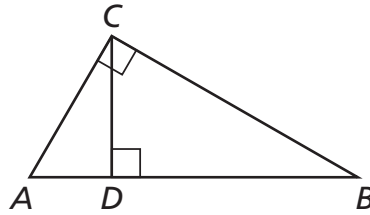


9.3 Start Thinking

In the diagram below, \overline{CD} is an altitude to the hypotenuse of $\triangle ABC$.

1. Prove: $\triangle ABC \sim \triangle ACD$
2. Prove: $\triangle ABC \sim \triangle CBD$

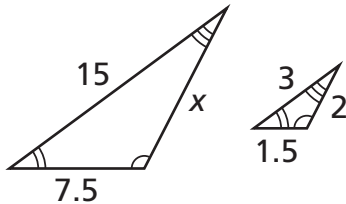


3. Use the information from the two proofs to make a conclusion about the two smaller triangles in the diagram.

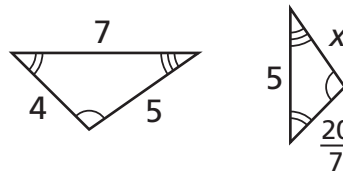
9.3 Warm Up

Given that the triangles are similar, find the missing side length.

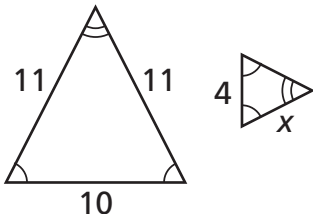
1.



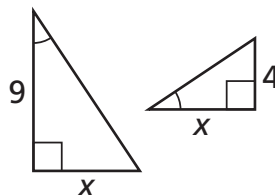
2.



3.



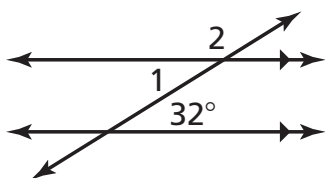
4.



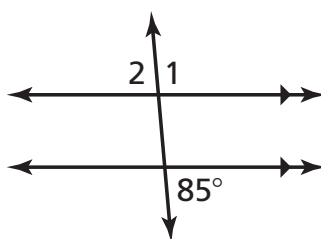
9.3 Cumulative Review Warm Up

Use the diagram to find $m\angle 1$ and $m\angle 2$.

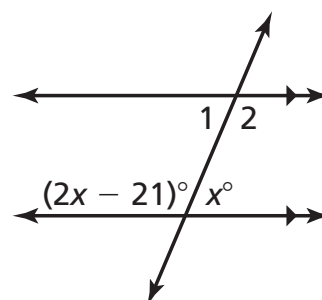
1.



2.



3.

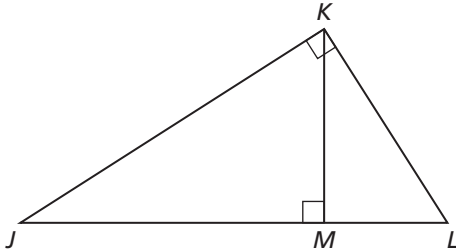


9.3

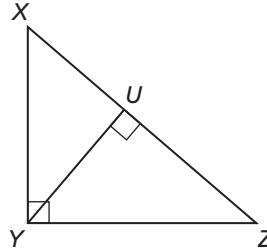
Practice A

In Exercises 1 and 2, identify the similar triangles.

1.

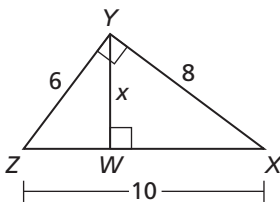


2.

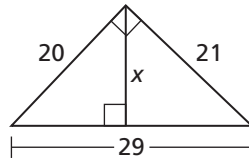


In Exercises 3–5, find the value of x .

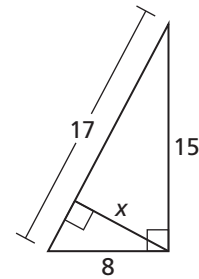
3.



4.



5.



In Exercises 6–8, find the geometric mean of the two numbers.

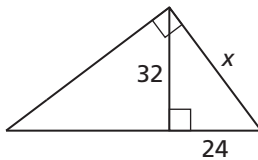
6. 3 and 12

7. 4 and 14

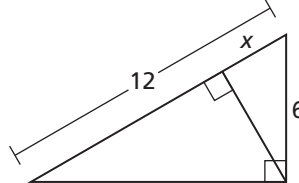
8. 10 and 24

In Exercises 9–11, find the value of x .

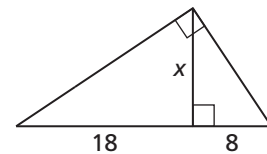
9.



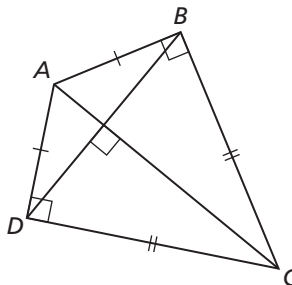
10.



11.



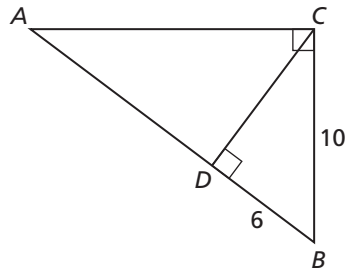
12. You are designing a diamond-shaped kite. You know that $AB = 38.4$ centimeters, $BC = 72$ centimeters, and $AC = 81.6$ centimeters. You want to use a straight crossbar \overline{BD} . About how long should it be?



9.3

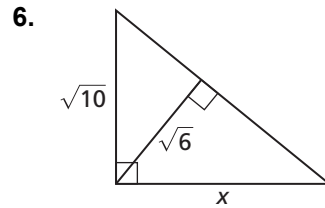
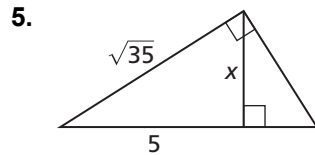
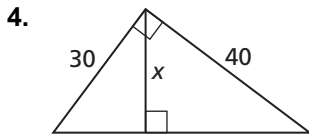
Practice B

In Exercises 1–3, use the diagram.



1. Identify the similar triangles.
2. Which segment's length is the geometric mean of AB and DB ?
3. Find CD , AD , and AC .

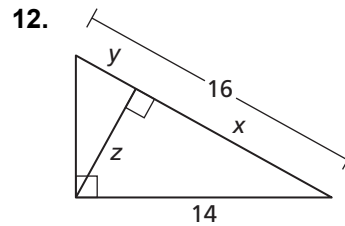
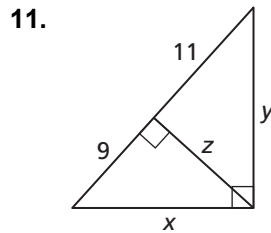
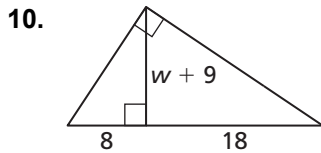
In Exercises 4–6, find the value of x .



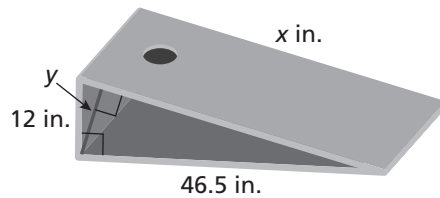
In Exercises 7–9, find the geometric mean of the two numbers.

7. 12 and 24
8. 16 and 25
9. $\frac{1}{2}$ and 40

In Exercises 10–12, find the value(s) of the variable(s).



13. You build a cornhole game. The game is constructed from a sheet of plywood supported by two boards. The two boards form a right angle and their lengths are 12 inches and 46.5 inches.



- a. Find the length x of the plywood to the nearest inch.
- b. You put in a support that is altitude y to the hypotenuse of the right triangle. What is the length of the support? Round your answer to the nearest tenth.
- c. Where does the support attach to the plywood? Explain.

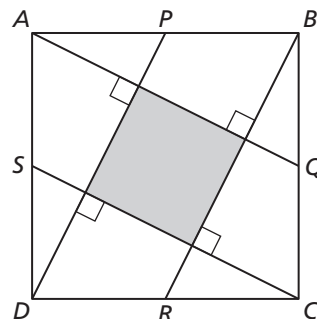
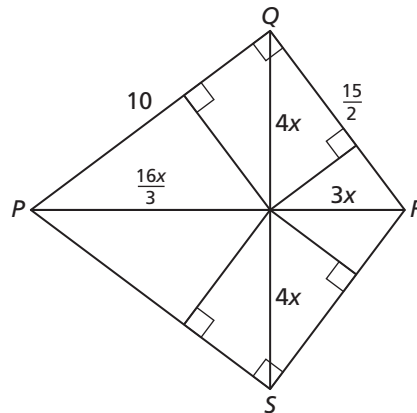
9.3 Enrichment and Extension

Geometric Mean

- In right triangle RST , altitude \overline{SU} is drawn to the hypotenuse \overline{RT} , $RS = 8$, and the ratio of RU to UT is 1 to 3. What is the length of \overline{RT} ?
- In right triangle ABC , altitude \overline{BD} is drawn to hypotenuse \overline{AC} . If $AD = 5$ and $BC = 2\sqrt{21}$, find the length of \overline{DC} , \overline{BD} , and \overline{AB} .
- The *harmonic mean* of a and b is $\frac{2ab}{a+b}$. The Greek mathematician Pythagoras found that three equally taut strings on stringed instruments will sound harmonious if the length of the middle string is equal to the harmonic mean of the lengths of the shortest and longest string.
 - Find the harmonic mean of 10 and 15.
 - Find the harmonic mean of 6 and 14.
 - Will equally taut strings whose lengths have the ratio of 4 : 6 : 12 sound harmonious? Explain your reasoning.
- In polygon $PQRS$ at the right, $PQ = PS$ and $QR = SR$. Find PR and QS .

In Exercises 5 and 6, the vertices of $\triangle ABC$ are given. Use the point-slope formula to find the coordinates of a point D such that \overline{CD} is the altitude to the hypotenuse.

- $A(-1, 1)$, $B(1, -1)$, $C(1, 1)$
- $A(2, 0)$, $B(-2, 8)$, $C(2, 8)$
- Square $ABCD$ in the diagram at the right has side lengths of 1, and the midpoints of its sides are labeled P , Q , R , and S . Find the length of a side of the shaded square.





Puzzle Time

Why Did The Forest Ranger Change Jobs?

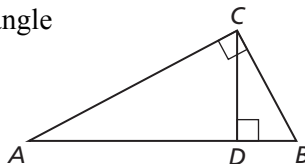
A	B	C	D	E	F
G	H	I			

Complete each exercise. Find the answer in the answer column. Write the word under the answer in the box containing the exercise letter.

26.5 LEAF
bisector WAS
geometric HE
9.1 TIME
15.5 TO
$\triangle CDB$ WANTED
18.8 FOREST
7.1 OVER
27.6 END

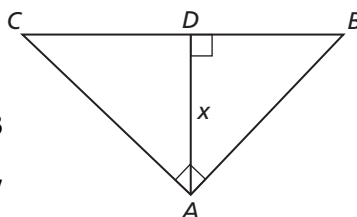
Complete the sentence.

- A. If the _____ is drawn to the hypotenuse of a right triangle, then the two triangles formed are similar to the original triangle and to each other.
- B. In a right triangle, the altitude from the right angle to the hypotenuse divides the hypotenuse into two segments. The length of the altitude is the _____ mean of the lengths of the two segments.
- C. Identify the smallest similar triangle using the diagram for $\triangle ABC$.



Find x . Round your answer to the nearest tenth.

- D. $AC = 63, AB = 16,$
 $CB = 65$
- E. $AC = 12, AB = 5, CB = 13$
- F. $AC = 15, AB = 8, CB = 17$



Find the geometric mean of the two numbers. Round your answer to the nearest tenth.

- G. 15 and 24
- H. 18 and 30
- I. 20 and 35

length THE
23.2 NEW
$\triangle BCD$ GRASS
altitude BECAUSE
16.5 GREENER
23.1 WITH
4.6 TURN
5.4 TREE
19.0 A