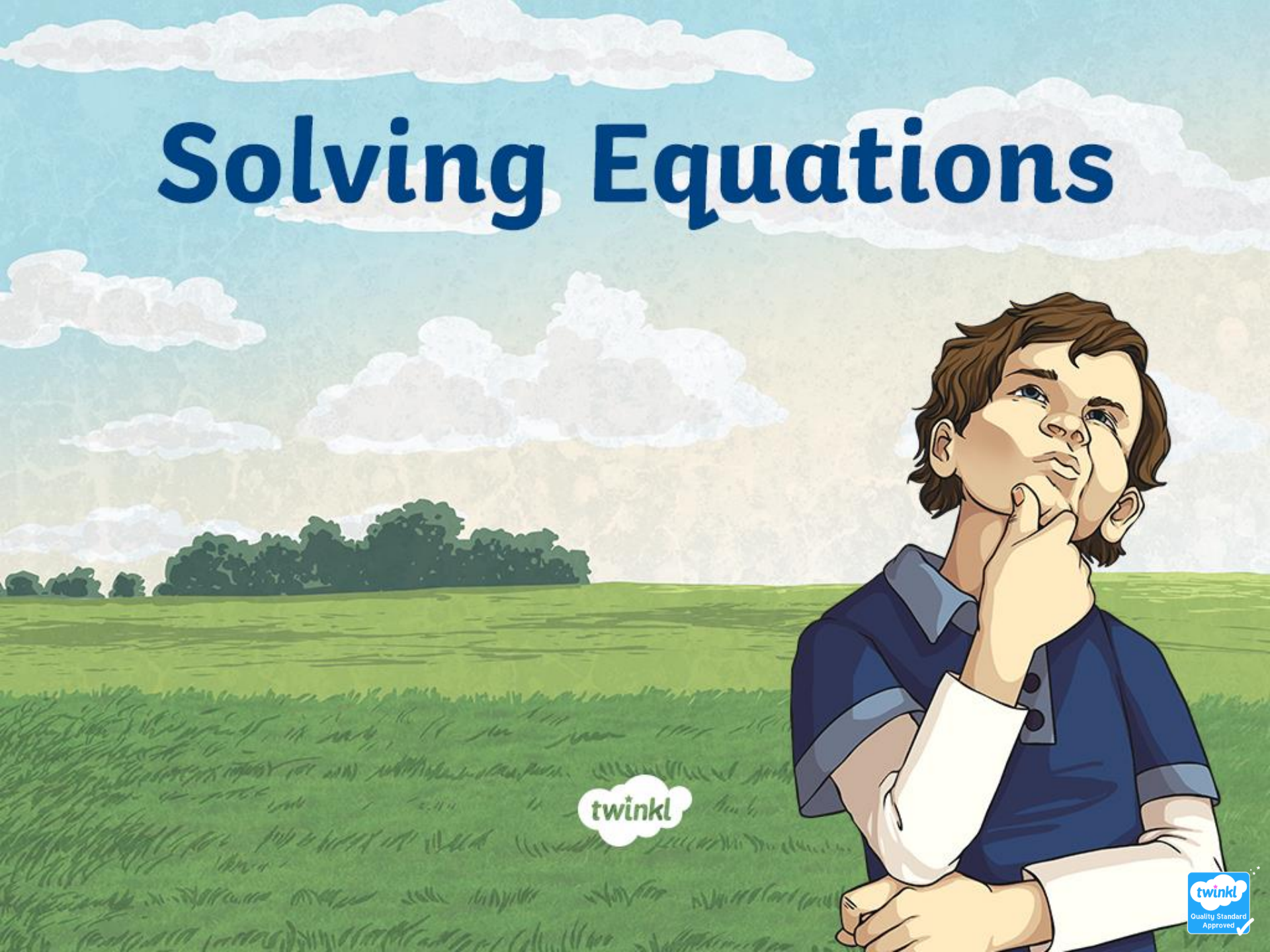
Solving Equations



Equations in the National Curriculum

Equations are present through all year groups. In Year 1, the first addition and subtraction objective introduces the concept of the equals sign; and in Year 2 in multiplication and division.

Missing number problems are introduced in Year 2, and are the first steps to understanding unknown numbers, later represented by letters.

This concept is established further in Year 5 multiplication and division: "understanding the meaning of the equals sign", and it is in Year 6 algebra that many teachers will recognise equations with letters representing unknown values and variables.

The term, "equation" only appears once, in the objective "find pairs of numbers that satisfy an equation with two unknowns", but equations are anywhere there is a statement where the values of two mathematical expressions are equal. Thus most of the learning surrounding the algebra objectives revolves around equations.

What is an Equation?

An equation is a statement where the values of two mathematical expressions are equal.

$2 + 5 = 7$
is a simple equation.

$2 + 5 = 8 - 1$
is an equation with a calculation either side of the equals sign.

Can you write some equations with a calculation either side of the equals sign? Have a partner check them.

Equations with an Unknown Number

Often equations are written with an unknown number.

Sometimes we write 6 + 5 =__
The ___ represents an unknown number.
There is only one solution: 6 + 5 = 11

The unknown number can also be written as part of a calculation:
13 -__= 7
Here, the solution is that the unknown number is 6.
13 – 6 = 7

Using a Letter to Represent an Unknown

Unknown numbers in an equation can be represented by a letter.

We can write $4 + 9 = a$
The a represents an unknown number.
There is only one solution: $4 + 9 = 13$,
so $a = 13$

The unknown number as a letter can also be written as part of a calculation: $n + 8 = 15$
Here the solution is that $n = 7$
$7 + 8 = 15$

Solve These Equations

Solve these equations by finding the value of the letter that represents the unknown number:

$a + 6 = 19$	$a = 13$
$25 = 41 - b$	$b = 16$
$18 + c = 41 - 12$	$c = 11$
$23 + 14 = d - 8$	$d = 45$
$4 \times e = 20$	$e = 5$
$f \div 7 = 6$	$f = 42$

Write some of your own equations for a partner.

Answers

Equations with 2 Unknowns

Equations can also be written with more than 1 unknown.
These would be represented by 2 different letters.

Can you think of 2 numbers that add up to 12?

This could be written a + b = 12
Write down some solutions in this format:
a = 2 and b = 10.
There are 13 different solutions when only using positive whole numbers.
Did you find them all? (a can be from 12 to 0).

Remember, both a and b can represent the same number, but are still different letters: a + b = 12, 6 + 6 = 12, a = 6 and b = 6

Solve These Equations

Solve these equations by finding 3 different solutions for each equation:

$a + b = 10$	(a = 9, b = 1) pairs of numbers that add up to 10
$c - d = 4$	(c = 5, d = 1) pairs of numbers with a difference of 4
$9 + e = f$	(e = 1, f = 10) pairs of numbers with a difference of 9
$gh = 12$	(g = 3, h = 4) pairs of numbers whose product is 12
$9i = j$	(i = 2, j = 18) j is 9 times i

Write some of your own equations for a partner.

Answers