

1

Algebra

Lesson 1 Algebraic Equations

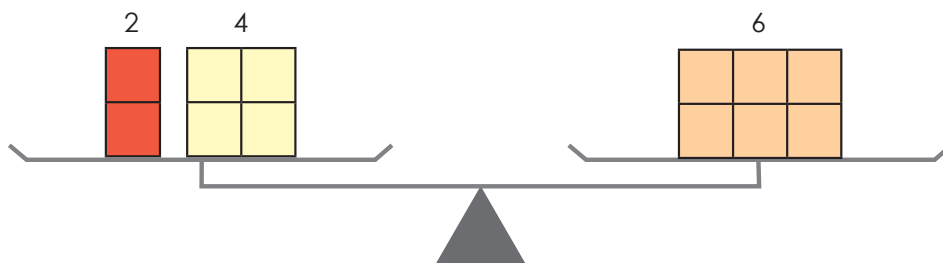
Learning Outcomes:

- Understand equations
- Solve simple algebraic equations

Understanding equations

Learn

We place some cubes on both sides of a scale.



The total number of cubes on the left of the scale is equal to the number of cubes on the right.

The scale is balanced.

We can use the **equation**, $2 + 4 = 6$, to show this relationship between the number of cubes on both sides of the scale.

An **equation** is a mathematical sentence where the values on both sides of the equal sign ($=$) are the same.

'2 + 4' has the same value as '6'.

$4 + x = 10$ and $3z - 2 = 4$ are also equations.

There are unknown numbers in these equations and they are represented by letters. These equations are called **algebraic equations**.



Practice 1



1. Are these algebraic equations? Write **Yes** or **No** in the blanks.

a) $x + 5$ _____

b) $q - 4 = 8$ _____

c) $10 - 6b + 3 = 1$ _____

d) $16 + 3 = 19$ _____

e) $23u - 5 + 3$ _____

f) $10a + 2a = 3$ _____

2. Circle the algebraic equations.

a)

$$d - 10$$

$$d - 10 = 20$$

b)

$$4 + p = 17$$

$$4 + 13 = 17$$

c)

$$15 - 2z + 9$$

$$15 - 2z = 9$$

d)

$$5a + 3a - 10$$

$$5a + 3a = 10$$

3. Tick the correct column.




	Algebraic expression	Algebraic equation
a) $5 + 9 + r$		
b) $5 + z = 10$		
c) $p - 6 = 20$		
d) $14 + r - 2 = 17$		
e) $33 - 2y + 8$		
f) $24k - 14k = 50$		

Using the guess and check method to solve algebraic equations

Learn




a) Find the value of m in the equation $9 + m = 16$.

Guess	Check
$m = 2$	$9 + m = 9 + 2$ $= 11 \quad \times$ <p>11 is smaller than 16, so m is not 2. The next guess should be greater than 2.</p> 
$m = 8$	$9 + m = 9 + 8$ $= 17 \quad \times$ <p>17 is greater than 16, so m is not 8. The next guess should be greater than 2 but smaller than 8. Since 17 is close to 16, the value of m must be close to 8.</p> 
$m = 7$	$9 + m = 9 + 7$ $= 16 \quad \checkmark$ <p>I have solved the equation!</p> 

$m = 7$ is a **solution** of the equation $9 + m = 16$.


To **solve** an equation, we find the value of the unknown number in it.

b) Solve $2x + 5 = 15$.

Guess	Check
$x = 4$	$2x + 5 = 2 \times 4 + 5$ $= 8 + 5$ $= 13 \quad \times$ <div> <p>13 is smaller than 15, so x is not 4. 13 is close to 15, so the next guess should be a greater number that is close to 4.</p>  </div>
$x = 5$	$2x + 5 = 2 \times 5 + 5$ $= 10 + 5$ $= 15 \quad \checkmark$

$x = 5$ is a solution of the equation $2x + 5 = 15$.

c) Solve $\frac{1}{3}n - 9 = 0$.

Guess	Check
$n = 30$	$\frac{1}{3}n - 9 = \frac{1}{3} \times 30 - 9$ $= 10 - 9$ $= 1 \quad \times$ <div> <p>To get a whole number answer, n should be divisible by 3.</p> <p>1 is greater than 0, so n is not 30. 1 is close to 0, so the next guess should be a smaller number that is close to 30.</p>  </div>
$n = 27$	$\frac{1}{3}n - 9 = \frac{1}{3} \times 27 - 9$ $= 9 - 9$ $= 0 \quad \checkmark$

$n = 27$ is a solution of $\frac{1}{3}n - 9 = 0$.

Practice 2



1. Use the guess and check method to solve $q + 9 = 20$.

When $q = 15$, $q + 9 = \underline{15} + 9$
 $= \underline{\hspace{2cm}}$

$\underline{\hspace{2cm}}$ is greater than 20, so $q = 15$ is not a solution of $q + 9 = 20$.

When $q = \underline{\hspace{2cm}}$, $q + 9 = \underline{\hspace{2cm}} + 9$
 $= \underline{\hspace{2cm}}$

$q = \underline{\hspace{2cm}}$ is a solution of $q + 9 = 20$.

The next guess
should be
smaller than 15.



2. Solve these equations using the guess and check method.

a) $h + 21 = 38$

b) $h - 17 = 23$

c) $h + 28 = 50$



3. Solve $5y - 22 = 13$.

When $y = 5$,

$$5y - 22 = 5 \times \underline{\hspace{2cm}} - 22$$

$$= \underline{\hspace{2cm}} - 22$$

$$= \underline{\hspace{2cm}}$$

$\underline{\hspace{2cm}}$ is smaller than 13, so $y = 5$ is not a solution of $5y - 22 = 13$.

When $y = \underline{\hspace{2cm}}$,

$$5y - 22 = 5 \times \underline{\hspace{2cm}} - 22$$

$$= \underline{\hspace{2cm}} - 22$$

$$= \underline{\hspace{2cm}}$$

$y = \underline{\hspace{2cm}}$ is a solution of $5y - 22 = 13$.

The next guess
should be
greater than 5.



4. Solve these equations using the guess and check method.

a) $2p + 18 = 42$

b) $4p - 17 = 19$

c) $3p + 24 = 57$



Write **a solution** or **not a solution** in the blank below.

6. Solve these equations using the guess and check method.

c) $\frac{1}{2}z + 18 = 33$



7. Is $k = 11$ a solution of $k + 25 = 36$?

8. Is $j = 7$ a solution of $8j - 11 = 29$?

9. Is $w = 9$ a solution of $\frac{1}{3}w + 12 = 15$?