# Year 10 pythagoras' theorem worksheet

Year 10 · 10 questions · www.tuterly.com.au

Name: _____ Date: _____

**Question 1**

In $\triangle ABC$, AB = AC and M is the midpoint of BC. It can be proved that $\triangle ABM \equiv \triangle ACM$ by SSS. If AB = 10 cm and BC = 12 cm, what is the length of AM in centimetres, correct to 2 decimal places?

Answer: _____

**Question 2**

A rectangular room is 6 m long, 4 m wide and 3 m high. A cable is to be run in a straight line from one bottom corner of the room to the opposite top corner. Find the length of the cable and the angle it makes with the floor, correct to one decimal place.

Answer: _____

**Question 3**

A rectangular prism has length 12 cm, width 5 cm and height 4 cm. Find the length of the space diagonal (the diagonal from one corner to the opposite corner through the inside of the prism). Give your answer correct to two decimal places.

Answer: _____

**Question 4**

A rectangular prism has length 9 cm, width 4 cm and height 6 cm. A straight rod is placed along the space diagonal of the prism. Find the length of the rod correct to 2 decimal places. Give your answer in centimetres.

Answer: _____

**Question 5**

A right-angled triangle has shorter sides of length 9 cm and 12 cm. Find the length of the hypotenuse.

Answer: _____

**Question 6**

A storage box is a rectangular prism 12 cm long, 4 cm wide and 3 cm high.

(a) Find the length of the diagonal across the base of the box.

(b) Find the length of the longest straight rod that fits inside the box (from one bottom corner to the opposite top corner).

Answer: _____

**Question 7**

A rectangular box (cuboid) measures 3 cm by 4 cm by 12 cm. Find the length of its space diagonal (the diagonal joining opposite corners through the inside of the box).

Answer: _____

**Question 8**

A rectangular box has a base 6 cm by 8 cm and a height of 24 cm.

(a) Find the length of a diagonal of the base.

(b) Find the length of the space diagonal.

Answer: _____

**Question 9**

A right pyramid has a square base of side 10 cm, and its apex is 12 cm directly above the centre of the base. Find the slant height of a triangular face (the distance from the apex to the midpoint of a base edge).

Answer: _____

**Question 10**

Priya wants to pack a straight umbrella 1.2 m long into a suitcase. The inside of the suitcase is a rectangular box 80 cm by 50 cm by 30 cm. Will the umbrella fit lying straight inside it? Show working to justify your answer.

Answer: _____

# Year 10 pythagoras' theorem: answers and worked solutions

Year 10 · 10 questions · www.tuterly.com.au

**Question 1**

**Key idea:** Because △ ABM ≡ △ ACM (SSS), AM is the perpendicular bisector of BC, so angle AMB = 90°.

1. BM = BC/2 = 12/2 = 6 cm 2. Apply Pythagoras' theorem in △ ABM: $AM^2 + BM^2 = AB^2$ 3. $AM^2 = AB^2 - BM^2 = 10^2 - 6^2 = 100 - 36 = 64$ 4. AM = √(64) = 8 cm

**Answer:** 8.00 cm

**Question 2**

**Key idea:** First use Pythagoras' theorem to find the diagonal of the floor, then use that diagonal and the height to find the length of the cable and the angle with the floor.

1. Find the floor diagonal d:\ $d = \sqrt{6^2 + 4^2} = \sqrt{36 + 16} = \sqrt{52}$ 2. Find the cable length L using the height of 3 m:\ $L = \sqrt{(\sqrt{52})^2 + 3^2} = \sqrt{52 + 9} = \sqrt{61} \approx 7.8$ m 3. Find the angle θ the cable makes with the floor (opposite = 3 m, adjacent = √(52) m):\ $\tan(\theta) = (3)/(\sqrt{52})$ 4. Solve:\ $\theta = \tan^{-1}!((3)/(\sqrt{52})) \approx 22.6°$

**Answer:** The cable is approximately 7.8 m long and makes an angle of approximately 22.6° with the floor.

**Question 3**

**Key idea:** The space diagonal d can be found using the 3D extension of Pythagoras' theorem: $d = \sqrt{l^2 + w^2 + h^2}$.

1. Write the formula and substitute the dimensions:\ $d = \sqrt{12^2 + 5^2 + 4^2}$ 2. Evaluate each square:\ $d = \sqrt{144 + 25 + 16}$ 3. Add and take the square root:\ $d = \sqrt{185} \approx 13.60$ cm

**Answer:** The space diagonal is approximately 13.60 cm.

**Question 4**

**Key idea:** The space diagonal of a rectangular prism with dimensions l, w and h is $d = \sqrt{l^2 + w^2 + h^2}$.

1. Identify the dimensions: l = 9 cm, w = 4 cm, h = 6 cm. 2. Find the base diagonal: $d_{base} = \sqrt{9^2 + 4^2} = \sqrt{81 + 16} = \sqrt{97}$ cm. 3. Use $d_{base}$ and the height to find the space diagonal: $d = \sqrt{(\sqrt{97})^2 + 6^2} = \sqrt{97 + 36} = \sqrt{133}$. 4. Evaluate: $d = \sqrt{133} \approx 11.53$ cm (correct to 2 decimal places).

**Answer:** 11.53 cm

**Question 5**

**Answer:** 15 cm (√(81 + 144) = √(225))

**Question 6**

**Answer:** (a) √(160) ≈ 12.65 cm (√(144 + 16)) (b) 13 cm (√(160 + 9) = √(169))

**Question 7**

**Answer:** 13 cm (√(9 + 16 + 144))

**Question 8**

**Answer:** (a) 10 cm (b) 26 cm (√($10^2$ + $24^2$))

**Question 9**

**Answer:** 13 cm (√($5^2$ + $12^2$))

**Question 10**

**Answer:** No. The longest straight object that fits is the space diagonal, √($80^2$ + $50^2$ + $30^2$) = √(9800) ≈ 98.99 cm, which is less than 120 cm.