Name **Modeling with Geometry** | **3.1H**

Ready, Set, Go!

Ready

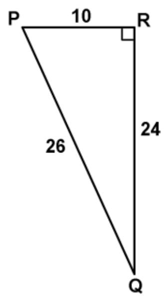
Topic: Finding the trigonometric ratios in a triangle

Use the given measures on the triangles to write the indicated trigonometry value. Leave answers as simplified fractions.

1. $\sin P = \frac{24}{26} = \frac{12}{13}$

   $\cos P = \frac{10}{26} = \frac{5}{13}$

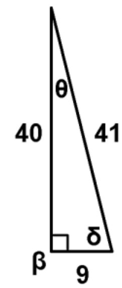
   $\tan P = \frac{24}{10} = \frac{12}{5}$



2. $\sin \theta = \frac{9}{41}$

   $\cos \theta = \frac{40}{41}$

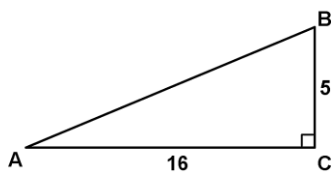
   $\tan \theta = \frac{9}{40}$



3. $\sin B = \frac{16}{\sqrt{281}} = \frac{16\sqrt{281}}{281}$

   $\cos B = \frac{5}{\sqrt{281}} = \frac{5\sqrt{281}}{281}$

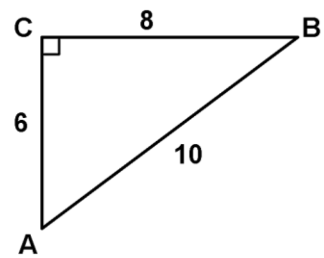
   $\tan B = \frac{16}{5}$



4. $\sin A = \frac{8}{10} = \frac{4}{5}$

   $\cos A = \frac{6}{10} = \frac{3}{5}$

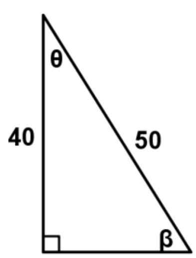
   $\tan A = \frac{8}{6} = \frac{4}{3}$



5. $\sec \beta = \frac{5}{3}$

   $\csc \theta = \frac{5}{3}$

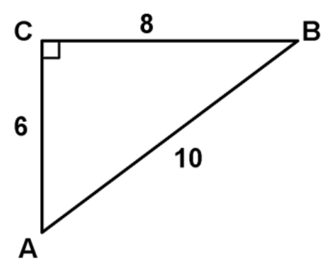
   $\cot \beta = \frac{3}{4}$



6. $\csc A = \frac{5}{4}$

   $\cot A = \frac{3}{4}$

   $\sec A = \frac{5}{3}$



7. My calculator tells me that $\frac{\sqrt{2}}{2} = 0.7071067812$. Is one value more accurate than the other? Explain.

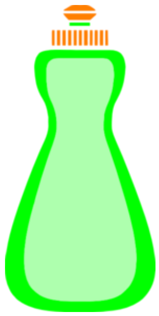
   $\frac{\sqrt{2}}{2}$ is more accurate because $\sqrt{2}$ is irrational. Therefore 0.7071067812 is a rounded answer.

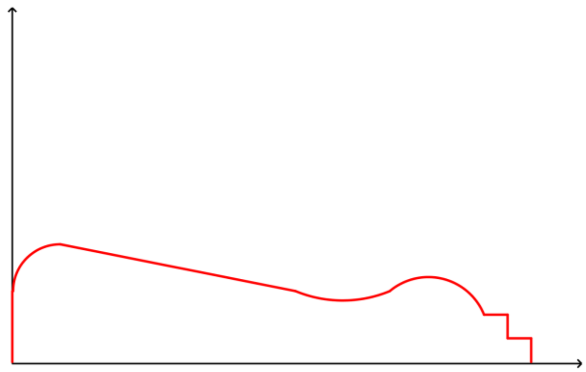
Set

Topic: Solids of revolution

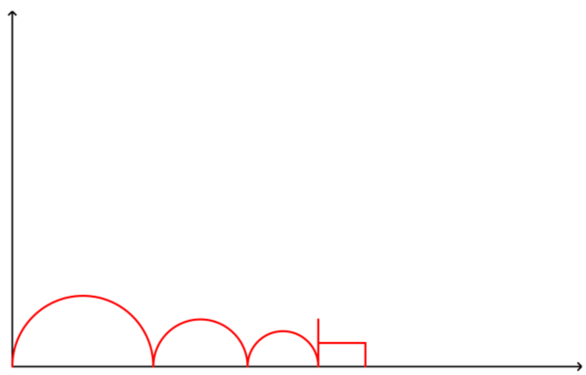
For each of the following solids, draw the two-dimensional shape that would be revolved about the *x*-axis to generate it.

8.

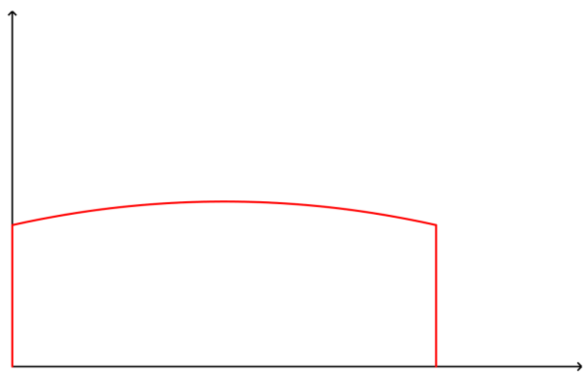




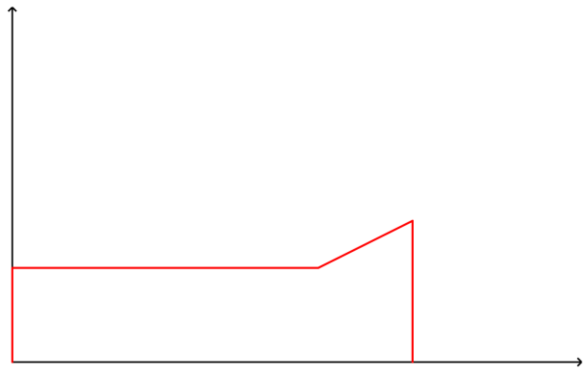
9.



10.

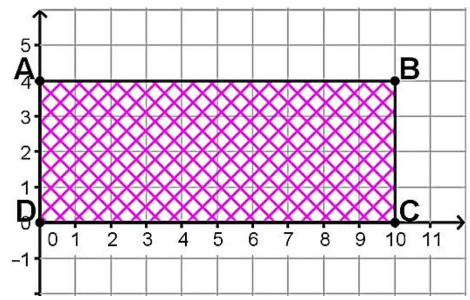


11.



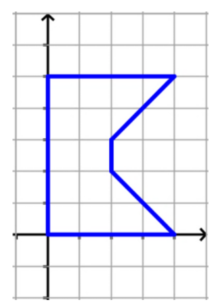
12. Name something in your house that would be shaped like the solid of revolution formed, if the figure on the right were rotated about the *x*-axis.

    Sample answers: Can of food, candle, cylinder



13. Name something in the world would be shaped like the solid of revolution formed if the figure on the right were rotated about the *y*-axis.

    Sample answers: bow tie, hour glass, double cone lamp, vase, wheel



Topic: Applications of volume, weight, and density

14. The figure at the right is of 2 grain storage silos. The diameter of each silo measures 24 feet and the height of the cylinder measures 51 feet. The height of the cone adds an additional 12 feet. Find the total volume of one silo.

    $\mathbf{7,920\pi \text{ ft}^3 \approx 24881.4 \text{ ft}^3}$

15. How many bushels of grain will each silo be able to store, if a bushel is 1.244 cubic feet? Assume it can be filled to the top.

    20,001 bushels

16. Density relates to the degree of compactness of a substance. A cubic inch of gold weighs a great deal more than a cubic inch of wood because gold is more dense than wood. The density of grains also varies. Use the information below to calculate how many tons of each grain can be stored in one silo. (1 ton = 2000 lbs)

    a. 1 bushel of oats weighs 32 pounds
    320.016 tons

    b. 1 bushel of barley weighs 48 pounds
    480.024 tons

    c. 1 bushel of wheat weighs 60 pounds
    600.03 tons

17. A $\frac{3}{4}$ - ton pickup has the capacity to haul a little more than 1500 lbs. If the hauling bed of the pickup measures 4 ft. by 6.5 ft. by 2 ft., can a $\frac{3}{4}$ - ton pickup safely haul a full (level) load of oats, barley, or wheat? Justify your answer for each type of grain.

    The pickup can safely haul the oats because the weight of the oats would be approximately 1,337.62 pounds. The weight of the barely would be approximately 2,006.43 pounds and the weight of the wheat would be approximately 2,508.04 pounds. Both the weight of the barley and wheat are greater than the number of pounds the pickup can haul.

Go

Topic: Using formulas to find the volume of a solid.

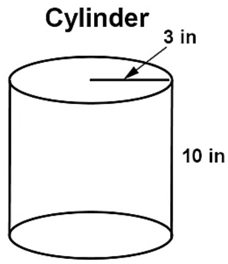
Find the volume of the indicated solid.

18. $V = \pi r^2 h$

$r = 3\ in$

$h = 10\ in$

$\boldsymbol{90\pi\ in^3}$

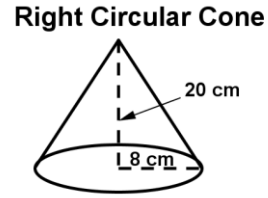


19. $V = \frac{1}{3}Bh$

$r = 8\ cm$

$h = 20\ cm$

$\boldsymbol{\frac{1280\pi}{3}\ cm^3}$

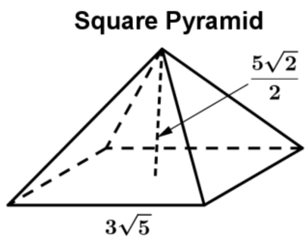


20. $V = \frac{1}{3}Bh$

$h = \frac{5\sqrt{2}}{2}\ m$

base edge $= 3\sqrt{5}\ m$

$\boldsymbol{\frac{75\sqrt{2}}{2}\ m^3}$

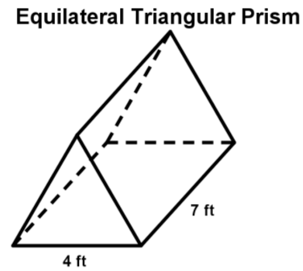


21. $V = Bh$

$h = 7\ ft$

base edge $= 4\ ft$

$\boldsymbol{28\sqrt{3}\ ft^3}$



Name **Modeling with Geometry** | **3.2H**

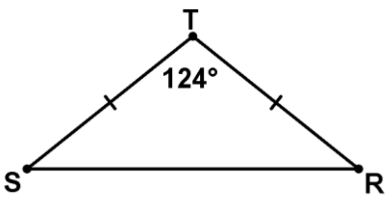
Ready, Set, Go!

Ready

Topic: Finding missing angles in triangles

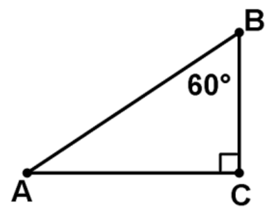
Use the given information and what you know about triangles to find the missing angles. All angle measures are in degrees.

1.



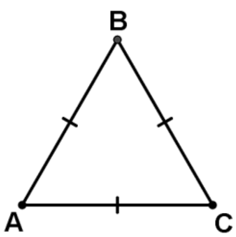
$m\angle R = 28°, m\angle S = 28°$

2.



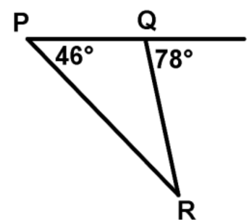
$m\angle A = 30°$

3.



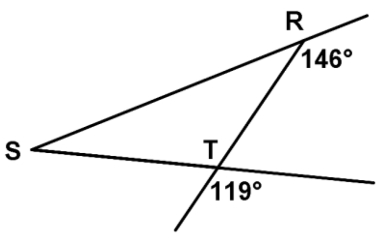
$m\angle A = m\angle B = m\angle C = 60°$

4.



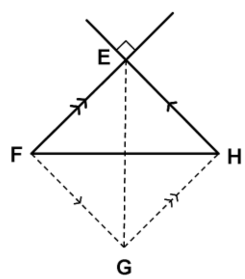
$m\angle R = 32°, m\angle PQR = 102°$

5.



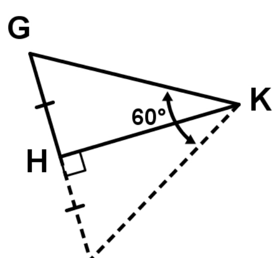
$m\angle S = 27°, m\angle STR = 119°, m\angle SRT = 34°$

6. $\overline{EG} \cong \overline{FH}$



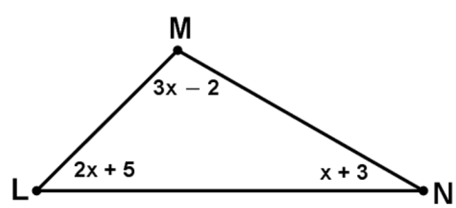
$m\angle FEH = 90°, m\angle EFH = 45°, m\angle EHF = 45°$

7.



$m\angle HGK = 60°, m\angle GKH = 30°, m\angle KHG = 90°$

8.

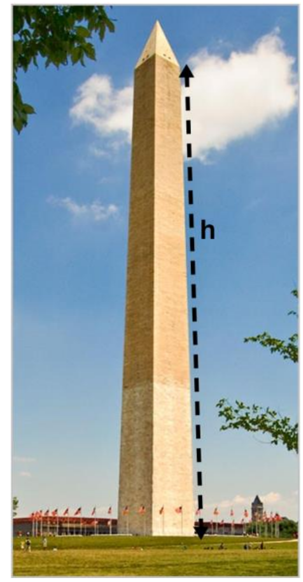


$m\angle L = 63°, m\angle M = 85°, m\angle N = 32°$

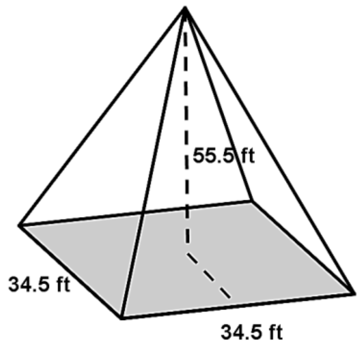
Set

Topic: Finding the surface area and volume of combined shapes

The picture at the right is of the Washington Monument in DC. The body of the monument is a square frustum. The bottom square measures 55 ft. on a side and the top square measures 34.5 feet. The top is a square pyramid.



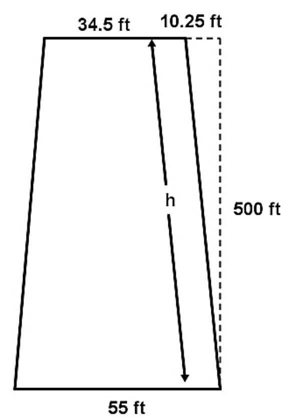
9. Find the dimensions of the 4 triangular faces of the pyramid at the top of the monument. (Height is 55.5 ft)



34.5 ft by 60.6 ft by 60.6 ft

10. Find the area of each face of the pyramid at the top of the monument.
$1002.55\ \text{ft}^2$

11. Find the area of the 4 trapezoids that make the faces of the frustum on the monument. The area of a trapezoid: $A = \frac{b_1+b_2}{2}h$ You will need to find h (slant height) since the 500 ft marked on the diagram at the right is the height of the body of the monument (vertical height from the ground to the top of the body of the monument) and not the height of the trapezoidal face.



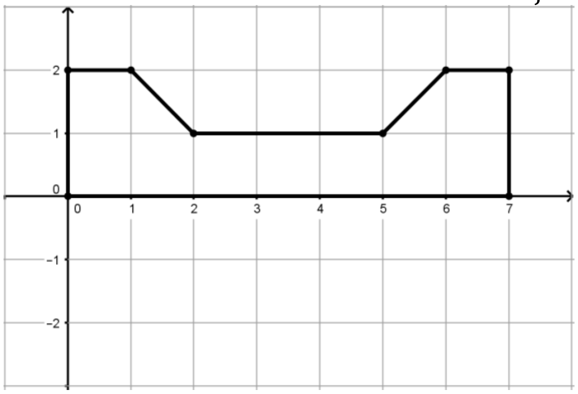
$22,379.92\ \text{ft}^2$

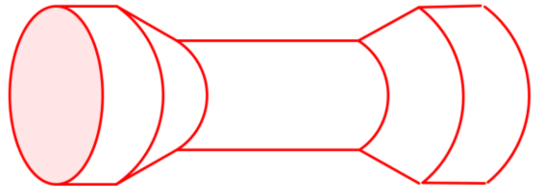
12. Find the total surface area of the Washington Monument.

$23,382.70\ \text{ft}^2$

13. Find the total volume of the Washington Monument.
Volume of a square frustum: $\frac{1}{3}h(a^2 + ab + b^2)$ where a and b are the side lengths of each square.
Volume of pyramid: $V = \frac{1}{3}Bh$
$1,041,040\ \text{ft}^3$

14. Draw a sketch of the three-dimensional object formed by rotating the figure about the *x*-axis.



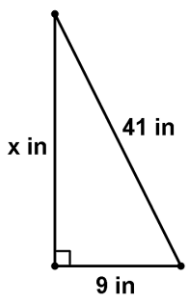


Go

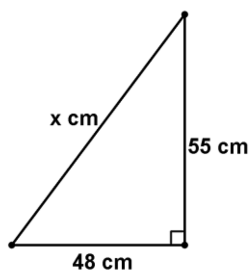
Topic: Solving for the missing side in a right triangle

Calculate the missing side in the right triangles. Give your answers in simplified radical form.

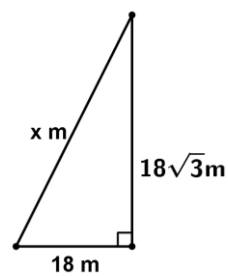
15. **40 in**



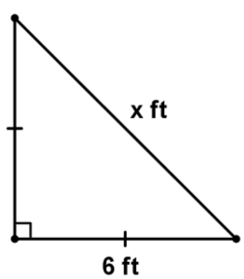
16. **73 cm**



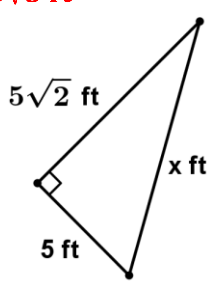
17. **36 m**



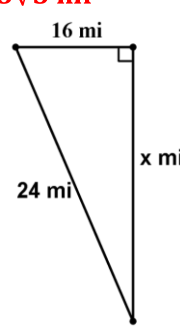
18. **$6\sqrt{2}$ ft**



19. **$5\sqrt{3}$ ft**



20. **$8\sqrt{5}$ mi**



Name **Modeling with Geometry | 3.3H**

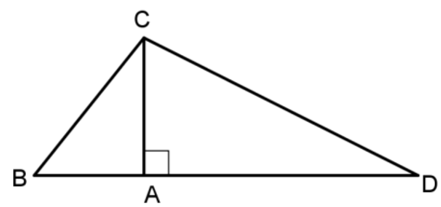
Ready, Set, Go!

Ready

Topic: Finding missing measurements in triangles

Use the given figure to answer the questions. Round your answers to hundredths place. Questions 1-8 all refer to the same triangle below.

Given: $m\angle CBD = 51°$
$m\angle CDA = 30°$
$m\angle CAD = 90°$
$CA = 6\ ft$



1. Find $m\angle BCA$ and $m\angle ACD$
   $m\angle BCA = 39°, m\angle ACD = 60°$

2. Find $m\angle BCD$
   $m\angle BCD = 99°$

3. Find BC
   7.72

4. Find BA
   4.86

5. Find CD
   12

6. Find AD
   10.39

7. Find BD
   15.25

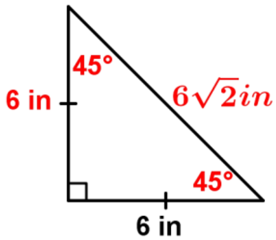
8. Find the area of ΔBCD
   $45.75\ \text{un}^2$

Set

Topic: Triangle relationships in the special right triangles

Fill in all of the missing measures in the triangles. Express answers in simplest radical form.

9.



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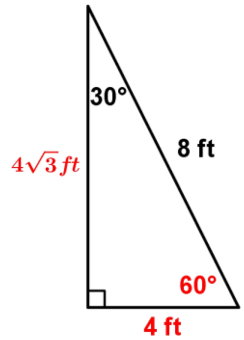

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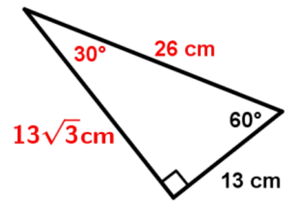
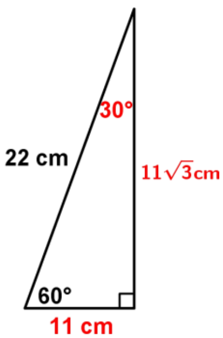
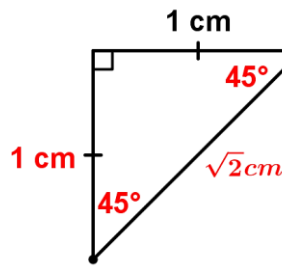


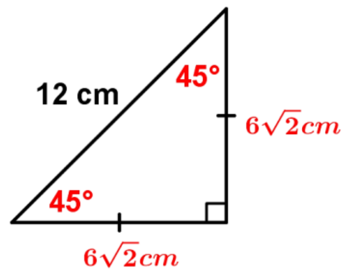
12.



13.



14.



Use an appropriate triangle from above to fill in the function values below.

15.

$\sin 45° = \frac{\sqrt{2}}{2}$

$\cos 45° = \frac{\sqrt{2}}{2}$

$\tan 45° = \mathbf{1}$

16.

$\sin 30° = \frac{1}{2}$

$\cos 30° = \frac{\sqrt{3}}{2}$

$\tan 30° = \frac{\sqrt{3}}{3}$

17.

$\sin 60° = \frac{\sqrt{3}}{2}$

$\cos 60° = \frac{1}{2}$

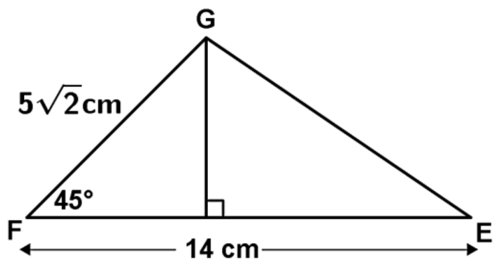
$\tan 60° = \sqrt{3}$

18. In question 17, does it matter if you used the triangle in question 10, 11, or 12? Explain.
    No because the triangles are similar, therefore, their ratios are the same.

Topic: Finding areas of triangles

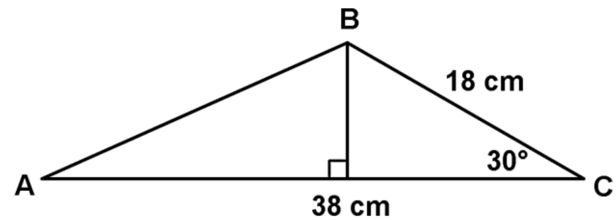
Find the area of each triangle. $A = \frac{1}{2}bh$

19.



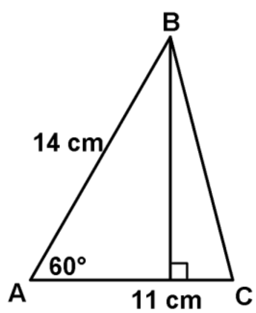
$\mathbf{35\ cm^2}$

20.



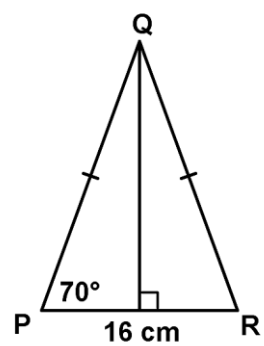
$\mathbf{171\ cm^2}$

21.



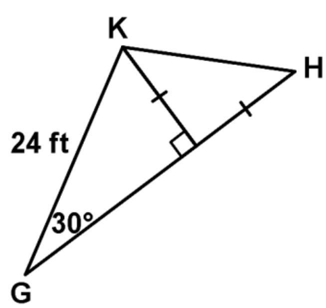
$\mathbf{\frac{77\sqrt{3}}{2}\ cm^2}$

22.



$\mathbf{174.84\ cm^2}$

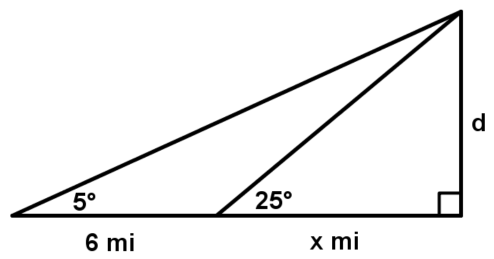
23.



$\mathbf{72\sqrt{3} + 72\ ft^2}$

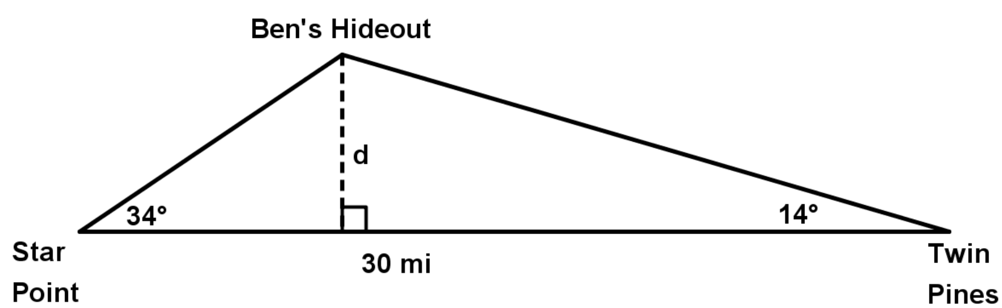
Topic: Using right triangle trigonometry to solve triangles

24. While traveling across a flat stretch of desert, Joey and Holly make note of a mountain peak in the distance that seems to be directly in front of them. They estimate the angle of elevation to the peak as 5°. After traveling 6 miles toward the mountain, the angle of elevation is 25°. Approximate the height of the mountain in miles and in feet. **5,280 ft = 1 mile** (While figuring, use at least 4 decimal places.)



0.6462 miles; 3,411.7544 ft

25. The Star Point Ranger Station and the Twin Pines Ranger Station are 30 miles apart along a straight scenic road. Each station gets word of a cabin fire in a remote area known as Ben's Hideout. A straight path from Star Point to the fire makes an angle of 34° with the road, while a straight path from Twin pines makes an angle of 14° with the road. Find the distance, *d,* of the fire from the road.

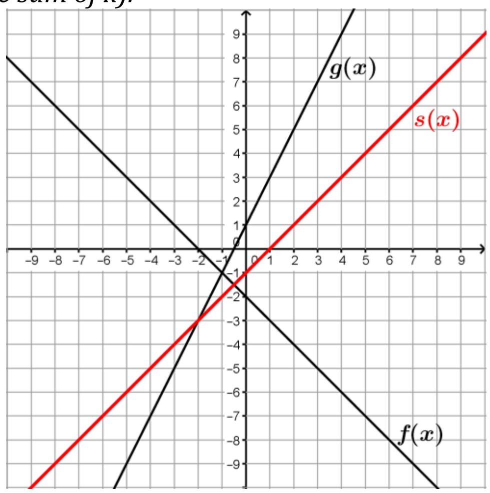


5.4612 miles

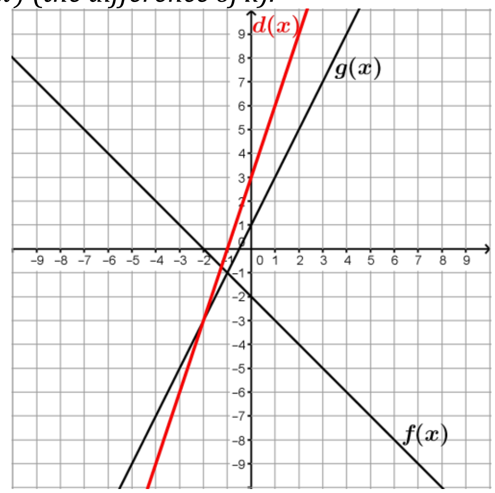
Go

Topic: Function arithmetic

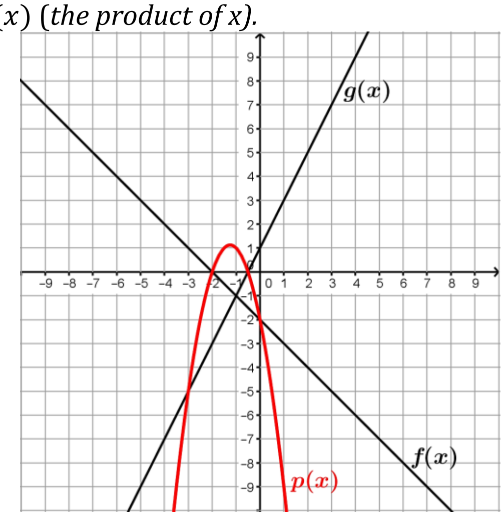
26. Add $f(x)$ and $g(x)$ using the graph below. Draw the new figure on the graph and label it as $s(x)$ (*the sum of x*).



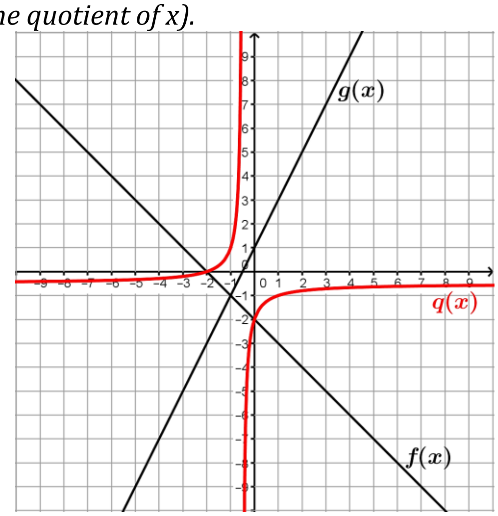
27. Subtract $f(x)$ from $g(x)$ using the graph below. Draw the new figure on the graph and label it as $d(x)$ (*the difference of x*).



28. Multiply $f(x)$ and $g(x)$ using the graph below. Draw the new figure on the graph and label it as $p(x)$ (*the product of x*).



29. Divide $f(x)$ by $g(x)$ using the graph below. Draw the new figure on the graph and label it as $q(x)$ (*the quotient of x*).



30. Write the equations of $f(x)$ and $g(x)$.
$f(x) = -x - 2, g(x) = 2x + 1$

31. Write the equation of the sum of $f(x)$ and $g(x)$.
$s(x) =$ **$x - 1$**

32. Write the equation of the difference between $g(x)$ and $f(x)$.
$d(x) =$ **$3x + 3$**

33. Write the equation of the product of $f(x)$ and $g(x)$.
$p(x) =$ **$-2x^2 - 5x - 2$**

34. Write the equation of the quotient of $f(x)$ divided by $g(x)$.
$q(x) = \frac{-x-2}{2x+1}$

Ready, Set, Go!

Ready

Topic: Finding missing angles using trigonometry

Solve for the missing angle. Round your answers to the nearest degree.

1. $\cos\theta = \frac{1}{6}$
   80°

2. $\tan\theta = \frac{2}{3}$
   34°

3. $\sin\theta = \frac{7}{8}$
   61°

4. $5\sin\theta - 2 = 0$
   24°

5. $7\cos\theta - 6 = 0$
   31°

6. $4\tan\theta - 1 = 0$
   14°

Topic: Verifying trigonometric identities

Verify each trigonometric identity. Be sure to show all of your steps.

Answers may vary. Sample answer below.

7. $\cot\theta + 1 = \csc\theta\,(\cos\theta + \sin\theta)$

$$\cot\theta + 1 = \frac{1}{\sin\theta}(\cos\theta + \sin\theta)$$

$$\cot\theta + 1 = \frac{\cos\theta}{\sin\theta} + \frac{\sin\theta}{\sin\theta}$$

$$\cot\theta + 1 = \cot\theta + 1$$

8. $\cos\theta + \sin\theta \cdot \tan\theta = \sec\theta$

$$\cos\theta + \sin\theta \cdot \frac{\sin\theta}{\cos\theta} = \sec\theta$$

$$\frac{\cos^2\theta + \sin^2\theta}{\cos\theta} = \sec\theta$$

$$\frac{1}{\cos\theta} = \sec\theta$$

$$\sec\theta = \sec\theta$$

9. $\frac{\sin\theta}{\cos\theta + 1} + \frac{\cos\theta - 1}{\sin\theta} = 0$

$$\frac{\sin^2\theta + (\cos\theta - 1)(\cos\theta + 1)}{\sin\theta(\cos\theta + 1)} = 0$$

$$\frac{\sin^2\theta + \cos^2\theta - 1}{\sin\theta(\cos\theta + 1)} = 0$$

$$\frac{1-1}{\sin\theta(\cos\theta + 1)}0$$

$$\frac{0}{\sin\theta(\cos\theta + 1)} = 0$$

$$0 = 0$$

10. $\tan^2\theta = \csc^2\theta \cdot \tan^2\theta - 1$

$$\tan^2\theta = \frac{1}{\sin^2\theta} \cdot \frac{\sin^2\theta}{\cos^2\theta} - 1$$

$$\tan^2\theta = \frac{1}{\cos^2\theta} - 1$$

$$\tan^2\theta = \frac{1 - \cos^2\theta}{\cos^2\theta}$$

$$\tan^2\theta = \frac{\sin^2\theta}{\cos^2\theta}$$

$$\tan^2\theta = \tan^2\theta$$

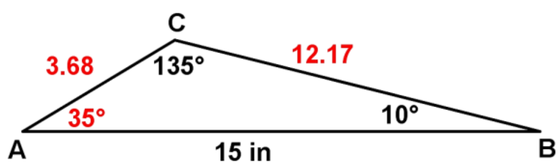
Set

Topic: The laws of sine and cosine

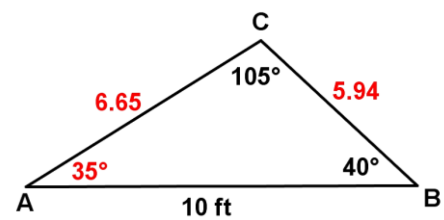
Law of Sines:	**Law of Cosines:**
If ABC is a triangle with sides a, b, and c, then $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ or it can be written as: $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$	If ABC is a triangle with sides a, b, and c, then $a^2 = b^2 + c^2 - 2bc\cos A$ $b^2 = a^2 + c^2 - 2ac\cos B$ $c^2 = a^2 + b^2 - 2ab\, cosC$

Use the Law of Sines to solve each triangle. Round angles to the nearest degree and side lengths to the nearest hundredth.

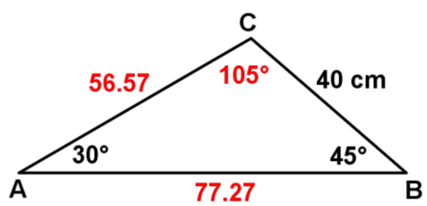
11.



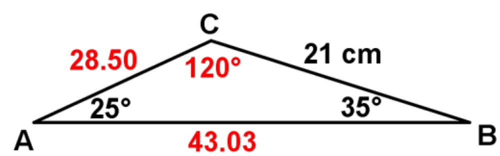
12.



13.



14.

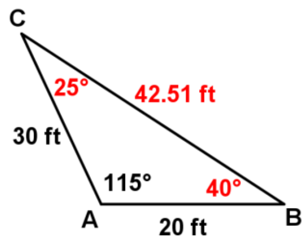


15. What information do you need in order to use the *Law of Sines*?

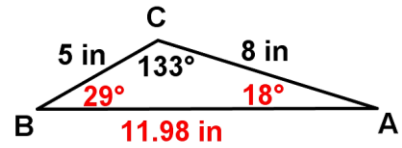
2 angle measure and one side length

Use the *Law of Cosines* to solve each triangle. Round angles to the nearest degree and side lengths to the nearest hundredth.

16.



17.



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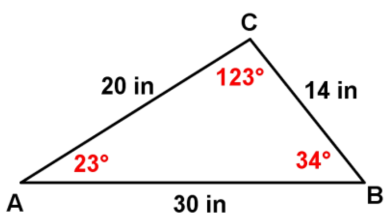
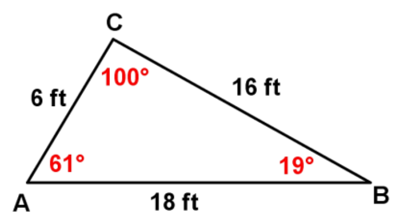


19.



20. What information do you need in order to use the *Law of Cosines* to solve a triangle?

3 side lengths or 2 side lengths and the included angle measure

Go

Topic: Trigonometry ratios of the special triangles

Fill in the missing angle. Do not use a calculator.

21. $\sin\theta = \frac{\sqrt{2}}{2}$
45°

22. $\tan\theta = \sqrt{3}$
60°

23. $\cos\theta = \frac{1}{2}$
60°

24. $\sin\theta = \frac{\sqrt{3}}{2}$
60°

25. $\tan\theta = 1$
45°

26. $\tan\theta = \frac{\sqrt{3}}{3}$
30°

27. $\sin\theta = \frac{1}{2}$
30°

28. $\cos\theta = \frac{\sqrt{2}}{2}$
45°

29. $\cos\theta = \frac{\sqrt{3}}{2}$
30°

Ready, Set, Go!

Ready

Topic: Rotational symmetry

Hubcaps have *rotational symmetry*. That means that a hubcap does not have to turn a full circle to appear the same. For instance, a hubcap with this pattern, $\otimes$, will look the same every $\frac{1}{4}$ turn. ***It is said to have 90° rotational symmetry*** because for each quarter turn it rotates 90°.

State the *rotational symmetry* for the following hubcaps. Answers will be in degrees.

1.

72°

2.

60°

3.

51.4°

4.

18°

5.

22.5°

6.

30°

Topic: Verifying trigonometric identities

Verify each trigonometric identity. Show all of your steps.

Answers may vary. Sample answers provided below.

7. $\sin\theta - \sin\theta \cdot \cos^2\theta = \sin^3\theta$

$\boldsymbol{\sin\theta - \sin\theta\left(1 - \sin^2\theta\right) = \sin^3\theta}$

$\boldsymbol{\sin\theta - \sin\theta + \sin^3\theta = \sin^3\theta}$

$\boldsymbol{\sin^3\theta = \sin^3\theta}$

8. $\sec\theta + \tan\theta = \frac{\cos\theta}{1-\sin\theta}$

$\boldsymbol{\frac{1}{\cos\theta} + \frac{\sin\theta}{\cos\theta} = \frac{\cos\theta}{1-\sin\theta}}$

$\boldsymbol{\frac{1+\sin\theta}{\cos\theta} = \frac{\cos\theta}{1-\sin\theta}}$

$\boldsymbol{\frac{1+\sin\theta}{\cos\theta} \cdot \frac{1-\sin\theta}{1-\sin\theta} = \frac{\cos\theta}{1-\sin\theta}}$

$\boldsymbol{\frac{1-\sin^2\theta}{\cos\theta(1-\sin\theta)} = \frac{\cos\theta}{1-\sin\theta}}$

$\boldsymbol{\frac{\cos^2\theta}{\cos\theta(1-\sin\theta)} = \frac{\cos\theta}{1-\sin\theta}}$

$\boldsymbol{\frac{\cos\theta}{1-\sin\theta} = \frac{\cos\theta}{1-\sin\theta}}$

9. $\frac{\csc\theta}{\sin\theta} - \frac{\cot\theta}{\tan\theta} = 1$

$\frac{1}{\sin\theta} \div \sin\theta - \frac{\cos\theta}{\sin\theta} \div \frac{\sin\theta}{\cos\theta} = 1$

$\frac{1}{\sin\theta} \cdot \frac{1}{\sin\theta} - \frac{\cos\theta}{\sin\theta} \cdot \frac{\cos\theta}{\sin\theta} = 1$

$\frac{1}{\sin^2\theta} - \frac{\cos^2\theta}{\sin^2\theta} = 1$

$\frac{1-\cos^2\theta}{\sin^2\theta} = 1$

$\frac{\sin^2\theta}{\sin^2\theta} = 1$

$1 = 1$

10. $\frac{\cos\theta}{1-\sin\theta} - \frac{\cos\theta}{1+\sin\theta} = 2\tan\theta$

$\frac{\cos\theta(1+\sin\theta)-\cos\theta(1-\sin\theta)}{(1-\sin\theta)(1+\sin\theta)} = 2\tan\theta$

$\frac{\cos\theta+\cos\theta\sin\theta-\cos\theta+\cos\theta\sin\theta}{1-\sin^2\theta} = 2\tan\theta$

$\frac{2\cos\theta\sin\theta}{\cos^2\theta} = 2\tan\theta$

$\frac{2\sin\theta}{\cos\theta} = 2\tan\theta$

$2\tan\theta = 2\tan\theta$

Set

Topic: Area formulas for triangles

Area of an Oblique Triangle: The area of **any** triangle is one-half the product of the lengths of two sides times the sine of their included angle. $Area = \frac{1}{2}bc\sin A = \frac{1}{2}ab\sin C = \frac{1}{2}ac\sin B$

Find the area of the triangle having the indicated sides and angle. Round answers to the nearest hundredth.

11. $C = 84.5°, a = 32, b = 40$

637.05 un^2

12. $A = 29°, b = 49, c = 50$

593.86 un^2

13. $B = 27.5°, a = 105, c = 64$

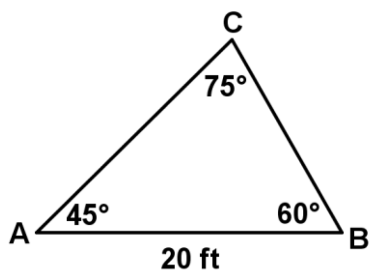
1551.48 un^2

14. $C = 31°, a = 16, b = 14$

57.68 un^2

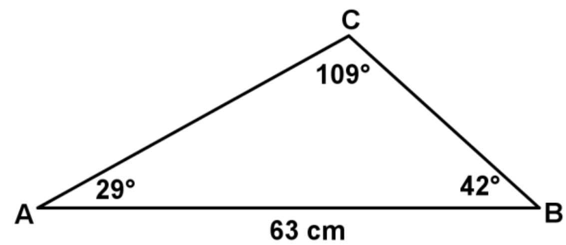
Find the area of these triangles. You will need to find additional measurements first. Round answers to the nearest hundredth.

15.



126.80 ft^2

16.



680.87 cm^2

Perhaps you used the *Law of Cosines* to establish the following formula for the area of a triangle. The formula was known as early as circa 100 B.C. and is attributed to the Greek mathematician, Heron.

Heron's Area Formula: Given any triangle with sides of lengths *a, b,* and *c,* the area of the triangle is: $Area = \sqrt{s(s-a)(s-b)(s-c)}$ where s is half of the perimeter of the triangle, or $s = \frac{(a+b+c)}{2}$.

Find the area of the triangle having the indicated sides. Round to the nearest hundredth.

17. $a = 11, b = 14, c = 20$

74.15 un^2

18. $a = 12, b = 5, c = 9$

20.40 un^2

19. $a = 12.32, b = 8.46, c = 15.05$

52.11 un^2

20. $a = 5, b = 7, c = 10$

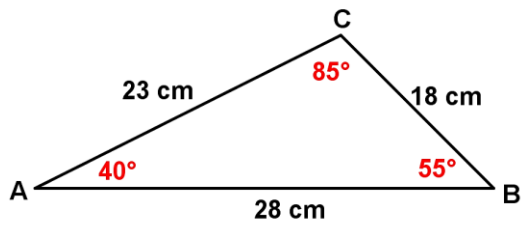
16.25 un^2

Go

Topic: Distinguishing between the *Law of Sines* and the *Law of Cosines*

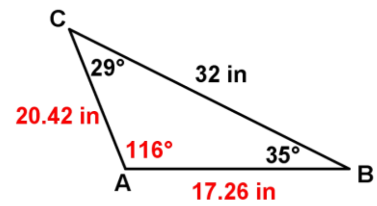
Indicate whether you would use the *Law of Sines* or the *Law of Cosines* to solve the triangles. Then solve each triangle. Round angles to the nearest degree and side lengths to the nearest hundredth.

21.



Law of Cosines

22.



Law of Sines

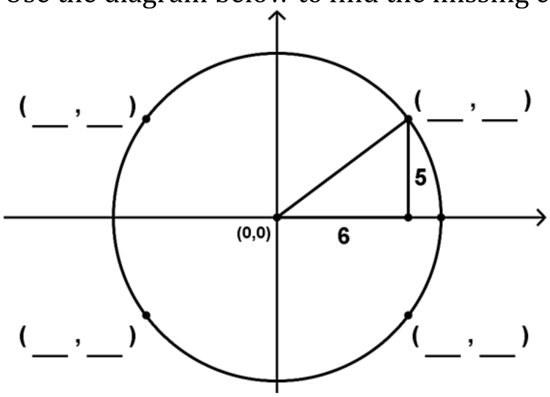
Name **Modeling with Geometry** | **3.6H**

Ready, Set, Go!

Ready

Topic: Coordinates on a circle

1. Use the diagram below to find the missing coordinates. Then write the equation of the circle.



$(\mathbf{6,5}), (\mathbf{-6,5}), (\mathbf{-6,-5}), (\mathbf{6,-5}), \boldsymbol{x^2+y^2=61}$

Topic: Angles in standard position

2. An angle is drawn in standard position such that $\tan\theta = \frac{5}{8}$ and the value of $\cos\theta$ is positive.

θ is in quadrant ____**I**____

$\sin\theta = \frac{5\sqrt{89}}{89}$

$\cos\theta = \frac{8\sqrt{89}}{89}$

$\csc\theta = \frac{\sqrt{89}}{5}$

$\sec\theta = \frac{\sqrt{89}}{8}$

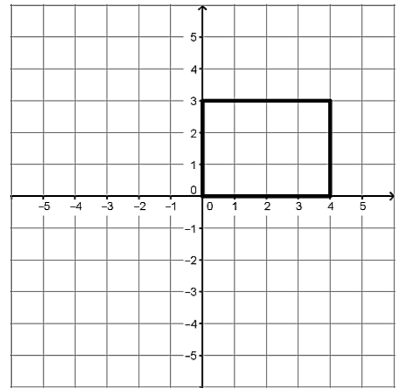
$\cot\theta = \frac{8}{5}$

Set

Topic: Volumes of rotated figures

3. Find the radius and height of the cylinder formed when the rectangle shown is rotated about
   a. the *x*-axis. $r = \mathbf{3}$_______ $h = \mathbf{4}$________

   b. the *y*-axis. $r = \mathbf{4}$_______ $h = \mathbf{3}$________

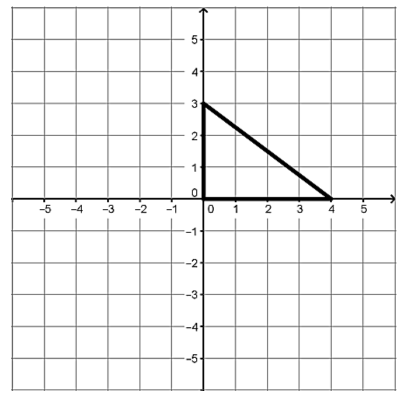


4. Which cylinder will have the greater volume? Estimate and then compute and compare.

   Volume of *y*-axis cylinder $= 48\pi\ un^3$
   Volume of *x*-axis cylinder $= 36\pi\ un^3$

5. Find the radius and height of the cone formed when the triangle is rotated about
   a. the *x*-axis. $r = \mathbf{3}$_______ $h = \mathbf{4}$________

   b. the *y*-axis. $r = \mathbf{4}$_______ $h = \mathbf{3}$________



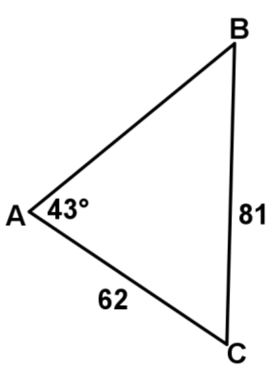
6. Which cone will have the greater surface area? Estimate and then compute and compare.

   Volume of *y*-axis cone $= 16\pi\ un^3$
   Volume of *x*-axis cone $= 12\pi\ un^3$

Go

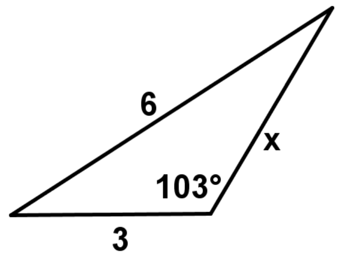
Topic: Solving oblique triangles

7. Find all missing dimensions and angle measures of the given triangle.



$\boldsymbol{c \approx 114.2, B \approx 31°, C \approx 106°}$

8. Use the diagram to answer the question.



In applying the Law of Cosines to the figure, a student writes $x^2 = 3^2 + 6^2 - 2(3)(6)\cos 103°$. Did the student start the problem correctly? Explain your answer.

No, when using the Law of Cosines, the angle needs to be between the two sides.

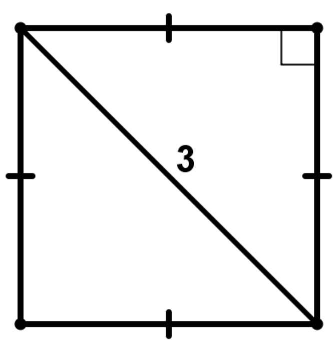
Solve for x by continuing the student's work or starting correctly yourself.

$\boldsymbol{x \approx 4.5}$

Topic: Special right triangles

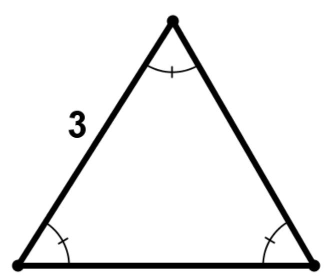
9. Find the areas of the following figures. Leave your answers in simplest radical form.

a.



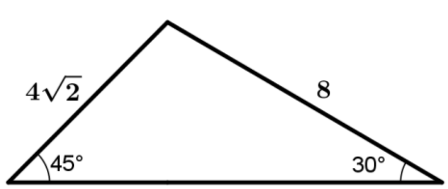
$\boldsymbol{A = \frac{9}{2}}$

b.



$\boldsymbol{A = \frac{9}{2}\sqrt{3}}$

c.



$\boldsymbol{A = 8 + 8\sqrt{3} \approx 21.856\ un^2}$

Topic: Verifying trigonometric identities

Verify each trigonometric identity. Show all of your steps.

Answers may vary. Sample answers provided below.

10. $\frac{1-\sin\theta}{\cos\theta} = \frac{\cos\theta}{1+\sin\theta}$

$$\frac{1-\sin\theta}{\cos\theta}\cdot\frac{1+\sin\theta}{1+\sin\theta} = \frac{\cos\theta}{1+\sin\theta}$$

$$\frac{1-\sin^2\theta}{\cos\theta(1+\sin\theta)} = \frac{\cos\theta}{1+\sin\theta}$$

$$\frac{\cos^2\theta}{\cos\theta(1+\sin\theta)} = \frac{\cos\theta}{1+\sin\theta}$$

$$\frac{\cos\theta}{1+\sin\theta} = \frac{\cos\theta}{1+\sin\theta}$$

11. $\frac{\sin^2\theta+4\sin\theta+3}{\cos^2\theta} = \frac{3+\sin\theta}{1-\sin\theta}$

$$\frac{(\sin\theta+3)(\sin\theta+1)}{\cos^2\theta} = \frac{3+\sin\theta}{1-\sin\theta}$$

$$\frac{(\sin\theta+3)(\sin\theta+1)}{1-\sin^2\theta} = \frac{3+\sin\theta}{1-\sin\theta}$$

$$\frac{(\sin\theta+3)(\sin\theta+1)}{(1-\sin\theta)(1+\sin\theta)} = \frac{3+\sin\theta}{1-\sin\theta}$$

$$\frac{3+\sin\theta}{1-\sin\theta} = \frac{3+\sin\theta}{1-\sin\theta}$$

12. $\cos 2\theta = \frac{1-\tan^2\theta}{1+\tan^2\theta}$

$$\cos 2\theta = \frac{1-\frac{\sin^2\theta}{\cos^2\theta}}{1+\frac{\sin^2\theta}{\cos^2\theta}}$$

$$\cos 2\theta = \frac{\cos^2\theta-\sin^2\theta}{\cos^2\theta} \div \frac{\cos^2\theta+\sin^2\theta}{\cos^2\theta}$$

$$\cos 2\theta = \frac{\cos^2\theta-\sin^2\theta}{\cos^2\theta} \cdot \frac{\cos^2\theta}{\cos^2\theta+\sin^2\theta}$$

$$\cos 2\theta = \frac{\cos 2\theta}{\cos^2\theta} \cdot \frac{\cos^2\theta}{1}$$

$$\cos 2\theta = \cos 2\theta$$

13. $\sin 2\theta = \frac{2\tan\theta}{1+\tan^2\theta}$

$$\sin 2\theta = \frac{2\sin\theta}{\cos\theta} \div \left(1+\frac{\sin^2\theta}{\cos^2\theta}\right)$$

$$\sin 2\theta = \frac{2\sin\theta}{\cos\theta} \div \frac{\cos^2\theta+\sin^2\theta}{\cos^2\theta}$$

$$\sin 2\theta = \frac{2\sin\theta}{\cos\theta} \cdot \frac{\cos^2\theta}{\cos^2\theta+\sin^2\theta}$$

$$\sin 2\theta = \frac{2\sin\theta\cos^2\theta}{\cos\theta(1)}$$

$$\sin 2\theta = 2\sin\theta\cos\theta$$

$$\sin 2\theta = \sin 2\theta$$