Chapter 7: Right Triangles and Trigonometry
Study Guide

Name: _____

Block: 1 2 3 4 5 6 7 8

SOL G.8   The student will solve real-world problems involving right triangles by using the Pythagorean Theorem and its converse, properties of special right triangles, and right triangle trigonometry.

Block / Date	Section and Objectives	Classwork and Homework
1	**7.1 Apply the Pythagorean Theorem** • Identify the legs and hypotenuse of a right triangle • Find the length of the hypotenuse of a right triangle • Find the length of a leg of a right triangle • Solve word problems involving right triangles • Find the area of an isosceles right triangle • Memorize common Pythagorean Triples **7.2 Use the Converse of the Pythagorean Theorem** • Classify triangles as right, acute, or obtuse by applying the Converse of the Pythagorean Theorem	● CW Pythagorean Theorem and Converse (KUTA) ● WS Practice 7.1 & 7.2
2	**7.3 Use Similar Right Triangles** • Draw the three triangles that result when an altitude is drawn to the hypotenuse of a right triangle • Write three similarity statements that result from the drawing of the three triangles that result when an altitude is drawn to the hypotenuse of a right triangle • Apply the Geometric Mean (Altitude) Theorem • Apply the Geometric Mean (Leg) Theorem	● CW Using Similar Right Triangles (KUTA) ● Quiz next class on 7.1 and 7.2
3	**7.4 Special Right Triangles** • Determine the length of the hypotenuse for a $45° - 45° - 90°$ triangle given a leg • Determine the length of the legs for a $45° - 45° - 90°$ triangle given the hypotenuse • Identify the short leg, long leg, and hypotenuse in a $30° - 60° - 90°$ triangle • Determine the length of any missing side of a $30° - 60° - 90°$ triangle given one of the sides	● Quiz on 7.1-7.2 ● CW Special Right Triangles (KUTA) ● WS Geometry Review 7.1-7.3 ● WS Practice 7.4

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Block / Date	Section and Objectives	Classwork and Homework
4	**7.5 Apply the Tangent Ratio and** **7.6 Apply the Sine and Cosine Ratios** • Identify the opposite side, adjacent side, and the hypotenuse to a given angle in a right triangle • Write the sine, cosine, and tangent ratios as both a fraction and decimal • Apply the sine, cosine, and tangent ratios to determine missing side lengths in a right triangle • Solve problems involving the angle of depression and the angle of elevation	● Quiz 7.3-7.4 ● HW Trig (KUTA) ● WS SohCahToa
5	**7.7 Solve Right Triangles** • Solve a right triangle • Use inverse sine, inverse cosine, and inverse tangent to approximate the angle measurements in a right triangle	● WS Solving Right Triangles (KUTA) ● EL Gizmo: Sine, Cosine, Tangent
6	**Review**	STUDY!!
7	**Test**	● Ch 7 Post Test Reflection (online) ● Ch 8 Pre-Test (online)

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Helpful Hints
• Be sure to watch the videos for each lesson before you come to class.
• Come to class with specific questions.
• To receive full credit for your work, you need to include all drawings and show the work that leads to your solution. If this is missing, you will not receive any credit.
• Fill out your formula sheet as we go along.
• There are lots of formulas in this chapter; study them daily so you have them memorized.

Chapter 7 Formula Sheet

First:	*Pythagorean Theorem and the* *Converse of Pythagorean Theorem:*	*Pythagorean Triples:*
S + M _____ L	Right Δ	
	Acute Δ	
	Obtuse Δ	

- -

<u>Geometric Mean Ratios for Right Triangles:</u>

Picture
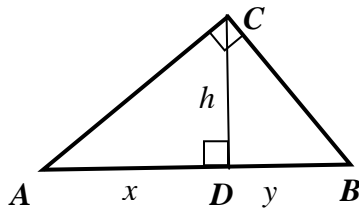
Draw 3 triangles:

Proportions

Similarity statement

- -

<u>Special Right Triangles:</u>

45°-45°-90°   30°-60°-90°

- -

SOH−CAH−TOA:
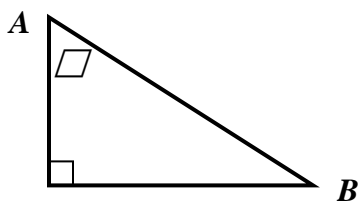
sin ⧄

cos ⧄

tan ⧄

Why would you use the following?

$$\sin^{-1}\left(\frac{BC}{AB}\right)$$

C
Geometry   Name_____
§7.1 – 7.2   Date_____ Pd_____

Pythagorean Theorem

Pythagorean Theorem –

Ex:
Find the length of the unknown side of the right triangle. Determine whether the unknown side is a **leg** or **hypotenuse**.

1.

2.

3.

4.
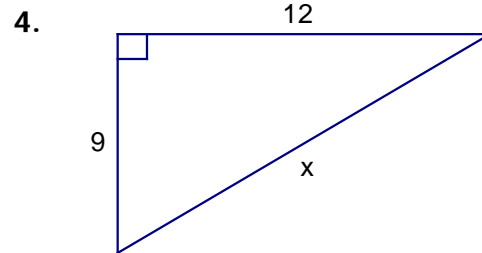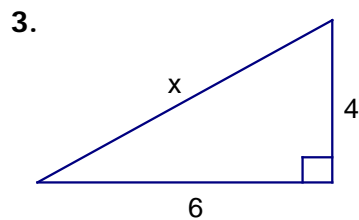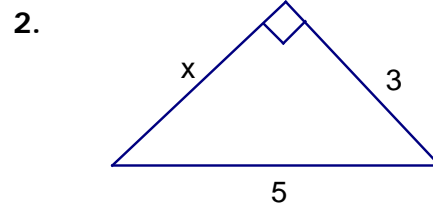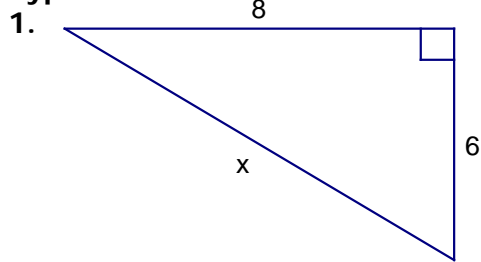
5. A 16 foot ladder rests against the side of the house, and the base of the ladder is 4 feet away. Approximately how high above the ground is the top of the ladder?

6. Find the area of an isosceles triangle with side lengths 10 meters, 13 meters and 13 meters.

Classifying Triangles – Right, Acute, Obtuse, or No Triangle

First   Second

$$c^2 \quad a^2 + b^2$$

$$c^2 \quad a^2 + b^2$$

$$c^2 \quad a^2 + b^2$$

Tell whether the given triangle is a right triangle.

7.

8.
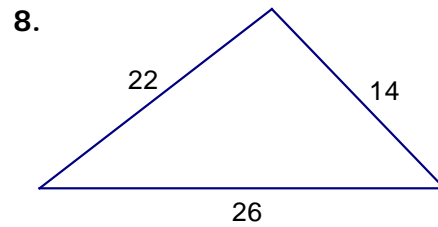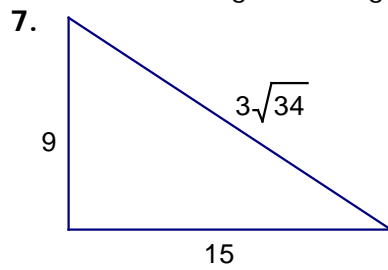
Tell whether a triangle with the given side lengths is a right triangle.

9. 4, $4\sqrt{3}$, 8   **10.** 10, 11, and 14   **11.** 5, 6, and $\sqrt{61}$

12. Can segments with lengths of 4.3 feet, 5.2 feet, and 6.1 feet form a triangle? If so, would the triangle be **acute**, **right**, or **obtuse**?

13. Show that segments with lengths 3, 4, and 6 can form a triangle and classify the triangle as **acute**, **right**, or **obtuse**.

Geometry   Name_____
WS – Practice 7.1 & 7.2

Use $\triangle ABC$ to determine if the equation is true or false.

1. $b^2 + a^2 = c^2$

2. $c^2 - a^2 = b^2$

3. $b^2 - c^2 = a^2$

4. $c^2 = a^2 - b^2$

5. $c^2 = b^2 + a^2$

6. $a^2 = c^2 - b^2$
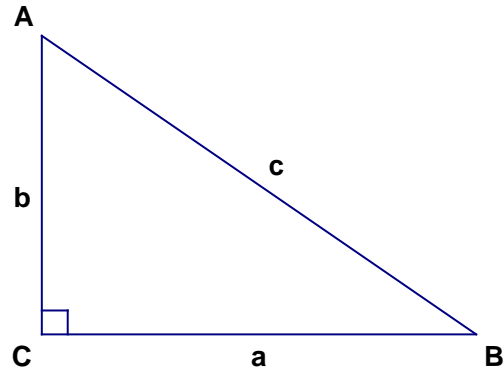
Find the unknown side length. Simplify answers that are radicals.

7.

8.

9.
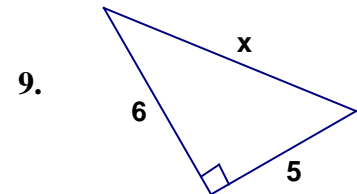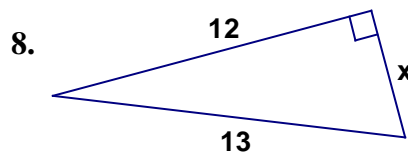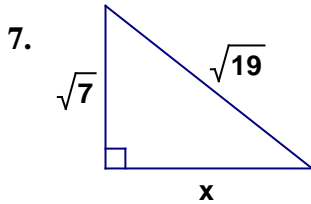
Find the area of the figure. Round decimal answers to the nearest tenth.
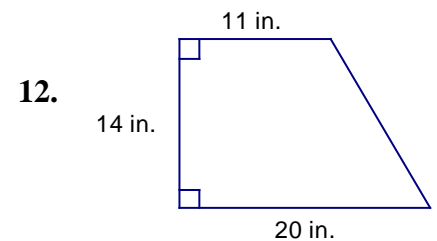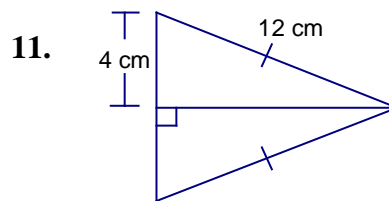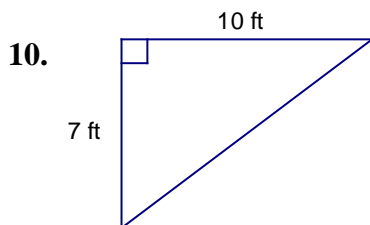
10.

11.

12.

Decide whether the numbers can represent the side lengths of a triangle. If they can, classify the triangle as **right**, **acute**, or **obtuse**.

13. 5, 12, 13

14. $\sqrt{8}, 4, 6$

15. 20, 21, 28

Geometry   Name_____
§7.3 – Similar Right Triangles   Date_____ Pd_____

Theorem 7.5
If the altitude is drawn to the hypotenuse of a right triangle,
then the two triangles formed are similar to the original triangle and to each other.
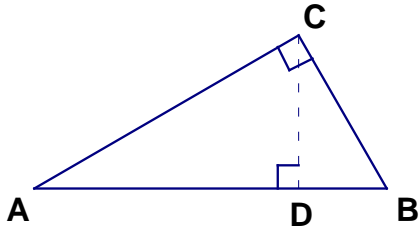
Small   Medium   Large
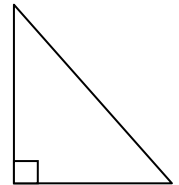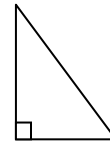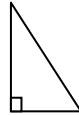
Similarity Statement:

1. Identify the similar triangles in the diagram. Then, write a similarity statement.
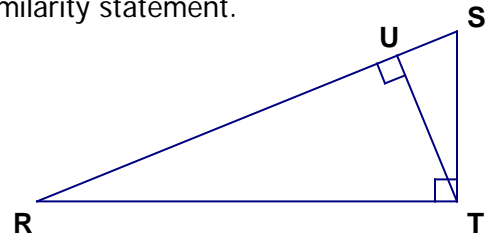
2. Find the value y. No decimals!
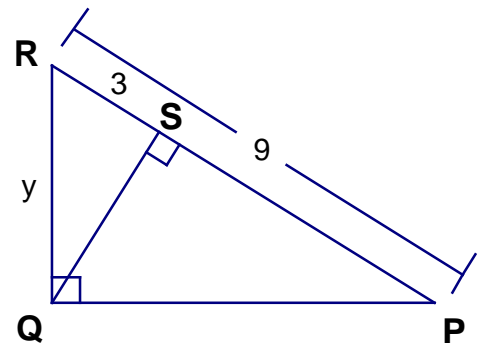
3. Find the value of k.
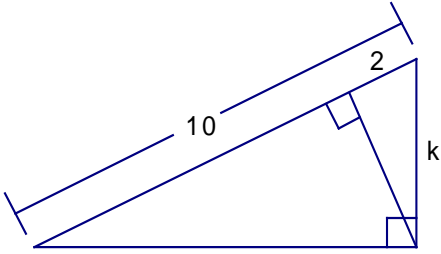
4. Find the value of x.
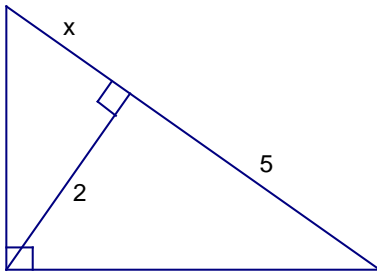
5. A cross section of a group of seats at a stadium shows a drainage pipe BD that leads from the seats to the inside of the stadium. What is the length of the pipe if AB = 20 ft, BC = 30 ft, and AC = $10\sqrt{3}$ ft?
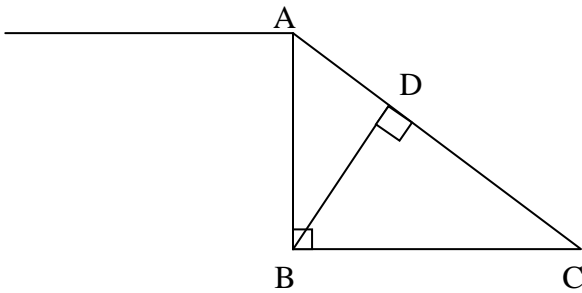
Geometry
WS – Practice 7.3

Complete and solve the proportion.

1. $\dfrac{x}{12} = \dfrac{?}{8}$
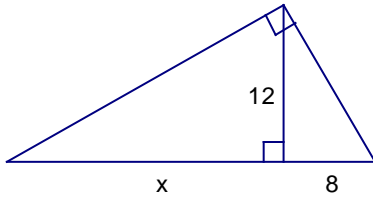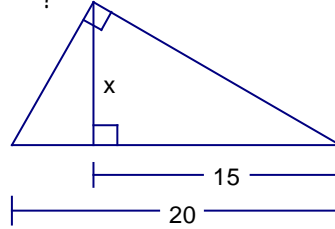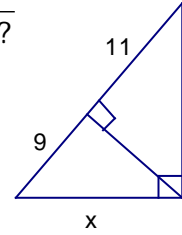
12

x   8

2. $\dfrac{15}{x} = \dfrac{x}{?}$

x

15

20

3. $\dfrac{9}{x} = \dfrac{x}{?}$

11

9

x

Find the value(s) of the variable(s).

4.
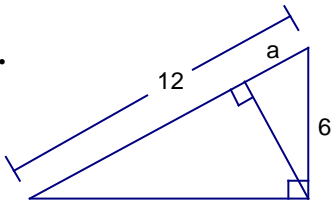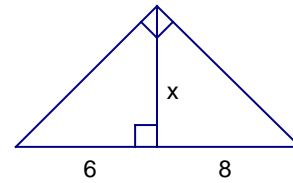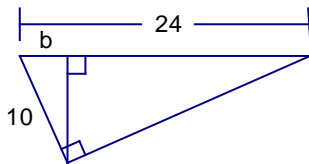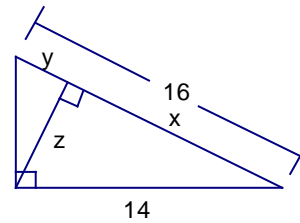
12   a

6

5.

x

6   8

6.

24

b

10

7.

y   16

x

z

14

Tell whether the triangle is a right triangle.

8.

$2\sqrt{85}$

12

14

9.

$6\sqrt{19}$

15

19

10.

18

30

$6\sqrt{34}$
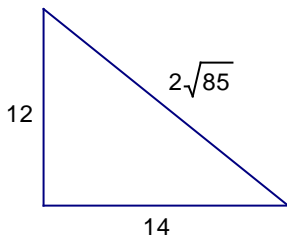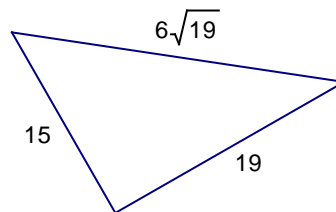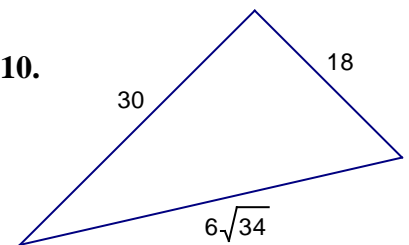
Geometry   Name_____
§7.4 Special Right Triangles   Date_____ Pd_____

Theorem - 45°-45°-90° Triangle Theorem

$$\text{hypotenuse} = \text{leg} \bullet \sqrt{2}$$

$$\text{leg} = \frac{\text{hypotenuse} \bullet \sqrt{2}}{2}$$
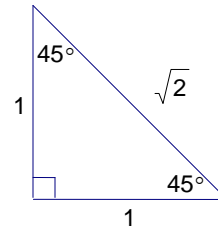
Find the length of the hypotenuse.

1.
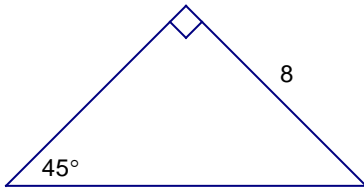
2.
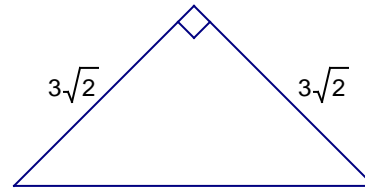
Find the lengths of the legs in the triangle.

3.
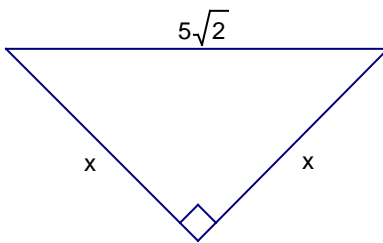
4.
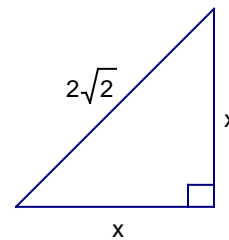
Theorem - 30°-60°-90° Triangle Theorem

$$\text{hypotenuse} = 2 \bullet \text{short leg}$$

$$\text{long leg} = \text{short leg} \bullet \sqrt{3}$$

$$\text{short leg} = \frac{\text{hypotenuse}}{2}$$

$$\text{short leg} = \frac{\text{long leg} \bullet \sqrt{3}}{3}$$
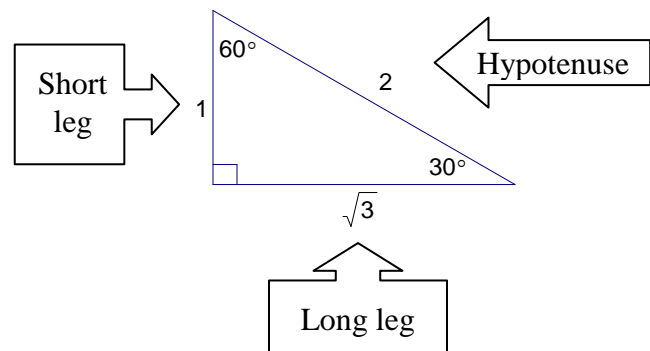
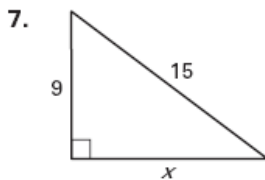Find the value(s) of the variable(s).

5.
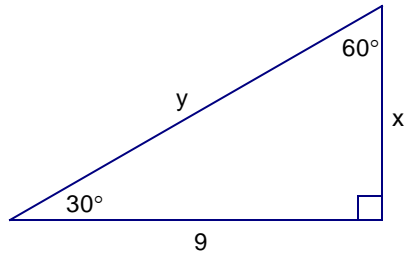
6.
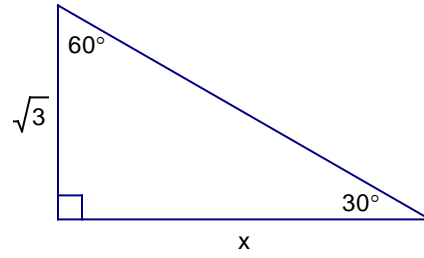
7. The logo on a recycling bin resembles an equilateral triangle with side lengths of 6 centimeters. What is the approximate height of the logo?

Geometry Review: 7.1-7.3   Name: _____

Complete all work on a separate sheet of paper. Include all drawings.
Check your answers using the answer key!

LESSON 7.1 **Practice A**
For use with pages 432–439   **Use Pythagorean Theorem!!**

Find the length of the hypotenuse of the right triangle.

1.

8, x, 6

2.

15, x, 36

3.

7, x, 24

4.

6, 3, x

5.

x, 30, 16

6.

x, 9, 4
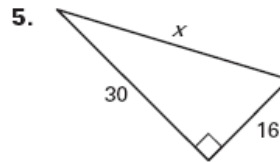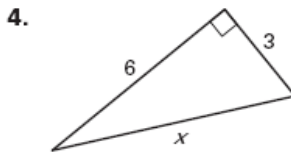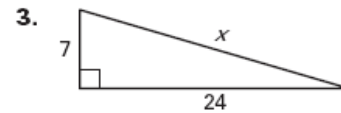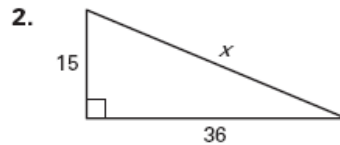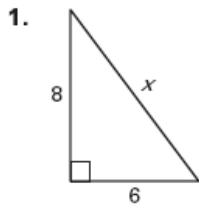
Find the unknown leg length x.

7.

9, 15, x

8.

8, 17, x

9.

x, 50, 48
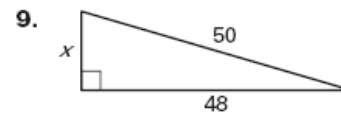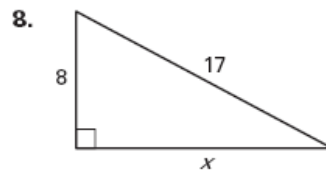
LESSON 7.2 **Practice A**
For use with pages 440–447   **Remember, to be a triangle: Small + Medium > Large**
Then, classify as R, A, or O (Pythagorean Theorem!)

Tell whether the triangle is a right triangle.
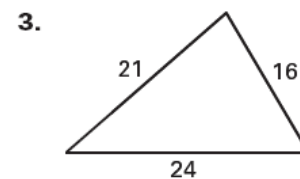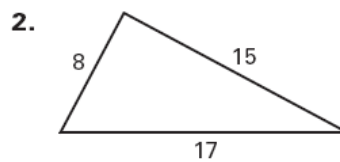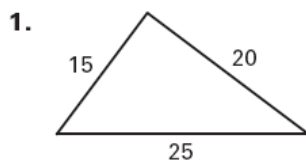
1.

15, 20, 25

2.

8, 15, 17

3.

21, 16, 24

**Decide whether the numbers can represent the side lengths of a triangle.
If they can, classify the triangle as *acute*, *right*, or *obtuse*.**

4. 6, 8, 10

5. 5, 7, 9

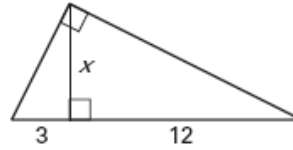6. 8, 9, 10

7. 10, 12, 30

8. 16, 30, 34

9. 18, 34, 45

LESSON 7.3 **Practice A** *continued*
For use with pages 448–456
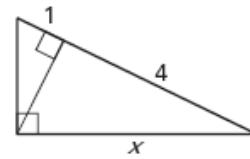
Complete and solve the proportion.

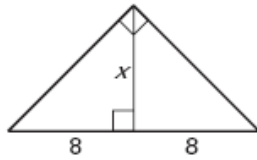8. $\frac{x}{8} = \frac{?}{4}$
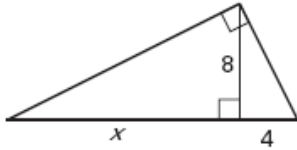
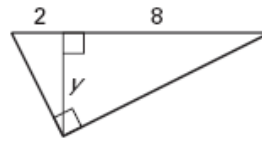9. $\frac{12}{x} = \frac{x}{?}$

10. $\frac{5}{x} = \frac{x}{?}$

Find the value of the variable.
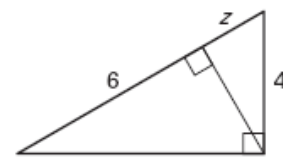
11.

12.

13.

Answer Keys

Lesson 7.1 **Practice A**
1.   10
2.   39
3.   25
4. $3\sqrt{5}$
5.   34
6. $\sqrt{97}$
7.   12
8.   15
9.   14

Lesson 7.2 **Practice A**
1.   Yes
2.   Yes
3.   No
4.   Right
5.   Obtuse
6.   Acute
7.   Not a triangle
8.   Right
9.   Obtuse

Lesson 7.3 **Practice A**

8. $\frac{x}{8} = \frac{8}{4}$, $x = 16$
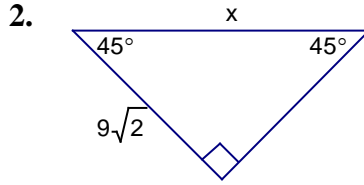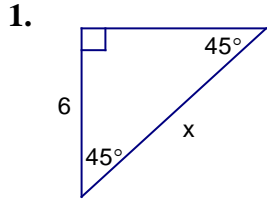
9. $\frac{12}{x} = \frac{x}{3}$, $x = 6$

10. $\frac{5}{x} = \frac{x}{4}$, $x = 2\sqrt{5}$
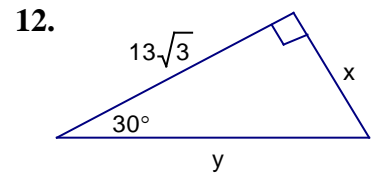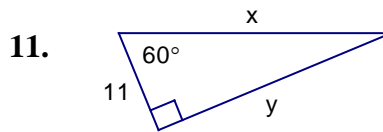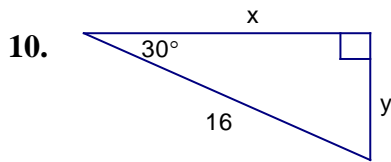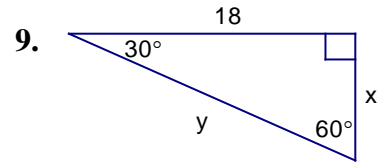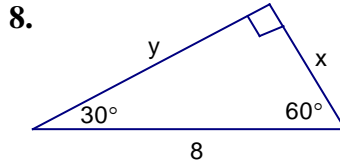
11. $\frac{8}{x} = \frac{x}{8}$, $x = 8$

12. $\frac{8}{y} = \frac{y}{2}$, $y = 4$
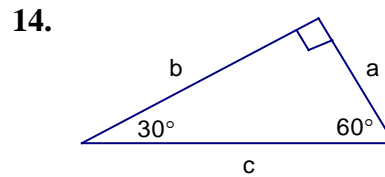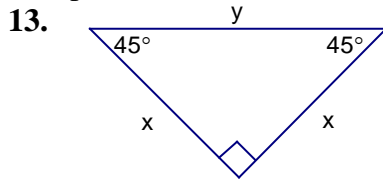
13. $\frac{6+z}{4} = \frac{4}{z}$, $z = 2$

Geometry   **Non-Calculator**   Name_____
WS – Practice 7.4

Find the value of x. Write your answer in simplest radical form.

1.

2.

3.

4.

5.

6.
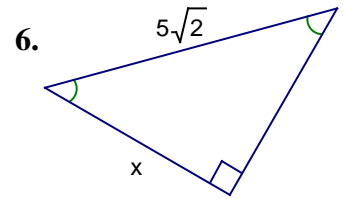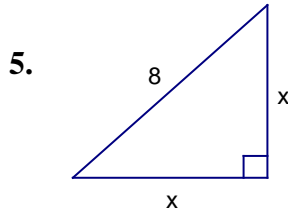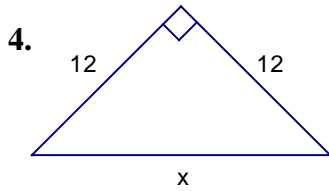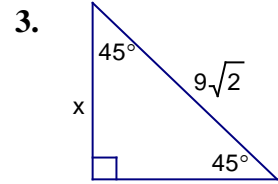
Find the value of each variable. Write your answers in simplest radical form.

7.

8.

9.

10.

11.

12.

Complete the table.

13.

	5		$\sqrt{2}$	9	
		$4\sqrt{2}$			24

14.

	9			11	
		9	$5\sqrt{3}$		
					16

Geometry   Name_____
§7.5-7.6   Date_____ Pd_____
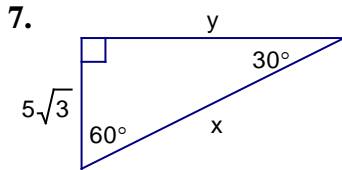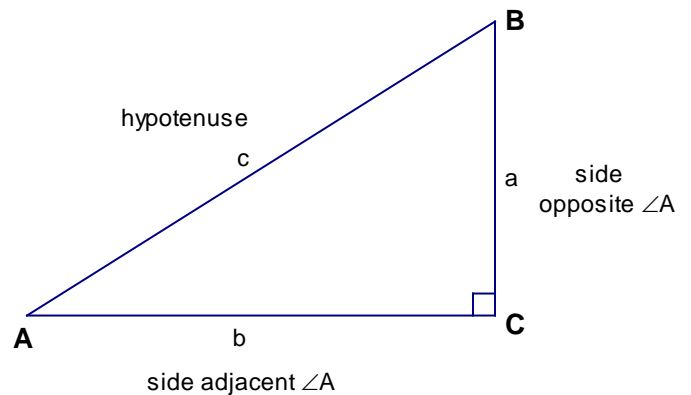
SohCahToa

trigonometric ratio –

3 basic trig ratios:

$\sin A = \dfrac{\text{side opposite } \angle A}{\text{hypotenuse}} = \dfrac{a}{c}$

$\cos A = \dfrac{\text{side adjacent } \angle A}{\text{hypotenuse}} = \dfrac{b}{c}$
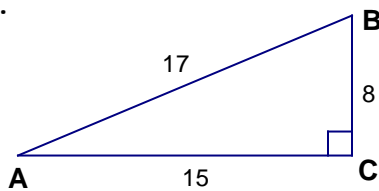
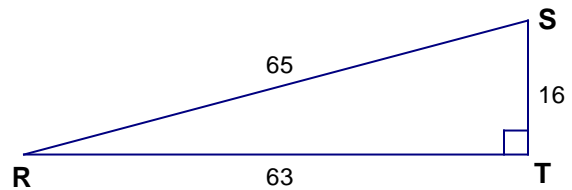$\tan A = \dfrac{\text{side opposite } \angle A}{\text{side adjacent } \angle A} = \dfrac{a}{b}$

Examples:
Find the sin, cos, and tan ratios for each **acute** angle in the triangle. Write each answer as a fraction and as a decimal rounded to four places.
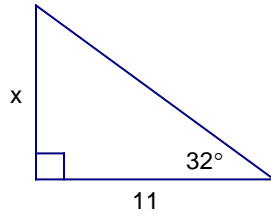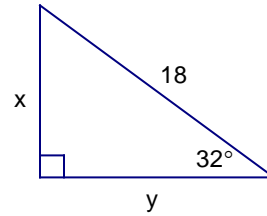
1.

2.

Find the value of x (and y).

3.
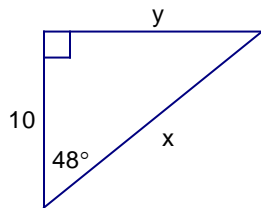

x

32°

11

4.

18

x

32°

y

5.

y

10

x

48°

6. You want to build a skateboard ramp with a length of 14 feet and an angle of elevation of 26°. Find the height and length of the base of the ramp.
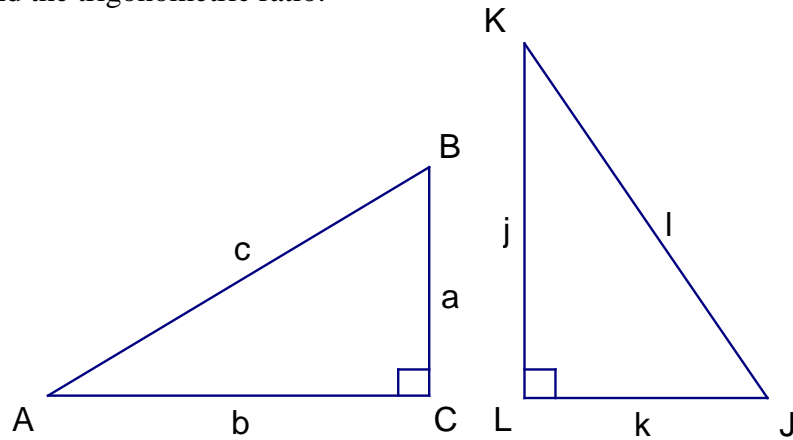
7. You are skiing on a mountain with an altitude of 1200 meters. The angle of depression is 21°. About how far do you ski down the mountain?

Geometry   Name_____
WS – Practice SohCahToa

Use the diagrams at the right to find the trigonometric ratio.

1. sin A

2. cos A

3. tan B

4. sin J

5. cos K

6. tan K

Use a calculator to approximate the given value to four decimal places.

7. sin 30°   **8.** cos 18°   **9.** tan 72°   **10.** sin 48°

11. tan 42°   **12.** cos 65°   **13.** tan 14°   **14.** sin 83°

Fill in the blank then solve for the variable. Round decimals to the nearest tenth.
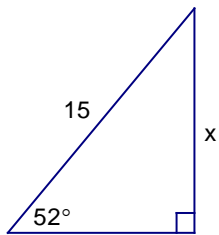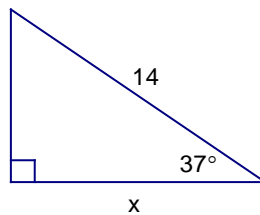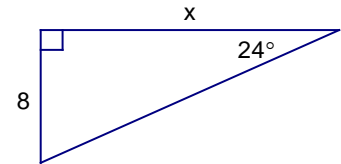
15. $\sin 52° = \dfrac{x}{?}$ **16.** $\cos \underline{\ ?\ }° = \dfrac{x}{14}$ **17.** $\tan 24° = \dfrac{8}{?}$
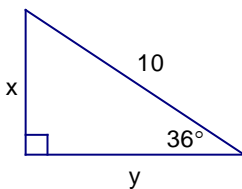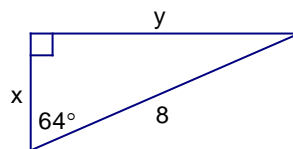
Find the value of each variable. Round decimals to the nearest tenth.

18.   **19.**   **20.**

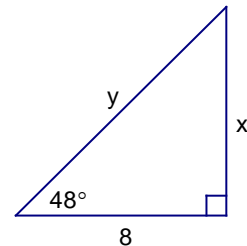Geometry   Name_____
§7.7   Date_____ Pd_____

Solving Right Triangles

to **solve a right triangle –**
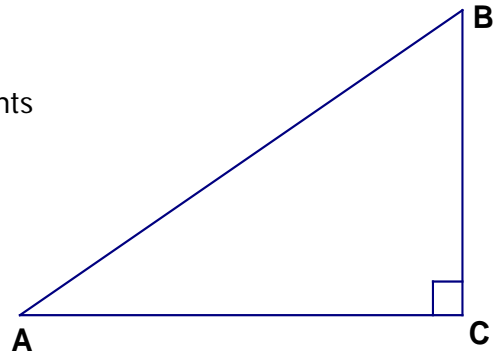
you must know either:

  - two side lengths

  - one side length and one acute angle

Inverse Trigonometric Ratios – Used to find angle measurements

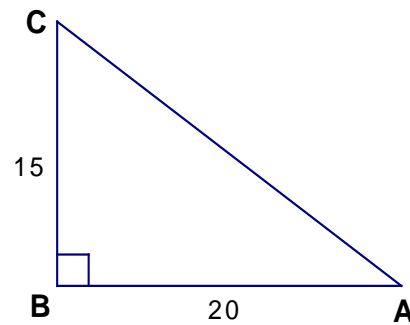**inverse sine -** If sin A = x, then $\sin^{-1} x = m\angle A$

inverse cosine - If cos A = y, then $\cos^{-1} y = m\angle A$

inverse tangent - If tan A = z, then $\tan^{-1} z = m\angle A$

Examples:
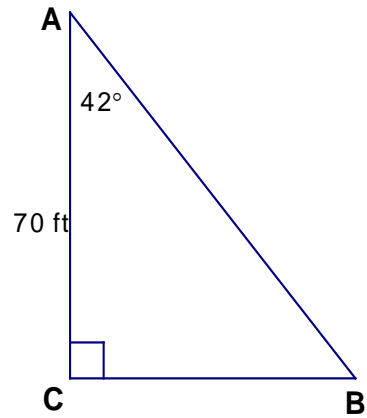**1.** Use a calculator to approximate the measure of $\angle A$ to the nearest tenth of a degree.

2. Let $\angle A$ and $\angle B$ be acute angles in a right triangle. Use a calculator to approximate the measures of $\angle A$ and $\angle B$ to the nearest tenth of a degree.
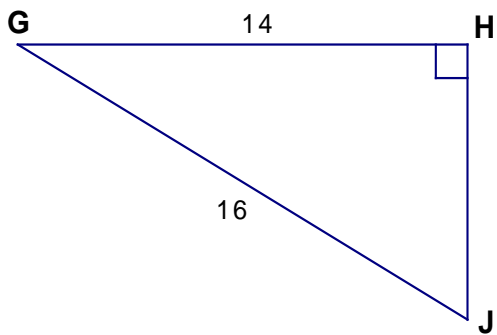
  a. sin A = 0.87   **b.** cos B = 0.15

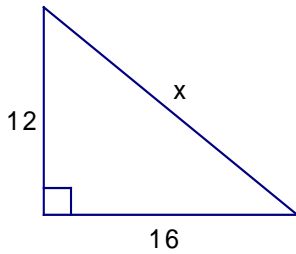**3.** Solve the right triangle. Round decimals to the nearest tenth.

A

42°

70 ft

C   B

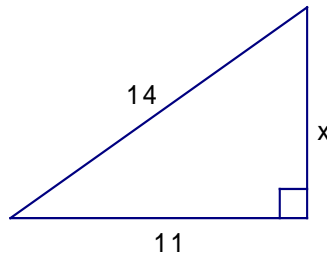**4.** Solve the right triangle. Round decimals to the nearest tenth.

G   14   H

16

J

Chapter 7 Review

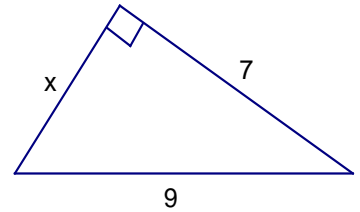Find the unknown side length. Write your answer in simplest radical form.

1.

12
x
16

2.

14
x
11

3.

x
7
9

Classify the triangle formed by the side lengths as **right**, **acute**, or **obtuse**.
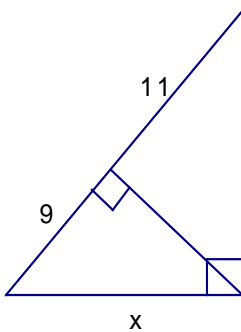
4. 4, 5, 6

5. 9, 12, 15

6. 11, 13, 23

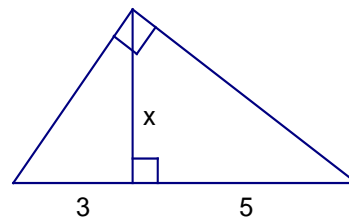Find the value of each variable. Round each answer to the nearest tenth.

7.

x
$\sqrt{10}$
$\sqrt{6}$
y
z
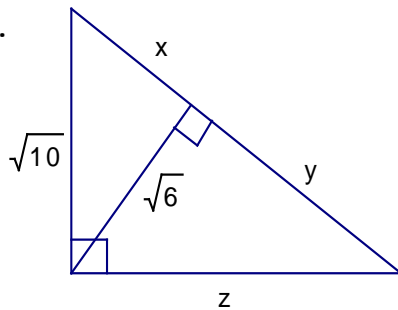
Find the value of the variable. Round each answer to the nearest tenth.
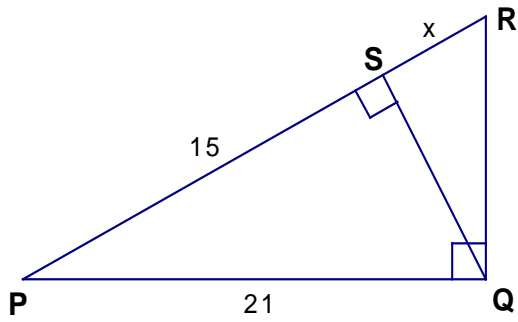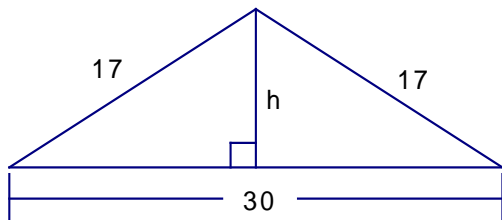
8.

11
9
x

9.

x
3   5

10. Write a similarity statement for the three similar triangles in the diagram. Then solve for x.
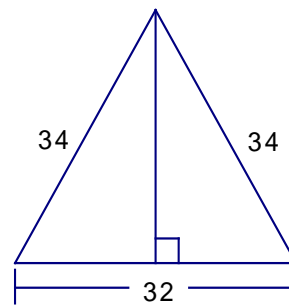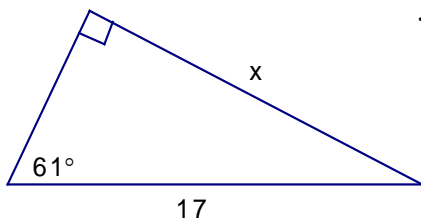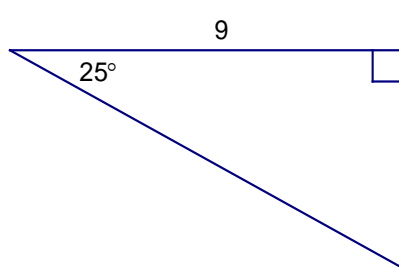

Find the area of the isosceles triangle.

11.

12.

Use the trig ratios to find the value of x. Round to the nearest tenth.
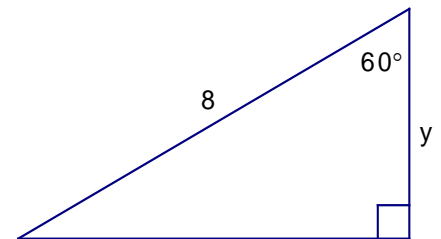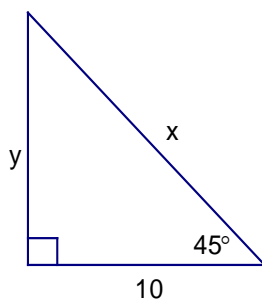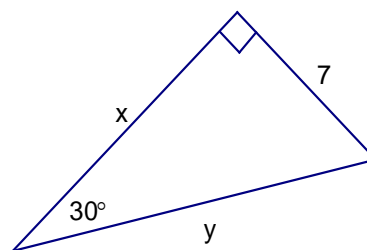
13.

14.

15.

Find the value of each variable using special right triangles. Leave answers in simplest radical form.

16.

17.

18. Find the value of ∠F and ∠G.

H ⌐ 96 G

28

100

F
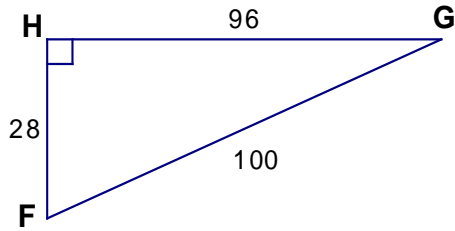
19. Find the value of ∠A and ∠B.

C ⌐ 24 A

18

30

B
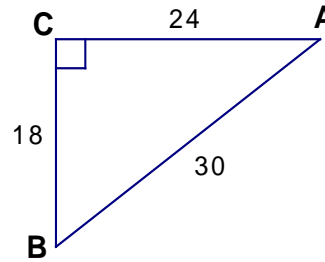
20. Solve the right triangle. (find EVERYTHING!) Round answers to the nearest tenth.

P

20

R 14 Q
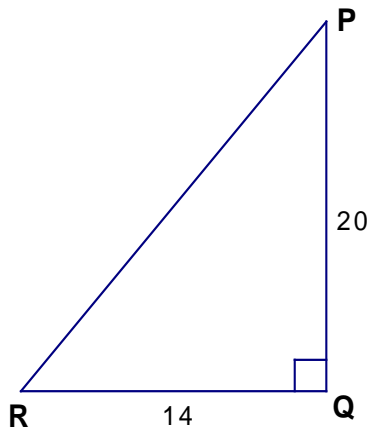
21. A chair lift on a ski slope has an angle of elevation of 28° and covers a total distance of 4640 feet. To the nearest foot, what is the **vertical** height of the chair lift?