

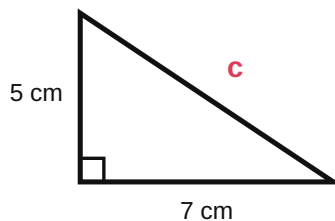
Boost Free Lessons - Year 9 Maths

Lesson 11: Finding the Hypotenuse

Name: _____ Grade: _____ Date: _____

Worked Example 1

The two shorter sides of a right-angled triangle are 5 cm and 7 cm. Find the hypotenuse, leaving your answer as an exact surd.



1. Pythagoras' theorem: $c^2 = a^2 + b^2$.
2. $c^2 = 5^2 + 7^2 = 25 + 49 = 74$.
3. $c = \sqrt{74}$.
4. 74 has no perfect square factors, so $\sqrt{74}$ cannot be simplified any further.

$c = \sqrt{74}$ cm (about 8.6 cm)

Worked Example 2

Both shorter sides of a right-angled triangle are 6 m. Find the hypotenuse as a simplified surd.

1. $c^2 = 6^2 + 6^2 = 36 + 36 = 72$.
2. $c = \sqrt{72}$.
3. Look for the largest perfect square that divides 72. That is 36, since $72 = 36 \times 2$.
4. $\sqrt{72} = \sqrt{36 \times 2} = 6\sqrt{2}$.

$c = 6\sqrt{2}$ m

Remember: The hypotenuse is opposite the right angle and is always the longest side. **Add** the squares of the two shorter sides. An exact answer leaves the surd in, simplified using the largest perfect square factor.



Question 1: Find the hypotenuse. Each of these gives a whole number answer.

1. 3 cm and 4 cm
2. 8 cm and 15 cm
3. 9 m and 40 m
4. 12 cm and 16 cm
5. 20 m and 21 m
6. 7 cm and 24 cm
7. 10 cm and 24 cm
8. 18 m and 24 m



Question 2: Find the hypotenuse, giving your answer as a simplified surd where possible.

1. 2 cm and 3 cm

2. 1 m and 4 m

3. 4 cm and 4 cm

4. 5 m and 5 m

5. 3 cm and 6 cm

6. 2 m and 6 m

7. 6 cm and 8 cm

8. 4 m and 8 m





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Answers: Finding the Hypotenuse

Question 1

- | | |
|----------|----------|
| 1. 5 cm | 5. 29 m |
| 2. 17 cm | 6. 25 cm |
| 3. 41 m | 7. 26 cm |
| 4. 20 cm | 8. 30 m |

Question 2

- | | |
|-------------------|-------------------|
| 1. $\sqrt{13}$ cm | 5. $3\sqrt{5}$ cm |
| 2. $\sqrt{17}$ m | 6. $2\sqrt{10}$ m |
| 3. $4\sqrt{2}$ cm | 7. 10 cm |
| 4. $5\sqrt{2}$ m | 8. $4\sqrt{5}$ m |

Question 3

1. $5\sqrt{2}$ cm
2. 10 m
3. $9\sqrt{2}$ cm
4. $\sqrt{29}$ m
5. 8 cm

