

The Pythagorean Theorem and Its Converse

Grade 8 math · Test Answer Key · Standards: 8.G.B.6, 8.G.B.7

Award points as shown in each scoring note. Give credit for a correct method with a rounding slip, and require the converse test (both sums shown) when a problem asks whether a triangle is right.

Standards: 8.G.B.6, 8.G.B.7 · **Level:** Grade 8

Question 1 Hypotenuse (2 points)

$$15^2 + 36^2 = 225 + 1,296 = 1,521.$$

$$\sqrt{1,521} = 39.$$

39

Scoring: 1 point for the equation, 1 point for the answer.

Question 2 Missing leg (2 points)

$$b^2 = 37^2 - 12^2 = 1,369 - 144 = 1,225.$$

$$b = 35.$$

35

Scoring: 1 point for the equation, 1 point for the answer.

Question 3 Right triangles? (3 points)

(a) $11^2 + 60^2 = 121 + 3,600 = 3,721 = 61^2$. **Yes**

(b) $14^2 + 48^2 = 196 + 2,304 = 2,500 = 50^2$. **Yes**

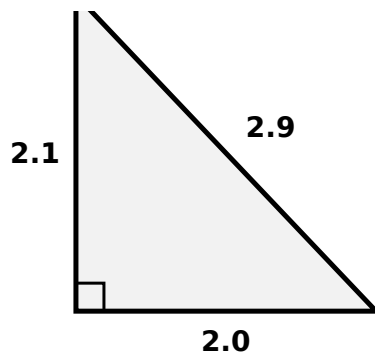
(c) $9^2 + 12^2 = 81 + 144 = 225$, but $16^2 = 256$. **No**

Scoring: 1 point per part, with the check shown.

Question 4 Decimal sides (3 points)

$$x^2 + 2.1^2 = 2.9^2, \text{ so } x^2 = 8.41 - 4.41 = 4.$$

$$x = 2.$$



$$\text{Check: } 2.0^2 + 2.1^2 = 4 + 4.41 = 8.41 = 2.9^2.$$

$$x = 2.0 \text{ cm}$$

Scoring: 1 point for the equation, 1 point for the value of x , 1 point for a correct check.

Question 5 Squares on the sides (3 points)

(a) $100 + 576 = \mathbf{676}$

(b) $\sqrt{676} = \mathbf{26}$

(c) The leg lengths are $\sqrt{100} = 10$ and $\sqrt{576} = 24$, so the sides 10, 24, 26 match: $10^2 + 24^2 = 676 = 26^2$. **Yes, by the converse**

Scoring: 1 point per part.

Question 6 Ladder (2 points)

$$h^2 = 20^2 - 6^2 = 400 - 36 = 364.$$

$$h = \sqrt{364} \approx 19.08.$$

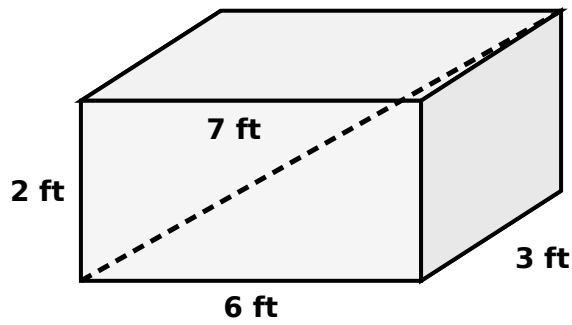
About 19.1 feet

Scoring: 1 point for the equation, 1 point for the rounded answer.

Question 7 Crate diagonal (3 points)

(a) $\sqrt{6^2 + 3^2} = \sqrt{45} \approx 6.7$. **About 6.7 ft**

(b) $d^2 = 36 + 9 + 4 = 49$, so $d = 7$.



Space diagonal: $\sqrt{36 + 9 + 4} = 7$ ft.

7 ft

Scoring: part (a) 1 point; part (b) 1 point for the equation, 1 point for the answer.

Question 8 Cutting the corner (2 points)

Diagonal: $40^2 + 96^2 = 1,600 + 9,216 = 10,816$ and $\sqrt{10,816} = 104$.

Along the sides: $40 + 96 = 136$. Saved: $136 - 104 = 32$.

32 meters

Scoring: 1 point for the diagonal, 1 point for the savings.