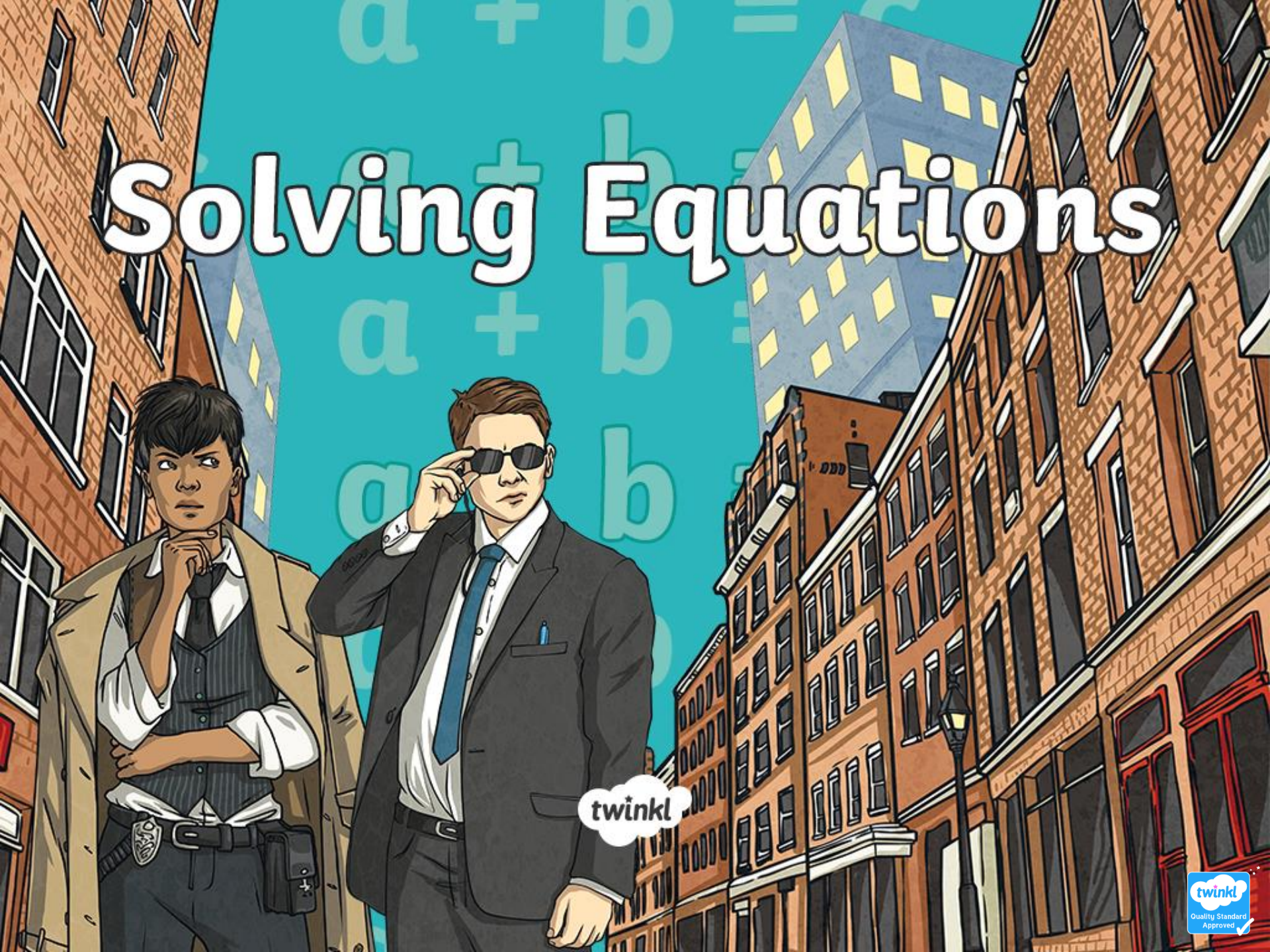
Solving Equations
a + b = c
twinkl
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Quality Standard
Approved

Aim

- I can solve one-step and two-step missing number equations using inverse operations.

Success Criteria

- I can write multiplication correctly in algebraic expressions.
- I can use concrete and pictorial methods to solve one-step and two-step equations.
- I can solve equations by using inverse operations on each side.

One-Step Number Riddle Match-Up

Match the word problems to the correct representation.

✓

?	?	?
18		

X

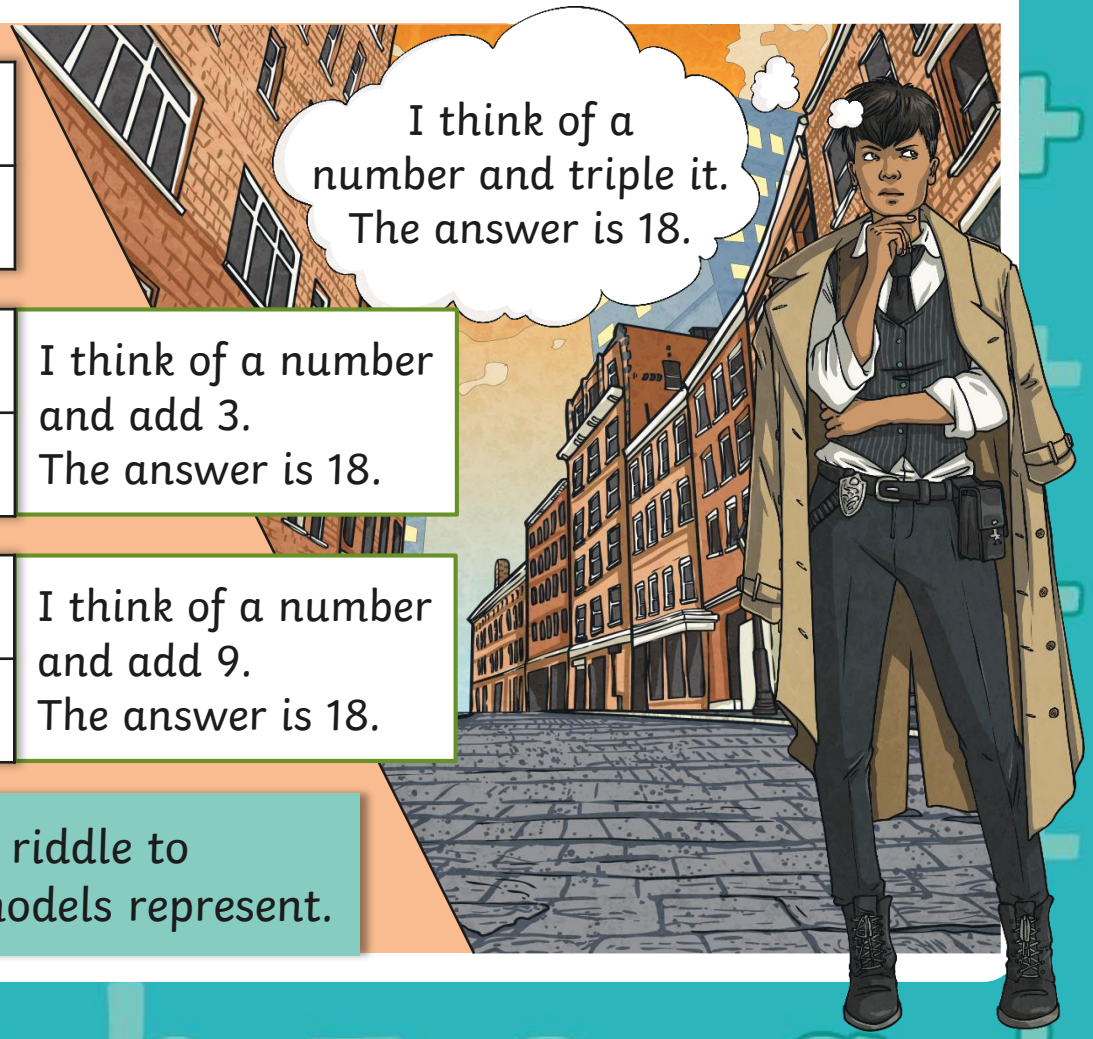
3	?
18	

I think of a number and add 3.
The answer is 18.

X

?	3	3	3
18			

I think of a number and add 9.
The answer is 18.



Extra Challenge: Write a number riddle to explain what the two other bar models represent.

One-Step Number Riddle Match-Up

Match the word problems to the correct representation.

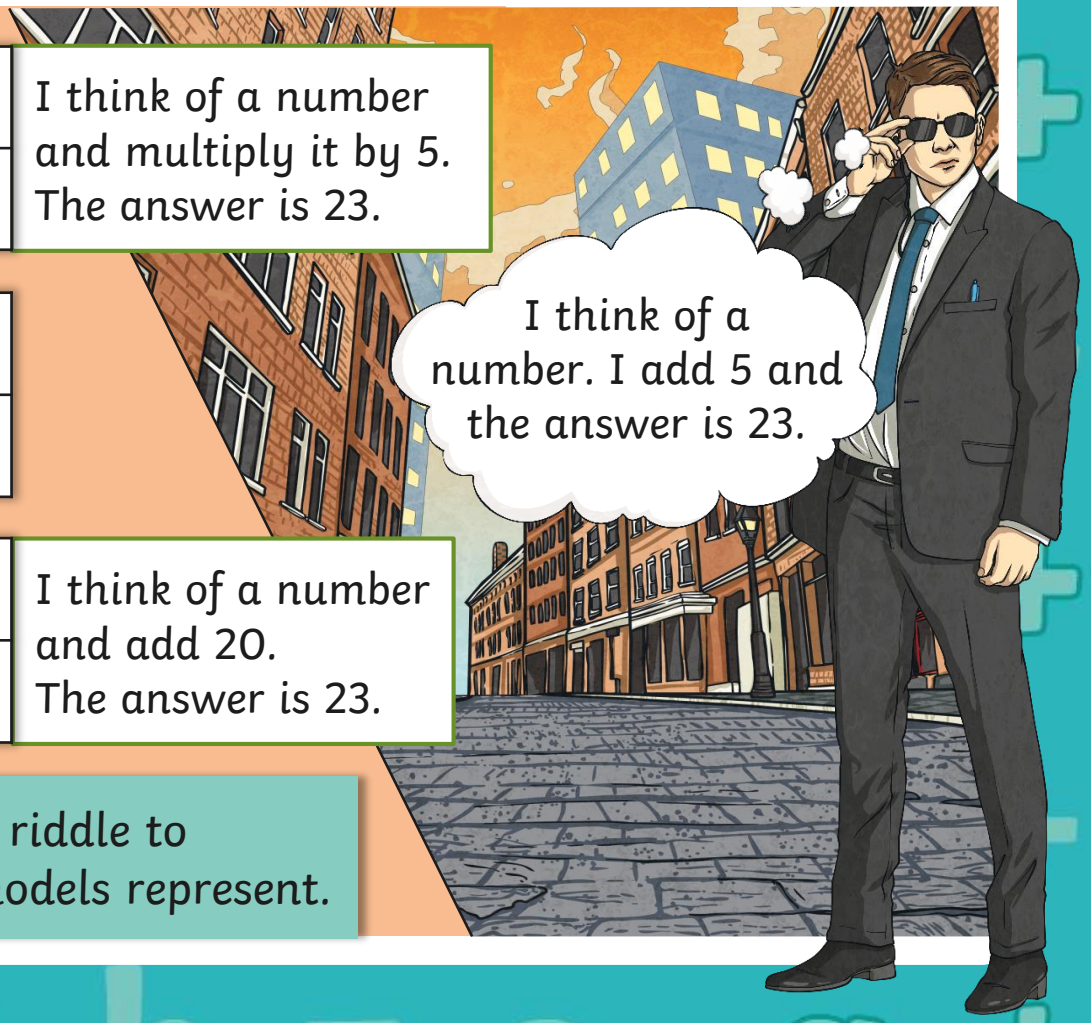
✗

?	?	?	?	?
23				

I think of a number and multiply it by 5. The answer is 23.

✓

5	?
23	



✗

?	5	5	5	5
23				

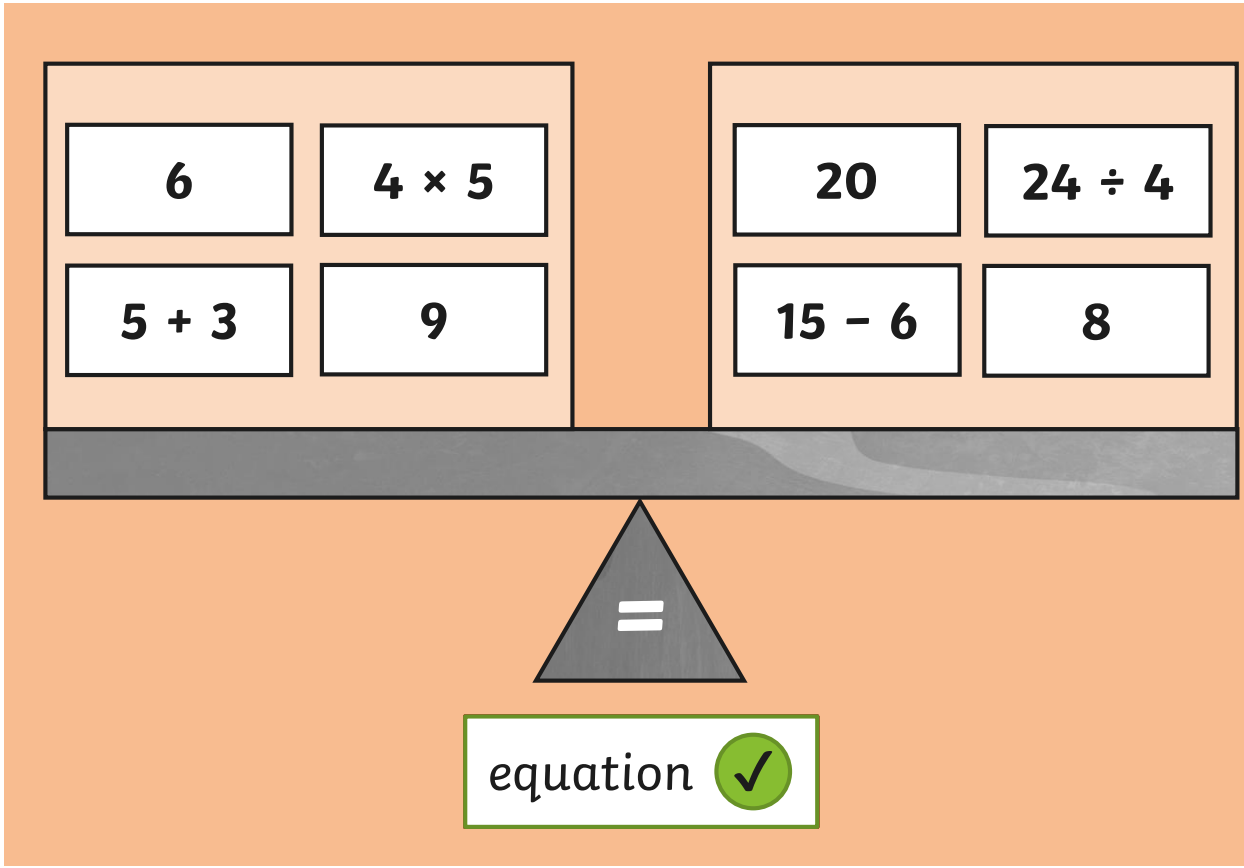
I think of a number and add 20. The answer is 23.

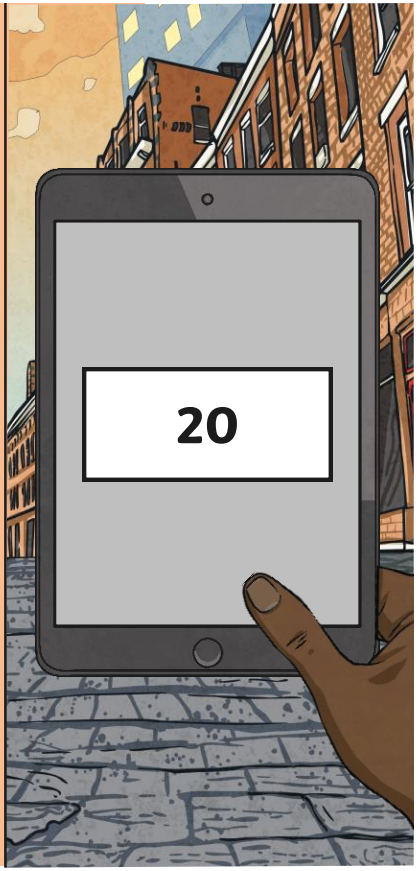
Extra Challenge: Write a number riddle to explain what the two other bar models represent.

Solving One-Step Equations

Whole Class

An equation is a number statement that uses the = sign, showing that one side of the equation equals the other side.

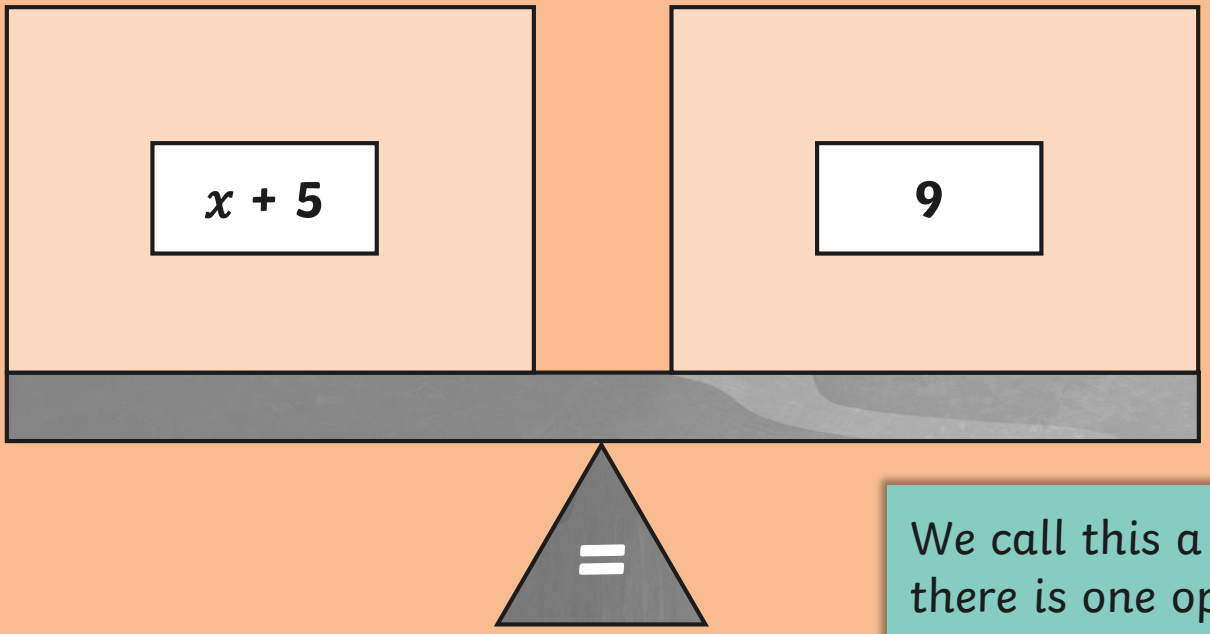


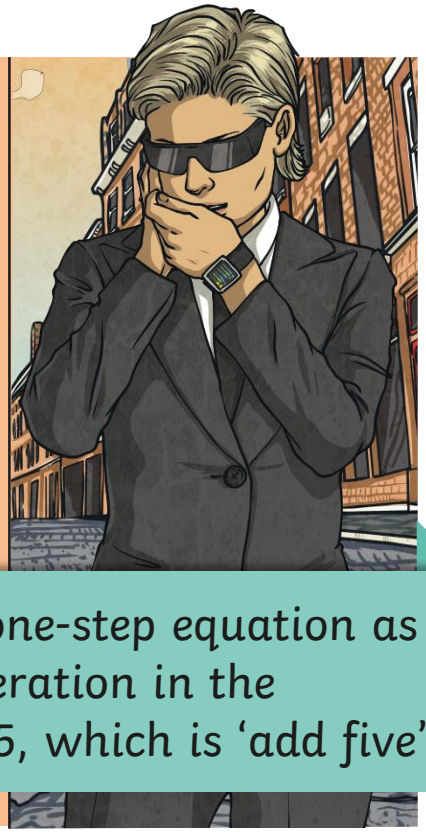


Solving One-Step Equations

Whole Class

In algebra, missing numbers in equations are represented by letters. Any letter can be used, but often the letter x is chosen. An algebraic x is written to look different to a normal letter 'x' to avoid confusion with multiplication.



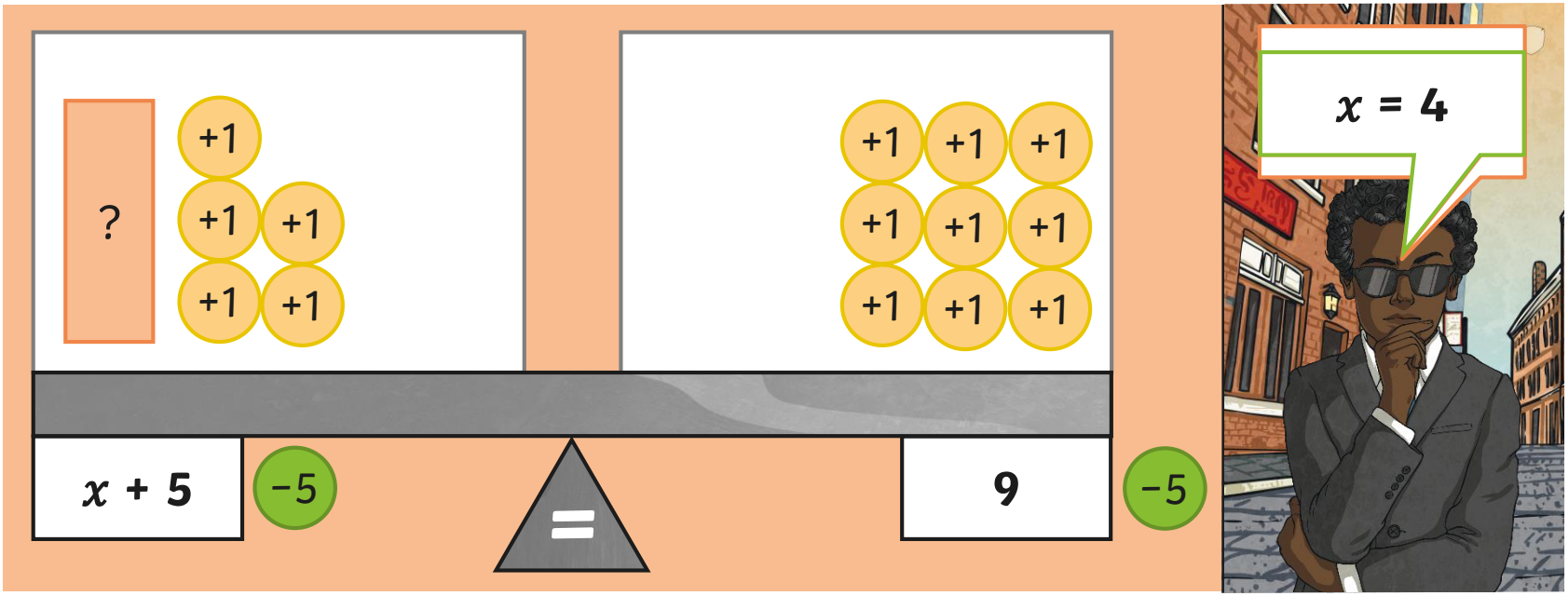


We call this a one-step equation as there is one operation in the expression x + 5, which is 'add five'.

Solving One-Step Equations

To find the value of x, we can use inverse operations to isolate the unknown so it is on its own on one side of the equation.

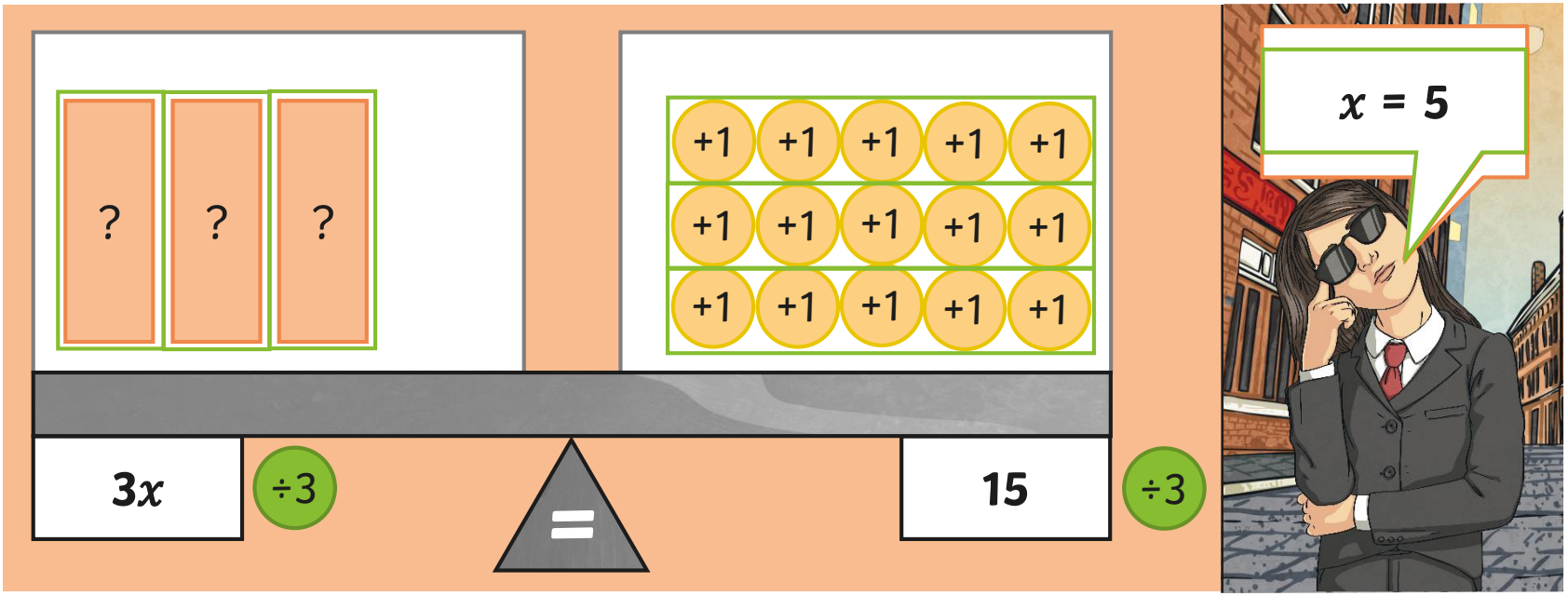
Here the operation in the expression is ‘add 5’. The inverse operation is ‘subtract 5’. We must do this inverse operation to both sides of the equation.



Solving One-Step Equations

The multiplication sign is not used in algebra to avoid confusing it with the algebraic x used to show a missing number. Instead, the number you are multiplying by is put before the letter, so $2x$ means 'x multiplied by 2'.

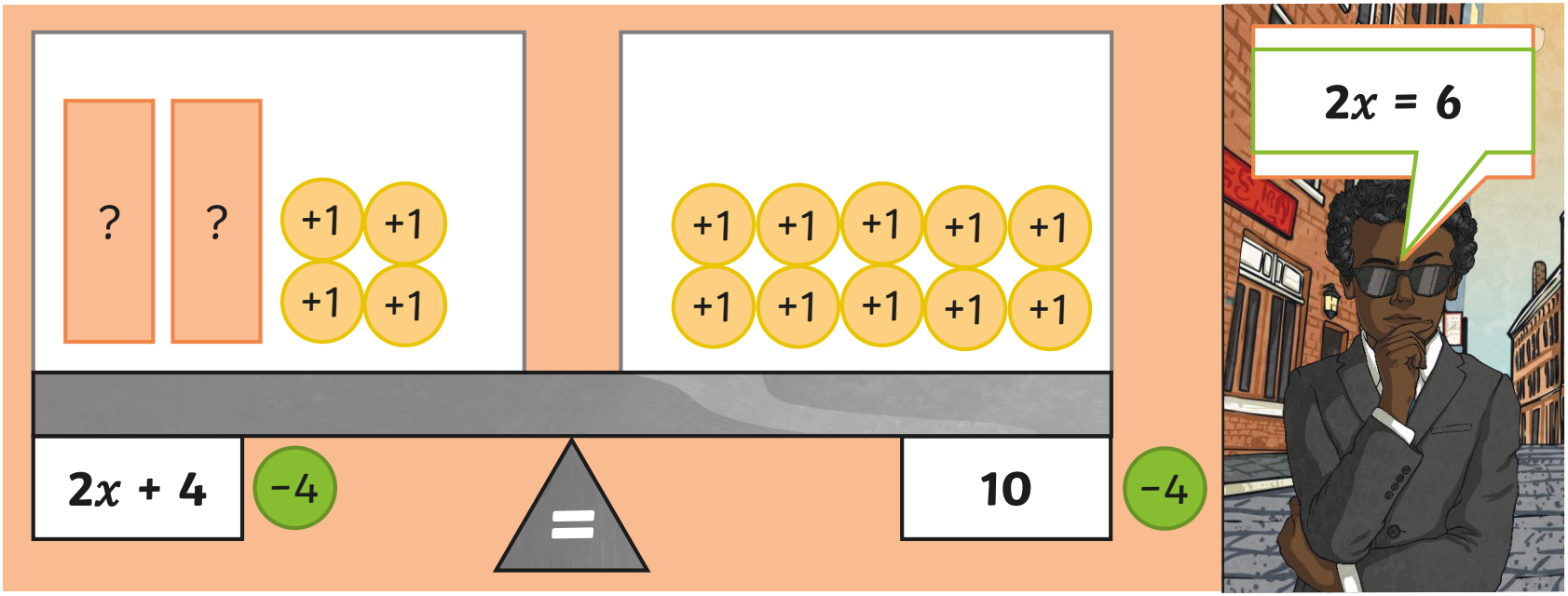
The operation in this expression is 'multiply by 3'. The inverse operation is 'divide by 3'. We must do this inverse operation to both sides of the equation.



Solving Two-Step Equations

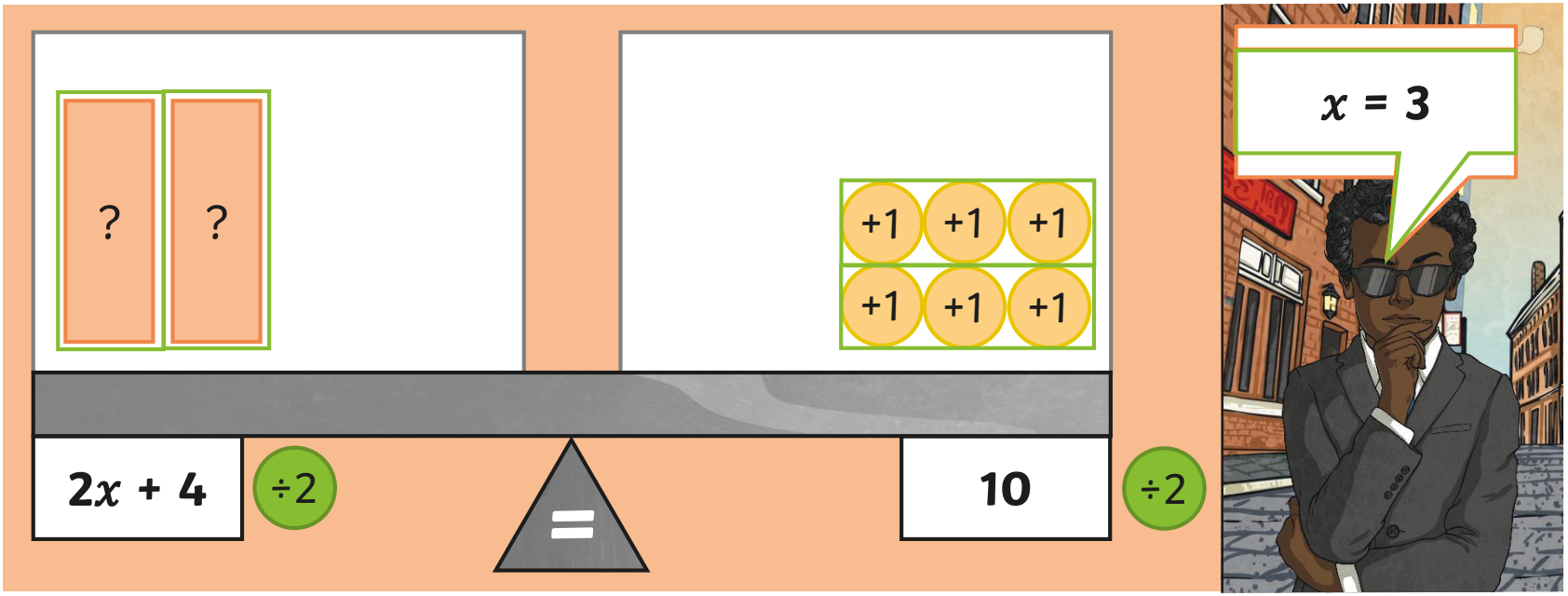
Here is a two-step equation.

- In the expression $2x + 4$, there are two operations, 'multiply by 2' and 'add 4'.
- We look at the operation separate to the letter first, which is 'add 4'.
- The inverse operation is 'subtract 4'. We do this first, to both sides of the equation.



Solving Two-Step Equations

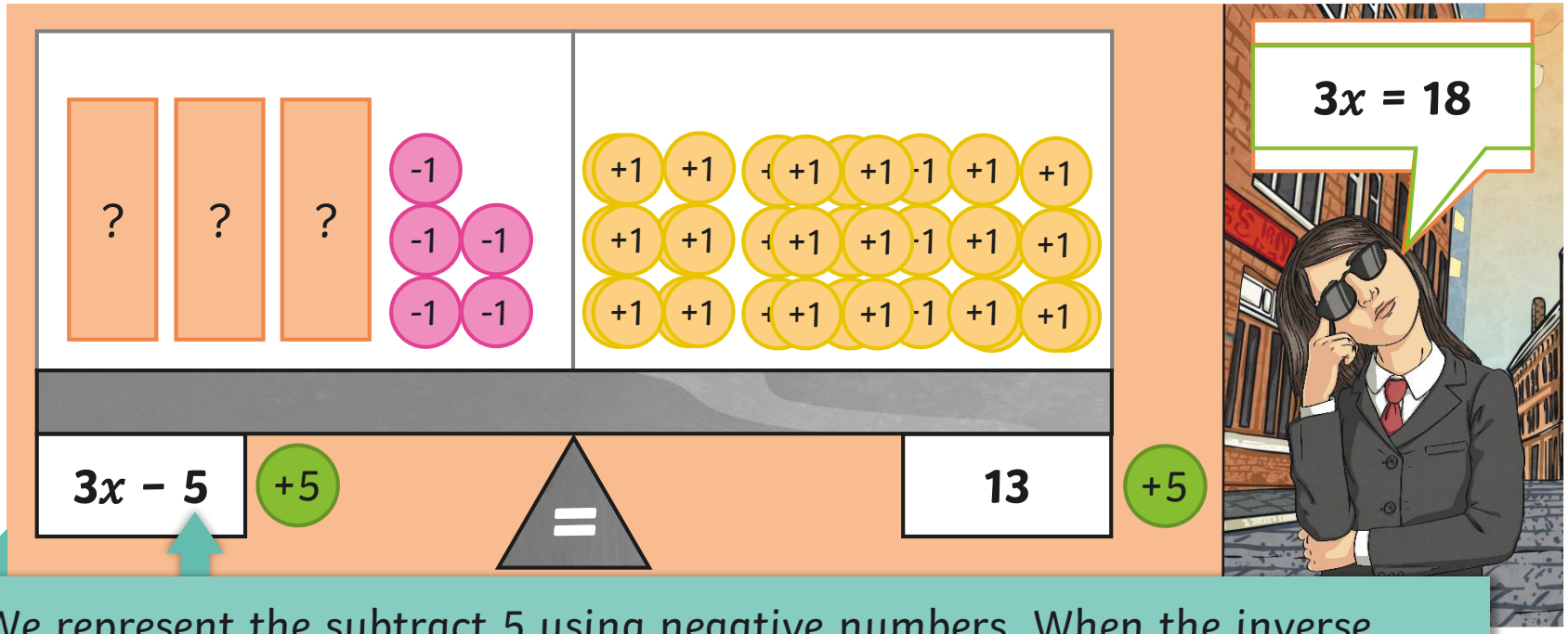
- The second operation is ‘multiply by 2’. The inverse operation is ‘divide by 2’.
- We do this to both sides of the equation.



Solving Two-Step Equations

Here is a two-step equation.

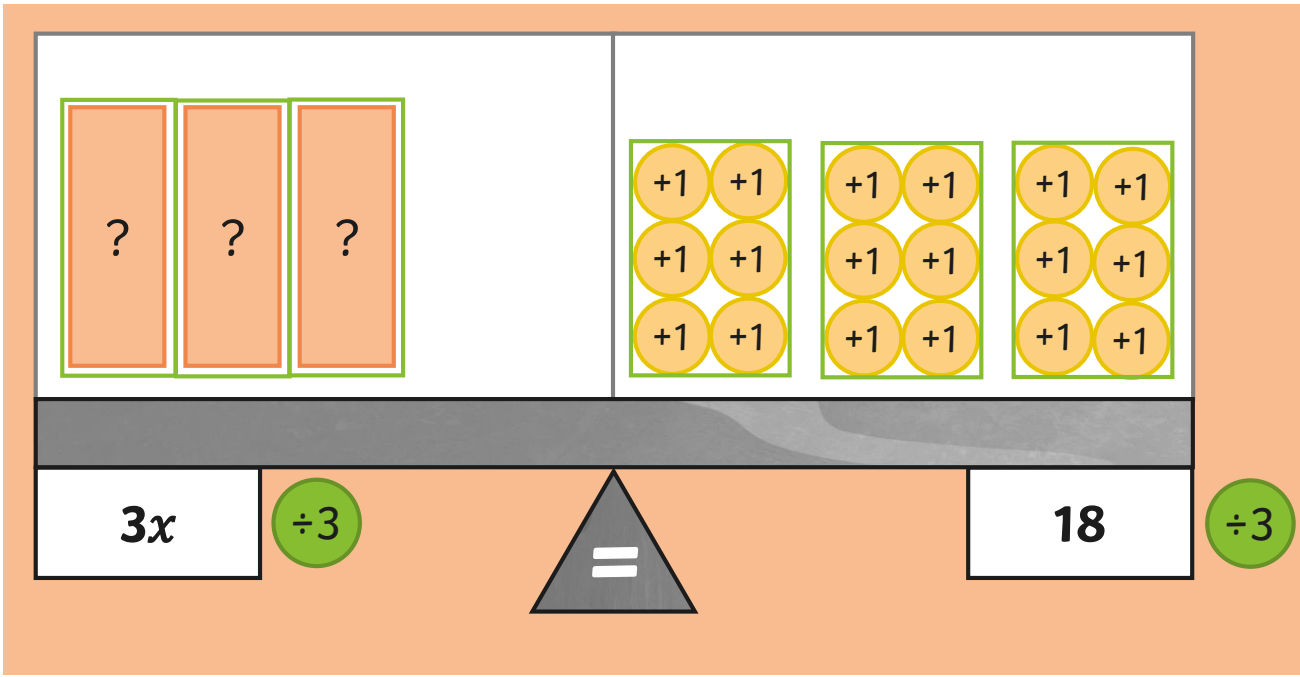
- In the expression $3x - 5$, there are two operations, 'multiply by 3' and 'subtract 5'.
- We look at the operation separate to the letter first, which is 'subtract 5'.
- The inverse operation is 'add 5'. We do this first, to both sides of the equation.



We represent the subtract 5 using negative numbers. When the inverse operation is completed, -5 + 5 = 0 so the operations cancel each other out.

Solving Two-Step Equations

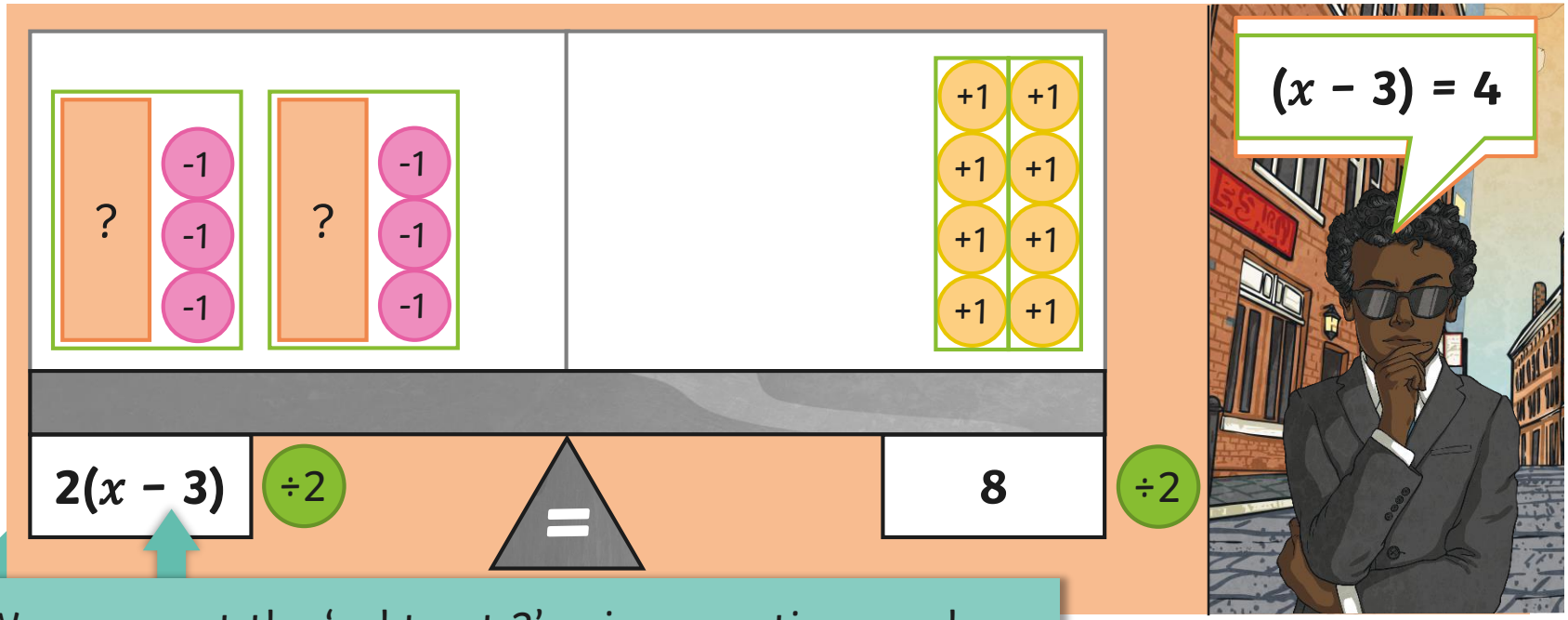
- The second operation is ‘multiply by 3’.
- The inverse operation is ‘divide by 3’. We now do this to both sides of the equation.



Solving Two-Step Equations

Here is a two-step equation that uses brackets.

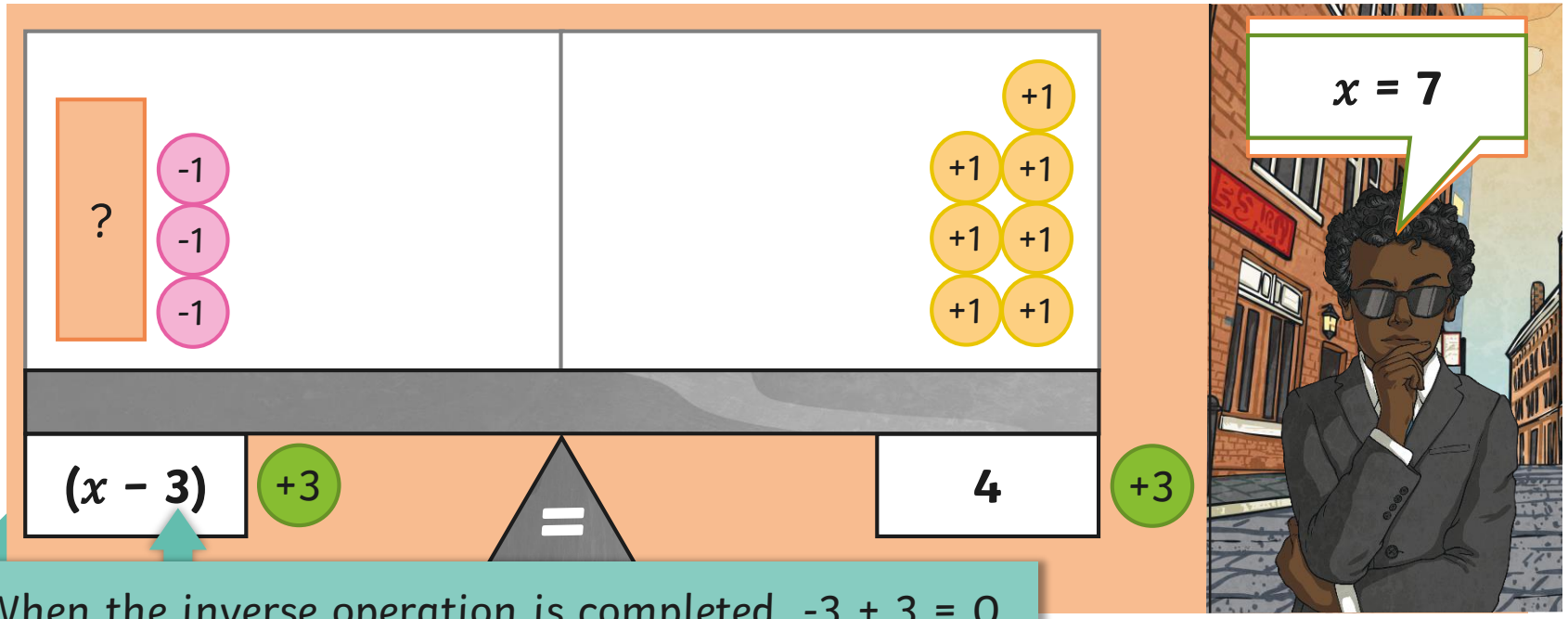
- In the expression $2(x - 3)$, there are two operations, 'multiply by 2' and 'subtract 3'.
- We look at the operation separate to the letter first, which in this case is 'multiply by 2' because that is outside the brackets.
- The inverse operation is 'divide by 2'. We do this first, to both sides of the equation.



We represent the 'subtract 3' using negative numbers.

Solving Two-Step Equations

- The second operation is ‘subtract 3’.
- The inverse operation is ‘add 3’. We now do this to both sides of the equation.

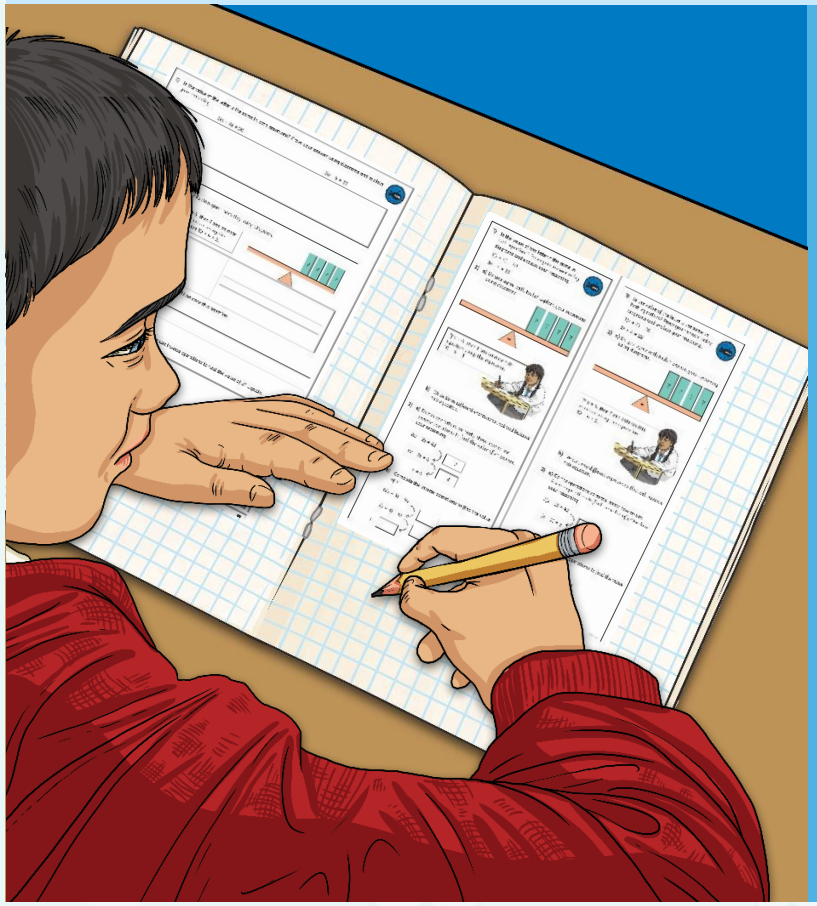


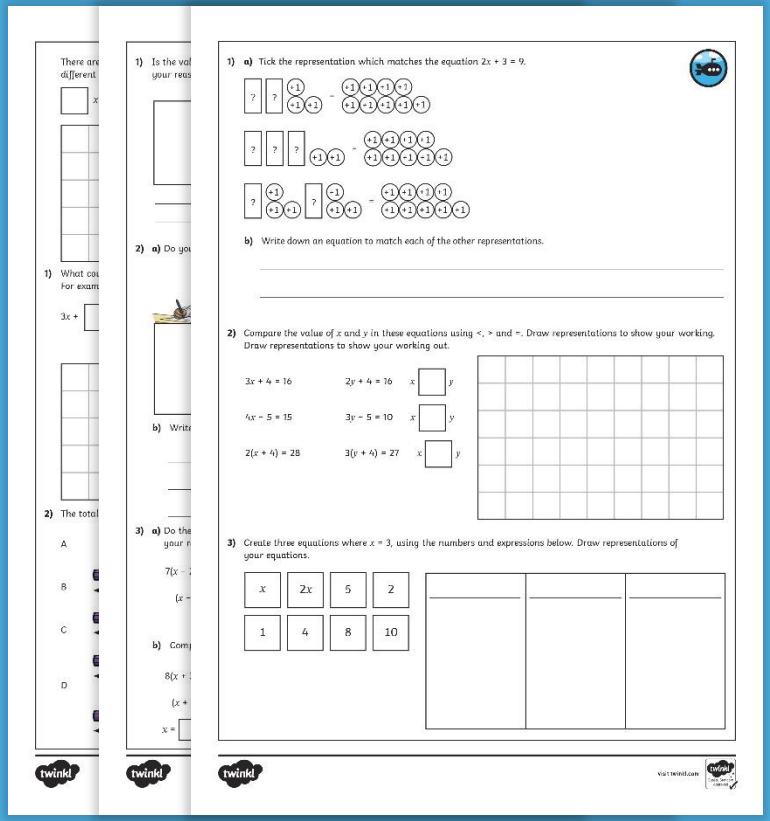
When the inverse operation is completed, -3 + 3 = 0 so the operations cancel each other out.

Solving Equations

Solving Equations

Dive in by completing your own activity!





1) a) Tick the representation which matches the equation $2x + 3 = 9$.

b) Write down an equation to match each of the other representations.

2) Compare the value of x and y in these equations using $<$, $>$ and $=$. Draw representations to show your working. Draw representations to show your working out.

$3x + 4 = 16$	$2y + 4 = 16$	x ☐ y
$4x - 5 = 15$	$3y - 5 = 10$	x ☐ y
$2(x + 4) = 28$	$3(y + 4) = 27$	x ☐ y

3) Create three equations where $x = 3$, using the numbers and expressions below. Draw representations of your equations.

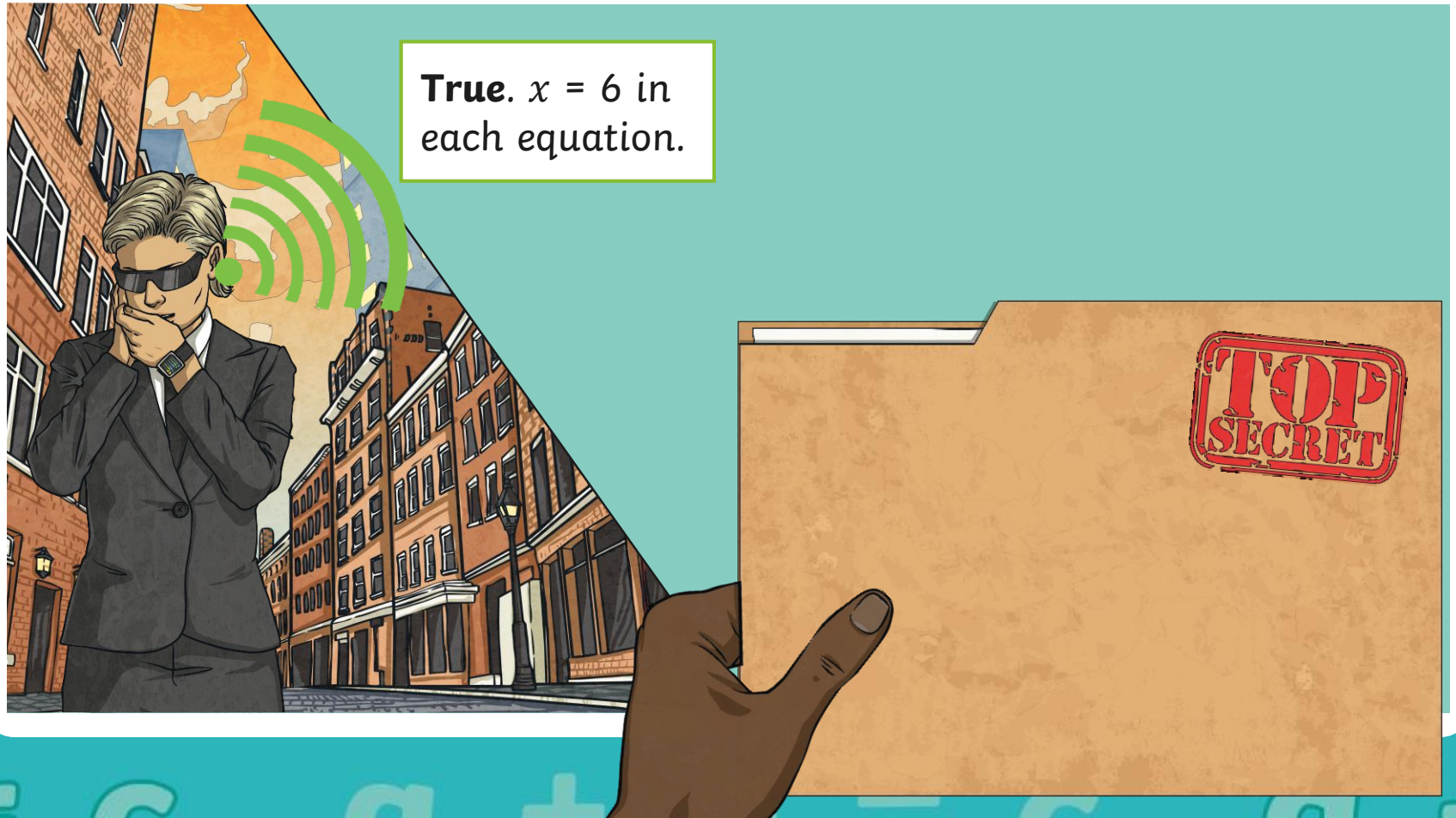
x	$2x$	5	2
1	4	8	10

Prove it!

Whole Class

The value of x is the same in all three equations. True or false?

Explain your answer.



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