Name _____ Date _____ Class_____

Summer Assignment: Unit 8 Right Triangle Trigonometry

Accelerated Coordinate Algebra/Analytic Geometry

Students, if you are taking accelerated math 2 next year, you need to complete this assignment. For your convenience, I have included some of the information from the unit 8 frameworks that can be found on my webpage. You will need a scientific calculator and you may also use the links below to view videos that will assist you with your assignment.

www.khanacademy.org/library#geometry (Pythagorean Theorem/Special right triangles)
www.khanacademy.org/library#trigonometry (Basic trigonometric ratios)

You may also use USA Test Prep for additional practice problems, if available. When you login, click on the EOCT tab and select Math 2. Scroll down to the Test tab and "Begin specific domain" and choose either "Geometry – special right triangles or right triangles". For teacher, select Yvette Woodson and class Accelerated Math 1 EOCT.

This unit will be reviewed during the first week of school and assessed, therefore it is important to complete the summer assignment. Good luck and have a great summer!

In this unit students will:
• explore the relationships that exist between sides and angles of right triangles.
• build upon their previous knowledge of similar triangles and of the Pythagorean Theorem to determine the side length ratios in special right triangles
• understand the conceptual basis for the functional ratios sine and cosine
• explore how the values of these trigonometric functions relate in complementary angles
• use trigonometric ratios to solve problems.
• develop the skills and understanding needed for the study of many technical areas
• build a strong foundation for future study of trigonometric functions of real numbers.

Vocabulary

- **Adjacent side:** In a right triangle, for each acute angle in the interior of the triangle, one ray forming the acute angle contains one of the legs of the triangle and the other ray contains the hypotenuse. This leg on one ray forming the angle is called the adjacent side of the acute angle.
- For any acute angle in a right triangle, we denote the measure of the angle by θ and define three numbers related to θ as follows:

    sine of θ = length of opposite side
              length of hypotenuse
    cosine of θ = length of adjacent side
                 length of hypotenuse
    tangent of θ = length of adjacent side
                 length of hypotenuse

• **Complementary angles:** Two angles whose sum is 90° are called **complementary.** Each angle is called the complement of the other.

• **Opposite side:** In a right triangle, the side of the triangle opposite the vertex of an acute angle is called the opposite side relative to that acute angle.

• **Similar triangles:** Triangles are similar if they have the same shape but not necessarily the same size.
• Triangles whose corresponding angles are congruent are similar.
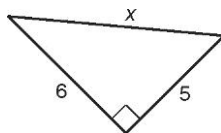• Corresponding sides of similar triangles are all in the same proportion.
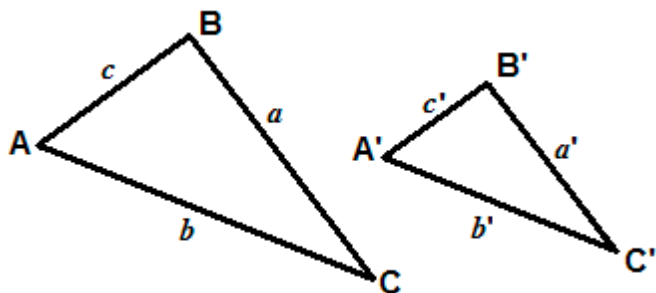
- For each pair of complementary angles in a right triangle, the sine of one angle is the cosine of its complement.

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The Pythagorean Theorem

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

1.

2.
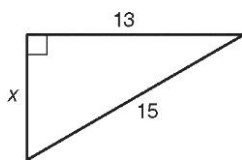
3.

_____   _____   _____
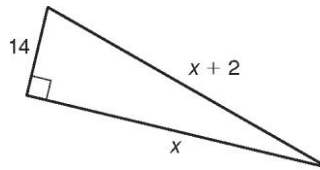
4. The aspect ratio of a TV screen is the ratio of the width to the height of the image.
   A regular TV has an aspect ratio of 4 : 3. Find the height and width of a 42-inch
   TV screen to the nearest tenth of an inch. (The measure given is the length of
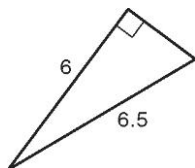   the diagonal across the screen.)

   _____

5. A "wide-screen" TV has an aspect ratio of 16 : 9. Find the length
   of a diagonal on a wide-screen TV screen that has the same
   height as the screen in Exercise 4.   _____

**Find the missing side lengths. Give your answer in simplest radical
form. Tell whether the side lengths form a Pythagorean Triple.**

6.

7.
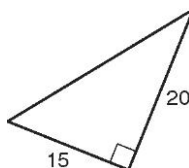
8.

_____   _____   _____
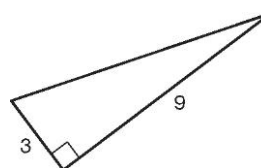
**Tell whether the measures can be the side lengths of a triangle. If so,
classify the triangle as acute, obtuse, or right.**

9. 15, 18, 20   10. 7, 8, 11   11. 6, 7, $3\sqrt{13}$

_____   _____   _____

12. Kitty has a triangle with sides that measure 16, 8, and 13. She does some
    calculations and finds that $256 + 64 > 169$. Kitty concludes that the triangle
    is obtuse. Evaluate Kitty's conclusion and Kitty's reasoning.

    _____

    _____

    _____

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Problem Solving

The Pythagorean Theorem

1. It is recommended that for a height of 20 inches, a wheelchair ramp be 19 feet long. What is the value of *x* to the nearest tenth?

19 ft

20 in.

x ft

_____

2. Find *x*, the length of the weight-lifting incline bench. Round to the nearest tenth.

x ft

3.2 ft

2.6 ft

_____
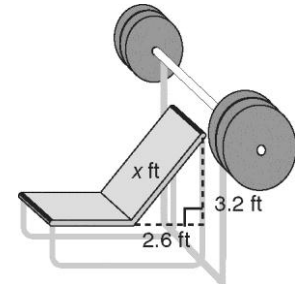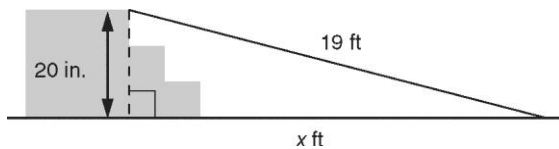
3. A ladder 15 feet from the base of a building reaches a window that is 35 feet high. What is the length of the ladder to the nearest foot?

_____

4. In a wide-screen television, the ratio of width to height is 16 : 9. What are the width and height of a television that has a diagonal measure of 42 inches? Round to the nearest tenth.

_____

Choose the best answer.

5. The distance from Austin to San Antonio is about 74 miles, and the distance from San Antonio to Victoria is about 102 miles. Find the approximate distance from Austin to Victoria.

   A 28 mi   C 126 mi

   B 70 mi   D 176 mi

Austin

74 mi

San Antonio

102 mi

Victoria
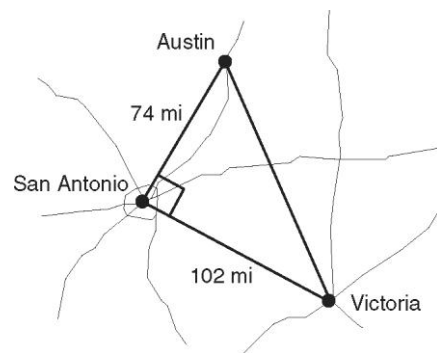
6. What is the approximate perimeter of n*DEC* if rectangle *ABCD* has a length of 4.6 centimeters?

   A 5.1 cm

   B 6.5 cm

   C 9.8 cm

   D 11.1 cm

   A   E   B

   D   4.6 cm   C

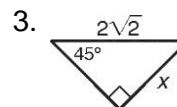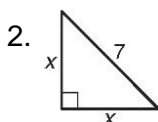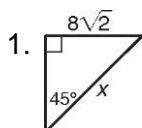Name _____ Date _____ Class_____
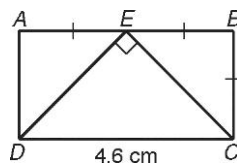
7. The legs of a right triangle measure 3*x* and 15. If the hypotenuse measures 3*x* + 3, what is the value of *x*?
   A 12   C 36
   B 16   D 221

8. A cube has edge lengths of 6 inches. What is the approximate length of a diagonal *d* of the cube?
   A 6 in.   C 10.4 in.
   B 8.4 in.   D 12 in.
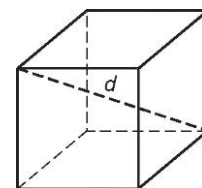
Applying Special Right Triangles
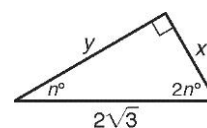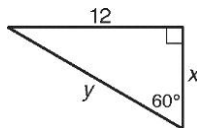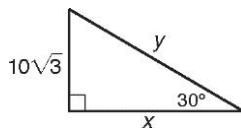
Find the value of *x* in each figure. Give your answer in simplest radical form.

1.

2.

3.

_____   _____   _____

Find the values of *x* and *y*. Give your answers in simplest radical form.

4. *x* = _____ *y* = _____   5. *x* = _____ *y* = _____   6. *x* = _____ *y* = _____

7. To secure an outdoor canopy, a 64-inch cord is extended from the top of a vertical pole to the ground. If the cord makes a 60° angle with the ground, how tall is the pole? (draw a diagram)

_____

Choose the best answer. (Draw a diagram.)

8. An equilateral triangle has an altitude of 21 inches. What is the side length of the triangle?

_____

9. A shelf is an isosceles right triangle, and the longest side is 38 centimeters. What is the length of each of the other two sides?
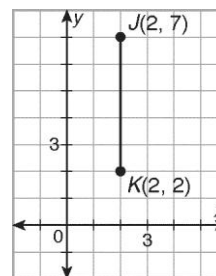
_____

Use the figure for Exercises 10 and 11.

Assume △*JKL* is in the first quadrant, with m∠*K* = 90°.

10. Suppose that $\overline{JK}$ is a leg of △*JKL*, a 45°-45°-90° triangle. What are possible coordinates of point *L*?

    A (6, 4.5)   C (6, 2)

    B (7, 2)   D (8, 7)

11. Suppose △*JKL* is a 30°-60°-90° triangle and $\overline{JK}$
is the side opposite the 60° angle. What are the
approximate coordinates of point *L*?

    A (4.9, 2)   C (8.7, 2)
    B (4.5, 2)   D (7.1, 2)

Trigonometric Ratios

**Use the figure for Exercises 1–6. Write each trigonometric
ratio as a simplified fraction and as a decimal rounded to
the nearest hundredth.**

1. sin *A*   2. cos *B*   3. tan *B*

   _____   _____   _____
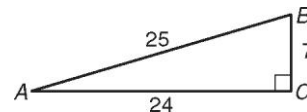
4. sin *B*   5. cos *A*   6. tan *A*

   _____   _____   _____

**Use special right triangles to write each trigonometric ratio as a
simplified fraction.**

7. sin 30° _____   8. cos 30° _____   9. tan 45° _____

10. tan 30° _____   11. cos 45° _____   12. tan 60° _____

**Use a calculator to find each trigonometric ratio. Round to the nearest
hundredth.**

13. sin 64° _____   14. cos 58° _____   15. tan 15° _____

Find each length. Round to the nearest hundredth.

16.

   XZ _____

17.

   HI _____

18.

   KM _____

19.

   ST _____

20.

   EF _____

21.

   DE _____
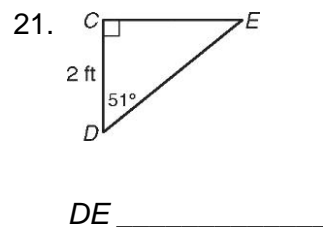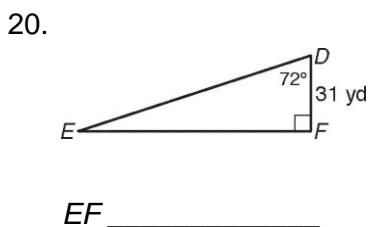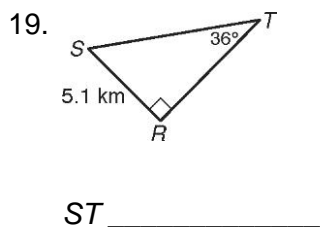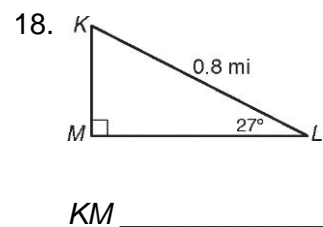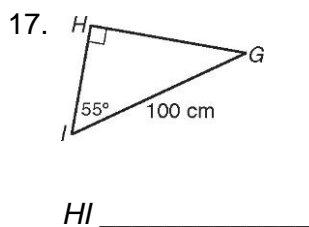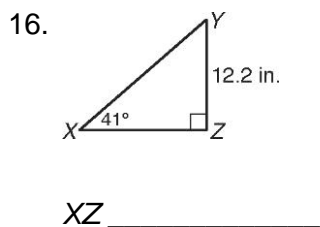
22. A right triangle has an angle that measures 55°. The leg adjacent to this angle has a length of 43 cm. What is the length of the other leg of the triangle? Round to the nearest tenth.

Choose the best answer.

23. A 14-foot ladder makes a 62° angle with the ground. To the nearest foot, how far up the house does the ladder reach?

   A 6 ft

   B 7 ft

   C 12 ft

   D 16 ft

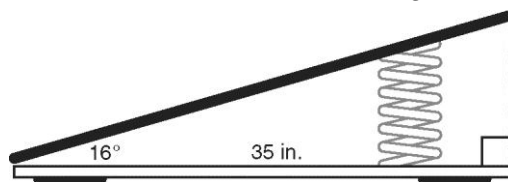24. What is *EF*, the measure of the longest side of the sail on the model? Round to the nearest inch.
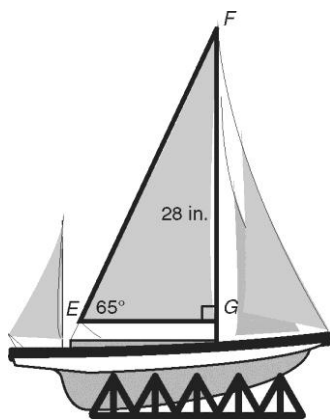
   A 31 in.

   B 35 in.

   C 40 in.

   D 60 in.

25. The hypotenuse of a right triangle measures 9 inches, and one of the acute angles measures 36°. What is the area of the triangle? Round to the nearest square inch.
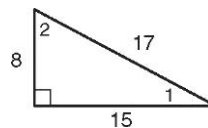
   _____

26.   To the nearest inch, what is the length of the springboard shown below?

   A 24 in.   C 38 in.

   B 36 in.   D 127 in.

Solving Right Triangles

Use the given trigonometric ratio to determine which angle of the triangle is ∠A.

1. $\sin A = \dfrac{8}{17}$ _____

2. $\cos A = \dfrac{15}{17}$ _____

3. $\tan A = \dfrac{15}{8}$ _____

4. $\sin A = \dfrac{15}{17}$ _____

5. $\cos A = \dfrac{8}{17}$ _____

6. $\tan A = \dfrac{8}{15}$ _____

Use a calculator to find each angle measure to the nearest degree.

7. $\sin^{-1}(0.82)$ _____
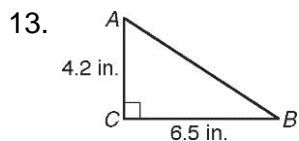
8. $\cos^{-1}\left(\dfrac{11}{12}\right)$ _____

9. $\tan^{-1}(5.03)$ _____

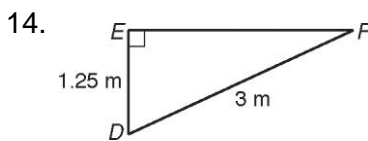10. $\sin^{-1}\left(\dfrac{3}{8}\right)$ _____

11. $\cos^{-1}(0.23)$ _____

12. $\tan^{-1}\left(\dfrac{1}{9}\right)$ _____

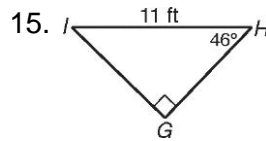**Find the unknown measures. Round lengths to the nearest hundredth and angle measures to the nearest degree.**
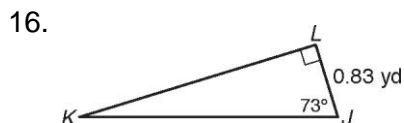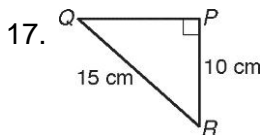
13. _____

_____

14. _____

_____

15. _____
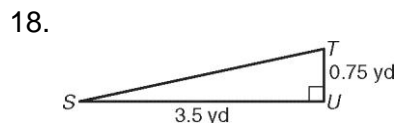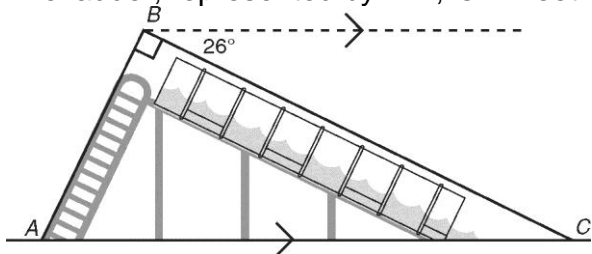
_____

16. _____

17. _____

18. _____

Use the side view of a water slide for Exercises 19 and 20.

The ladder, represented by $\overline{AB}$, is 17 feet long.

19. What is the measure of angle *A*, the angle that the ladder makes with a horizontal line?

20. What is *BC*, the length of the slide? Round to the nearest tenth of a foot.

Angles of Elevation and Depression

Marco breeds and trains homing pigeons on the roof of his building. Classify each angle as an angle of elevation or an angle of depression.
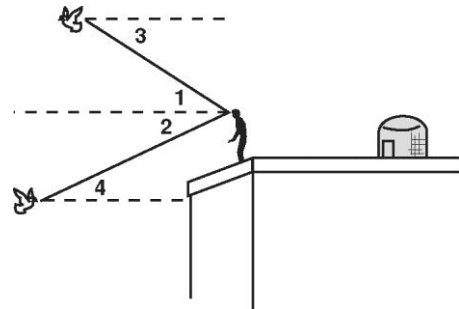
1. ∠1 _____

2. ∠2 _____

3. ∠3 _____

4. ∠4 _____

To attract customers to his car dealership, Frank tethers a large red balloon to the ground. In Exercises 5–7, give answers in feet and inches to the nearest inch. (*Note:* Assume the cord that attaches to the balloon makes a straight segment.)
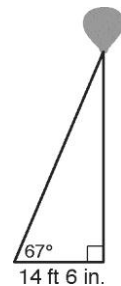
5. The sun is directly overhead. The shadow of the balloon falls 14 feet 6 inches from the tether. Frank sights an angle of elevation of 67°. Find the height of the balloon.

    _____

6. Find the length of the cord that tethers the balloon.

    _____

7. The wind picks up and the angle of elevation changes to 59°. Find the height of the balloon.

    _____

Lindsey shouts down to Pete from her third-story window.

8. Lindsey is 9.2 meters up, and the angle of depression from Lindsey to Pete is 79°. Find the distance from Pete to the base of the building to the nearest tenth of a meter.

    _____
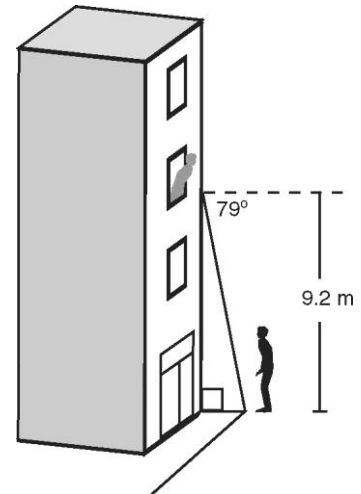
9. To see Lindsey better, Pete walks out into the street so he is 4.3 meters from the base of the building. Find the angle of depression from Lindsey to Pete to the nearest degree.

    _____

10. Mr. Shea lives in Lindsey's building. While Pete is still out in the street, Mr. Shea leans out his window to tell Lindsey and Pete to stop all the shouting. The angle of elevation from Pete to Mr. Shea is 72°. Tell whether Mr. Shea lives above or below Lindsey.