

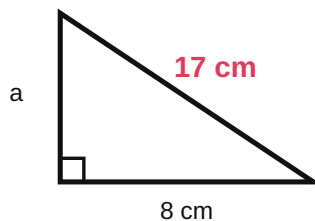
Boost Free Lessons - Year 9 Maths

Lesson 12: Finding the Shorter Side

Name: _____ Grade: _____ Date: _____

Worked Example 1

A right-angled triangle has a hypotenuse of 17 cm and one shorter side of 8 cm. Find the other shorter side.



1. Rearrange Pythagoras' theorem to $a^2 = c^2 - b^2$.
2. To find a shorter side you **subtract**, always squaring the hypotenuse first.
3. $a^2 = 17^2 - 8^2 = 289 - 64 = 225$.
4. $a = \sqrt{225} = 15$. Check it is smaller than the hypotenuse (correct).

a = 15 cm

Worked Example 2

A right-angled triangle has a hypotenuse of 9 m and one shorter side of 5 m. Find the other shorter side as an exact surd.

1. $a^2 = 9^2 - 5^2 = 81 - 25 = 56$.
2. $a = \sqrt{56}$.
3. The largest perfect square factor of 56 is 4, since $56 = 4 \times 14$.
4. $\sqrt{56} = \sqrt{4 \times 14} = 2\sqrt{14}$.

a = $2\sqrt{14}$ m

Remember: Hypotenuse means **add** the squares. A shorter side means **subtract**, starting from the hypotenuse squared. Your answer must always come out smaller than the hypotenuse.



Question 1: Find the missing shorter side. Each of these gives a whole number answer.

1. hypotenuse 13 cm, shorter side 5 cm
2. hypotenuse 25 cm, shorter side 15 cm
3. hypotenuse 10 m, shorter side 8 m
4. hypotenuse 41 cm, shorter side 9 cm
5. hypotenuse 29 m, shorter side 21 m
6. hypotenuse 26 cm, shorter side 24 cm
7. hypotenuse 15 m, shorter side 12 m
8. hypotenuse 37 cm, shorter side 12 cm



Question 2: Find the missing shorter side, giving your answer as a simplified surd.

1. hypotenuse 5 cm, shorter side 2 cm

2. hypotenuse 7 m, shorter side 4 m

3. hypotenuse 6 cm, shorter side 3 cm

4. hypotenuse 10 m, shorter side 5 m

5. hypotenuse 8 cm, shorter side 4 cm

6. hypotenuse 12 m, shorter side 6 m



Question 3: Answer the following questions.

1. A 10 m ladder reaches 8 m up a wall. How far is its foot from the wall?
2. A rectangle has a diagonal of 25 cm and a length of 24 cm. Find its width.
3. An isosceles triangle has two equal sides of 13 cm and a base of 10 cm. Find its perpendicular height.
4. A ramp is 5 m long and rises 3 m. Find the horizontal distance it covers.
5. A right-angled triangle has a hypotenuse of 4 cm and one shorter side of 2 cm. Find the other shorter side exactly.





Every student has gaps. The hard part is knowing exactly where they are.
That is what a Boost assessment is for.

Book a Free Assessment

Normally valued at \$199, free for new families

- A friendly skills check aligned to the NSW syllabus
- Face to face with our qualified tutors
- A clear picture of your child's strengths and gaps
- A weekly plan built around what they actually need

Book a Free Assessment →

boosttutoring.com.au/contact



Answers: Finding the Shorter Side

Question 1

- | | |
|----------|----------|
| 1. 12 cm | 5. 20 m |
| 2. 20 cm | 6. 10 cm |
| 3. 6 m | 7. 9 m |
| 4. 40 cm | 8. 35 cm |

Question 2

- | | |
|-------------------|-------------------|
| 1. $\sqrt{21}$ cm | 4. $5\sqrt{3}$ m |
| 2. $\sqrt{33}$ m | 5. $4\sqrt{3}$ cm |
| 3. $3\sqrt{3}$ cm | 6. $6\sqrt{3}$ m |

Question 3

1. 6 m
2. 7 cm
3. 12 cm
4. 4 m
5. $2\sqrt{3}$ cm

