9.1 Start Thinking

Draw and cut out a figure as shown in Diagram A with two connected squares. What is the area of the figure? Add segments to your figure to create two triangles as shown in Diagram B.

Diagram A

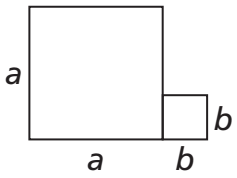
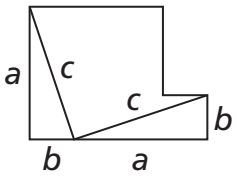


Diagram B



Cut along the hypotenuse c of each triangle so that the figure is now in three separate pieces. Reassemble the three pieces to create a square. What is the area of the square? How do your results relate to the Pythagorean Theorem?

9.1 Warm Up

Solve the equation.

1. $4^2 + 3^2 = x^2$

2. $13^2 + x^2 = 25^2$

3. $\left(\frac{5}{2}\right)^2 - x^2 = \left(\frac{1}{3}\right)^2$

4. $\left(9\sqrt{3}\right)^2 - x^2 = 2^2$

5. $\left(\sqrt{5}\right)^2 + x^2 = 12^2$

6. $\left(5\sqrt{10}\right)^2 - \left(\sqrt{2}\right)^2 = x^2$

9.1 Cumulative Review Warm Up

Find the perimeter of the polygon with the given vertices.

1. $X(-2, 1), Y(4, 1), Z(-2, -4)$

2. $P(3, 5), Q(3, 4), R(-1, 4), S(-1, 5)$

3. $A(-4, 7), B(3, 5), C(0, 1)$

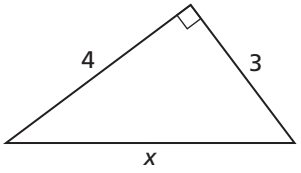
4. $T(3, 6), U(-4, 6), V(-1, 2), W(6, 2)$

Name_____ Date _____

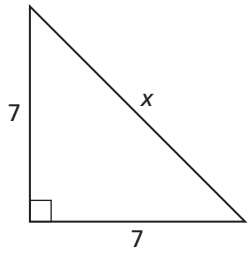
9.1 Practice A

In Exercises 1–6, find the value of *x*. Then tell whether the side lengths form a Pythagorean triple.

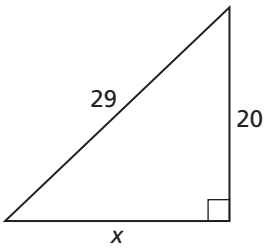
1.



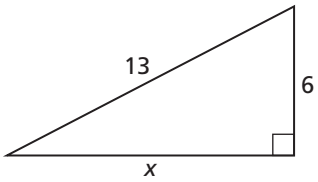
2.



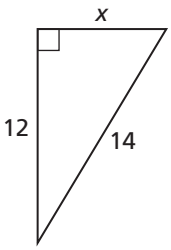
3.



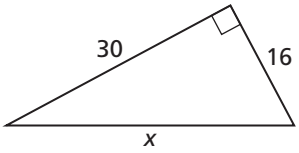
4.



5.

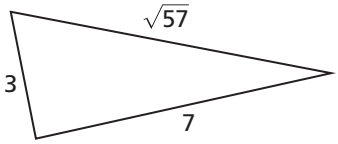


6.

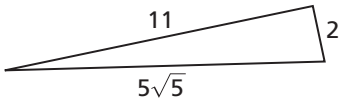


In Exercises 7 and 8, tell whether the triangle is a right triangle.

7.



8.



In Exercises 9–12, verify that the segment lengths form a triangle. Is the triangle *acute*, *right*, or *obtuse*?

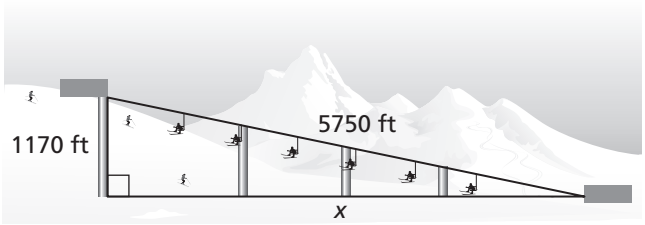
9. 5, 12, and 13

10. 5, 7, and 8

11. 2, 10, and 11

12. $\sqrt{8}$, 4, and 6

13. A ski lift forms a right triangle, as shown. Use the Pythagorean Theorem (Theorem 9.1) to approximate the horizontal distance traveled by a person riding the ski lift. Round your answer to the nearest whole foot.

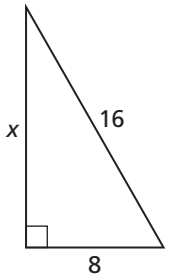


Name _____ Date _____

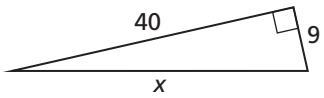
9.1 Practice B

In Exercises 1–3, find the value of *x*. Then tell whether the side lengths form a Pythagorean triple.

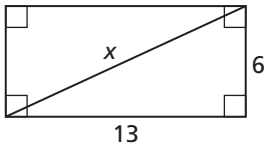
1.



2.

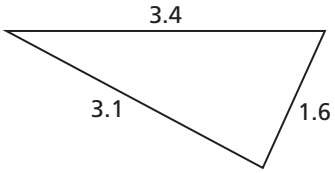


3.

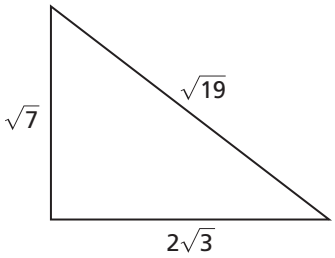


In Exercises 4 and 5, tell whether the triangle is a right triangle.

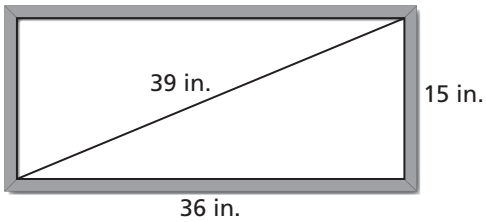
4.



5.



6. You construct a picture frame with a diagonal piece attached to the back for support, as shown. Can you tell from the dimensions whether the corners of the frame are right angles? Explain.



In Exercises 7–9, verify that the segment lengths form a triangle. Is the triangle *acute*, *right*, or *obtuse*?

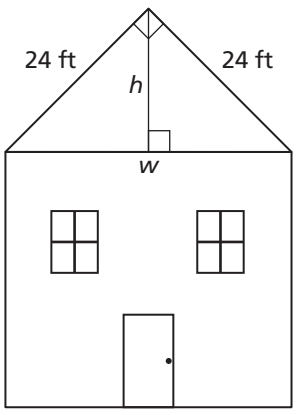
7. 14, 48, and 50

8. 7.1, 13.3, and 19.5

9. $\sqrt{67}$, 4, and 9

10. A triangle has side lengths of 12 feet and 18 feet. Your friend claims that the third side must be greater than 6 feet. Is your friend correct? Explain.

11. The diagram shows the design of a house roof. Each side of the roof is 24 feet long, as shown. Use the Pythagorean Theorem (Theorem 9.1) to answer each question.



a. What is the approximate width *w* of the house?

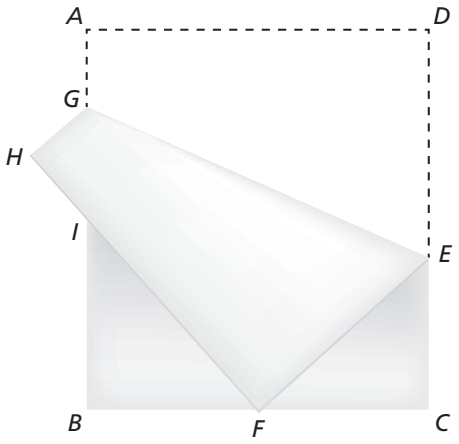
b. What is the approximate height *h* of the roof above the ceiling?

Name_____ Date _____

9.1 Enrichment and Extension

Pythagorean Theorem

In Exercises 1 and 2, use the diagram.



1. The dimensions of a rectangular piece of paper $ABCD$ are $AB = 10$ and $BC = 9$. It is folded so that corner D is matched with a point F on edge $\overline{BC}$. Given that $DE = 6$, find EF, EC, and FC.

2. The lengths of $\overline{EF}$, $\overline{EC}$, and $\overline{FC}$ are all functions of length DE. The area of $\triangle EFC$ is also a function of DE. Using $DE = x$, write formulas for these four functions.

3. Find all values of k so that $(-1, 2)$, $(-10, 5)$, and $(-4, k)$ are the vertices of a right triangle.

4. Suppose the numbers a, b, and c form a Pythagorean triple. Is each of the following also always a Pythagorean triple? Explain.

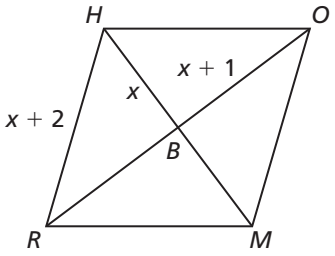
a. $a + 1, b + 1, c + 1$

b. $2a, 2b, 2c$

c. a^2, b^2, c^2

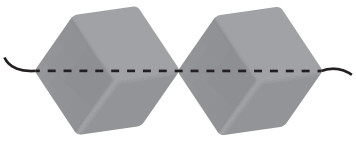
d. $\sqrt{a}, \sqrt{b}, \sqrt{c}$

5. If $RHOM$ is a rhombus, find the value of x.



6. A pencil box in the shape of a rectangular prism measures 16 centimeters by 12 centimeters by 8 centimeters. Find the length of the longest pencil that would fit inside the box.

7. A cube-shaped bead has a length, width, and height of 2 centimeters. A hole is drilled through the bead diagonally from one corner to the opposite corner that is farthest away from it. How many of these beads must be strung together to form a length of about 5 feet? $(1 \text{ in.} \approx 2.54 \text{ cm})$



Name _____ Date _____

9.1 Puzzle Time

What Do You Get When You Cross A Computer With A Lifeguard?

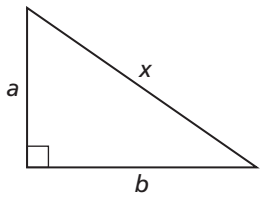
Write the letter of each answer in the box containing the exercise number.

Complete the sentence.

1. In a(n) _____ triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the legs.
2. A(n) _____ triple is a set of three positive integers, a, b, and c, that satisfy the equation $c^2 = a^2 + b^2$.
3. If the square of the length of the _____ side of a triangle is equal to the sum of the squares of the lengths of the other two sides, then the triangle is a right triangle.
4. For any $\triangle ABC$, where c is the length of the longest side, if $c^2 < a^2 + b^2$, then $\triangle ABC$ is _____.
5. For any $\triangle ABC$, where c is the _____ of the longest side, if $c^2 > a^2 + b^2$, then $\triangle ABC$ is obtuse.

Find the value of x.

6. $a = 20$, $b = 99$; Find x.
7. $a = 60$, $b = 91$; Find x.

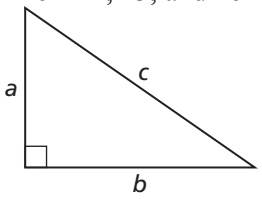


Classify the triangle as (1) acute, (2) obtuse, or (3) right, based on the given side lengths.

8. 20, 21, and 29
9. 15, 19, and 24
10. 11, 23, and 26

Find the indicated value.

11. $a = x$, $b = 45$, $c = 53$; Find x.
12. $a = 9$, $b = x$, $c = 41$; Find x.



Answers

V. 1	**B.** obtuse
S. acute	**S.** 2
N. length	**I.** angle
E. 101	**H.** special
R. right	**K.** null
U. $\sqrt{101}$	**A.** 40
M. 113	**E.** 109
O. shortest	**C.** 28
C. 36	**R.** longest
A. Pythagorean	
T. 98	**E.** 3

12		4	11	1	6	8	5	10	2	9	7	3