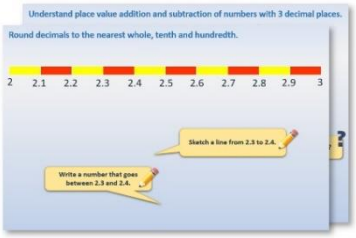
Week 11, Day 5
Pythagoras' theorem

Each day covers one maths topic. It should take you about 1 hour or just a little more.

1. Start by reading through the **Learning Reminders**.



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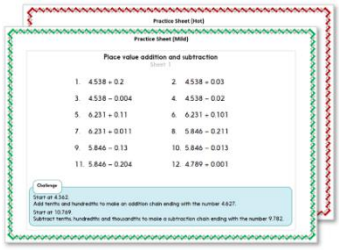
2. Think you've got it? Have a go at the **Investigation** or **Practical Activity**.



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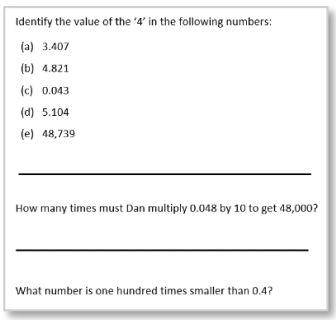
3. Have I mastered the topic? A few questions to **Check your understanding**.
Fold the page to hide the answers!



Learning Reminders

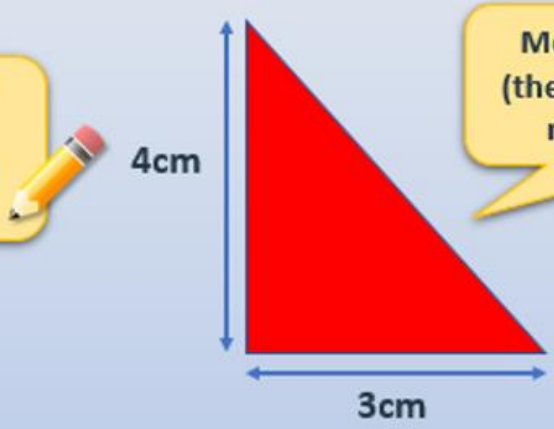
Pythagoras' theorem.

Pythagoras lived in the 6th century BCE, and is one of the most famous Western mathematicians. Some think that he came up with the multiplication table as we know it. He believed that everything in life related to numbers.

Did you know that his wife Theano was also a mathematician? This was unusual in those days.

Pythagoras is most famous for his theorem about the relationship between the length of the sides of a right-angled triangle.

Draw a right-angled triangle using a ruler, with sides of length 3cm and 4cm forming the right angle.



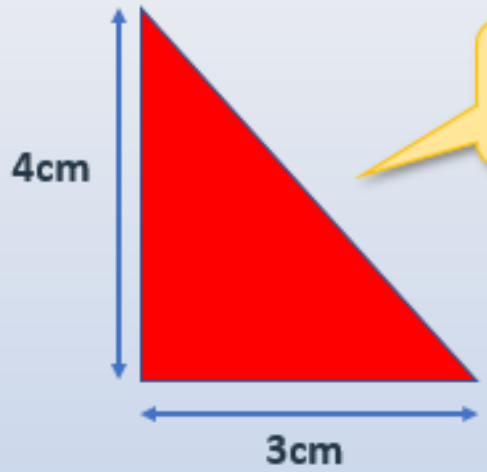
Measure the longest side (the hypotenuse). It should measure exactly 5cm.

Learning Reminders

Pythagoras' theorem.

$a^2 + b^2 = c^2$

Pythagoras said that for any right-angled triangle, the square of the length of the longest side, c, is equal to the sum of the squares of the two shorter sides.



Does this works for your triangle?

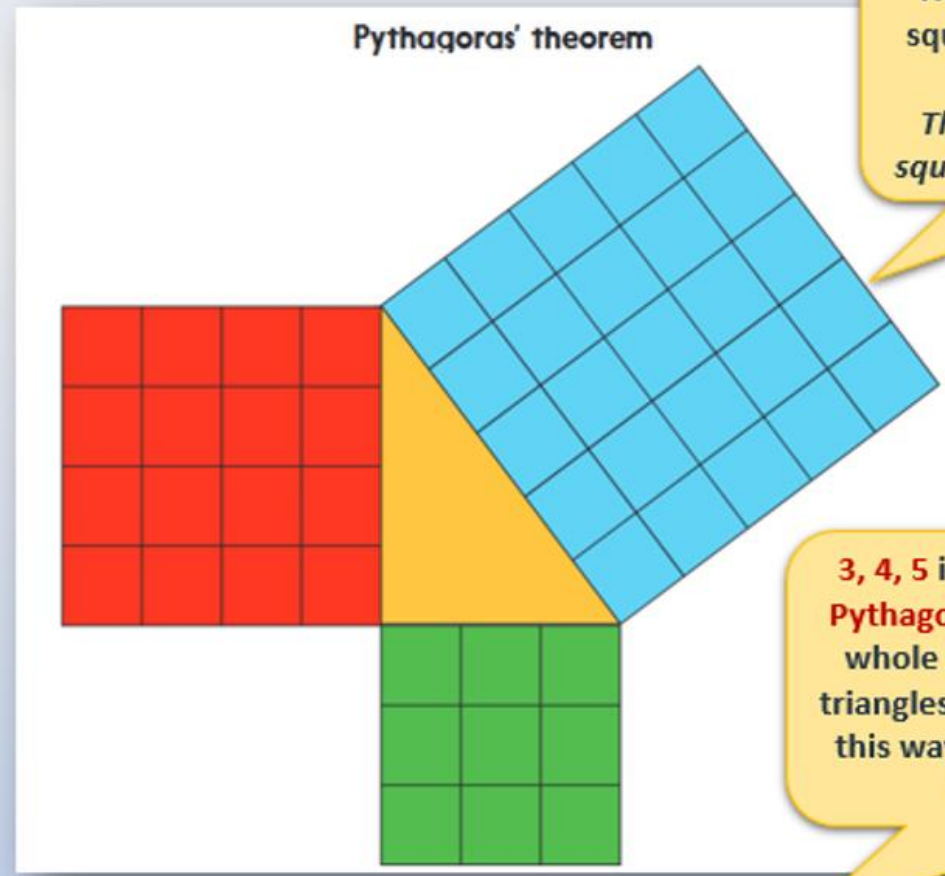
$3^2 + 4^2 = 5^2$

$9 + 16 = 25$

Yes!

Learning Reminders

Pythagoras' theorem.

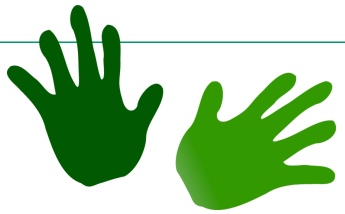


This picture shows 3 squared, 4 squared and 5 squared on each side of the triangle.
The sum of the red and green squares equals the blue squares!

3, 4, 5 is a special set of numbers that fit **Pythagoras' theorem** because they are all whole numbers. Not many right-angled triangles are made from whole numbers in this way. One of your challenges today is to try to find some more.

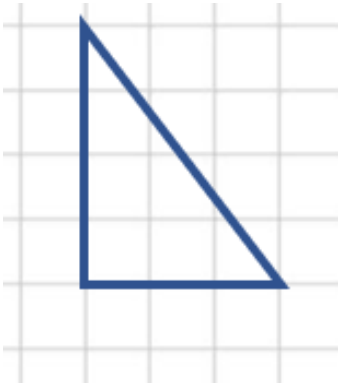
Investigation
Pythagoras' theorem

Things you will need:
- Squared paper (see resources)
- A ruler
- Scissors
- A calculator



What to do:

- Draw right-angled triangles on cm-squared paper.
- Measure the length of each side and then, on separate pieces of paper, draw and cut out three squares with these lengths.
- Show that the area of the larger square equals the total area of the smaller two squares (by laying the medium-sized square on top of the largest square, then cutting up the smaller square to fit round the medium square to cover the area of the largest square).
- Use a calculator to find the area of your squares to see if the sum of the smaller two is equal to the area of the larger one.



Challenge

A 'Pythagorean triple' is a set of three integers (whole numbers) that fit Pythagoras' theorem. The smallest such set is 3, 4, 5. We checked it worked in the Learning reminders: $3^2 + 4^2 = 5^2$ $(9 + 16 = 25)$.

Can you find any other Pythagorean triples?

Challenge Answers

It's a bit like looking for a needle in a haystack, so here is a list of triangles to test: (5, 12, 13), (6, 8, 10), (8, 15, 17), (7, 24, 25), (9, 9, 13), (20, 21, 29), (12, 35, 37), (9, 40, 41), (14, 22, 26), (11, 60, 61).

Investigation

Pythagoras' theorem

Check your understanding

Questions

Write the next three numbers in this sequence.

1, 4, 9, 16, 25

Put these values in order with the smallest first:

5^2, 3^2, 3^3, 2^3

Draw triangles to match each description:

i. With a right angle and the shortest side is 3cm.

ii. Two sides and two angles are equal.

iii. No equal angles; one side twice as long as one other side.

Answers on the next page

Check your understanding

Answers

Write the next three numbers in this sequence.

1, 4, 9, 16, 25, 36, 49, 64 … they are the square numbers.

Put these values in order with the smallest first:
5^2, 3^2, 3^3, 2^3

2^3 3^2 5^2 3^3 which are equal to 8, 9, 25 and 27 respectively. Check that children who have answered incorrectly are not *multiplying* by 2 or 3 rather than squaring or cubing the numbers, e.g. thinking $2^3 = 6$.

Draw triangles to match each description

i. With a right angle and the shortest side is 3cm. Check it has a right angle.

ii. Two sides and two angles are equal. Check it *is* isosceles.

iii. No equal angles; one side twice as long as one other side.
Check the lengths of sides and that it is scalene.

Check children's drawings. For accurate drawings, they should be using a sharp pencil and ruler. Can children name each type of triangle?