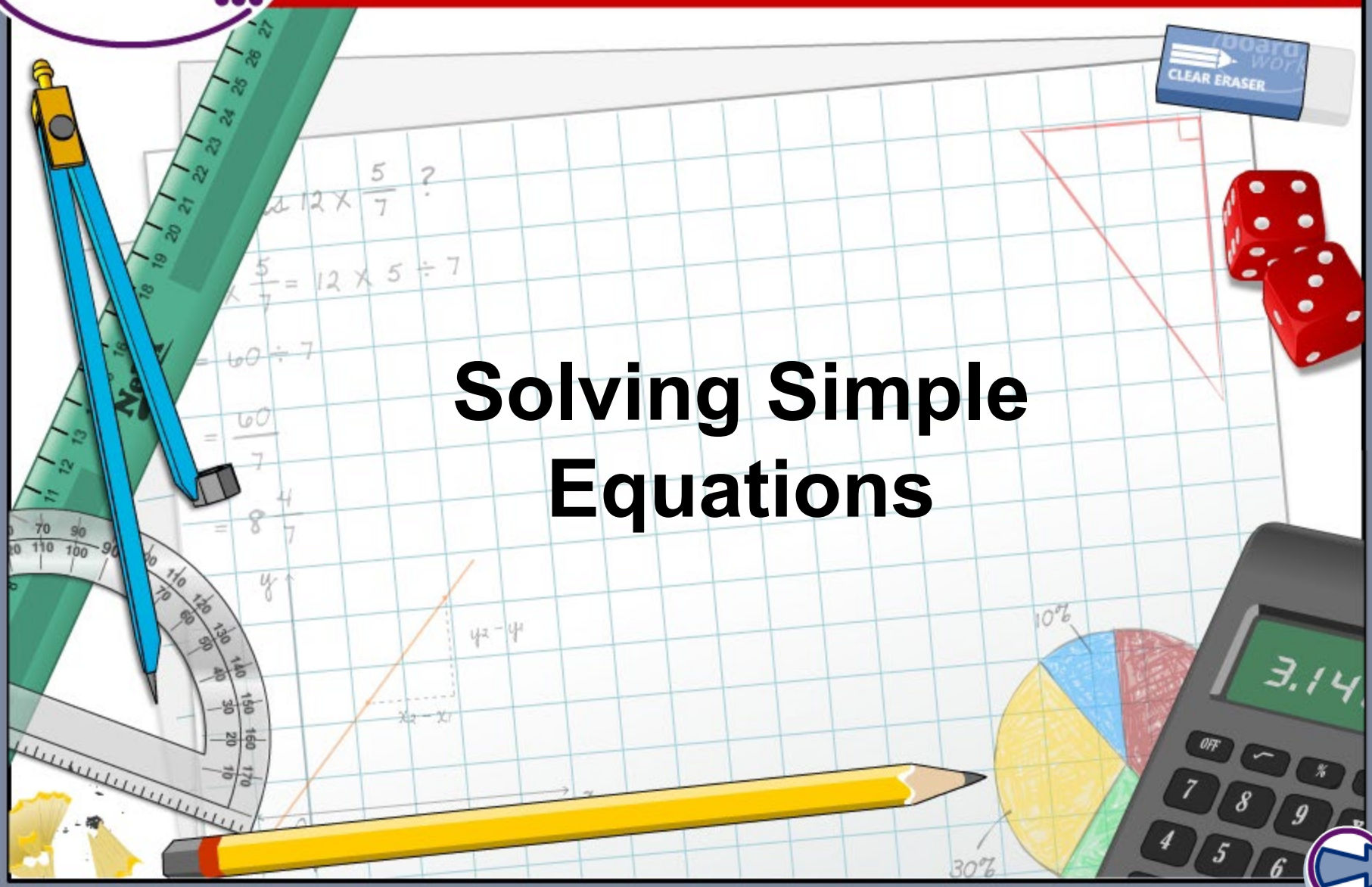


Solving Simple Equations

Information

Common core icons

This icon indicates a slide where the Standards for Mathematical Practice are being developed. Details of these are given in the Notes field.

Slides containing examples of mathematical modeling are marked with this stamp.

This icon indicates an opportunity for discussion or group work.

The **Standards for Mathematical Practice** outlined in the Common Core State Standards for Mathematics describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

These are:

1) Make sense of problems and persevere in solving them.

2) Reason abstractly and quantitatively.

3) Construct viable arguments and critique the reasoning of others.

4) Model with mathematics.

5) Use appropriate tools strategically.

6) Attend to precision.

7) Look for and make use of structure.

8) Look for and express regularity in repeated reasoning.

This icon indicates that the slide contains activities created in Flash. These activities are not editable.

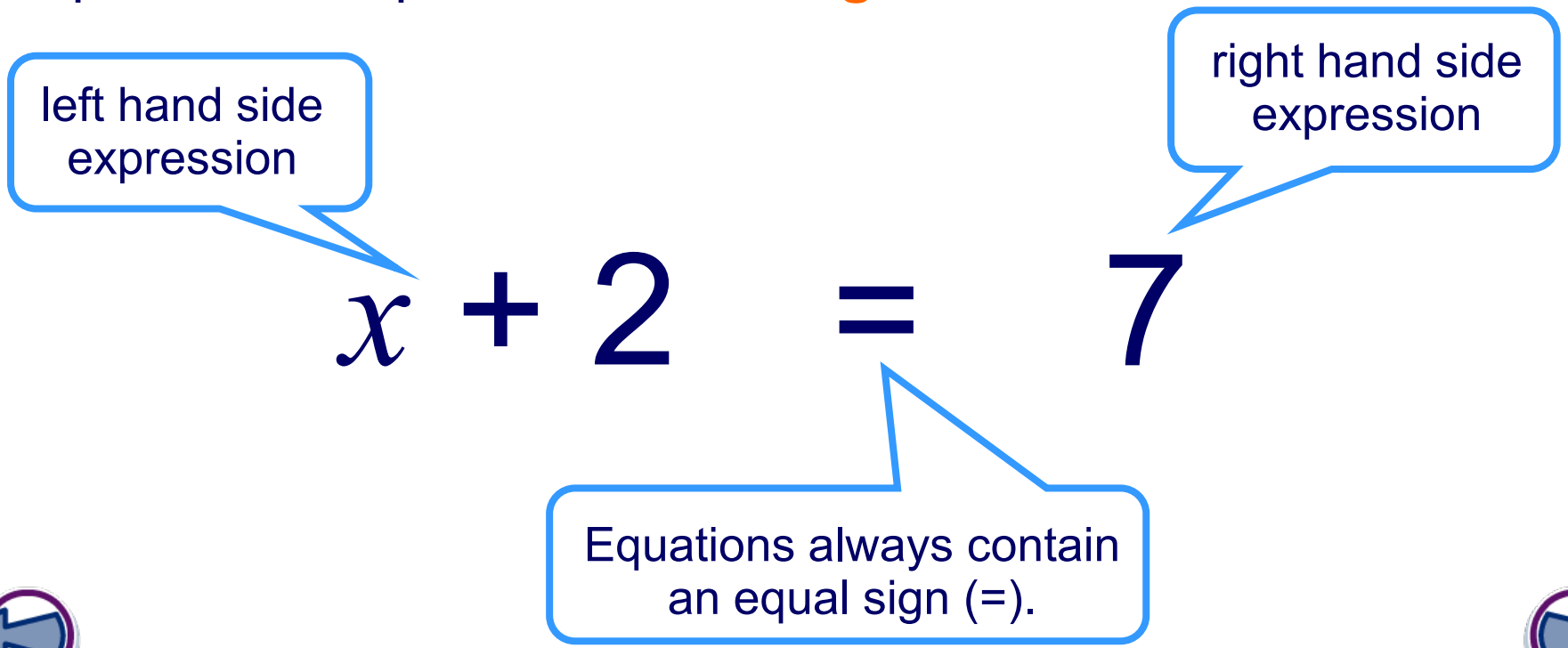
This icon indicates teacher's notes in the Notes field.

Introducing equations

What is an equation?

An equation is a mathematical statement.

An equation says that the expression **left** of the equal sign is equal to the expression on the **right**.



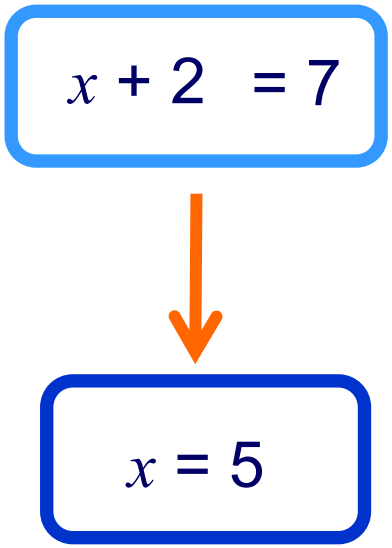
Using equations

What are equations used for?

Equations are used to answer the question:
"Which values make the equation true?"

If we take an expression containing the variable x on its own, we do not know the value of x.

When the expression is included in an equation, we can find out what x is.



What is x?

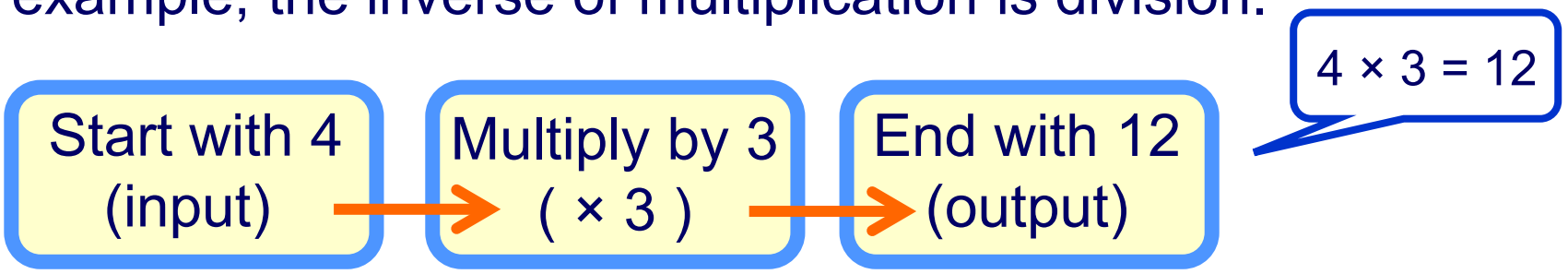
5 is the value that makes the equation, or mathematical statement, true. Finding this value is called **solving** the equation.

Inverse operations

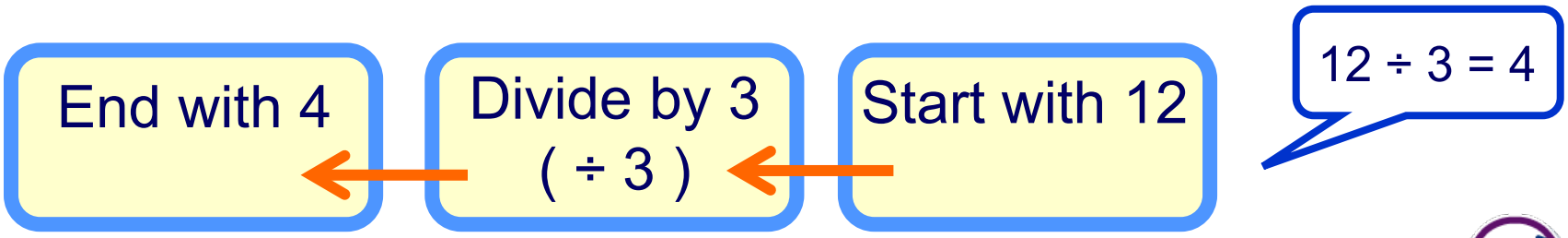
What is an inverse operation?

An inverse operation is an operation that turns an output back into the original input.

For example, the inverse of multiplication is division.



What calculation would turn 12 back into 4?



Using inverse operations

We can use inverse operations to solve simple equations.

If we start with x and add 5, what is the inverse of "+ 5?"

You must **always** make the same change to **both** sides of the equal sign.

$$x + 5 = 13$$

$$-5 \qquad -5$$

$$x + 5 - 5 = 13 - 5$$

$$x + 0 = 8$$

$$x = 8$$

Can you think why?

When we solve an equation we always line up the equal signs.

Checking solutions

How can we check the solution to the equation?

We can check the solution to the equation by **substituting** the solution back into the original equation.

For the equation: $x + 5 = 13$

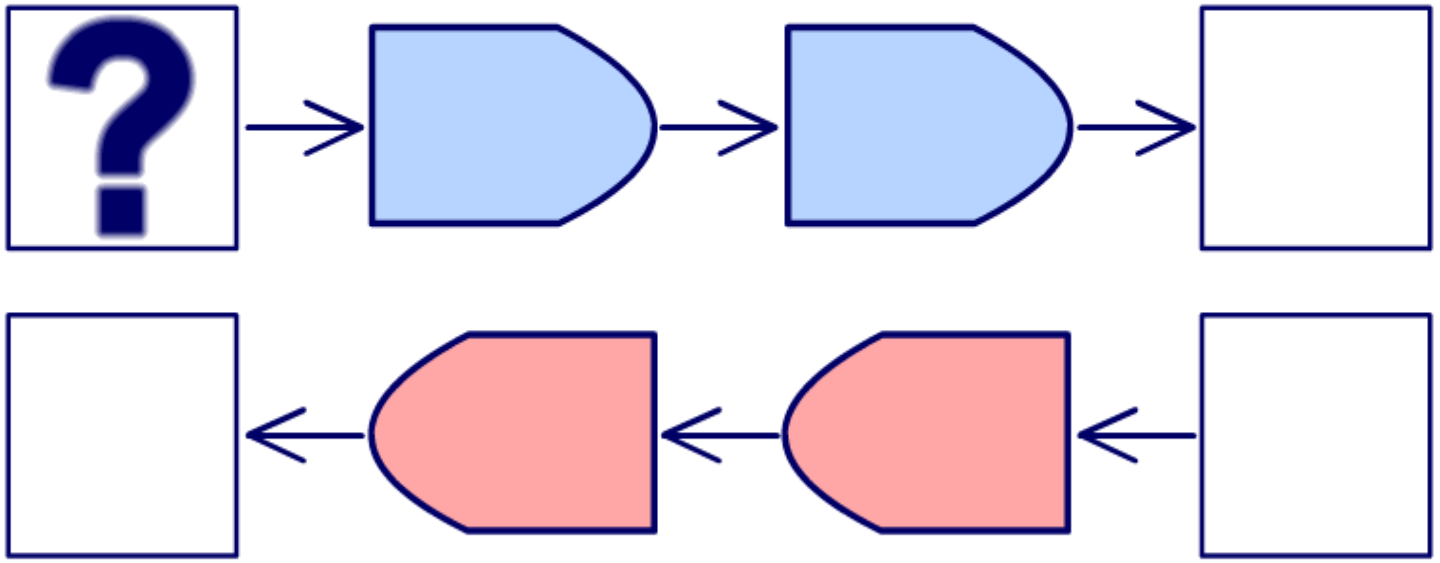
The solution is $x = 8$

If we substitute $x = 8$ back into $x + 5 = 13$ we have:

$$8 + 5 = 13$$

I am thinking of a number…

I am thinking of a number. When I divide it by 7, then subtract 43, I get 1.
Press the boxes to see how to figure out the number.



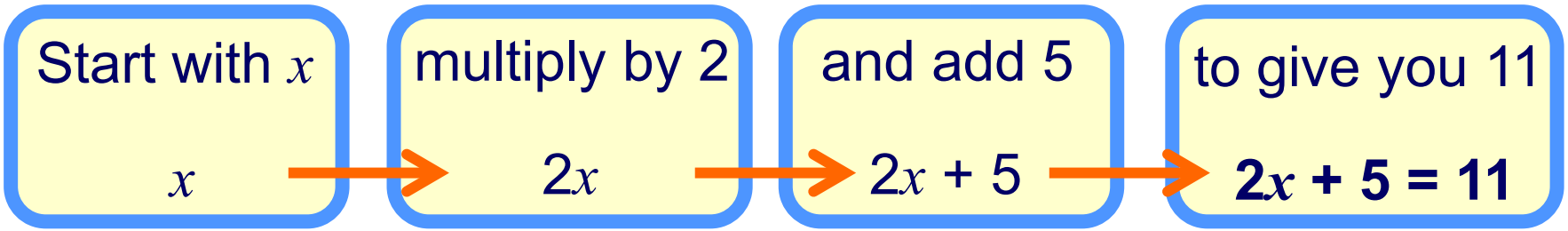
I am thinking of a number…

I am thinking of a number. When I multiply the number by 2 and add 5, the answer is 11.

What number am I thinking of?

We can write this as an equation.

Instead of using ? for the number I am thinking of, let's use the letter x.



What number am I thinking of?

Start with x	Multiply by 2	and add 5	to give you 11.
x	$2x$	$2x + 5$	$\mathbf{2x + 5 = 11}$

We can solve this equation using inverse operations in the opposite order.

Start with the equation $2x + 5 = 11$.

$$2x + 5 = 11$$

Subtract 5: -5 -5

$$2x = 6$$

Divide by 2: $\div 2$ $\div 2$

$$x = 3$$

Putting it all together

Solve this equation by transforming both sides in the same way:

$$\frac{m}{4} - 1 = 2$$

$+1$ $+1$

$$\frac{m}{4} = 3$$

Add 1 to both sides.

$\times 4$ $\times 4$

$$m = 12$$

Multiply both sides by 4.

Remember to show these steps in your work. We can check the solution by substituting it back into the original equation:

$$12 \div 4 - 1 = 2$$ ✓

Solving practice

Solve these equations.

1.	$5x = 45$	? W
2.	$17 - x = 6$	? W
3.	$\frac{x}{7} = 3$	? W
4.	$2x + 4 = 14$	? W
5.	$2 + 4x = 18$	? W

Real-life examples

Q1/4 Tanya has noticed some money has gone missing from her purse. Yesterday she had $40 and now she has $25. How much money is missing?

Press the "=" button to show the work step by step.

$10

$15

$25