Linear Equations

Examples

1)

$$x + 2 = 6$$

$$\cancel{x + 2 - 2 = 6 - 2}$$

$$x = 6 - 2$$

$$x = 4$$

2)

$$y - 3 = 5$$

$$\cancel{y - 3 + 3 = 5 + 3}$$

$$y = 5 + 3$$

$$y = 8$$

3)

$$2x = 10$$

$$\cancel{\frac{2x}{2} = \frac{10}{2}}$$

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

$$x = 5$$

4)

$$\frac{x}{3} = 4$$

$$\cancel{\frac{x}{3} \times 3 = 4 \times 3}$$

$$x = 4 \times 3$$

$$\underline{x = 12}$$

Further Examples

1)

$$x + 7 = 10$$
$$x = 10 - 7$$
$$\underline{x = 3}$$

2)

$$x - 4 = 1$$
$$x = 1 + 4$$
$$\underline{x = 5}$$

3)

$$3x = 12$$
$$x = \frac{12}{3}$$
$$\underline{x = 4}$$

4)

$$\frac{x}{2} = 5$$
$$x = 5 \times 2$$
$$\underline{x = 10}$$

Exercise

1)

$$x + 1 = 8$$
$$x = 8 - 1$$
$$\underline{x = 7}$$

5)

$$x + 6 = 10$$
$$x = 10 - 6$$
$$\underline{x = 4}$$

2) $x - 2 = 9$

$x = 9 + 2$

$\underline{x = 11}$

3) $10x = 20$

$x = \frac{20}{10}$

$\underline{x = 2}$

4) $\frac{x}{3} = 3$

$x = 3 \times 3$

$\underline{x = 9}$

6) $x - 5 = 2$

$x = 2 + 5$

$\underline{x = 7}$

7) $8x = 16$

$x = \frac{16}{8}$

$\underline{x = 2}$

8) $\frac{x}{5} = 3$

$x = 3 \times 5$

$\underline{x = 15}$

Linking these methods together

Ex 1

$2x + 3 = 11$

$2x = 11 - 3$

$2x = 8$

$x = \frac{8}{2}$

$\underline{x = 4}$

Ex 2

$5x - 3 = 17$

$5x = 17 + 3$

$5x = 20$

$x = \frac{20}{5}$

$\underline{x = 4}$

Ex 3

$3x + 5 = 11$

$3x = 11 - 5$

$3x = 6$

$x = \frac{6}{3}$

Ex 4

$10x - 7 = 23$

$10x = 23 + 7$

$10x = 30$

$x = \frac{30}{10}$

$\underline{x = 2}$ $\underline{x = 3}$

Exercise Solve

1) $2x - 7 = 5$

2) $2x + 3 = 19$

3) $3x - 1 = 8$

4) $4x + 2 = 10$

5) $5x - 8 = 12$

6) $6x + 3 = 21$

7) $7x - 2 = 68$

8) $8x + 5 = 37$

9) $9x - 2 = 25$

10) $10x + 6 = 48$

1)
$$2x - 7 = 5$$
$$2x = 5 + 7$$
$$2x = 12$$
$$x = \frac{12}{2}$$
$$\underline{x = 6}$$

2)
$$2x + 3 = 19$$
$$2x = 19 - 3$$
$$2x = 16$$
$$x = \frac{16}{2}$$
$$\underline{x = 8}$$

3)
$$3x - 1 = 8$$
$$3x = 8 + 1$$
$$3x = 9$$
$$x = \frac{9}{3}$$
$$\underline{x = 3}$$

4)
$$4x + 2 = 10$$
$$4x = 10 - 2$$
$$4x = 8$$
$$x = \frac{8}{4}$$
$$\underline{x = 2}$$

5)
$$5x - 8 = 12$$
$$5x = 12 + 8$$
$$5x = 20$$
$$x = \frac{20}{5}$$
$$\underline{x = 4}$$

6)
$$6x + 3 = 21$$
$$6x = 21 - 3$$
$$6x = 18$$
$$x = \frac{18}{6}$$
$$\underline{x = 3}$$

7)

$$7x - 2 = 68$$
$$7x = 68 + 2$$
$$7x = 70$$
$$x = \frac{70}{7}$$
$$\underline{x = 10}$$

8)

$$8x + 5 = 37$$
$$8x = 37 - 5$$
$$8x = 32$$
$$x = \frac{32}{8}$$
$$\underline{x = 4}$$

9)

$$9x - 2 = 25$$
$$9x = 25 + 2$$
$$9x = 27$$
$$x = \frac{27}{9}$$
$$\underline{x = 3}$$

10)

$$10x + 6 = 48$$
$$10x = 48 - 6$$
$$10x = 42$$
$$x = \frac{42}{10}$$
$$\underline{x = 4.2}$$

or $4\frac{2}{10}$ or $4\frac{1}{5}$

Alan is twice as old as Bill. Colin is 5 years older than Alan. Colin is 17. How old is Bill?

Let Bill be x years old

Then Alan is $2x$

Colin is $2x + 5$

$$\therefore \quad 2x + 5 = 17$$
$$2x = 17 - 5$$
$$2x = 12$$
$$x = \frac{12}{2}$$

$\underline{x = 6}$ Bill is 6 years old

Equations With x on Both Sides

Ex1

$$5x - 3 = 3x + 11$$
$$5x - 3x = +11 + 3$$
$$2x = 14$$
$$x = \frac{14}{2}$$
$$\underline{x = 7}$$

Ex2

$$3x + 7 = 27 - 7x$$
$$3x + 7x = 27 - 7$$
$$10x = 20$$
$$x = \frac{20}{10}$$
$$\underline{x = 2}$$

Ex3

$$43x - 19 = 39x + 1$$
$$43x - 39x = +1 + 19$$
$$4x = 20$$
$$x = \frac{20}{4}$$
$$\underline{x = 5}$$

Ex 4

$$5x + 4 = 16 - x$$
$$5x + x = 16 - 4$$
$$6x = 12$$
$$x = \frac{12}{6}$$
$$\underline{x = 2}$$

5)

$$53x + 49 = 51x + 55$$
$$53x - 51x = 55 - 49$$
$$2x = 6$$
$$x = \frac{6}{2}$$
$$\underline{x = 3}$$