

Unit 9

Linear Equations

Exercise 9.1

1. Separate the linear equations and non-linear equations from the following equations.

(i) 2x + 3 = 7Solution: The power of variable in this equation is 1 so, it is a linear equation.

(ii) $5x^2 + 2 = 9$

Solution: The power of variable in this equation is 2 so, it is a non-linear equation.

(iii) 3x + 5y = 8

Solution: The power of variables in this equation is 1 so, it is a linear equation.

(iv) 7x + 3 = 12Solution: The power of variable in this equation is 1 so, it is a linear equation.

(v) 5y = 8Solution: The power of variable in this equation is 1 so, it is a linear equation.

(vi) 3x + 7y = 8Solution: The power of variables in this equation is 1 so, it is a linear equation.

(vii) $8x^3 + 7 = 9$ Solution: The power of variable in this equation is 1 so, it is a linear equation.

(viii) 3x + 5 = 10Solution: The power of variable in this equation is 1 so, it is a linear equation.

2. Separate linear equations in one variable and linear equations in two variables.
(i) 3x + 7 = 12

Solution: There is only 1 variable (which is 'x') in this linear equation so, it is a linear equation in one variable.

(ii) 5x + 7y = 10

Solution: There are 2 variables (which are 'x' and 'y') in this linear equation so, it is a linear equation in two variables.

(iii) 4x + 3 = 9

Solution: There is only 1 variable (which is 'x') in this linear equation so, it is a linear equation in one variable.



(iv) 8x = 3

Solution: There is only 1 variable (which is 'x') in this linear equation so, it is a linear equation in one variable.

(v) 7x + 9y = 11

Solution: There are 2 variables (which are 'x' and 'y') in this linear equation so, it is a linear equation in two variables.

(vi) 2x + y = 12

Solution: There are 2 variables (which are 'x' and 'y') in this linear equation so, it is a linear equation in two variables.

(vii) 12x = 4

Solution: There is only 1 variable (which is 'x') in this linear equation so, it is a linear equation in one variable.

(viii) 13x = 6

Solution: There is only 1 variable (which is 'x') in this linear equation so, it is a linear equation in one variable.

(ix) 7y = 9

Solution: There is only 1 variable (which is 'y') in this linear equation so, it is a linear equation in one variable.

(x) x + y = 1

Solution: There are 2 variables (which are 'x' and 'y') in this linear equation so, it is a linear equation in two variables.

3. Solve the following linear equations.

(i) 2x + 3 = 6

Solution: In this linear equation we will find value of *x*. It means, we have to separate *x* from all other terms. For this:

2x + 3 = 6

Subtract 3 from both sides

$$2x + 3 - 3 = 6 - 3$$

2x = 3

Divide both sides by 2

$$\frac{\cancel{2}x}{\cancel{2}} = \frac{3}{2}$$
$$x = \frac{3}{2}$$

Δ7

(ii) 6x + 5 = 9

Solution: In this linear equation we will find value of *x*. It means, we have to separate *x* from all other terms. For this:

6x + 5 = 9

Subtract 5 from both sides

6x + 5 - 5 = 9 - 56x = 4

Divide both sides by 6

$$\frac{\cancel{6}x}{\cancel{6}} = \frac{\cancel{4}^2}{\cancel{6}_3}$$
$$x = \frac{2}{3}$$

(iii) 7x + 8 = 12

Solution: In this linear equation we will find value of *x*. It means, we have to separate *x* from all other terms. For this:

7x + 8 = 12Subtract 8 from both sides 7x + 8 - 8 = 12 - 8

7x = 4

Divide both sides by 7

$$\frac{\cancel{7} x}{\cancel{7}} = \frac{4}{7}$$
$$x = \frac{4}{7}$$

(iv) 12x + 3 = 14

Solution: In this linear equation we will find value of x. It means, we have to separate x from all other terms. For this:

12x + 3 = 14Subtract 3 from both sides 12x + 3 - 3 = 14 - 3 12x = 11Divide both sides by 12 $\frac{\sqrt{2}x}{\sqrt{2}} = \frac{11}{12}$ $x = \frac{11}{12}$

(v) 12x + 2 = 14

Solution: In this linear equation we will find value of *x*. It means, we have to separate *x* from all other terms. For this:

12x + 2 = 14Subtract 2 from both sides 12x + 2 - 2 = 14 - 212x = 12Divide both sides by 12 $\frac{\cancel{12}x}{\cancel{12}} = \frac{\cancel{12}}{\cancel{12}}$ x = 1

ΔZ

(vi) 6x + 8 = 15

Solution: In this linear equation we will find value of x. It means, we have to separate x from all other terms. For this:

6x + 8 = 15Subtract 8 from both sides 6x + 8 - 8 = 15 - 86x = 7

Divide both sides by 6

$$\frac{\cancel{6}x}{\cancel{6}} = \frac{7}{6}$$
$$x = \frac{7}{6}$$

(vii) 11x + 3 = 15

Solution: In this linear equation we will find value of x. It means, we have to separate x from all other terms. For this:



(viii) 13x + 8 = 21

Solution: In this linear equation we will find value of x. It means, we have to separate x from all other terms. For this:

13x + 8 = 21Subtract 8 from both sides

$$13x + 8 - 8 = 21 - 8$$

 $13x = 13$
Divide both sides by 13

$$\frac{\cancel{13}x}{\cancel{13}} = \frac{\cancel{13}}{\cancel{13}}$$
$$x = 1$$

- 4. Solve the following linear equations.
- $\frac{x+1}{x-1} = \frac{11}{21}$ (i)

Solution: In this linear equation we will find value of x. It means, we have to separate x from all other terms. For this:





 $\frac{x+1}{x-1} = \frac{11}{21}$

Cross multiply

 $21 \times (x + 1) = 11 \times (x - 1)$ 21x + 21 = 11x - 11Subtract 21 from both sides 21x + 21 - 21 = 11x - 11 - 21 21x = 11x - 32Subtract 11x from both sides 21x - 11x = 11x - 32 - 11x

Divide both sides by 10

 $\frac{\cancel{10}x}{\cancel{10}} = -\frac{\cancel{32}^{16}}{\cancel{10}_5}$ $x = -\frac{16}{5}$

10 x = -32

(ii)
$$\frac{2x+3}{3x+2} = 12$$

Solution: In this linear equation we will find value of *x*. It means, we have to separate *x* from all other terms. For this:

 $\frac{2x+3}{3x+2} = 12$

Cross multiply 2x + 3 = 36x + 24 **TERNATIONAL** $1 \times (2x + 3) = 12 \times (3x + 2)$ Subtract 3 from both sides 2x + 3 - 3 = 36x + 24 - 32x = 36x + 21Subtract 2x from both sides 2x - 2x = 36x + 21 - 2x0 = 34x + 21Subtract 21 from both sides 0 - 21 = 34x + 21 - 21-21 = 34xDivide both sides by 34 $-\frac{21}{34} = \frac{34x}{34}$ $-\frac{21}{34} = x \quad or \quad x = -\frac{21}{34}$ (iii) $\frac{3x+4}{4x+3} = \frac{12}{13}$ Solution: In this linear equation we will find value of x. It means, we have to separate x from all other





terms. For this: $\frac{3x+4}{4x+3} = \frac{12}{13}$ Cross multiply $13 \times (3x + 4) = 12 \times (4x + 3)$ 39x + 52 = 48x + 36Subtract 52 from both sides 39x + 52 - 52 = 48x + 36 - 5239x = 48x - 16Subtract 39x from both sides 39x - 39x = 48x - 16 - 39x0 = 9x - 16Add 16 on both sides 0 + 16 = 9x - 16 + 1616 = 9xDivide both sides by 9 $\frac{16}{9} = \frac{\cancel{9}x}{\cancel{9}}$ $\frac{16}{9} = x \quad or \quad x = \frac{16}{9}$ (iv) $\frac{2x+1}{3x+2} = \frac{3}{2}$ Solution: In this linear equation we will find value of x. It means, we have to separate x from all other terms. For this: $\frac{2x+1}{3x+2} = \frac{3}{2}$ Cross multiply $2 \times (2x + 1) = 3 \times (3x + 2)$ 4x + 2 = 9x + 6Subtract 2 from both sides 4x + 2 - 2 = 9x + 6 - 24x = 9x + 4Subtract 9*x* from both sides 4x - 9x = 9x + 4 - 9x-5x = 4Divide both sides by - 5 $\frac{\cancel{75}}{\cancel{75}}x = -\frac{4}{5}$ $x = -\frac{4}{5}$ (v) $\frac{x+1}{x+1} = \frac{1}{x+1}$

$$2x+3^{-}3$$

Solution: In this linear equation we will find value of *x*. It means, we have to separate *x* from all other





terms. For this: $\frac{x+1}{2x+3} = \frac{1}{3}$ Cross multiply $3 \times (x+1) = 1 \times (2x+3)$ 3x+3 = 2x+3Subtract 3 from both sides 3x+3-3 = 2x+3-3 39x = 2xSubtract 2x from both sides 39x-2x = 2x-2x 37x = 0Divide both sides by 37 37 = 0

$$\frac{\cancel{37}}{\cancel{37}}x = \frac{0}{37}$$
$$x = 0$$

$$(vi) \quad \frac{5x+1}{x+2} = 4$$

Solution: In this linear equation we will find value of *x*. It means, we have to separate *x* from all other terms. For this:

 $\frac{5x+1}{x+2} = 4$

 $1 \times (5x + 1) = 4 \times (x + 2)$ 5x + 1 = 4x + 8

Subtract 1 from both sides 5x + 1 - 1 = 4x + 8 - 1 5x = 4x + 7Subtract 4x from both sides

$$5x - 4x = 4x + 7 - 4x$$
$$x = 7$$

(vii) $\frac{x+1}{x} = 8$

Solution: In this linear equation we will find value of x. It means, we have to separate x from all other terms. For this:

 $\frac{x+1}{x} = 8$

Cross multiply

 $1 \times (x + 1) = 8 \times (x)$ x + 1 = 8xSubtract *x* from both sides



$$x + 1 - x = 8x - x$$
$$1 = 7x$$

Divide both sides by 7

$$\frac{1}{7} = \frac{\cancel{7}x}{\cancel{7}}$$
$$\frac{1}{7} = x$$

(viii)
$$\frac{7x+2}{x+1} = \frac{3}{5}$$

Solution: In this linear equation we will find value of x. It means, we have to separate x from all other terms. For this:

 $\frac{7x+2}{x+1} = \frac{3}{5}$

Cross multiply

$$5 \times (7x + 2) = 3 \times (x + 1)$$

35x + 10 = 3x + 3

Subtract 10 from both sides

35x + 10 - 10 = 3x + 3 - 10

35x = 3x - 7

Subtract 3x from both sides

$$35x - 3x = 3x - 7 - 3x$$
$$32x = -7$$

Divide both sides

s by 32

$$\frac{32}{32}x = -\frac{7}{32}$$
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 $x = -\frac{7}{32}$

Exercise 9.2

1. Determine in which quadrant of the coordinate plane, the following points lie?

(i) A(7, -8)

(ii) B(2, 8)

Solution: Here *x* is positive and *y* is negative so it lies in the 4th quadrant.

(iii) C(7, 1)

Solution: Here *x* is positive and *y* is also positive so it lies in the 1st quadrant.

E(-2, -8)**(v)**

Solution: Here *x* is negative and *y* is also negative so it lies in the 3^{rd} quadrant.

Solution: Here *x* is positive and *y* is also positive so it lies in the 1st quadrant.

(iv) D(-8, 2)

Solution: Here *x* is negative and *y* is positive so it lies in the 2^{nd} quadrant.

(vi) F(8, -2)

Solution: Here *x* is positive and *y* is negative so it lies in the 4th quadrant.











1. Draw the graph of following linear equations in one variable.

(i) 2x + 3 = 8Solution: To draw the graph of the linear equation find the value of x and draw a line parallel to y-axis. 2x + 3 = 8Subtract 3 from both sides 2x + 3 - 3 = 8 - 32x = 5Divide both sides by 2 2x = 5

$$\frac{2x}{2} = \frac{5}{2}$$
$$x = \frac{5}{2} \text{ or } 2\frac{1}{2}$$









Solution: To draw the graph of the linear equation find the value of *x* and draw a line parallel to y-axis.



 $\frac{5x+2}{4x+3} = \frac{12}{11}$ Cross multiply $11 \times (5x + 2) = 12 \times (4x + 3)$ 55x + 22 = 48x + 36Subtract 22 from both sides 55x + 22 - 22 = 48x + 36 - 2255x = 48x + 14 $\leftarrow -6 -5 -4 -3 -2 -1^{1-}$ x-axis Subtract 48x from both sides 55x - 48x = 48x - 6 - 48x7x = -6Divide both sides by 7 $\frac{\cancel{7}x}{\cancel{7}} = -\frac{6}{7}$ $x = -\frac{6}{7}$ $\frac{3x+4}{4x+3} = \frac{10}{11}$ (vi) Solution: To draw the graph of the linear equation find the value of x and draw a line parallel to y-axis. Publis $\begin{array}{c|c} & 3 + & & \\ & 2 - & & \\ & 2 - & & \\ & 2 - & & \\ & -1 - & 1 & 2 & 3 \\ & -1 - & 1 & 2 & 3 \\ & -1 - & 1 & 2 & 3 \\ & -2 - & & \\ & -3 - & & \\ & -3 - & & \\ & -4 - & & \\ & -5 - & & \\ \end{array}$ $\frac{3x+4}{4x+3} = \frac{10}{11}$ 3x + 4 = 10**Cross multiply** $11 \times (3x + 4) = 10 \times (4x + 3)$ 33x + 44 = 40x + 30x-axis Subtract 44 from both sides 33x + 44 - 44 = 40x + 30 - 4433x = 40x - 11Subtract 40*x* from both sides 33x - 40x = 40x - 11 - 40x-7x = -11Divide both sides by -7 $\frac{\cancel{1} x}{\cancel{1}} = \frac{-11}{-7}$ $x = \frac{11}{7}$ or $1\frac{4}{7}$

2. Draw the graph of following linear equations in two variables.

(i) 2x + 3y = 12

Solution: To draw the graph of the linear equation in two variables: **Step 1:** Put x = 0 and find the value of y and make an ordered pair. 2x + 3y = 12

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Step 2: Put y = 0 and find the value of x and make an ordered pair.

2x + 3y = 122x + 3(0) = 122x = 12Divide both sides by 2

x = 6



So, the required point is (6, 0).

Step 3: Locate obtained points in the coordinate plane and join them with a line.

(ii) 3x + 4y = 24**Solution:** To draw the graph of the linear equation in two variables: **Step 1:** Put x = 0 and find the value of y and make an ordered pair. 3x + 4y = 243(0) + 4y = 24v-axis 4y = 2410Divide both sides by 4 v = 6So, the required point is (0, 6). x-axis **Step 2:** Put y = 0 and find the value of x and make an ordered pair. 3x + 4y = 243x + 4(0) = 243x = 24Divide both sides by 3 -10 x = 8So, the required point is (8, 0).

Step 3: Locate obtained points in the coordinate plane and join them with a line.

(iii) x + 7y = 14v-axis 10¹ **Solution:** To draw the graph of the linear equation in two variables: **Step 1:** Put x = 0 and find the value of y and make an ordered pair. r-axis x + 7y = 1410 12 14 (0) + 7y = 147y = 14Divide both sides by 7 v = 2-10 So, the required point is (0, 2).



Step 2: Put y = 0 and find the value of x and make an ordered pair. x + 7y = 14x + 7(0) = 14x = 14So, the required point is (14, 0). Step 3: Locate obtained points in the coordinate plane and join them with a line. (iv) 7x + 3y = 21**Solution:** To draw the graph of the linear equation in two v-axis variables: **Step 1:** Put x = 0 and find the value of y and make an ordered pair. 7x + 3y = 217(0) + 3y = 21x-axis 3y = 21Divide both sides by 3 v = 7So, the required point is (0, 7). **Step 2:** Put y = 0 and find the value of x and make an ordered pair. 7x + 3y = 217x + 3(0) = 217x = 21Divide both sides by 7 x = 3So, the required point is (3, 0). Step 3: Locate obtained points in the coordinate plane and join them with a line. **(v)** 3x + 5y = 15Solution: To draw the graph of the linear equation in two variables: **Step 1:** Put x = 0 and find the value of y and make an ordered pair. 3x + 5y = 153(0) + 5y = 155y = 15V-axis Divide both sides by 5 v = 3So, the required point is (0, 3). **Step 2:** Put y = 0 and find the value of x and make an ordered pair. 3x + 5y = 153x + 5(0) = 153x = 15Divide both sides by 3 x = 5-10 So, the required point is (5, 0). **Step 3:** Locate obtained points in the coordinate plane and join them with a line.



v-axis

S;

x-axis



(vi) 7x + 5y = 35

Solution: To draw the graph of the linear equation in two variables: **Step 1:** Put x = 0 and find the value of y and make an ordered pair.

$$7x + 5y = 35$$

 $7(0) + 5y = 35$
 $5y = 35$

Divide both sides by 5

y = 7So, the required point is (0, 7).

Step 2: Put y = 0 and find the value of *x* and make an ordered pair.

$$7x + 5y = 35$$

 $7x + 5(0) = 35$
 $7x = 35$

Divide both sides by 7

x = 5

So, the required point is (5, 0).

Step 3: Locate obtained points in the coordinate plane and join them with a line.

3. Find the coordinate of the following encircled points of the graph of linear equation in two variables.



4. Twice a number added to half of it equals 15, find the number.

Solution: Suppose that the number is *x*. According to given condition:

Twice the number will be 2x and half of the number means $\frac{x}{2}$.

$$2x + \frac{x}{2} = 15$$

Now, we have to find the value of *x*.



Take LCM to add

$$\frac{4x+x}{2} = 15$$
$$\frac{5x}{2} = 15$$

Multiply both sides by 2.

$$\frac{5x}{\cancel{2}} \times \cancel{2} = 15 \times 2$$

$$5x = 30$$

Dividing both sides by 5

$$\frac{\cancel{5}x}{\cancel{5}} = \frac{\cancel{30}^6}{\cancel{5}}$$
$$x = 6$$

It means, the required number is 6.

5. Thrice a number decreased by 10 the result is 26, find the number.

Solution: Suppose that the number is *x*. According to given condition:

Thrice the number will be 3x and decreased means minus (-) so,

3x - 10 = 26

Now, we have to find the value of *x*. Add 10 on both sides of the linear equation

$$3x - 10 + 10 = 26 + 10$$

Divide both sides by 3

$$\frac{3x}{3} = \frac{36}{3}$$
$$\frac{\cancel{3}x}{\cancel{3}} = \frac{\cancel{3}6}{\cancel{3}}$$
$$x = 12$$

It means, the required number is 12.

6. The sum of three consecutive numbers is 15, find the numbers.

Solution: Suppose that the consecutive numbers are n, n + 1 and n + 2. According to given condition:

3x = 36 INTERNATIONAL

$$n + n + 1 + n + 2 = 15$$

Now, we have to find the value of *n*.

Subtract 3 from both sides

$$3n + 3 = 15$$

 $3n + 3 - 3 = 15 - 3$
 $3n = 12$

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Divide both sides by 3

$$\frac{3n}{3} = \frac{12}{3}$$
$$\frac{\cancel{3}n}{\cancel{3}} = \frac{\cancel{12}^4}{\cancel{3}}$$
$$n = 4$$

It means, the required numbers are 4, 5 and 6.

7. The sum of three consecutive odd numbers is 27. Find the numbers.

Solution: Suppose that the consecutive odd numbers are n, n + 2 and n + 4. According to given condition:

$$n + n + 2 + n + 4 = 27$$

Now, we have to find the value of *n*.

Subtract 6 from both sides

$$3n+6-6=27-6$$
$$3n=21$$

3n + 6 = 27

Divide both sides by 3

$$\frac{3n}{3} = \frac{21}{3}$$
$$\frac{\cancel{3}n}{\cancel{3}} = \frac{\cancel{21}^7}{\cancel{3}}$$
$$n = 7$$
$$-4 = 11$$

n = 7, n + 2 = 7 + 2 = 9 and n + 4 = 7 + 4 = 1

It means, the required numbers are 7, 9 and 11.

8. The sum of three consecutive even numbers is 24. Find the numbers.

Solution: Suppose that the consecutive even numbers are 2n, 2n + 2 and 2n + 4. According to given condition:

$$2n + 2n + 2 + 2n + 4 = 24$$

Now, we have to find the value of *n*.

Subtract 6 from both sides

$$6n + 6 - 6 = 24 - 6$$

 $6n = 18$

6n + 6 = 24

Divide both sides by 6

$$\frac{6n}{6} = \frac{18}{6}$$
$$\frac{\cancel{6}n}{\cancel{6}} = \frac{\cancel{18}^3}{\cancel{6}}$$
$$n = 3$$

n = 3, 2n = 6, 2n + 2 = 6 + 2 = 8 and 2n + 4 = 6 + 4 = 10

It means, the required consecutive even numbers are 6, 8 and 10.



Review Exercise 9

1. Choose the correct option.							
(i) Which one of the equations is linear	?						
(a) $2x^2 + 3$ (b) $3x^3$	x + 5	(c)	$x^2 + x + 1$		(d)	2^{18}	
(ii) Which one of the equations is non-lin	near?						
(a) $x + 5$ (b) x	•	(c)	2x + 3		(d)	$2x^3 + 7$	
(iii) The solution of $2x + 3 = 11$ is:							
(a) 4 (b) 3	(c)	5	(d)	2			
(iv) The solution of $\frac{x+1}{x+2} = \frac{2}{3}$ is:							
(a) 1 (b) 2	(c)	3	(d)	5			
(v) The solution of $\frac{3x}{2} = 3$ is:							
(a) $x = 1$ (b) $x = 2$	(c)	<i>x</i> = 3	(d)	x = 4			
 2. Solve the following. (i) 11x + 3 = 19 		(ii) 12 <i>x</i>	+ 8 = 24				
Solution: In this linear equation we will find value Solution: In this linear equation we will find value							
of x . It means, we have to separate x from all other of x . It means, we have to separate x from all other						from all other	
erms. For this: terms. For this:							
11x + 3 = 19 $12x + 8 = 24$ Subtract 2 from both sides							
Subtract 5 from both sides 11r + 3 = 3 = 10 3 12r + 8 = 8 = 24 8							
11x + 5 $5 = 19 - 511x - 16$			12x + 6 = 6 = 12r = 12r	- 16			
Divide both sides by 11 \square	ide both sides by 11 Divide both sides by 12						
$\frac{\cancel{1}}{\cancel{1}} = \frac{16}{11}$	RNA Pu	blishin	g Hou $\frac{\cancel{1}}{\cancel{1}}$	$=\frac{16^4}{12_3}$			
$x = \frac{16}{11}$			<i>x</i> =	$=\frac{4}{3}$			

(iii) 13x + 9 = 21

Solution: In this linear equation we will find value of *x*. It means, we have to separate *x* from all other terms. For this:

13x + 9 = 21Subtract 9 from both sides 13x + 9 - 9 = 21 - 913x = 12Divide both sides by 13 $\frac{\cancel{13}x}{\cancel{13}} = \frac{12}{13}$ $x = \frac{12}{13}$

(iv) 7x + 8 = 18

Solution: In this linear equation we will find value of *x*. It means, we have to separate *x* from all other terms. For this:

7x + 8 = 18Subtract 8 from both sides 7x + 8 - 8 = 18 - 87x = 10Divide both sides by 7 $\frac{\sqrt{7}x}{\sqrt{7}} = \frac{10}{7}$ $x = \frac{10}{7}$



3. Solve the following equations.

(i) $\frac{3x+1}{x+1} = \frac{5}{2}$

Solution: In this linear equation we will find value of *x*. It means, we have to separate *x* from all other terms. For this:

 $\frac{3x+1}{x+1} = \frac{5}{2}$

Cross multiply

 $2 \times (3x + 1) = 5 \times (x + 1)$ 6x + 2 = 5x + 5

Subtract 2 from both sides

$$6x + 2 - 2 = 5x + 5 - 2$$

$$6x = 5x + 3$$

Subtract 5x from both sides

$$6x - 5x = 5x + 3 - 5x$$
$$x = 3$$

(iii) $\frac{7x+3}{2x+5} = \frac{10}{7}$

Solution: In this linear equation we will find value of x. It means, we have to separate x from all other terms. For this:

 $\frac{7x+3}{2x+5} = \frac{10}{7}$

Cross multiply

$$7 \times (7x + 3) = 10 \times (2x + 5)$$

 $49x + 21 = 20x + 50$

Subtract 21 from both sides

$$49x + 21 - 21 = 20x + 50 - 21$$

$$49x = 20x + 29$$

Subtract 20x from both sides

$$49x - 20x = 20x + 29 - 20x$$
$$29x = 29$$

Divide both sides by 29

$$\frac{29}{29}x = \frac{29}{29}$$
$$x = 1$$

(ii)
$$\frac{x+1}{2x+3} = \frac{5}{11}$$

Solution: In this linear equation we will find value of *x*. It means, we have to separate *x* from all other terms. For this:

$$\frac{x+1}{2x+3} = \frac{5}{11}$$

Cross multiply
 $11 \times (x+1) = 5 \times (2x+3)$
 $11x + 11 = 10x + 15$
Subtract 11 from both sides
 $11x + 11 - 11 = 10x + 15 - 11$
 $11x = 10x + 4$
Subtract 10x from both sides
 $11x - 10x = 10x + 4 - 10x$

x = 4

(iv) $\frac{5x+1}{x+3} = \frac{8}{3}$

Solution: In this linear equation we will find value of x. It means, we have to separate x from all other terms. For this:

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$$\frac{5x+1}{x+3} = \frac{8}{3}$$

Pul Cross multiply se

$$3 \times (5x+1) = 8 \times (x+3)$$

15x + 3 = 8x + 24

Subtract 3 from both sides

$$15x + 3 - 3 = 8x + 24 - 3$$

15x = 8x + 21

Subtract 8x from both sides

$$15x - 8x = 8x + 21 - 8x$$

$$7x = 21$$

Divide both sides by 7

$$\frac{\cancel{1}}{\cancel{1}}x = \frac{\cancel{2}1^3}{\cancel{1}}$$
$$x = 3$$



4. Draw the graph of following linear equations in one variable.

(i) 3x + 5 = 11

Solution: To draw the graph of the linear equation find the value of *x* and draw a line parallel to y-axis. 3x + 5 = 11 y-axis



(ii) 3x + 8 = -10

Solution: To draw the graph of the linear equation find the value of *x* and draw a line parallel to y-axis. 3x + 8 = -10



(iii) 7x + 2 = -12

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Solution: To draw the graph of the linear equation find the value of *x* and draw a line parallel to y-axis. 7x + 2 = -12





x-axis



Solution: To draw the graph of the linear equation find the value of *x* and draw a line parallel to y-axis.

$$\frac{2x+5}{x+1} = \frac{1}{2}$$

Cross multiply



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

(v)
$$\frac{5x+2}{3x+2} = \frac{7}{3}$$

Solution: To draw the graph of the linear equation find the value of *x* and draw a line parallel to y-axis.

 $\frac{5x+2}{3x+2} = \frac{7}{3}$

Cross multiply

$$3 \times (5x + 2) = 7 \times (3x + 2)$$

15x + 6 = 21x + 14

Subtract 6 from both sides

$$15x + 6 - 6 = 21x + 14 - 6$$

$$15x = 21x + 8$$

Subtract 21x from both sides

$$15x - 21x = 21x + 8 - 21x$$

$$-6x = 8$$

Divide both sides by 6

$$-\frac{\cancel{6}}{\cancel{6}}x = \frac{\cancel{8}^4}{\cancel{6}_3}$$
$$x = -\frac{4}{3} \text{ or } -1\frac{1}{3}$$



y-axis

0 -1-



5. Sara is twice as old as her brother now. After five years, the sum of their ages is 31. Find the age of Sara. Solution: Suppose that the age of Sara's brother is *x*. According to given condition:

Age of Sara = Twice as old as her brother

Age of Sara = 2x

After five years

Age of Sara's brother = x + 5

Age of Sara = 2x + 5

Now, according to given condition

x + 5 + 2x + 5 = 313x + 10 = 31

Subtract 10 from both sides

3x + 10 - 10 = 31 - 103x = 21Divide both sides by 3 x = 7

It means, the age of Sara's brother is 7 years and Sara's age is 14 years.