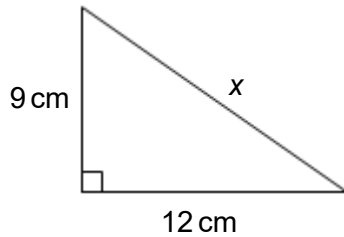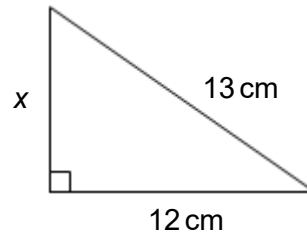# GCSE (9–1)
MATHEMATICS

Foundation Check In - 10.05a Pythagoras' theorem

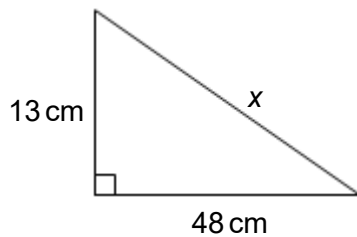Calculate the missing side *x* in each of these triangles.

1.

9 cm *x* 12 cm

2.

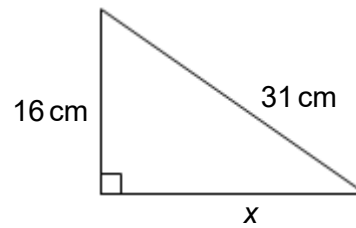*x* 13 cm 12 cm

3.

13 cm *x* 48 cm

4.

16 cm 31 cm *x*

5. Find the length of the diagonal of a square with sides 4 cm.

6. Explain why a triangle with sides 12 cm, 16 cm and 20 cm is a right-angled triangle.

7. A rectangular field is 45 metres long and 30 metres wide. Ian walks diagonally across the field. Show that the distance he walks is 54 metres correct to the nearest metre.

8. Explain why the missing side *x* is equal to 13 cm.

12 cm *x* 3 cm 4 cm
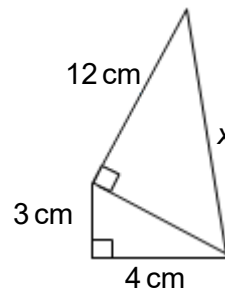
9. A ship sails 20 km west from a harbour, and then changes direction and sails 30 km south. What is the shortest distance the ship needs to travel to return to the harbour?

10. Find the area of an equilateral triangle with sides 6 cm.

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Extension

A Pythagorean Triple is a set of three numbers where the sum of the squares of two numbers is equal to the square of the third number, e.g. 3, 4, 5 is a Pythagorean Triple because $3^2 + 4^2 = 5^2$.

Complete the table below for Pythagorean Triples.

Side a	Side b	Side c
3	4	5
5	12	
7	24	
9		
11		

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Answers

1. 15 cm

2. 5 cm

3. 49.7 cm

4. 26.6 cm

5. 5.7 cm

6. Because the side lengths fit Pythagoras' theorem: $12^2 + 16^2 = 20^2$.

7. $45^2 + 30^2 = 2925$
    $\sqrt{2925}$ = 54.08 = 54 m

8. $\sqrt{3^2 + 4^2}$ = 5
    $\sqrt{5^2 + 12^2}$ = 13

9. 36.1 km

10. 15.6 cm^2

Extension

Side *a*	Side *b*	Side *c*
3	4	5
5	12	13
7	24	25
9	40	41
11	60	61
13	84	85
15	112	113
17	144	145

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Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Find hypotenuse using Pythagoras' theorem			
AO1	2	Find short side using Pythagoras' theorem			
AO1	3	Find hypotenuse using Pythagoras' theorem			
AO1	4	Find one of the shorter sides using Pythagoras' theorem			
AO1	5	Find diagonal length of a square			
AO2	6	Apply Pythagoras' theorem			
AO2	7	Check diagonal length of a rectangle			
AO2	8	Apply Pythagoras' theorem			
AO3	9	Use Pythagoras' theorem in context			
AO3	10	Use Pythagoras' theorem to solve a problem			

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