## Exercise 6(B)

**For solving each pair of equations, in this exercise use the method of elimination by equating coefficients:**

**1. 13 + 2y = 9x**
**3y = 7x**
**Solution:**

Given equations,
13 + 2y = 9x … (1)
3y = 7x … (2)
Performing (1)×3 - (2)×2, we get
39 + 6y = 27x
6y = 14x
(-) (-)
39 = 13x
So,
x = 39/13
x = 3
Now, substituting the value of x in (2), we get
3y = 7(3)
y = 7
Hence, the values of x and y are 3 and 7 respectively.

**2. 3x - y = 23**
**(x/3) + (y/4) = 4**
**Solution:**

**Given equations,**
3x - y = 23 ... (1)
(x/3) + (y/4) = 4
⇒ 4x + 3y = 48 ... (2)
Performing (1)×3 + (2), we get
9x – 3y = 69
4x + 3y = 48

13x = 117
So,
x = 117/13
x = 9
Now, substituting the value of x in (1), we get
3(9) - y = 23
y = 27 - 23
y = 4
Hence, the values of x and y are 9 and 4 respectively.

**3. (5y/2) – (x/3) = 8**

**(y/2) + (5x/3) = 12**
**Solution:**

Given equations,
(5y/2) – (x/3) = 8
⇒ -(x/3) + (5y/2) = 8 … (i)
(y/2 + (5x/3) = 12
⇒ (5x/3) + (y/2) = 12 … (ii)

Performing (i)×5 + (ii), we get
-(5x/3) + (25y/2) = 40
(5x/3) + (y/2) = 12
(+)_____(+)___(+)____
(26y/2) = 52
So,
13y = 52
y = 4
Now, substituting y = 4 in (i), we get
-(x/3) + 5(4)/2 = 8
-(x/3) = 8 – 10
x = 6
Hence, the values of x and y are 6 and 4 respectively.

**4.1/5(x - 2) = 1/4(1 - y)**
**26x + 3y + 4 = 0**
**Solution:**

**Given equations,**
1/5(x - 2) = 1/4(1 - y)
⇒ 4x + 5y = 13 … (1)
26x + 3y = - 4 … (2)
Performing (1)×3 - (2)×5, we get
12x + 15y = 39
130x + 15y = -20
(-)___(-)____(+)____
-115x = 59
So,
x = - (59/118)
x = -½
Now, substituting x in (1), we get
4(-1/2) + 5y = 13
5y = 13 + 2
y = 3
Hence, the values of x and y are –½ and 3 respectively.

**5. y = 2x - 6**

**y = 0**
**Solution:**

Given equations,
y = 2x - 6
⇒ 2x – y = 6 … (1)
y = 0 … (2)
Adding (1) and (2), we get
x – y = 6
y = 0

2x = 6
So,
x = 6/2
x = 3
Hence, the values of x and y are 3 and 0 respectively.

**6. (x - y)/6 = 2(4 – x)**
**2x + y = 3(x - 4)**
**Solution:**

Given equations,
(x - y)/6 = 2(4 - x)
⇒ 13x – y = 48 … (i) [On simplifying]
2x + y = 3(x - 4)
⇒ x – y = 12 … (ii) [On simplifying]
Performing (ii)×13 – (i),
13x – 13y = 156
13x – y = 48
(-) (+) (-)

-12y = 108
So,
y = -108/12
y = - 9
Now, substituting y = -9 in (i), we get
13x – (-9) = 48
13x = 39
x = 3
Hence, the values of x and y are 3 and -9 respectively.

**7. 3 - (x - 5) = y + 2**
**2 (x + y) = 4 - 3y**
**Solution:**

Given equations,

3 - (x - 5) = y + 2
⇒ x + y = 6... (1)
2(x + y) = 4 - 3y
⇒ 2x + 5y = 4 ... (2)

Performing (1)×2 – (2), we get
2x + 2y = 12
2x + 5y = 12
(-) (-) (-)

-3y = 8
So,
y = -8/3
Now, substituting value of y in (1), we get
x – (8/3) = 6
x = 26/3
Hence, the values of x and y are 26/3 and -8/3 respectively.

**8. 2x - 3y - 3 = 0**
**(2x/3) + 4y + 1/2 = 0**
**Solution:**

Given equations,
2x -3y - 3 = 0
⇒ 2x - 3y = 3 ... (1)
(2x/3) + 4y + 1/2 = 0
⇒ 4x + 24y = -3 ... (2)

Performing (1)×8 + (2), we get
16x – 24y = 24
4x + 24y = -3

20x = 21
So, x = 21/20
Now, substituting the value of x in (1), we get
2(21/20) – 3y = 3
-3y = 3 - (21/20)
y = -3/10
Hence, the values of x and y are 21/20 and -3/10 respectively.

**9. 13x+ 11y = 70**
**11x + 13y = 74**
**Solution:**

Given equations,

13x + 11y = 70... (1)
11x+ 13y = 74... (2)
On adding (1) and (2), we get
24x + 24y = 144
x + y = 6... (3)
And,
On subtracting (2) from (1), we get
2x - 2y = -4
x – y = -2 … (4)
Now, adding (3) and (4) we get
x + y = 6
x - y = -2

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2x = 4 ⇒ x = 2
On substituting the value of x in (3), we get
2 + y = 6
⇒ y = 4
Hence, the values of x and y are 2 and 4 respectively.

**10. 41x + 53y = 135**
**53x + 41y = 147**
**Solution:**

**Given equations,**
41x + 53y = 135 ... (1)
53x + 41y = 147 ... (2)
On adding (1) and (2), we get
94x + 94y = 282
⇒ x + y = 3 ... (3)
And, on subtracting (2) from (1) we get
-12x +12y = -12
-x + y = -1 … (4)
Now, adding (3) and (4), we get
-x + y = -1
x + y = 3

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2y = 2
⇒ y = 1
On substituting the value of y in (3), we get
x + 1 = 3
⇒ x = 2
Hence, the values of x and y are 2 and 1 respectively.

**11. If 2x + y = 23 and 4x - y = 19; find the values of x - 3y and 5y - 2x.**
**Solution:**

Given equations,
2x + y = 23 ... (1)
4x - y = 19 ... (2)
On adding equation (1) and (2), we get
2x + y = 23
4x - y = 19

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6x = 42 ⇒ x = 7
Now,
On substituting the value of x in (1), we get
2(7) + y = 23
y = 23 - 14
⇒ y = 9
Hence,
x - 3y = 7 - 3(9) and 5y - 2x = 5(9) - 2(7)
= 7 - 27 = 45 - 14
= -20 = 31

**12. If 10y = 7x - 4 and 12x + 18y = 1; find the values of 4x + 6y and 8y - x.**
**Solution:**

Given equations,
10y = 7x - 4
-7x + 10y = -4 ... (1)
12x + 18y = 1... (2)
Performing (1)×12 + (2)×7, we get
-84x + 120y = -48
84x + 126y = 7

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246y = -41
⇒ y = -41/246
y = -1/6
On substituting the value of y in (1), we get
-7x + 10 + (-1/6) = -4
-7x = -4 + (5/3)
⇒ x = 1/3
Hence, values of 4x + 6y = 4(1/3) + 6(-1/6) = 1/3
And,
8y - x = 8(-1/6) – (1/3) = (-5/3)

**13. Solve for x and y:**
**(i) (y + 7)/5 = (2y – x)/4 + 3x – 5**
**(7 – 5x)/2 + (3 – 4y)/6 = 5y – 18**

**(ii) 4x = 17 – (x – y)/8**
**2y + x = 2 + (5y + 2)/3**
**Solution:**

(i) Given equations,
(y + 7)/5 = (2y - x)/4 + 3x – 5
⇒ 55x + 6y = 128 … (i) [On simplifying]
And,
(7 – 5x)/2 + (3 – 4y)/6 = 5y – 18
⇒ 15x + 34y = 132 … (ii) [On simplifying]

Performing (i)×3 - (ii)×11, we get
165x + 18y = 384
165x + 374y = 1452
(-) (-) (-) [subtracting]

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-356y = - 1068
⇒ y = 1068/356
y = 3
Now, on substituting y = 3 in equation (i), we get
55x + 6(3) = 128
55x = 110
x = 2
∴ The solution is x = 2 and y = 3.

(ii) Given equations,
4x = 17 – (x - y)/8
33x – y = 136 … (i) [On simplifying]
2y + x = 2 + (5y + 2)/3
3y + y = 8 … (ii) [On simplifying]

Performing (i) - (ii)×11, we get
33x + 11y = 88
33x - y = 136
(-) (+) (-)

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12y = -48
⇒ y = -48/12
y = -4
Now, on substituting y = -4 in equation (i), we get
33x - (-4) = 136
33x = 132
x = 4
∴ The solution is x = 4 and y = -4.

**14. Find the value of m, if x = 2, y = 1 is a solution of the equation 2x + 3y = m.**
**Solution:**

Given, x = 2 and y = 1 is the solution of the equation 2x + 3y = m
Then,
2(2) + 3(1) = m
4 + 3 = m
∴ m = 7
Hence, if x = 2 and y = 1 is the solution of the equation 2x + 3y = m, then the value of m = 7.

**15. 10% of x + 20% of y = 24**
**3x - y = 20**

**Solution:**

Given equations,
10% of x + 20% of y = 24
0.1x + 0.2y = 24 …(i) [On simplifying]
3x – y = 20 …(ii)

Performing (ii)×0.2 + (i), we get
0.6x – 0.2y = 4
0.1x + 0.2y = 24
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0.7x = 28
So,
x = 28/0/7
x = 40
Now, on substituting x = 40 in (i), we get
0.1(40) + 0.2y = 24
0.2y = 20
y = 100
∴ The solution is x = 40 and y = 100.

**16. The value of expression mx - ny is 3 when x = 5 and y = 6. And its value is 8 when x = 6 and y = 5. Find the values of m and n.**
**Solution:**

Given,
The value of expression mx – ny is 3 when x = 5 and y = 6.
⇒ 5m – 6n = 3 … (i)
And,
The value of expression mx – ny is 8 when x = 6 and y = 5
⇒ 6m – 5n = 8 … (ii)
Solving for m and n:

Performing (i)×6 - (ii)×5, we get
30m – 36n = 18
30m – 25n = 40
(-) (+) (-)

-11n = -22
So,
n = 22/11
n = 2
Now, on substituting n = 2 in equation (i), we get
5m – 6(2) = 3
5m = 15
m = 3
∴ The solution is m = 3 and n = 2.

**17. Solve:**
**11(x - 5) + 10(y - 2) + 54 = 0**
**7(2x - 1) + 9(3y - 1) = 25**
**Solution:**

Given equations,
11(x – 5) + 10(y -2) + 54 = 0
11x – 55 + 10(y-2) + 54 = 0
11x + 10y – 21 = 0
⇒ 11x + 10y = 21 … (1)
And,
7(2x - 1) +9(3y - 1) = 25
14x – 7 + 27y – 9 = 25
14x + 27y – 16 = 25
⇒ 14x + 27y = 41 … (2)

On multiplying equation (1) by 27 and equation (2) by 10, we get
297x + 270y = 567 … (3)
140x + 270y = 410 … (4)
Subtracting equation (4) from equation (3), we get
157x = 157
x = 1
Now, on substituting x = 1 in equation (1), we get
11 × 1 + 10y = 21
10y = 10
y = 1
∴ The solution set is x = 1 and y = 1.

**18. Solve:**
**(7+x)/5 – (2x-y)/4 = 3y – 5**

**(5y – 7)/2 + (4x - 3)/6 = 18 – 5x**
**Solution:**

Given equations,
(7 + x)/5 – (2x - y)/4 = 3y – 5
4(7 + x) – 5(2x - y) = 20(3y - 5)
28 + 4x – 10x + 5y = 60y – 100
⇒ -6x – 55y = - 128 … (1)
And,
(5y – 7)/2 + (4x-3)/6 = 18 – 5x
3(5y - 7) + 4x – 3 = 6(18 – 5x)
15y – 21 + 4x – 3 = 108 – 30x
⇒ 34x + 15y = 132 … (2)

On multiplying equation (1) by 34 and equation (2) by 6, we get
-204x – 1870y = - 4352 … (3)
204x + 90y = 792 … (4)
Adding equations (3) and (4), we get
-1780y = -3560
y = 2
Now, on substituting y = 2 in equation (1), we get
-6x – 55 × 2 = -128
-6x – 110 = - 128
-6x = -18
x = 3
∴ The solution set is x = 3 and y = 2.

**19. Solve:**
**4x + (x – y)/8 = 17**
**2y + x – (5y+2)/3 = 2**
**Solution:**

Given equations,
4x + (x – y)/8 = 17
32x + x – y = 136
⇒ 33x – y = 136 … (1)
And,
2y + x – (5y+2)/3 = 2
6y + 3x – 5y – 2 = 6
⇒ 3x + y = 8 … (2)

On adding equations (1) and (2), we get
36x = 144
⇒ x = 4
Now, on substituting x = 4 in equation (2), we get

$3 \times 4 + y = 8$
$12 + y = 8$
$\Rightarrow y = -4$
$\therefore$ The solution is $x = 4$ and $y = -4$