Algebra

Understanding expressions, equations, formulae and identities

In algebra you use letters to represent unknown numbers.

$4a + 2b$ is an **expression**.

It does not have an equals (=) sign. The parts that are separated by + or − are called **terms**. In $4a + 2b$ the terms are $4a$ and $2b$. An expression can contain letter terms and/or number terms.

$2x + 2 = 8$ is an **equation**.

It has an equals sign. It contains letter terms and numbers. You can solve an equation to find the value of the letter. An equation is only true for certain values of the letter. Here, the value of x is 3.

$A = lw$ is a **formula** (plural: **formulae**).

It has an equals sign. The letters represent different quantities. The letters are **variables**, as their values can vary. You can use a formula to calculate one variable if you know the other variables. For example, you can use $A = lw$ to find A if you know l and w.

$\frac{10x}{2} \equiv 5x$ is an **identity** (plural: **identities**).

An identity is true for all values of the letters. Here, the two sides of $\frac{10x}{2} \equiv 5x$ are equal for all values of x. An identity can be written with the identity symbol '≡' or with an equals sign. (See page 69 for more on identities.)

WORKIT!

Write down whether each of these is an expression, an equation, a formula or an identity.

a $A = \frac{1}{2}bh$

Formula ← The value of A can be worked out if the values of b and h are known.

b $5x + 1 = 16$

Equation ← It can be solved to find the value of x.

c $3x + 2y + 4x = 7x + 2y$

Identity ← Collecting the like terms on the left-hand side gives $7x + 2y$ which is equal to the right-hand side. (See page 40 for more on collecting like terms.)

d $2m - 4$

Expression

It does not have an equals sign.

CHECKIT!

1 $c = \pi d$ $3a + 6 = 10$
$3ab + 2ab = 5ab$ $3(a + 2)$

From the above list, write down:

  a an equation   **c** an expression
  b a formula   **d** an identity.

2 Victor says that $4x - 2 = 2x$ is an identity. James says that $4x - 2 = 2x$ is an equation.

Who is correct? Give a reason for your answer.