

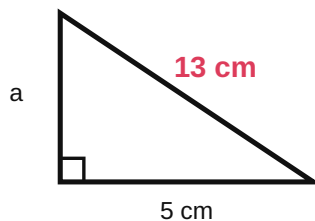
Boost Free Lessons - Year 8 Maths

Lesson 19: Finding a Shorter Side

Name: _____ Grade: _____ Date: _____

Worked Example 1

A right-angled triangle has a hypotenuse of 13 cm and one shorter side of 5 cm. Find the other shorter side.



1. Start from $c^2 = a^2 + b^2$ and rearrange it to $a^2 = c^2 - b^2$.
2. To find a shorter side you **subtract**, and the hypotenuse is always the one being squared first.
3. $a^2 = 13^2 - 5^2 = 169 - 25 = 144$.
4. $a = \sqrt{144}$.

a = 12 cm

Worked Example 2

A right-angled triangle has a hypotenuse of 10 m and one shorter side of 7 m. Find the other shorter side, correct to 1 decimal place.

1. $a^2 = 10^2 - 7^2$.
2. $10^2 = 100$ and $7^2 = 49$, so $a^2 = 51$.
3. $a = \sqrt{51} = 7.141...$
4. Check that the answer is smaller than the hypotenuse, because a shorter side always is.

a ≈ 7.1 m

Remember: To find the hypotenuse you **add** the squares. To find a shorter side you **subtract**, always starting with the hypotenuse squared. Your answer must come out smaller than the hypotenuse.



Question 1: Find the missing shorter side in each right-angled triangle.

1. hypotenuse 5 cm, shorter side 3 cm

2. hypotenuse 13 cm, shorter side 12 cm

3. hypotenuse 25 m, shorter side 7 m

4. hypotenuse 17 cm, shorter side 8 cm

5. hypotenuse 10 cm, shorter side 6 cm

6. hypotenuse 26 m, shorter side 10 m

7. hypotenuse 15 cm, shorter side 9 cm

8. hypotenuse 29 m, shorter side 20 m



Question 2: Find the missing shorter side, correct to 1 decimal place.

1. hypotenuse 9 cm, shorter side 4 cm

2. hypotenuse 12 m, shorter side 8 m

3. hypotenuse 20 cm, shorter side 15 cm

4. hypotenuse 7 m, shorter side 3 m

5. hypotenuse 11 cm, shorter side 6 cm

6. hypotenuse 6.5 m, shorter side 2.5 m



Question 3: Answer the following questions.

1. A 5 m ladder leans against a wall with its foot 1.4 m from the base. How far up the wall does it reach?
2. A rectangle has a diagonal of 17 cm and a width of 8 cm. Find its length.
3. A tent pole is held upright by a 2.5 m rope pegged 1.5 m from its base. How tall is the pole?
4. A ramp is 4.1 m long and covers 4 m horizontally. How high does it rise?
5. A kite string is 25 m long and the kite is 24 m above the ground. How far along the ground is the kite from the person holding it?





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Answers: Finding a Shorter Side

Question 1

- | | |
|----------|----------|
| 1. 4 cm | 5. 8 cm |
| 2. 5 cm | 6. 24 m |
| 3. 24 m | 7. 12 cm |
| 4. 15 cm | 8. 21 m |

Question 2

- | | |
|------------|-----------|
| 1. 8.1 cm | 4. 6.3 m |
| 2. 8.9 m | 5. 9.2 cm |
| 3. 13.2 cm | 6. 6.0 m |

Question 3

1. 4.8 m
2. 15 cm
3. 2 m
4. 0.9 m
5. 7 m

