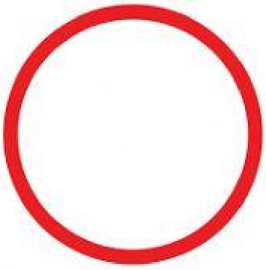
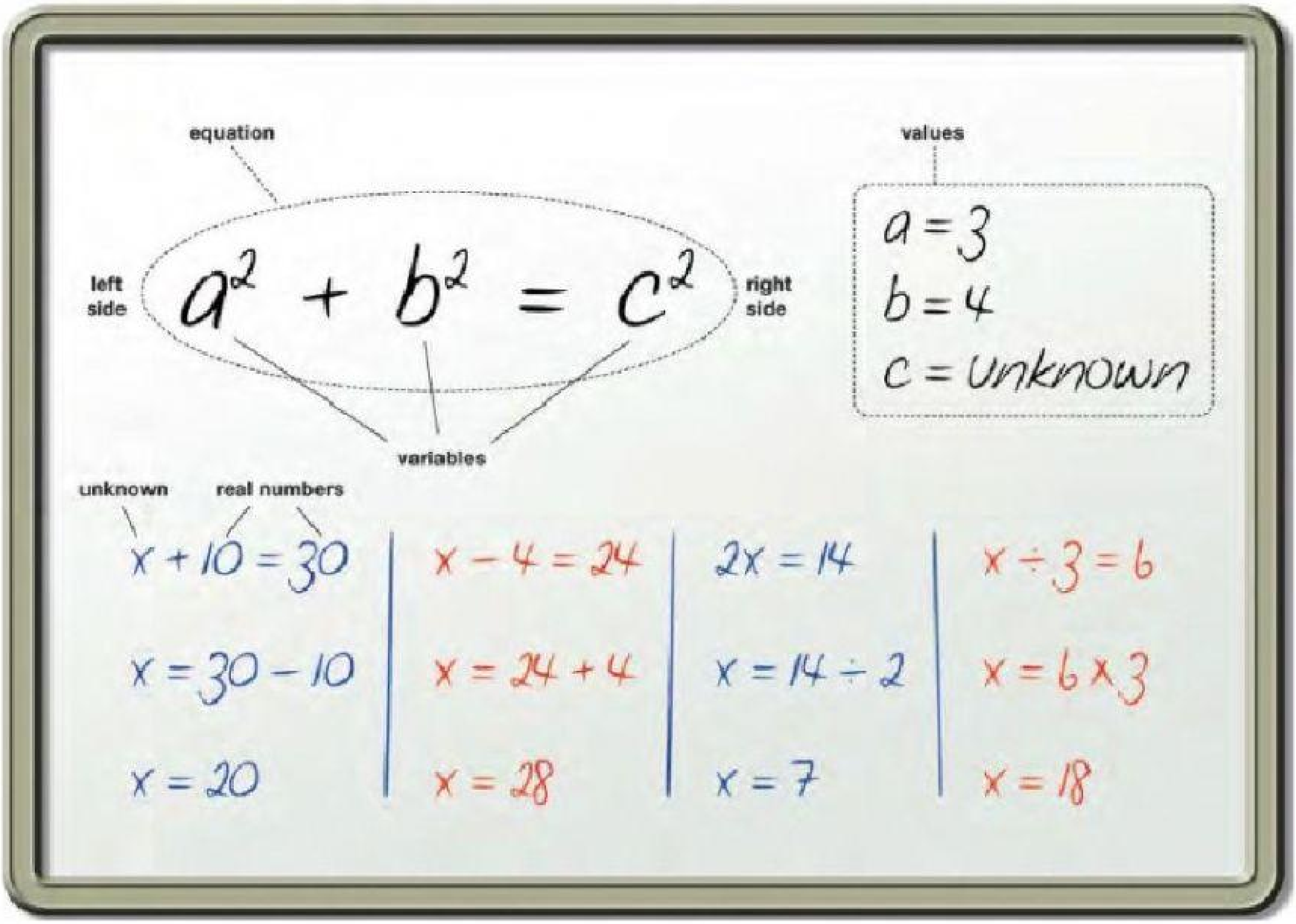
Algebra and formulas: Vocabulary

What's the formula for calculating the area of a circle?



Look at the top left of the box. Do you know what $a^2 + b^2 = c^2$ is?



a) **Read the text and look at the whiteboard above**

We learned Pythagoras' theorem in Unit 4. We can express the theorem as $a^2 + b^2 = c^2$. This is an equation. It has two sides with an equals sign between.

In the equation above there are three variables. We use letters to represent the variables as a, b and c. When we use letters - like a, b, c - to represent variables, we are using algebra.

If we know the value of a and b, we can work out the value of c. In other words, we can solve the equation. We can find the value of the unknown, in this case c.

For example:

if	$a = 3$ and $b = 4$
then	$a^2 = 9, b^2 = 16$
which means that	$a^2 + b^2 = 25$
so	c^2
must be	25
and	$c = \sqrt{25}$
therefore	$c = 5$

b) Look at the whiteboard below. Answer the questions.

1 How many formulas are there?

2 How many variables are there in the formulas?

3 There is a constant in Formula 4. What is it?

4 How many real numbers are there in the formulas?

5 What is on the left side of Formula 1?

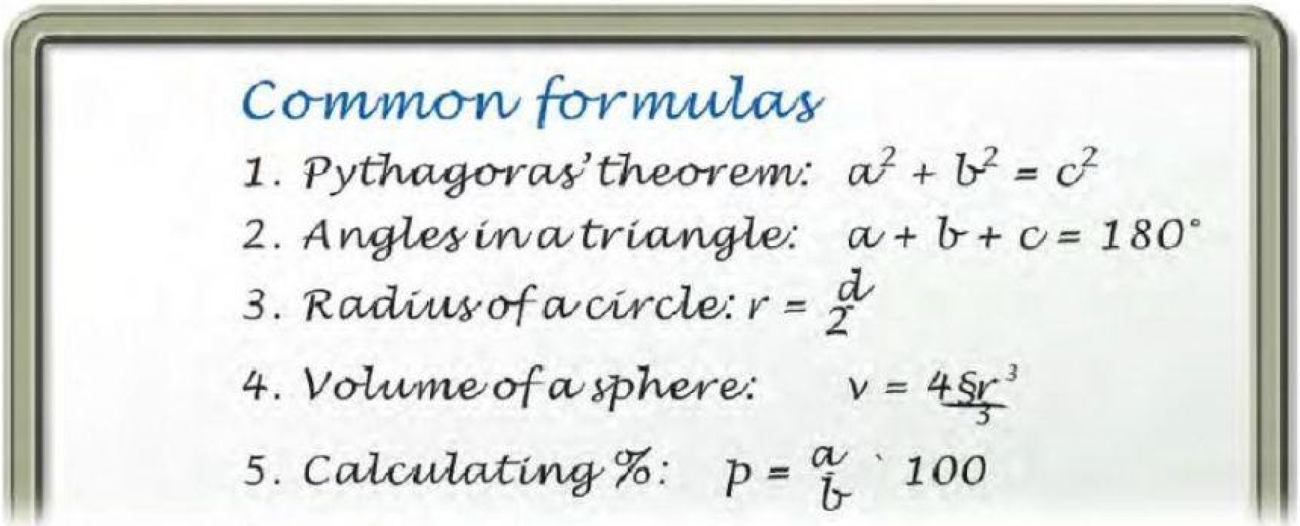
6 What is the on the right side of Formula 2?

7 What does *r* represent in Formula 3?

8 What letter is used to represent *volume* in Formula 4?

9 In Formula 5, if *a* is 4 and *b* is 10, what is *p*?

10 How can you write Formula 3 in a different way?



Match the descriptions to the corresponding formulas

v equals four (times) pi (times) r cubed divided by 3

p equals a over/ divided by b times a hundred

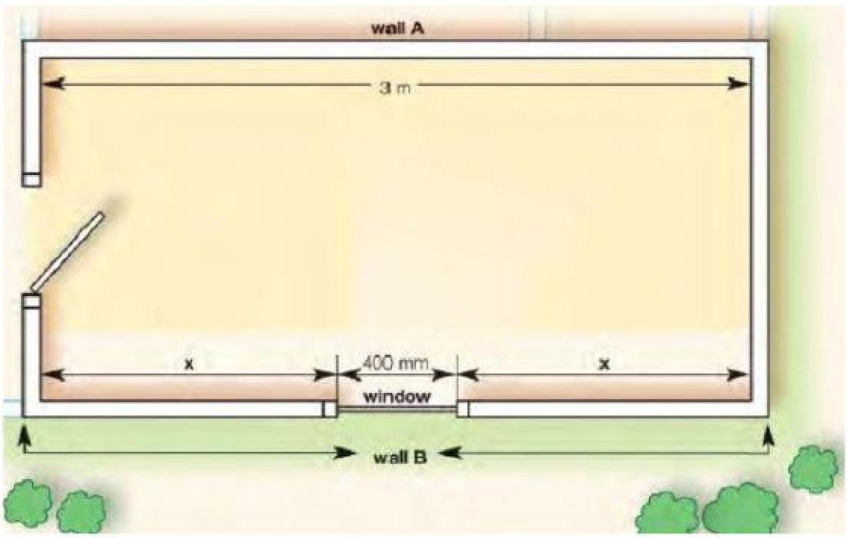
r equals d divided by/over 2

a squared plus b squared equals c squared

a plus b plus c equals a hundred and eighty degrees

Algebra and formulas: Reading

What does this diagram represent?



Read the text opposite. Choose the best answer in each case.

Algebra

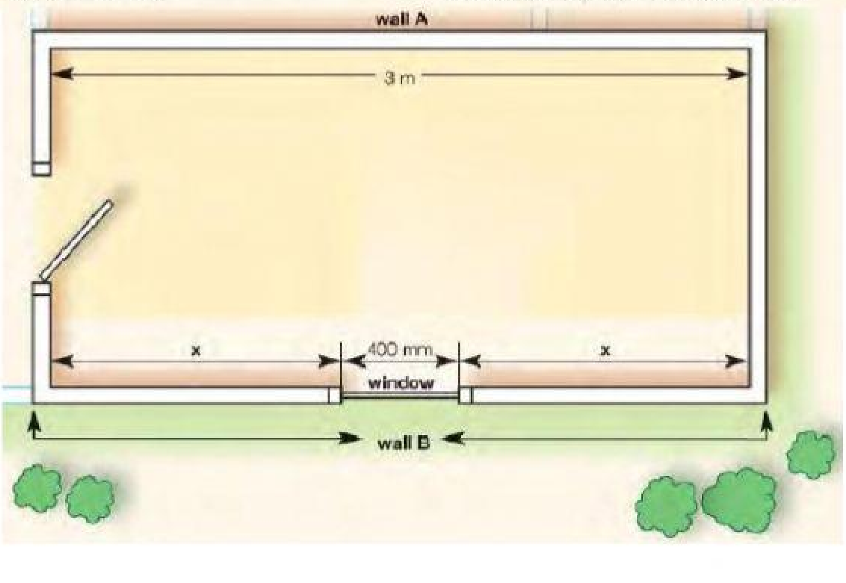
IN THE REAL WORLD

IMAGINE YOU ARE measuring a rectangular room. You know that the length of wall A is 3 metres. You know that the window in wall B is 400 millimetres. If the short walls either side of the window are the same length, then you don't need to measure them. There is only one unknown, so you can work out the length with algebra.

Call the length of one short wall x. If both short walls are equal, then the length of the two walls is $2x$. If wall A is 3 metres long, then wall B must be $2x + 400$ mm $= 3$ m.

However, there are different units of measurement on each side of the equation – millimetres on the left side and metres on the right. We must use a common unit on both sides. If we represent 3 m as 3,000 mm, then we can solve the equation. Take out the unit of measurement. We don't need it once we have reduced both sides to a common unit.

If $2x + 400 = 3{,}000$, then $2x = 3{,}000 - 400$. Therefore $2x = 2{,}600$, which means that $x = 2{,}600 \div 2$, so $x = 1{,}300$. So the length of each short wall must be 1,300 millimetres, or 1.3 metres.



1 Wall B is:

a 400 metres long.

b 300 millimetres long.

c 3,000 mm long.

d 400 mm long.

2 We don't need to measure the short walls because:

a the room is rectangular.

b wall B is the same length as wall A.

c the window is 400 mm.

d there is only one unknown.

3 $2x$ represents the length of:

a wall A.

b wall B.

c the window.

d wall B minus the window.

4 We cannot solve $2x + 400$ mm = 3 m because:

a there are different units of measurement.

b there are two unknowns.

c there are millimetres on the left.

d there are metres on the right.

5 We can rewrite $2x + 400 = 3{,}000$ as:

a $2x + 3{,}000 = 400$.

b $2x = 3{,}000 + 400$.

c $2x = 3{,}000 - 400$.

d $2x = 3{,}000 \times 400$.

How to calculate the size of the walls on either side of the window:

- *Call the short walls x.*
- *If the walls are equal, 2x plus 400 millimetres equals 3 metres.*
- *We must use the same unit of measurement on both sides of the equation.*
- *Therefore 2x plus 400 millimetres equals 3,000 millimetres.*
- *Take out the unit of measurement. Therefore 2x equals 3,000 minus 400. Therefore 2x equals 2,600.*
- *Therefore x equals 1,300.*