# Year 9 pythagoras' theorem worksheet

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Name: _____ Date: _____

**Question 1**

A right-angled triangle has shorter sides of 7 cm and 24 cm. Find the length of the hypotenuse.

Answer: _____

**Question 2**

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

Answer: _____

**Question 3**

A 4.5 m ladder leans against a vertical wall on flat ground. The foot of the ladder is 1.2 m from the wall. How far up the wall does the ladder reach? Give your answer correct to 2 decimal places.

Answer: _____

**Question 4**

A rectangular box has length 12 cm, width 5 cm and height 8 cm. Find the length of the longest diagonal of the box, correct to one decimal place.

Answer: _____

**Question 5**

A right-angled triangle has shorter sides of 4.5 m and 6 m. Find the length of the hypotenuse.

Answer: _____

**Question 6**

A right-angled triangle has a hypotenuse of 12.5 m and one shorter side of 7.5 m. Find the length of the other shorter side.

Answer: _____

**Question 7**

A rectangular TV screen is 120 cm wide and 68 cm high. Find the length of its diagonal, correct to 1 decimal place.

Answer: _____

**Question 8**

A rectangular box has a length of 9 cm, a width of 6 cm and a height of 6 cm. Find the length of the space diagonal of the box, correct to 2 decimal places. Give your answer in cm.

Answer: _____

**Question 9**

A right-angled triangle has shorter sides of 9 cm and 13 cm. Find the length of the hypotenuse, correct to 2 decimal places.

Answer: _____

**Question 10**

A right-angled triangle has a hypotenuse of 9 cm and one shorter side of 5 cm. Find the length of the other shorter side, correct to 2 decimal places.

Answer: _____

# Year 9 pythagoras' theorem: answers and worked solutions

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**Question 1**

**Key idea:** Use $c^2 = a^2 + b^2$.

1. $c^2 = 7^2 + 24^2 = 49 + 576 = 625$ 2. $c = \sqrt{(625)} = 25$

**Answer:** 25 cm

**Question 2**

**Key idea:** To find a shorter side, subtract: $a^2 = c^2 - b^2$, where c is the hypotenuse.

1. $a^2 = 17^2 - 8^2 = 289 - 64 = 225$ 2. $a = \sqrt{(225)} = 15$

**Answer:** 15 cm

**Question 3**

**Key idea:** The ladder, wall and ground form a right-angled triangle with the ladder as the hypotenuse.

1. $h^2 = 4.5^2 - 1.2^2 = 20.25 - 1.44 = 18.81$ 2. $h = \sqrt{(18.81)} = 4.337\ldots \approx 4.34$

**Answer:** 4.34 m

**Question 4**

**Key idea:** The longest diagonal of a rectangular prism goes from one corner to the opposite corner. Use Pythagoras twice: first on the base, then use that result with the height.

1. Find the diagonal d of the base using Pythagoras:\ $d^2 = 12^2 + 5^2 = 144 + 25 = 169$ $d = 13$ cm 2. Use d and the height to find the space diagonal D:\ $D^2 = d^2 + 8^2 = 169 + 64 = 233$ $D = \sqrt{(233)} \approx 15.3$ cm

**Answer:** The longest diagonal is approximately 15.3 cm.

**Question 5**

**Key idea:** Use $c^2 = a^2 + b^2$.

1. $c^2 = 4.5^2 + 6^2 = 20.25 + 36 = 56.25$ 2. $c = \sqrt{(56.25)} = 7.5$

**Answer:** 7.5 m

**Question 6**

**Key idea:** Use $a^2 = c^2 - b^2$ with c = 12.5, the longest side.

1. $a^2 = 12.5^2 - 7.5^2 = 156.25 - 56.25 = 100$ 2. $a = \sqrt{(100)} = 10$

**Answer:** 10 m

**Question 7**

**Key idea:** The diagonal of a rectangle is the hypotenuse of a right-angled triangle formed by the width and height.

1. $d^2 = 120^2 + 68^2 = 14{,}400 + 4624 = 19{,}024$ 2. $d = \sqrt{(19{,}024)} = 137.927\ldots \approx 137.9$

**Answer:** 137.9 cm

**Question 8**

**Key idea:** The space diagonal of a rectangular box is found by applying Pythagoras' theorem twice.

1. Find the base diagonal d, where the base has length 9 cm and width 6 cm:\ $d = \sqrt{(9^2 + 6^2)} = \sqrt{(81 + 36)} = \sqrt{(117)}$ 2. The space diagonal s forms a right-angled triangle with d as one leg and the height 6 cm as the other:\ $s = \sqrt{(d^2 + 6^2)} = \sqrt{(117 + 36)} = \sqrt{(153)}$ 3. Evaluate using a calculator:\ $s = \sqrt{(153)} \approx 12.3693\ldots$ 4. Round to 2 decimal places:\ $s \approx 12.37$ cm

**Answer:** 12.37 cm

**Question 9**

**Key idea:** Use $c^2 = a^2 + b^2$ and round at the end.

1. $c^2 = 81 + 169 = 250$ 2. $c = \sqrt{(250)} = 15.8114\ldots$ 3. Correct to 2 decimal places, $c = 15.81$

**Answer:** 15.81 cm

**Question 10**

**Key idea:** Subtract the squares, then take the square root: $a = \sqrt{(c^2 - b^2)}$.

1. $a^2 = 9^2 - 5^2 = 81 - 25 = 56$ 2. $a = \sqrt{(56)} = 7.483\ldots \approx 7.48$

**Answer:** 7.48 cm