,

Therefore, these linear equations are coincident pair of lines and thus have infinite number of possible solutions. Hence, the pair of linear equations is consistent.

5. Which of the following pairs of linear equations are consistent/inconsistent? If consistent, obtain the solution graphically:

(i) x + y = 5, 2x + 2y = 10 (ii) x – y = 8, 3x – 3y = 16

(iii) 2x + y – 6 = 0, 4x – 2y – 4 = 0 (iv) 2x – 2y – 2 = 0, 4x – 4y – 5 = 0

Sol. **(i)** x + y = 5, 2x + 2y = 10

$\frac{a_1}{a_2}=\frac{1}{2},\frac{b_1}{b_2}=\frac{1}{2},\frac{c_1}{c_2}=\frac{5}{10}=\frac{1}{2}$

Since $\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$

Therefore, these linear equations are coincident pair of lines and thus have infinite number of possible solutions. Hence, the pair of linear equations is consistent.

$x+y=5$

$x=5-y$

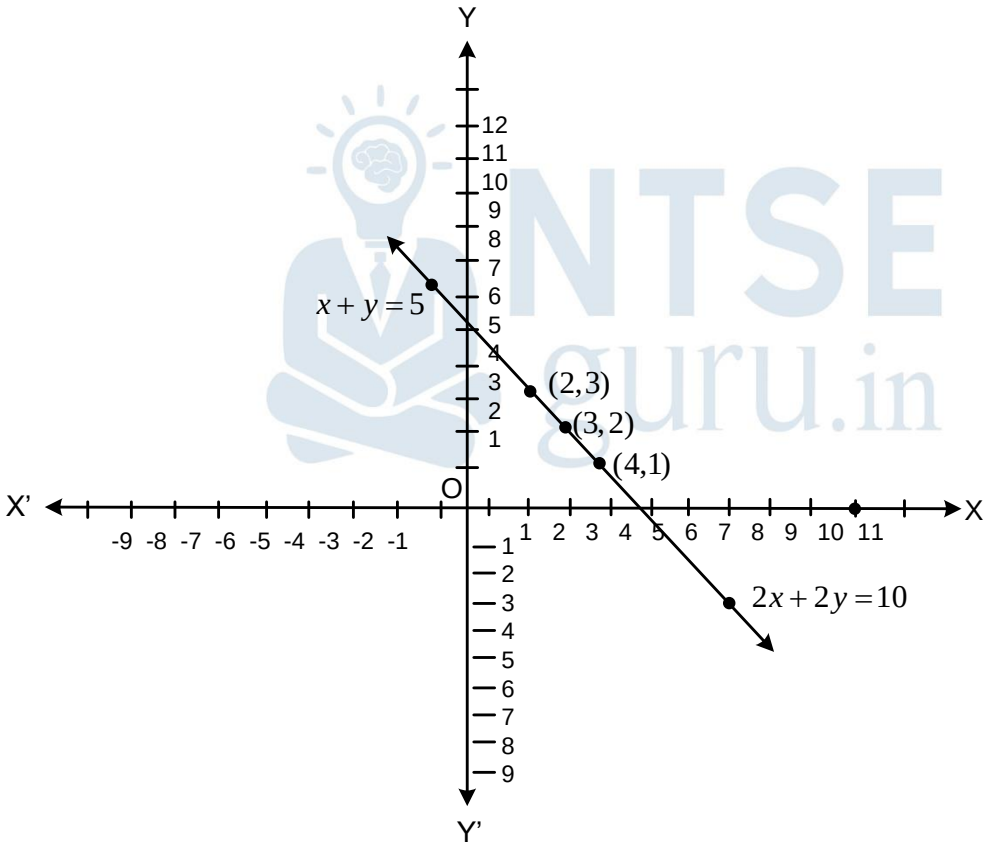
x	4	3	2
y	1	2	3

And, $2x+2y=10$

$x=\frac{10-2y}{2}$

x	4	3	2
y	1	2	3

Hence, the graphic representation is as follows.



From the figure, it can be observed that these lines are overlapping each other,
Therefore, infinite solutions are possible for the given pair of equations.

(ii) x – y = 8, 3x – 3y = 16

$\frac{a_1}{a_2}=\frac{1}{3}, \frac{b_1}{b_2}=\frac{-1}{-3}=\frac{1}{3}, \frac{c_1}{c_2}=\frac{8}{16}=\frac{1}{2}$

Since $\frac{a_1}{a_2}=\frac{b_1}{b_2}\neq\frac{c_1}{c_2}$,

Therefore, these linear equations are parallel to each other and thus have no possible solutions. Hence, the pair of linear equations is inconsistent.

(iii) 2x + y – 6 = 0, 4x – 2y – 4 = 0

$\frac{a_1}{a_2}=\frac{2}{4}=\frac{1}{2}, \frac{b_1}{b_2}=\frac{-1}{2}, \frac{c_1}{c_2}=\frac{-6}{-4}=\frac{3}{2}$

Since $\frac{a_1}{a_2}\neq\frac{b_1}{b_2}$

Therefore, these linear equations are intersecting each other at one point and thus have only one possible solution. Hence, the pair of linear equations is consistent.

$2x+y-6=0$

$y=6-2x$

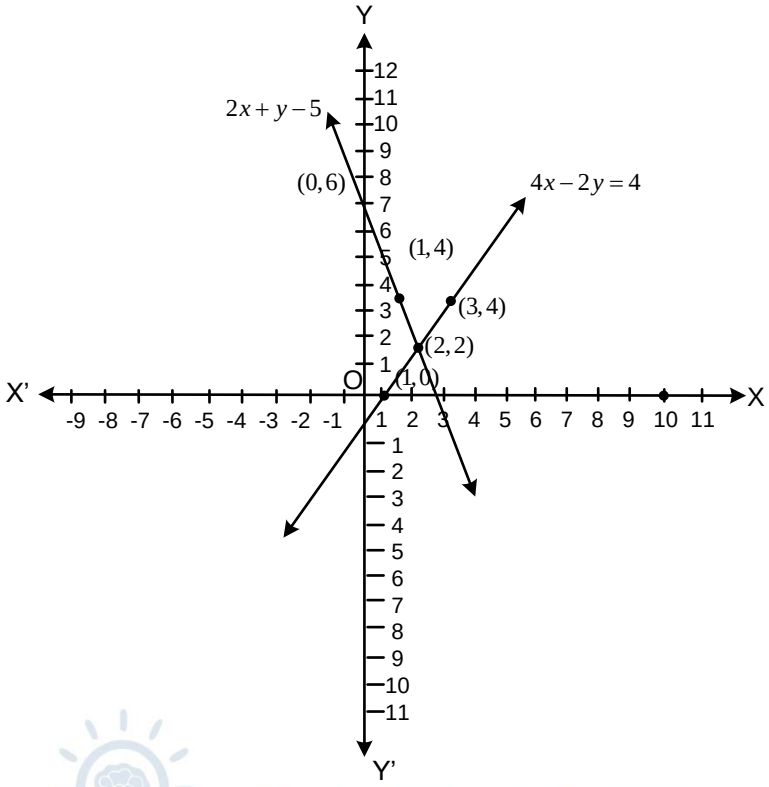
x	0	1	2
y	6	4	2

And $4x-2y-4=0$

$y=\frac{4x-4}{2}$

x	1	2	3
y	0	2	4

Hence, the graphic representation is as follows.



From the figure, it can be observed that these lines are intersecting each other at the only point i.e., (2, 2) and it is the solution for the given pair of equations.

(iv) 2x – 2y – 2 = 0, 4x – 4y – 5 = 0

$\frac{a_1}{a_2}=\frac{2}{4}=\frac{1}{2}, \frac{b_1}{b_2}=\frac{-2}{-4}=\frac{1}{2}, \frac{c_1}{c_2}=\frac{2}{5}$

Since $\frac{a_1}{a_2}=\frac{b_1}{b_2}\neq\frac{c_1}{c_2}$,

Therefore, these linear equations are parallel to each other and thus have no possible solution. Hence, the pair of linear equations is inconsistent.

6. Solve the following pair of linear equations by the substitution method

(i) $x+y=14,\quad x-y=4$

(ii) $s-t=3,\ \frac{s}{3}+\frac{t}{2}=6$

(iii) $3x-y=3,\ 9x-3y=9$

(iv) $0.2x+0.3y=1.3,\ 0.4x+0.5y=2.3$

(v) $\sqrt{2}x+\sqrt{3}y=0,\ \sqrt{3}x-\sqrt{8}y=0$

(vi) $\frac{3x}{2}-\frac{5y}{3}=-2,\ \frac{x}{3}+\frac{y}{2}=\frac{13}{6}$

Sol. **(i)** $x+y=14$ (1)

$x-y=4$ (2)

From (1), we obtain

$x=14-y$ (3)

Substituting this value in equation (2), we obtain

$(14-y)-y=4$

$14-2y=4$

$10=2y$

$y=5$ (4)

Substituting this in equation (3), we obtain

$x=9$

$\therefore x=9,\ y=5$

(ii) $s-t=3$ (1)

$\frac{s}{3}+\frac{t}{2}=6$ (2)

From (1), we obtain

$s=t+3$ (3)

Substituting this value in equation (2), we obtain

$\frac{t+3}{3}+\frac{t}{2}=6$

$2t+6+3t=36$

$5t=30$

$t=6$ (4)

Substituting in equation (3), we obtain

s = 9

$\therefore s=9,\ t=6$

(iii) $3x-y=3$ (1)

$9x-3y=9$ (2)

From (1), we obtain

$y=3x-3$ (3)

Substituting this value in equation (2), we obtain

$9x-3(3x-3)=9$

$9x-9x+9=9$

$9=9$

This is always true.

Hence, the given pair of equations has infinite possible solutions and the relation between these variables can be given by

$y = 3x - 3$

Therefore, one of its possible solutions is $x = 1,\ y = 0$.

(iv) $0.2x + 0.3y = 1.3$ (1)

$0.4x + 0.5y = 2.3$ (2)

From equation (1), we obtain

$x = \dfrac{1.3 - 0.3y}{0.2}$ (3)

Substituting this value in equation (2), we obtain

$0.4\left(\dfrac{1.3 - 0.3y}{0.2}\right) + 0.5y = 2.3$

$2.6 - 0.6y + 0.5y = 2.3$

$2.6 - 2.3 = 0.1y$

$0.3 = 0.1y$

$y = 3$ (4)

Substituting this value in equation (3), we obtain

$x = \dfrac{1.3 - 0.3 \times 3}{0.2}$

$\therefore x = 2,\ y = 3$

(v) $\sqrt{2}x + \sqrt{3}y = 0$ (1)

$\sqrt{3}x - \sqrt{8}y = 0$ (2)

From equation (1), we obtain

$x = \dfrac{-\sqrt{3}y}{\sqrt{2}}$ (3)

Substituting this value in equation (2), we obtain

$\sqrt{3}\left(-\dfrac{\sqrt{3}y}{\sqrt{2}}\right) - \sqrt{8}y = 0$

$-\dfrac{3y}{\sqrt{2}} - 2\sqrt{2}y = 0$

$y\left(-\dfrac{3}{\sqrt{2}} - 2\sqrt{2}\right) = 0$

$y = 0$ (4)

Substituting this value in equation (3), we obtain

$x = 0$

$\therefore x = 0,\ y = 0$

(vi) $\frac{3x}{2} - \frac{5y}{3} = -2$ (1)

$\frac{x}{3} + \frac{y}{2} = \frac{13}{6}$ (2)

From equation (1), we obtain

$9x - 10y = -12$

$x = \frac{-12 + 10y}{9}$ (3)

Substituting this value in equation (2), we obtain

$\frac{\frac{-12 + 10y}{9}}{3} + \frac{y}{2} = \frac{13}{6}$

$\frac{-12 + 10y}{27} + \frac{y}{2} = \frac{13}{6}$

$\frac{-24 + 20y + 27y}{54} = \frac{13}{6}$

$47y = 117 + 24$

$47y = 141$

$y = 3$ (4)

Substituting this value in equation (3), we obtain

$x = \frac{-12 + 10 \times 3}{9} = \frac{18}{9} = 2$

Hence, $x = 2,\ y = 3$

7. 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.

(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 travelling a distance of 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?

Sol. **(i)** Let the first number be x and the other number by y such that y > x. According to the given information,

$y = 3x$ (1)

$y - x = 26$ (2)

On substituting the value of y from equation (1) into equation (2), we obtain $3x - x = 26$

$x = 13$ (3)

Substituting this in equation (1), we obtain

$y = 39$

Hence, the numbers are 13 and 39.

(ii) Let the larger angle be x and smaller angle be y.

We know that the sum of the measures of angles of a supplementary pair is always 180^o.

According to the given information.

$x + y = 180^o$ (1)

$x - y = 18^o$ (2)

From (1), we obtain

$x - 180^o - y$ (3)

Substituting this in equation (2), we obtain

$180^o - y - y = 18^o$

$162^o = 2y$

$81^o = y$ (4)

Putting this in equation (3), we obtain

$x = 180^o - 81^o$

$= 99^o$

Hence, the angles are $= 99^o$ and 81^o.

(iii) Let the cost of a bat and a ball be x and y respectively.

According to the given information,

$7x + 6y = 3800$ (1)

$3x + 5y = 1750$ (2)

From (1), we obtain

$$y = \frac{3800 - 7x}{6} \qquad (3)$$

Substituting this value in equation (2), we obtain

$$3x + 5\left(\frac{3800 - 7x}{6}\right) = 1750$$

$$3x + \frac{9500}{3} - \frac{35x}{6} = 1750$$

$$3x - \frac{35x}{6} = 1750 - \frac{9500}{3}$$

$$\frac{18x - 35x}{6} = \frac{5250 - 9500}{3}$$

$$\frac{17x}{6} = \frac{-4250}{3}$$

$$-17x = -8500$$

$$x = 500 \qquad (4)$$

Substituting this in equation (3), we obtain

$$y = \frac{3800 - 7 \times 500}{6}$$

$$= \frac{300}{6} = 50$$

Hence, the cost of a bat is Rs. 500 and that of a ball is Rs. 50.

(iv) Let the fixed charge be Rs. x and per km charge be Rs. y

According to the given information,

$$x + 10y = 105 \qquad (1)$$

$$x + 15y = 155 \qquad (2)$$

From (3), we obtain

$$x = 105 - 10y \qquad (3)$$

Substituting this in equation (2), we obtain

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

$$5y = 50$$

$$y = 10 \qquad (4)$$

Putting this in equation (3), we obtain

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

$$x = 5$$

Hence, fixed charge = Rs. 5
And per km charge = Rs. 10
Charge for 25 km = x + 25y
$= 5 + 250 = \text{Rs } 255$

(v) Let the fraction be $\frac{x}{y}$.

According to the given information,

$$\frac{x+2}{y+2} = \frac{9}{11}$$

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

$$11x - 9y = -4 \qquad (1)$$

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

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

$$6x - 5y = -3 \qquad (2)$$

From equation (1), we obtain

$$x = \frac{-4 + 9y}{11} \qquad (3)$$

Substituting this in equation (2), we obtain

$$6\left(\frac{-4+9y}{11}\right) - 5y = -3$$

$$-24 + 54y - 55y = -33$$

$$-y = -9$$

$$y = 9 \qquad (4)$$

Substituting this in equation (3), we obtain

$$x = \frac{-4+81}{11} = 7$$

Hence, the fraction is $\frac{7}{9}$.

(vi) Let the age of Jacob be x and the age of this son be y.
According to the given information,

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

$$x - 3y = 10 \qquad (1)$$

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

$$x - 7y = -30 \qquad (2)$$

From (1), we obtain

$x = 3y + 10$

Substituting this value in equation (2), we obtain

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

$-4y = -40$

$y = 10$ (4)

Substituting this value in equation (3), we obtain

$x = 3 \times 10 + 10$

$= 40$

Hence, the present age of Jacob is 40 years whereas the present age of his son is 10 years.

8. Solve the following pair of linear equations by the elimination method and the substitution method:

(i) x + y = 5 and 2x – 3y = 4

(ii) 3x + 4y = 10 and 2x – 2y = 2

(iii) 3x – 5y – 4 = 0 and 9x = 2y + 7

(iv) $\frac{x}{2} + \frac{2y}{3} = -1$ and $x - \frac{y}{3} = 3$

Sol. **(i)** By elimination method

x + y = 5 (1)

2x – 3y = 4 (2)

Multiplying equation (1) by (2), we obtain

$2x + 2y = 10$ (3)

Subtracting equation (2) from equation (3), we obtain

$5y = 6$

$y = \frac{6}{5}$ (4)

Substituting the value in equation (1), we obtain

$x = 5 - \frac{6}{5} = \frac{19}{5}$

$\therefore x = \frac{19}{5}, y = \frac{6}{5}$

By substitution method

From equation (1), we obtain

$x = 5 - y$ (5)

Putting this value in equation (2), we obtain

$2(5 - y) - 3y = 4$

$-5y = -6$

$y = \frac{6}{5}$

Substituting the value in equation (5), we obtain

$x = 5 - \frac{6}{5} = \frac{19}{5}$

$\therefore x = \frac{19}{5}, y = \frac{6}{5}$

(ii) By elimination method

$3x + 4y = 10$ (1)

$2x - 2y = 2$ (2)

Multiplying equation (2) by 2, we obtain

$4x - 4y = 4$ (3)

Adding equation (1) and (3), we obtain

$7x = 14$

$x = 2$ (4)

Substituting in equation (1), we obtain

$6 + 4y = 10$

$4y = 4$

$y = 1$

Hence, $x = 2, y = 1$

By substitution method

From equation (2), we obtain

$x = 1 + y$ (5)

Putting this value in equation (1), we obtain

$3(1 + y) + 4y = 10$

$7y = 7$

$y = 1$

Substituting the value in equation (5), we obtain

$x = 1 + 1 = 2$

$\therefore x = 2, y = 1$

(iii) By elimination method

$3x - 5y - 4 = 0$ (1)

$9x = 2y + 7$

$9x - 2y - 7 = 0$ (2)

Multiplying equation (1) by (3), we obtain

$9x - 15y - 12 = 0$ (3)

Subtracting equation (3) from equation (2), we obtain

$13y = -5$

(iv) $\frac{x}{2} + \frac{2y}{3} = -1$ and $x - \frac{y}{3} = 3$

$y = \frac{-5}{13}$ (4)

Substituting in equation (1), we obtain

$3x + \frac{25}{13} - 4 = 0$

$3x = 4 - \frac{25}{13}$

$3x = \frac{27}{13}$

$x = \frac{9}{13}$

$\therefore x = \frac{9}{13}, y = \frac{-5}{13}$

By substitution method

From equation (1), we obtain

$x = \frac{5y + 4}{3}$ (5)

Putting this value in equation (2), we obtain

$9\left(\frac{5y + 4}{3}\right) - 2y - 7 = 0$

$13y = -5$

$y = -\frac{5}{13}$

Substituting the value in equation (5), we obtain

$x = \frac{5\left(\frac{-5}{13}\right) + 4}{3}$

$x = \frac{9}{13}$

$\therefore x = \frac{9}{13}, \ y = \frac{-5}{13}$

(iv) By elimination method

$\frac{x}{2}+\frac{2y}{3}=-1$

$3x+4y=-6$ (1)

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

$3x-y=9$ (2)

Subtracting equation (2) from equation (1), we obtain

$5y=-15$

$y=-3$ (3)

Substituting this value in equation (1), we obtain

$3x-12=-6$

$3x=6$

$x=2$

Hence, $x=2, y=-3$

By substitution method

From equation (2), we obtain

$x=\frac{y+9}{3}$ (5)

Putting this value in equation (1), we obtain

$3\left(\frac{y+9}{3}\right)+4y=-6$

$5y=-15$

Substituting the value in equation (5), we obtain

$x=\frac{-3+9}{3}=2$

$\therefore x=2, y=-3$

9. (i) For which values of a and b does the following pair of linear equations have an infinite number of solutions?

$2x + 3y = 7$

$(a – b) x + (a + b) y = 3a + b – 2$

(ii) For which value of k will the following pair of linear equations have no solution?

$3x + y = 1$

$(2k – 1) x + (k – 1) y = 2k + 1$

Sol. **(i)** $2x+3y=7$

$(a-b)x+(a+b)y-(3a+b-2)=0$

$\frac{a_1}{a_2}=\frac{2}{a-b}, \frac{b_1}{b_2}=\frac{3}{a+b}, \frac{c_1}{c_2}=\frac{-7}{-(3a+b-2)}=\frac{7}{(3a+b-2)}$

For infinitely many solutions,

$\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$

$\frac{2}{a-b}=\frac{7}{3a+b-2}$

$6a+2b-4=7a-7b$

$a-9b=-4$ (1)

$\frac{2}{a-b}=\frac{3}{a+b}$

$2a+2b=3a-3b$

$a-5b=0$ (2)

Subtracting (1) from (2), we obtain

$4b=4$

$b=1$

Substituting this in equation (2), we obtain

$a-5\times1=0$

$a=5$

Hence, a = 5 and b = 1 are the values for which the given equations give infinitely many solutions.

(ii) $3x+y-1=0$

$(2k-1)x+(k-1)y-2k-1=0$

$\frac{a_1}{a_2}=\frac{3}{2k-1}, \frac{b_1}{b_2}=\frac{1}{k-1}, \frac{c_1}{c_2}=\frac{-1}{-2k-1}=\frac{1}{2k+1}$

For no solution $\frac{a_1}{a_2}=\frac{b_1}{b_2}\neq\frac{c_1}{c_2}$

$\frac{3}{2k-1}=\frac{1}{k-1}\neq\frac{1}{2k+1}$

$\frac{3}{2k-1}=\frac{1}{k-1}$

$3k-3=2k-1$

$k=2$

Hence, for $k=2$, the given equation has no solution.

10. The ages of two friends Ani and Biju differ by 3 years. Ani's father Dharam is twice as old as Ani and Biju is twice as old as his sister Cathy. The ages of Cathy and Dharam differ by 30 years. Find the ages of Ani and Biju.

Sol. The difference between the ages of Biju and Ani is 3 years. Either Biju is 3 years older than Ani or Ani is 3 years older than Biju. However, it is obvious that in both cases, Ani's father's age will be 30 years more than that of Cathy's age.

Let the age of Ani and Biju be x and years respectively.

Therefore, age of Ani's father, Dharam $= 2 \times x = 2x$ years

And age of Biju's sister Cathy $= \frac{y}{2}$ years

By using the information given in the question,

Case (I) When Ani is older than Biju by 3 years,

$x - y = 3$ (i)

$4x - y = 60$ (ii)

Subtracting (i) from (ii), we obtain

$3x = 60 - 3 = 57$

$x = \frac{57}{3} = 19$

Therefore, age of Ani = 19 years

And age of Biju = 19 – 3 = 16 years

Case (II) When Biju is older than Ani

$y - x = 3$ (i)

$2x - \frac{y}{2} = 30$

$4x - y = 60$ (ii)

Adding (i) and (ii), we obtain

$3x = 63$

$x = 21$

Therefore, age of Ani = 21 years

And age of Biju = 21 + 3 = 24 years.