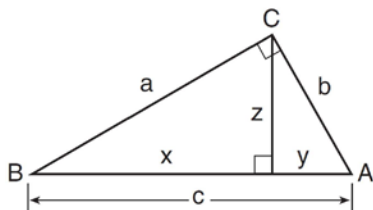


G.G.47: Similarity 1: Investigate theorems about mean proportionality: altitude to the hypotenuse of a right triangle is mean proportional between the segments along hypotenuse

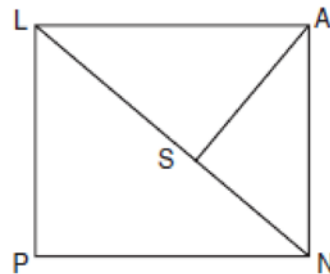
- 1 In the diagram below of right triangle $\triangle ABC$, an altitude is drawn to the hypotenuse \overline{AB} .



Which proportion would always represent a correct relationship of the segments?

- 1) $\frac{c}{z} = \frac{z}{y}$
- 2) $\frac{c}{a} = \frac{a}{y}$
- 3) $\frac{x}{z} = \frac{z}{y}$
- 4) $\frac{y}{b} = \frac{b}{x}$

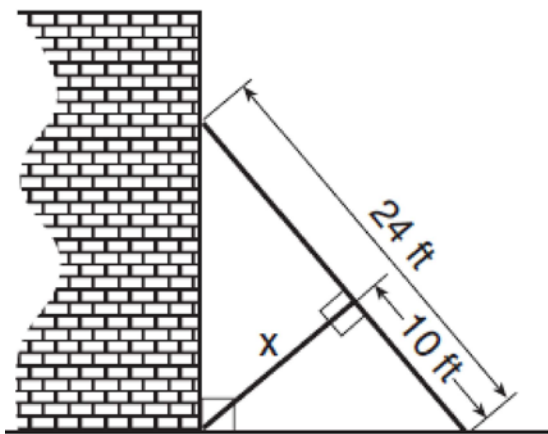
- 2 The accompanying diagram shows part of the architectural plans for a structural support of a building. $PLAN$ is a rectangle and $\overline{AS} \perp \overline{LN}$.



Which equation can be used to find the length of \overline{AS} ?

- 1) $\frac{LS}{AS} = \frac{AS}{SN}$
- 2) $\frac{AN}{LN} = \frac{AS}{LS}$
- 3) $\frac{AS}{SN} = \frac{AS}{LS}$
- 4) $\frac{AS}{LS} = \frac{LS}{SN}$

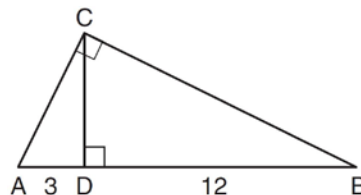
- 3 The accompanying diagram shows a 24-foot ladder leaning against a building. A steel brace extends from the ladder to the point where the building meets the ground. The brace forms a right angle with the ladder.



If the steel brace is connected to the ladder at a point that is 10 feet from the foot of the ladder, which equation can be used to find the length, x , of the steel brace?

- 1) $\frac{10}{x} = \frac{x}{14}$
- 2) $\frac{10}{x} = \frac{x}{24}$
- 3) $10^2 + x^2 = 14^2$
- 4) $10^2 + x^2 = 24^2$

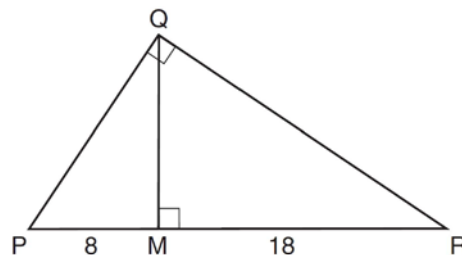
- 4 In the diagram below of right triangle ABC , altitude \overline{CD} is drawn to hypotenuse \overline{AB} .



If $AD = 3$ and $DB = 12$, what is the length of altitude \overline{CD} ?

- 1) 6
- 2) $6\sqrt{5}$
- 3) 3
- 4) $3\sqrt{5}$

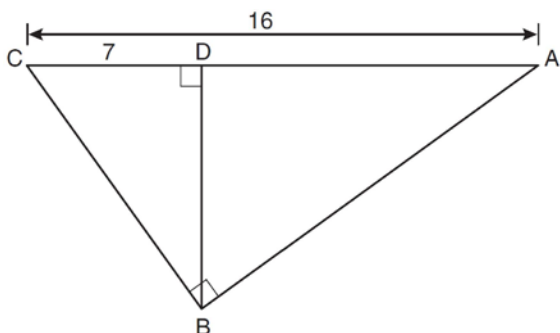
- 5 In the diagram below, \overline{QM} is an altitude of right triangle PQR , $PM = 8$, and $RM = 18$.



What is the length of \overline{QM} ?

- 1) 20
- 2) 16
- 3) 12
- 4) 10

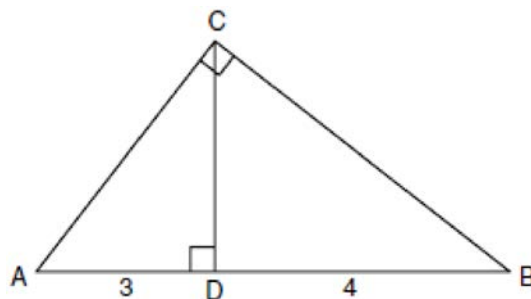
- 6 In the diagram below of right triangle ABC , altitude \overline{BD} is drawn to hypotenuse \overline{AC} , $AC = 16$, and $CD = 7$.



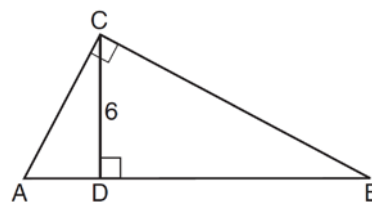
What is the length of \overline{BD} ?

- 1) $3\sqrt{7}$
 - 2) $4\sqrt{7}$
 - 3) $7\sqrt{3}$
 - 4) 12
- 7 In $\triangle PQR$, $\angle PRQ$ is a right angle and \overline{RT} is drawn perpendicular to hypotenuse \overline{PQ} . If $PT = x$, $RT = 6$, and $TQ = 4x$, what is the length of \overline{PQ} ?
- 1) 9
 - 2) 12
 - 3) 3
 - 4) 15

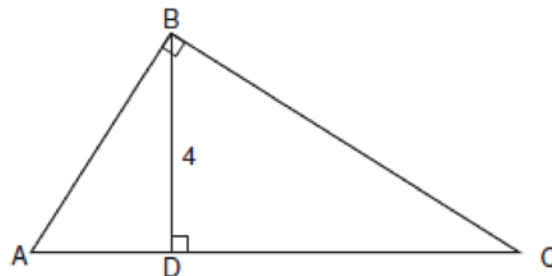
- 8 In the diagram below of right triangle ACB , altitude \overline{CD} intersects \overline{AB} at D . If $AD = 3$ and $DB = 4$, find the length of \overline{CD} in simplest radical form.



- 9 In right triangle ABC below, \overline{CD} is the altitude to hypotenuse \overline{AB} . If $CD = 6$ and the ratio of \overline{AD} to \overline{AB} is 1:5, determine and state the length of \overline{BD} . [Only an algebraic solution can receive full credit.]



- 10 The drawing for a right triangular roof truss, represented by $\triangle ABC$, is shown in the accompanying diagram. If $\angle ABC$ is a right angle, altitude $\overline{BD} = 4$ meters, and \overline{DC} is 6 meters longer than \overline{AD} , find the length of base \overline{AC} in meters.



G.G.47: Similarity 1: Investigate theorems about mean proportionality: altitude to the hypotenuse of a right triangle is mean proportional between the segments along hypotenuse
Answer Section

1 ANS: 3 REF: 081410ge

2 ANS: 1 REF: 010920b

3 ANS: 1 REF: 010619b

4 ANS: 1

$$x^2 = 3 \times 12$$

$$x = 6$$

REF: 011308ge

5 ANS: 3

$$x^2 = 8 \times 18$$

$$x^2 = 144$$

$$x = 12$$

REF: 061506ge

6 ANS: 1

$$x^2 = 7(16 - 7)$$

$$x^2 = 63$$

$$x = \sqrt{9} \sqrt{7}$$

$$x = 3\sqrt{7}$$

REF: 061128ge

7 ANS: 4

$$x \cdot 4x = 6^2. \quad PQ = 4x + x = 5x = 5(3) = 15$$

$$4x^2 = 36$$

$$x = 3$$

REF: 011227ge

8 ANS:

$$2\sqrt{3}. \quad x^2 = 3 \cdot 4$$

$$x = \sqrt{12} = 2\sqrt{3}$$

REF: fall0829ge

9 ANS:

$$4x \cdot x = 6^2$$

$$4x^2 = 36$$

$$x^2 = 9$$

$$x = 3$$

$$\overline{BD} = 4(3) = 12$$

REF: 011437ge

10 ANS:

$$x(x+6) = 4^2$$

$$10. \text{ Let } \overline{AD} = x. \quad \begin{array}{l} x^2 + 6x - 16 = 0 \\ (x+8)(x-2) = 0 \\ x = 2 \end{array} \quad \text{. Since } DC = 8, AC = 10.$$

REF: 080932b