

GRADE 8

MATHEMATICS

TOPIC: ALGEBRAIC EQUATIONS

Introduction

The statement $2 + 7 = 5 + 4$ is called a number sentence.

A number sentence is true if the left-hand side (LHS) is equal to the right-hand side (RHS).

E.G: $2 + 7 = 5 + 4$ is true because the LHS=RHS.

$$\frac{40}{4} = 5 \times 2 \text{ is true because the LHS=RHS}$$

However, $3 - 2 = 2 - 3$ is not true because the LHS $\neq$ RHS.

When a number sentence has a variable in it, we call it an algebraic equation.

E.G: $x + 8 = 12$

$$3y + 4 = 2y - 1$$

$$5^t = 25$$

An algebraic equation is a mathematical statement that shows the equality between two expressions. The value of the variable which makes the statement to be true is called the solution of the equation.

Activity 1

Solving equations by inspection.

a) $x + 11 = 16$

b) $4k + 6 = 26$

c) $\frac{m}{4} = 5$

d) $3^p = 27$

Additive and multiplicative inverses

Word	Description
Additive inverse	A term added to another term and the result is zero
Multiplicative inverse	A number multiplied by another number and the result is one

GRADE 8

MATHEMATICS

Activity 2

2.1 Use additive inverses to solve the following equations

- a) $x + 6 = 9$
- b) $4 + t = -8$
- c) $n - 7 = 12$
- d) $-4 + k = 10$

2.2 Use multiplicative inverses to solve the following equations

- a) $3x = 12$
- b) $-5m = -30$
- c) $\frac{2y}{3} = 4$
- d) $\frac{a}{4} = 6$

2.3 Use additive and multiplicative inverses to solve the following equations

- a) $2x - 4 = 20$
- b) $9 = -9k - 3$
- c) $\frac{y}{2} - 3 = 4$
- d) $\frac{7 - 2x}{3} = -1$
- e) $5k + 2 = 3k + 12$
- f) $2x + 8 = 7x - 2$
- g) $\frac{5 - 2y}{3} = -4y$

Equations involving the distributive law.

Activity 3

- a) $7(x + 2) = 6(x + 1)$
- b) $3(1 + 2p) = p + 8$
- c) $4(x + 2) + 1 - 2(x + 4) = 0$
- d) $2x^2 - 7 - x(2x + 1) = 0$

GRADE 8

MATHEMATICS

Exponential equations

Activity 4

a) $2^x = 8$

b) $3^{k-1} = 81$

c) $5^x = 1$

d) $4^{y+2} = 32$

e) $3.5^x = 75$

f) $7^{2y} \cdot 7^y = 49$

g) $\frac{1}{8} \cdot 2^{2x} + 8 = 9$

GRADE 8

MATHEMATICS

Answers

Activity 1

Solving equations by inspection.

a) $x + 11 = 16$

$$x = 5$$

b) $4k + 6 = 26$

$$k = 5$$

c) $\frac{m}{4} = 5$

$$m = 20$$

d) $3^p = 27$

$$p = 3$$

Activity 2

2.1 Use additive inverses to solve the following equations

a) $x + 6 = 9$

$$x + 6 - 6 = 9 - 6$$

$$x = 3$$

b) $4 + t = -8$

$$4 + t - 4 = -8 - 4$$

$$t = -12$$

c) $n - 7 = 12$

$$n - 7 + 7 = 12 + 7$$

$$n = 19$$

d) $-4 + k = 10$

$$-4 + k + 4 = 10 + 4$$

$$k = 14$$

2.2 Use multiplicative inverses to solve the following equations

a) $3x = 12$

$$3x \times \frac{1}{3} = 12 \times \frac{1}{3}$$

$$x = 4$$

GRADE 8

MATHEMATICS

b) $-5m = -30$

$$-5m \times -\frac{1}{5} = -30 \times -\frac{1}{5}$$

$$m = 6$$

c) $\frac{2y}{3} = 4$

$$\frac{2y}{3} \times \frac{3}{2} = 4 \times \frac{3}{2}$$

$$y = 6$$

d) $\frac{a}{4} = 6$

$$\frac{a}{4} \times \frac{4}{1} = 6 \times \frac{4}{1}$$

$$a = 24$$

2.3 Use additive and multiplicative inverses to solve the following equations

a) $2x - 4 = 20$

$$2x = 20 + 4$$

$$2x = 24$$

$$x = 12$$

b) $9 = -9k - 3$

$$9 + 3 = -9k$$

$$12 = -9k$$

$$\frac{12}{-9} = k$$

$$\therefore k = -\frac{4}{3}$$

c) $\frac{y}{2} - 3 = 4$

$$\frac{y}{2} = 4 + 3$$

$$\frac{y}{2} = 12$$

$$y = 24$$

d) $\frac{7 - 2x}{3} = -1$

GRADE 8
MATHEMATICS

$$7 - 2x = -3$$

$$-2x = -3 - 7$$

$$-2x = -10$$

$$x = 5$$

e) $5k + 2 = 3k + 12$

$$5k - 3k = 12 - 2$$

$$2k = 10$$

$$k = 5$$

f) $2x + 8 = 7x - 2$

$$2x - 7x = -2 - 8$$

$$-5x = -10$$

$$x = 2$$

g) $\frac{5 - 2y}{3} = -4y$

$$5 - 2y = -12y$$

$$5 = -12y + 2y$$

$$5 = 10y$$

$$\frac{5}{10} = y$$

$$\therefore y = \frac{1}{2}$$