RD SHARMA
Solutions
Class 10 Maths
Chapter 3
Ex 3.4

Q.1: x + 2y + 1 = 0 and 2x – 3y – 12 = 0

Soln:

x+2y+1 =0 ……………………………………(i)

2x-3y-12=0………………………………….. (ii)

Here a_1= 1 , b_1= 2 , c_1= 1

a_2= 2 , b_2= -3 , c_2= -12

By cross multiplication method,

x−24+3=−y−12−2=1−3−4 $\frac{x}{-24+3} = \frac{-y}{-12-2} = \frac{1}{-3-4}$ x−21=−y−14=1−7 $\frac{x}{-21} = \frac{-y}{-14} = \frac{1}{-7}$

Now,

x−21=1−7 $\frac{x}{-21} = \frac{1}{-7}$

=x= 3

And,

−y−14=1−7 $\frac{-y}{-14} = \frac{1}{-7}$

=y=-2

The solution of the given system of equation is 3 and -2 respectively.

Q.2: 3x + 2y + 25 = 0, 2x + y + 10 = 0

Soln:

3x+2y+25 =0 ……………………………………(i)

2x+y+10=0………………………………….. (ii)

Here a_1= 3 , b_1= 2 , c_1= 25

a_2= 2 , b_2= 1 , c_2= 10

By cross multiplication method,

x20−25=−y30−50=13−4 $\frac{x}{20-25} = \frac{-y}{30-50} = \frac{1}{3-4}$ x−5=−y−20=1−1 $\frac{x}{-5} = \frac{-y}{-20} = \frac{1}{-1}$

Now,

x−5=1−1 $\frac{x}{-5} = \frac{1}{-1}$

=x= 5

And,

−y−20=1−1 $\frac{-y}{-20} = \frac{1}{-1}$

=y=-20

The solution of the given system of equation is 5 and -20 respectively.

Q.3: 2x + y = 35, 3x + 4y = 65

Soln:

2x+y= 35 ………………………………(i)

3x+4y=65……………………………. (ii)

Here a_1= 2 , b_1= 1 , c_1= 35

a_2= 3 , b_2= 4 , c_2= 65

By cross multiplication method,

x−65+140=−y−130+105=18−3 $\frac{x}{-65+140} = \frac{-y}{-130+105} = \frac{1}{8-3}$ x75=−y−25=15 $\frac{x}{75} = \frac{-y}{-25} = \frac{1}{5}$

Now,

x75=15 $\frac{x}{75} = \frac{1}{5}$

=x= 15

And,

−y−25=15 $\frac{-y}{-25} = \frac{1}{5}$

=y=5

The solution of the given system of equation is 15 and 5 respectively.

Q.4: 2x – y – 6 = 0, x – y – 2 = 0

Soln:

2x-y= 6 ……………………………….(i)

x-y=2……………………………. (ii)

Here a_1= 2 , b_1= -1 , c_1= 6

a_2= 1 , b_2= -1 , c_2= 2

By cross multiplication method,

x2−6=−y−4+6=1−2+1 $\frac{x}{2-6} = \frac{-y}{-4+6} = \frac{1}{-2+1}$ x−4=−y2=1−1 $\frac{x}{-4} = \frac{-y}{2} = \frac{1}{-1}$

Now,

x−4=1−1 $\frac{x}{-4} = \frac{1}{-1}$

=x= 4

And,

−y2=1−1 $\frac{-y}{2} = \frac{1}{-1}$

=y=2

The solution of the given system of equation is 4 and 2 respectively.

Q5: **x+yxy=2** $\frac{x+y}{xy} = 2$ **,** **x−yxy=6** $\frac{x-y}{xy} = 6$

Soln:

x+yxy=2 $\frac{x+y}{xy} = 2$

= 1x+1y=2 $\frac{1}{x} + \frac{1}{y} = 2$ ……………………………….. (i)

x−yxy=6 $\frac{x-y}{xy} = 6$

= 1x−1y=6 $\frac{1}{x} - \frac{1}{y} = 6$ …………………………………. (ii)

Taking 1x $\frac{1}{x}$ =u

Taking 1y $\frac{1}{y}$ =v

= u+v=2 …………………………… (iii)

= u-v= 6 …………………………… (iv)

By cross multiplication method,

u6−2 = −v6+2 = 1−1−1 $\frac{u}{6-2} = \frac{-v}{6+2} = \frac{1}{-1-1}$ u4 = −v8 = 1−2 $\frac{u}{4} = \frac{-v}{8} = \frac{1}{-2}$

Now,

u4 = 1−2 $\frac{u}{4} = \frac{1}{-2}$

=u= -2

And,

−v−8 = 1−2 $\frac{-v}{-8} = \frac{1}{-2}$

=v=4

1u $\frac{1}{u}$ =x= −12 $\frac{-1}{2}$

1v $\frac{1}{v}$ =y= 14 $\frac{1}{4}$

The solution of the given system of equation is −12 $\frac{-1}{2}$ and 14 $\frac{1}{4}$ respectively.

Q.6: ax+by=a-b, bx-ay=a+b

Soln:

ax+by=a-b……………………………….(i)

bx-ay=a+b……………………………. (ii)

Here a_1= a , b_1= b , c_1= a-b

a_2= b , b_2= -a , c_2= a+b

By cross multiplication method,

x−ab−b2+ab−a2 = −y−a2−ab−b2+ab = 1−a2−b2 $\frac{x}{-ab-b^2+ab-a^2} = \frac{-y}{-a^2-ab-b^2+ab} = \frac{1}{-a^2-b^2}$ x−b2−a2 = −y−a2−b2 = 1−a2−b2 $\frac{x}{-b^2-a^2} = \frac{-y}{-a^2-b^2} = \frac{1}{-a^2-b^2}$

Now,

x−ab−b2+ab−a2 = 1−a2−b2 $\frac{x}{-ab-b^2+ab-a^2} = \frac{1}{-a^2-b^2}$

=x= 1

And,

$-y-a^2-ab-b^2+ab=1-a^2-b^2$ $\frac{-y}{-a^2-ab-b^2+ab} = \frac{1}{-a^2-b^2}$

=y=-1

The solution of the given system of equation is 1 and -1 respectively.

Q.7: x+ay-b=0, ax-by-c=0

Soln:

x+ay-b=0 ……………………………….. (i)

ax-by-c=0……………………………….. (ii)

Here a_1= 1 , b_1= a , c_1= -b

a_2= a , b_2= -b , c_2= -c

By cross multiplication method,

$x-ac-b^2=-y-c+ab=1-a^2-b$ $\frac{x}{-ac-b^2} = \frac{-y}{-c+ab} = \frac{1}{-a^2-b}$

Now,

$x-ac-b^2=1-a^2-b$ $\frac{x}{-ac-b^2} = \frac{1}{-a^2-b}$

=x= b^2+aca^2+b $\frac{b^2+ac}{a^2+b}$

And,

$-y-c+ab=1-a^2-b$ $\frac{-y}{-c+ab} = \frac{1}{-a^2-b}$

=y= $-c+aba^2+b$ $\frac{-c+ab}{a^2+b}$

The solution of the given system of equation is b^2+aca^2+b $\frac{b^2+ac}{a^2+b}$ and $-c+aba^2+b$ $\frac{-c+ab}{a^2+b}$ respectively.

Q8

$ax+by=a^2$

$bx+ay=b^2$

Soln:

$ax+by=a^2$……………………………….(i)

$bx+ay=b^2$……………………………. (ii)

Here $a_1= a$, $b_1= b$, $c_1= a^2$

$a_2= b$, $b_2= a$, $c_2= b^2$

By cross multiplication method,

x−b²+a² = −y−ab²−a²b = 1a²−b² $\frac{x}{-b^2+a^2} = \frac{-y}{-ab^2-a^2b} = \frac{1}{a^2-b^2}$

Now,

x−b²+a² = 1a²−b² $\frac{x}{-b^2+a^2} = \frac{1}{a^2-b^2}$

=x= a²+ab+b²a+b $\frac{a^2+ab+b^2}{a+b}$

And,

−y−ab²−a²b = 1a²−b² $\frac{-y}{-ab^2-a^2b} = \frac{1}{a^2-b^2}$

=y=- −ab(a−b)(a−b)(a+b) $\frac{-ab(a-b)}{(a-b)(a+b)}$

The solution of the given system of equation is a²+ab+b²a+b $\frac{a^2+ab+b^2}{a+b}$ and −ab(a−b)(a−b)(a+b) $\frac{-ab(a-b)}{(a-b)(a+b)}$ respectively.

Q9

5x+y − 2x−y = −1 $\frac{5}{x+y} - \frac{2}{x-y} = -1$ 15x+y + 7x−y = −10 $\frac{15}{x+y} + \frac{7}{x-y} = -10$

Soln:

Let 1x+y = $\frac{1}{x+y} =$ =u

Let 1x−y = $\frac{1}{x-y} =$ =v

The given system of equations are :

5u-2v=-1

15u+7v =10

Here $a_1= 5$, $b_1= -2$, $c_1= 1$

$a_2= 15$, $b_2= 7$, $c_2= -10$

By cross multiplication method,

u20−7=−v−50−15=135+30 $\frac{u}{20-7}=\frac{-v}{-50-15}=\frac{1}{35+30}$ u13=−v−65=165 $\frac{u}{13}=\frac{-v}{-65}=\frac{1}{65}$

Now,

u13=1−65 $\frac{u}{13}=\frac{1}{-65}$

=u= 15 $\frac{1}{5}$

1u= $\frac{1}{u}=$ =x+y

=x+y=5 ……………………….(i)

And,

−v−65=1−65 $\frac{-v}{-65}=\frac{1}{-65}$

=v=1

1v= $\frac{1}{v}=$ =x-y

=x-y =1 ………………………. (ii)

Adding equation (i) and (ii)

2x= 6

=x=3

Putting the value of x in equation (i)

3+y=5

=y=2

The solution of the given system of equation is 3 and 2 respectively.

Q10

2x+3y=13 $\frac{2}{x}+\frac{3}{y}=13$ 5x−4y=−2 $\frac{5}{x}-\frac{4}{y}=-2$

Soln:

Let 1x $\frac{1}{x}$ =u

Let 1y $\frac{1}{y}$ =v

The given system of equations becomes:

2u+3v=13 ……………………………… (i)

5u-4v=-2………………………………… (ii)

By cross multiplication method,

u6−52=−v4+65=1−8−15 $\frac{u}{6-52} = \frac{-v}{4+65} = \frac{1}{-8-15}$ u−46=−v69=1−23 $\frac{u}{-46} = \frac{-v}{69} = \frac{1}{-23}$

Now,

u−46=1−23 $\frac{u}{-46} = \frac{1}{-23}$

=u= 2

1u=$\frac{1}{u}$ = =1x $\frac{1}{x}$

=x= 12 $\frac{1}{2}$

And,

−v69=1−23 $\frac{-v}{69} = \frac{1}{-23}$

=v=3

1v $\frac{1}{v}$= 1y $\frac{1}{y}$

=y =13 $\frac{1}{3}$

The solutions of the given system of equations are 12 $\frac{1}{2}$ and 13 $\frac{1}{3}$respectively.

Q11

57x+y + 6x−y =5 $\frac{57}{x+y} + \frac{6}{x-y} = 5$ 38x+y + 21x−y =9 $\frac{38}{x+y} + \frac{21}{x-y} = 9$

Soln:

Let 1x+y=$\frac{1}{x+y}$ = =u

Let 1x−y=$\frac{1}{x-y}$ = =v

The given system of equations are :

57u+6v=5

38u+21v =9

Here a_1= 57, b_1= 6 , c_1= -5

a_2= 38 , b_2=21 , c_2= -9

By cross multiplication method,

u−54+105=−v−513+190=11193−228 $\frac{u}{-54+105} = \frac{-v}{-513+190} = \frac{1}{1193-228}$ u51=−v−323=1969

$\frac{u}{51} = \frac{-v}{-323} = \frac{1}{969}$

Now,

u51=1969 $\frac{u}{51} = \frac{1}{969}$

=u= 119 $\frac{1}{19}$

1u $\frac{1}{u}$ =x+y

=x+y=19 ……………………….(i)

And,

−v−323=1969 $\frac{-v}{-323} = \frac{1}{969}$

=v= 13 $\frac{1}{3}$

1v= $\frac{1}{v} =$ =x-y

=x-y =3 ………………………. (ii)

Adding equation (i) and (ii)

2x= 22

=x=11

Putting the value of x in equation (i)

11+y=19

=y=8

The solution of the given system of equation is 11 and 8 respectively.

Q12

xa−yb=2 $\frac{x}{a} - \frac{y}{b} = 2$

ax-by=a^2-b^2

Soln:

a_1= 1a $\frac{1}{a}$, Let b_1= 1b $\frac{1}{b}$, Let c_1=-2

$a_2=a$, $b_2=-b$, $c_2=b^2-a^2$

By cross multiplication method

= xb2−a2b−2b=−yb2−a2b+2b=1−ba−ab $\frac{x}{\frac{b^2-a^2}{b}-2b} = \frac{-y}{\frac{b^2-a^2}{b}+2b} = \frac{1}{\frac{-b}{a}-\frac{a}{b}}$

= xb2−a2−2b2b=−yb2−a2+2b2b=1−b2−a2ab $\frac{x}{\frac{b^2-a^2-2b^2}{b}} = \frac{-y}{\frac{b^2-a^2+2b^2}{b}} = \frac{1}{\frac{-b^2-a^2}{ab}}$

Now, xb2−a2−2b2b=1−b2−a2ab $\frac{x}{\frac{b^2-a^2-2b^2}{b}} = \frac{1}{\frac{-b^2-a^2}{ab}}$

x= a

and, −yb2−a2+2b2b=1−b2−a2ab $\frac{-y}{\frac{b^2-a^2+2b^2}{b}} = \frac{1}{\frac{-b^2-a^2}{ab}}$

=y=b

Hence the solution of the given system of equation are a and b respectively.

Q13

xa+yb=a+b $\frac{x}{a}+\frac{y}{b}=a+b$ xa2+yb2=2 $\frac{x}{a^2}+\frac{y}{b^2}=2$

Soln:

Here, a_1= 1a $\frac{1}{a}$, Let b_1= 1b $\frac{1}{b}$, Let c_1=-(a+b)

a_2= 1a2 $\frac{1}{a^2}$, b_2= 1b2 $\frac{1}{b^2}$, c_2=-2

By cross multiplication method

=x−2b+ab2+1b=−y−2a+1a+ba2=1−1ab2−−1a2b $\frac{x}{\frac{-2}{b}+\frac{a}{b^2}+\frac{1}{b}} = \frac{-y}{\frac{-2}{a}+\frac{1}{a}+\frac{b}{a^2}} = \frac{1}{\frac{-1}{ab^2}-\frac{-1}{a^2b}}$

= xa−bb2=−y−a−ba2+1a+ba2=1−1ab2−−1a2b $\frac{x}{\frac{a-b}{b^2}} = \frac{-y}{\frac{-a-b}{a^2}+\frac{1}{a}+\frac{b}{a^2}} = \frac{1}{\frac{-1}{ab^2}-\frac{-1}{a^2b}}$

Now, xa−bb2=1−1ab2−−1a2b $\frac{x}{\frac{a-b}{b^2}} = \frac{1}{\frac{-1}{ab^2}-\frac{-1}{a^2b}}$

=x=a^2

−y−a−ba2+1a+ba2=1−1ab2−−1a2b $\frac{-y}{\frac{-a-b}{a^2}+\frac{1}{a}+\frac{b}{a^2}} = \frac{1}{\frac{-1}{ab^2}-\frac{-1}{a^2b}}$

=y=b^2

The solution of the given system of equation are a^2 and b^2respectively.

Q14

xa = yb $\frac{x}{a}=\frac{y}{b}$

$ax+by=a^2+b^2$

Soln:

Here, a_1= 1a $\frac{1}{a}$, Let b_1= 1b $\frac{1}{b}$, $c_1=0$

Here, $a_1=a$, $b_2=b$, Let $c_1=-(a^2+b^2)$

By cross multiplication method

xa2+b2b = ya2+b2a = 1ab+ba $\frac{x}{\frac{a^2+b^2}{b}}=\frac{y}{\frac{a^2+b^2}{a}}=\frac{1}{\frac{a}{b}+\frac{b}{a}}$

Now, xa2+b2b = 1ab+ba $\frac{x}{\frac{a^2+b^2}{b}}=\frac{1}{\frac{a}{b}+\frac{b}{a}}$

$=x=a$

And ya2+b2a = 1ab+ba $\frac{y}{\frac{a^2+b^2}{a}}=\frac{1}{\frac{a}{b}+\frac{b}{a}}$

$=y=b$

The solution of the given system of equations are a and b respectively.

Q15

$2ax+3by=a+2b$

$3ax+2by=2a+b$

Soln:

The given system of equation is

$2ax+3by=a+2b$ …………………………… (i)

$3ax+2by=2a+b$……………………………. (ii)

Here $a_1= 2a$, $b_1= 3b$, $c_1= -(a+2b)$

$a_2= 3a$, $b_2=2b$, $c_2= -(2a+b)$

By cross multiplication method

x−4ab+b²=−y−a²+4ab=1−5ab $\frac{x}{-4ab+b^2} = \frac{-y}{-a^2+4ab} = \frac{1}{-5ab}$

Now,

x−4ab+b²=1−5ab $\frac{x}{-4ab+b^2} = \frac{1}{-5ab}$

=x= 4a−b5a $\frac{4a-b}{5a}$

And, −y−a²+4ab=1−5ab $\frac{-y}{-a^2+4ab} = \frac{1}{-5ab}$

=y= 4b−a5b $\frac{4b-a}{5b}$

The solutions of the system of equations are 4a−b5a $\frac{4a-b}{5a}$ and 4b−a5b $\frac{4b-a}{5b}$.

Q16

5ax+6by=28

3ax+4by=18

Soln:

The systems of equations are:

5ax+6by=28 …………………………. (i)

3ax+4by=18……………………………. (ii)

Here a_1= 5a, b_1= 6b , c_1= -(28)

a_2= 3a , b_2=4b , c_2= -(18)

By cross multiplication method

x4b=−y−6a=12ab $\frac{x}{4b} = \frac{-y}{-6a} = \frac{1}{2ab}$

Now,

x4b=12ab $\frac{x}{4b} = \frac{1}{2ab}$

=x= 2a $\frac{2}{a}$

And, −y−6a=12ab $\frac{-y}{-6a} = \frac{1}{2ab}$

=y= 3b $\frac{3}{b}$

The solution of the given system of equation is 2a $\frac{2}{a}$ and 3b $\frac{3}{b}$.

Q17

(a+2b)x+(2a-b)y=2

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

Soln.

The given system of equations are :

(a+2b)x+(2a-b)y=2 ……………………… (i)

(a-2b)x+(2a+b)y=3………………………….. (ii)

Here a_1= a+2b, b_1= 2a-b , c_1= -(2)

a_2= a-2b , b_2=2a+b , c_2= -(3)

By cross multiplication method:

x−2a+5b=ya+10b=110ab $\frac{x}{-2a+5b} = \frac{y}{a+10b} = \frac{1}{10ab}$

Now, x−2a+5b=110ab $\frac{x}{-2a+5b} = \frac{1}{10ab}$

=x= 5b−2a10ab $\frac{5b-2a}{10ab}$

And ya+10b=110ab $\frac{y}{a+10b} = \frac{1}{10ab}$

=y= a+10b10ab $\frac{a+10b}{10ab}$

The solution of the system of equations are =x= 5b−2a10ab $\frac{5b-2a}{10ab}$

And =y= a+10b10ab $\frac{a+10b}{10ab}$ respectively.

Q18

x(a−b+ aba−b)=y(a+b− aba+b)$x(a-b+\frac{ab}{a-b}) = y(a+b-\frac{ab}{a+b})$

x+y=$2a^2$

Soln:

The given systems of equations are:

x(a−b+ aba−b)=y(a+b− aba+b)$x(a-b+\frac{ab}{a-b}) = y(a+b-\frac{ab}{a+b})$

x+y=$2a^2$

From equation (i)

x(a²+b²−2ab+aba−b)−y(a²+b²+2ab−aba+b) $x(\frac{a^2+b^2-2ab+ab}{a-b})-y(\frac{a^2+b^2+2ab-ab}{a+b})$

= x(a²+b²−aba−b)−y(a²+b²+aba+b) $x(\frac{a^2+b^2-ab}{a-b})-y(\frac{a^2+b^2+ab}{a+b})$ ………………. (iii)

From equation (ii)

$X+y-2a^2=0$

Here a_1= (a²+b²−aba−b) $(\frac{a^2+b^2-ab}{a-b})$, b_1= −(a²+b²+aba−b) $(\frac{a^2+b^2+ab}{a-b})$, $c_1=0$

$a_2=1$, $b_2=1$, $c_2=-2a^2$

By cross multiplication method:

x2a²(a2+b2+aba+b) = −y(−2a²)(a2+b2−aba−b) = 1 2a³(a−b)(a+b) $\frac{x}{2a^2(\frac{a^2+b^2+ab}{a+b})}=\frac{-y}{(-2a^2)(\frac{a^2+b^2-ab}{a-b})}=\frac{1}{\frac{2a^3}{(a-b)(a+b)}}$

Now, x2a²(a2+b2+aba+b) = 1 2a³(a−b)(a+b) $\frac{x}{2a^2(\frac{a^2+b^2+ab}{a+b})}=\frac{1}{\frac{2a^3}{(a-b)(a+b)}}$

=x= a³−b³a $\frac{a^3-b^3}{a}$

And −y(−2a²)(a2+b2−aba−b) = 1 2a³(a−b)(a+b) $\frac{-y}{(-2a^2)(\frac{a^2+b^2-ab}{a-b})}=\frac{1}{\frac{2a^3}{(a-b)(a+b)}}$

=y= a³+b³a $\frac{a^3+b^3}{a}$

The solutions of the given system of equations are a³−b³a $\frac{a^3-b^3}{a}$ and a³+b³a $\frac{a^3+b^3}{a}$ respectively.

Q19

$bx+cy=a+b$

−ax(1a−b − 1a+b)+cy(1b−a + 1b+a)= 2aa+b $-ax(\frac{1}{a-b}-\frac{1}{a+b})+cy(\frac{1}{b-a}+\frac{1}{b+a})=\frac{2a}{a+b}$

Soln:

The system of equation is given by :

$bx+cy=a+b$ …………………………………… (i)

−ax(1a−b − 1a+b)+cy(1b−a + 1b+a)= 2aa+b $-ax(\frac{1}{a-b}-\frac{1}{a+b})+cy(\frac{1}{b-a}+\frac{1}{b+a})=\frac{2a}{a+b}$ …..(ii)

From equation (i)

bx+cy-(a+b) =0

From equation (ii)

$$-ax\left(\frac{1}{a-b}-\frac{1}{a+b}\right)+cy\left(\frac{1}{b-a}+\frac{1}{b+a}\right)-\frac{2a}{a+b}=0$$

$$= x\left(\frac{2ab}{(a-b)(a+b)}\right)+y\left(\frac{2ac}{(b-a)(b+a)}\right)-\frac{2a}{a+b}=0$$

$$= \frac{1}{a+b}\left(\frac{2abx}{a-b}-\frac{2acy}{a-b}-2a\right)=0$$

$$= \frac{2abx}{a-b}-\frac{2acy}{a-b}-2a=0$$

= 2abx-2acy-2a(a-b) =0 ………………………… (iv)

By cross multiplication

$$= \frac{x}{-4a^2c}=\frac{-y}{4ab^2}=\frac{-1}{4abc}$$

Now, $\frac{x}{-4a^2c}=\frac{-1}{4abc}$

$$=x=\frac{a}{b}$$

And,

$$= \frac{-y}{4ab^2}=\frac{-1}{4abc}$$

$$=y=\frac{b}{c}$$

The solution of the system of equations are $\frac{a}{b}$ and $\frac{b}{c}$

Q20

$(a-b)x+(a+b)y=2a^2-2b^2$

(a+b)(x+y) =4ab

Soln.

The given system of equations are :

$(a-b)x+(a+b)y=2a^2-2b^2$ ………………………….. (i)

(a+b)(x+y) =4ab ………………………… (ii)

From equation (i)

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

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

From equation (ii)

$(a-b)x+(a-b)y-4ab=0$

Here, $a_1= a-b$, $b_1 = a+b$, $c_1=-2(a^2+b^2)$

Here, $a_2= a+b$, $b_2 = a+b$, $c_2=-4ab$

By cross multiplication method

$x2(a+b)(a^2-b^2+2ab)=-y2(a-b)(a^2+b^2)=1-2b(a+b)$ $\frac{x}{2(a+b)(a^2-b^2+2ab)} = \frac{-y}{2(a-b)(a^2+b^2)} = \frac{1}{-2b(a+b)}$

Now,

$x2(a+b)(a^2-b^2+2ab)=1-2b(a+b)$ $\frac{x}{2(a+b)(a^2-b^2+2ab)} = \frac{1}{-2b(a+b)}$

$=x=$ $2ab-a^2+b^2b$ $\frac{2ab-a^2+b^2}{b}$

And, $-y2(a-b)(a^2+b^2)=1-2b(a+b)$ $\frac{-y}{2(a-b)(a^2+b^2)} = \frac{1}{-2b(a+b)}$

$=y=$ $(a-b)(a^2+b^2)b(a+b)$ $\frac{(a-b)(a^2+b^2)}{b(a+b)}$

The solution of the system of equations are $2ab-a^2+b^2b$ $\frac{2ab-a^2+b^2}{b}$ and $(a-b)(a^2+b^2)b(a+b)$ $\frac{(a-b)(a^2+b^2)}{b(a+b)}$ respectively.

Q21

$a^2x+b^2y=c^2$

$b^2x+a^2y=d^2$

Soln:

The given system of equations are :

$a^2x+b^2y=c^2$ …………………………………. (i)

$b^2x+a^2y=d^2$……………………………………. (ii)

Here, $a_1= a^2$, $b_1 = b^2$, $c_1=-c^2$

Here, $a_2= b^2$, $b_2 = a^2$, $c_2=-d^2$

By cross multiplication method

$= x{-}b^2d^2{+}a^2c^2 = {-}y{-}a^2d^2{+}b^2c^2 = 1a^4{-}b^4$ $\frac{x}{-b^2d^2+a^2c^2} = \frac{-y}{-a^2d^2+b^2c^2} = \frac{1}{a^4-b^4}$

Now,

$x{-}b^2d^2{+}a^2c^2 = 1a^4{-}b^4$ $\frac{x}{-b^2d^2+a^2c^2} = \frac{1}{a^4-b^4}$

$= x =$ $a^2c^2{-}b^2d^2a^4{-}b^4$ $\frac{a^2c^2-b^2d^2}{a^4-b^4}$

And, $=$ $x{-}b^2d^2{+}a^2c^2 = {-}y{-}a^2d^2{+}b^2c^2 = 1a^4{-}b^4$ $\frac{x}{-b^2d^2+a^2c^2} = \frac{-y}{-a^2d^2+b^2c^2} = \frac{1}{a^4-b^4}$

$= y =$ $a^2d^2{-}b^2c^2a^4{-}b^4$ $\frac{a^2d^2-b^2c^2}{a^4-b^4}$

The solution of the given system of equations are $a^2c^2{-}b^2d^2a^4{-}b^4$ $\frac{a^2c^2-b^2d^2}{a^4-b^4}$ and $a^2d^2{-}b^2c^2a^4{-}b^4$ $\frac{a^2d^2-b^2c^2}{a^4-b^4}$ respectively.

Q23

2(ax-by+a+4b=0

2(bx+ay)+b-4a=0

Soln:

The given system of equation may be written as :

2(ax-by+a+4b=0 …………………….. (i)

2(bx+ay)+b-4a=0……………………. (ii)

Here, a_1= 2a , b_1 = -2b , c_1=a+4b

Here, a_2= 2b , b_2 = 2a , c_2=b-4a

By cross multiplication method

$= x{-}2b^2{+}8ab{-}2a^2{-}8ab = {-}y2ab{-}8a^2{-}2ab{-}8b^2 = 14a^2{+}4b^2$ $\frac{x}{-2b^2+8ab-2a^2-8ab} = \frac{-y}{2ab-8a^2-2ab-8b^2} = \frac{1}{4a^2+4b^2}$

$= x{-}2b^2{-}2a^2 = {-}y{-}8a^2{-}8b^2 = 14a^2{+}4b^2$ $\frac{x}{-2b^2-2a^2} = \frac{-y}{-8a^2-8b^2} = \frac{1}{4a^2+4b^2}$

Now, $x{-}2b^2{-}2a^2 = 14a^2{+}4b^2$ $\frac{x}{-2b^2-2a^2} = \frac{1}{4a^2+4b^2}$

$= x =$ -12 $\frac{-1}{2}$

And, $-y{-}8a^2{-}8b^2 = 14a^2{+}4b^2$ $\frac{-y}{-8a^2-8b^2} = \frac{1}{4a^2+4b^2}$

$=y=2$

The solution of the given pair of equations are -12 $\frac{-1}{2}$ and 2 respectively.

Q24

6(ax+by)=3a+2b

6(bx-ay) = 3b-2a

Soln:

The systems of equations are

6(ax+by)=3a+2b .... (i)

6(bx-ay) = 3b-2a .... (ii)

From equation (i)

6ax+6by-(3a+2b)=0 .... (iii)

From equation (ii)

6bx-6ay-(3b-2a) =0 .... (iv)

Here, a_1= 6a , b_1 = 6b , c_1=-(3a+2b)

Here, a_2= 6b , b_2 = -6a , c_2=-(3b-2a)

By cross multiplication method

$x{-}18(a^2{+}b^2) = {-}y12(a^2{+}b^2) = {-}136(a^2{+}b^2)$ $\frac{x}{-18(a^2+b^2)} = \frac{-y}{12(a^2+b^2)} = \frac{-1}{36(a^2+b^2)}$

Now, $x{-}18(a^2{+}b^2) = {-}136(a^2{+}b^2)$ $\frac{x}{-18(a^2+b^2)} = \frac{-1}{36(a^2+b^2)}$

$=x=$ $12\frac{1}{2}$

And , $-y12(a^2{+}b^2) = {-}136(a^2{+}b^2)$ $\frac{-y}{12(a^2+b^2)} = \frac{-1}{36(a^2+b^2)}$

$=y=$ $13\frac{1}{3}$

The solution of the given pair of equations are $12\frac{1}{2}$ and $13\frac{1}{3}$respectively.

Q25

$a^2x - b^2y = 0 \frac{a^2}{x} - \frac{b^2}{y} = 0$ $a^2bx + b^2ay = a+b \frac{a^2b}{x} + \frac{b^2a}{y} = a + b$

Soln:

The given systems of equations are

$a^2x - b^2y = 0 \frac{a^2}{x} - \frac{b^2}{y} = 0$ $a^2bx + b^2ay = a+b \frac{a^2b}{x} + \frac{b^2a}{y} = a + b$

Taking $1x \frac{1}{x}$ =u

Taking $1y \frac{1}{y}$=v

The pair of equations becomes:

$a^2u-b^2v=0$

$a^2bu+b^2av-(a+b) =0$

Here, $a_1= a^2$, $b_1 = -b^2$, $c_1=0$

Here, $a_2= a^2b$, $b_2 = b^2a$, $c_2=-(a+b)$

By cross multiplication method

$= ub^2(a+b) = va^2(a+b) = 1a^2b^2(a+b) \frac{u}{b^2(a+b)} = \frac{v}{a^2(a+b)} = \frac{1}{a^2b^2(a+b)}$

Now, $ub^2(a+b) = 1a^2b^2(a+b) \frac{u}{b^2(a+b)} = \frac{1}{a^2b^2(a+b)}$

$=x= 1a^2 \frac{1}{a^2}$

And, $va^2(a+b) = 1a^2b^2(a+b) \frac{v}{a^2(a+b)} = \frac{1}{a^2b^2(a+b)}$

$=y= 1b^2 \frac{1}{b^2}$

The solution of the given pair of equations are $1a^2 \frac{1}{a^2}$ and $1b^2 \frac{1}{b^2}$ respectively.

Q26

$mx-my=m^2+n^2$

$x+y=2m$

Soln:

$mx-my=m^2+n^2$………………………………… (i)

x+y=2m…………………………………………….. (ii)

Here, a_1= m , b_1 = -n , c_1=-(m^2+n^2)

Here, a_2= 1 , b_2 = 1 , c_2=-(2m)

By cross multiplication method

$\frac{x}{(m+n)^2} = \frac{-y}{-m^2+n^2} = \frac{1}{m+n}$

Now, $\frac{x}{(m+n)^2} = \frac{1}{m+n}$

=x= m+n

And, $\frac{-y}{-m^2+n^2} = \frac{1}{m+n}$

=y=m-n

The solutions of the given pair of equations are m+n and m-n respectively.

Q27

$\frac{ax}{b} - \frac{by}{a} = a + b$

ax-by=2ab

Soln:

The given pair of equations are:

$\frac{ax}{b} - \frac{by}{a} = a + b$ ……………………….. (i)

ax-by=2ab ……………………………. (ii)

Here, a_1= $\frac{a}{b}$, b_1 = $-\frac{b}{a}$, c_1=-(a+b)

Here, a_2= a , b_2 = – b, c_2=-(2ab)

By cross multiplication method

= $\frac{x}{b(b-a)} = \frac{-y}{a(-a+b)} = \frac{1}{b-a}$

Now, $\frac{x}{b(b-a)} = \frac{1}{b-a}$

=x=b

And , $\frac{-y}{a(-a+b)} = \frac{1}{b-a}$

=y=-a

The solution of the given pair of equations are b and –a respectively.

Q28

ba x+ ab y−(a^2+b^2)=0 $\frac{b}{a}x + \frac{a}{b}y - (a^2 + b^2) = 0$

X+y-2ab=0

Soln:

ba x+ ab y−(a^2+b^2)=0 $\frac{b}{a}x + \frac{a}{b}y - (a^2 + b^2) = 0$ …………………….. (i)

X+y-2ab=0……………………………………….. (ii)

Here, a_1= ba $\frac{b}{a}$, b_1 = ab $\frac{a}{b}$, c_1=-(a^2+b^2)

Here, a_2= 1 , b_2 = -1, c_2=-(2ab)

By cross multiplication method

= xb2−a2=−y−b2+a2=1b2−a2ab $\frac{x}{b^2-a^2} = \frac{-y}{-b^2+a^2} = \frac{1}{\frac{b^2-a^2}{ab}}$

Now, xb2−a2=1b2−a2ab $\frac{x}{b^2-a^2} = \frac{1}{\frac{b^2-a^2}{ab}}$

=x=ab

And, −y−b2+a2=1b2−a2ab $\frac{-y}{-b^2+a^2} = \frac{1}{\frac{b^2-a^2}{ab}}$

=y=ab

The solutions of the given pair of equations are ab and ab respectively.