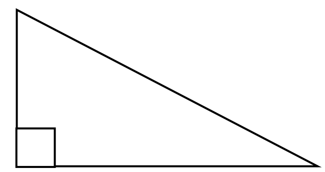
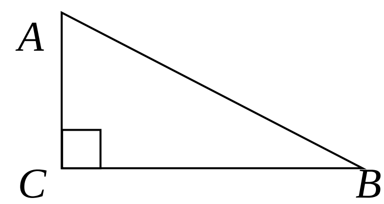
8.1: The Pythagorean Theorem and its Converse

Targets

- I can use the Pythagorean Theorem to find side lengths in right triangles.
- I can use the Pythagorean Theorem to determine whether a triangle is a right triangle.

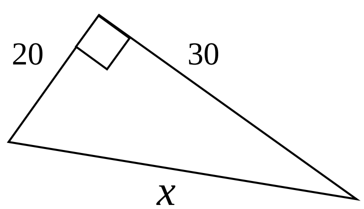
Instruction

Term/ Concept	Definition/Example	Picture
Pythagorean Theorem	In a ***right triangle***, the sum of the squares of the measures of the legs equals the square of the measure of the hypotenuse. The ***hypotenuse*** is always the side of the right triangle that is ***opposite*** the ***right angle***. It is also the ***longest side***.	 

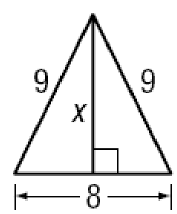
Instruction

Example 1:
Find the value of *x* in each of the following triangles.

a.

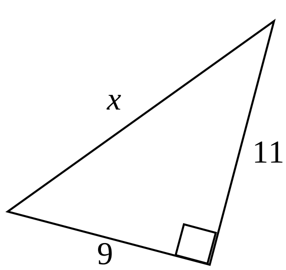


b.

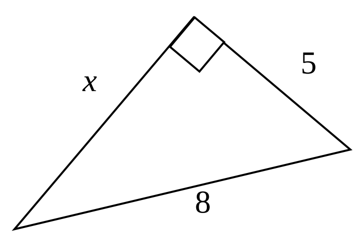


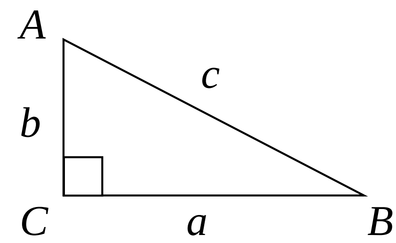
Your Turn:
Find the value of *x* in each of the following triangles.

a.



b.



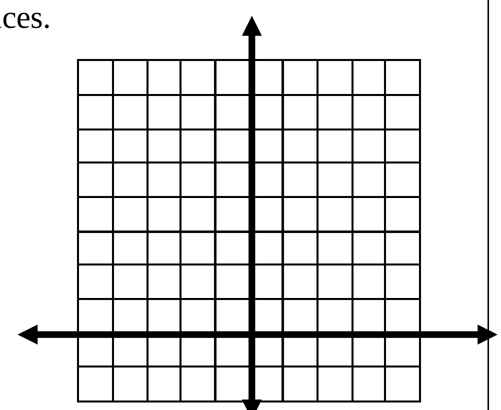
Instruction	Term/ Concept	Definition/Example	Picture
	Converse of the Pythagorean Theorem	If the **sum of the squares** of the measures of 2 sides of a triangle equals the **square** of the measure of the **longest side**, then the triangle is a **right triangle**.	 If $a^2 + b^2 = c^2$, then ΔABC is a right triangle.
	Pythagorean Triple	A Pythagorean triple is 3 ____________________ that satisfy the equation _________________where c is the greatest number.	

Instruction	
	Example 2: Determine whether each set of side measures form a right triangle. Then state whether the sides form a Pythagorean triple. Justify your answer mathematically. a. 8, 10, 6 b. 11, 7, 9 c. $\sqrt{24}$, 5, 7 d. $2\sqrt{7}$, 6, $2\sqrt{2}$

Instruction

Example 3:
Determine whether ΔRST is a right triangle for the given vertices.
Justify your answer mathematically.

$R(0, 3)$ $S(-2, 5)$ $T(4, 7)$



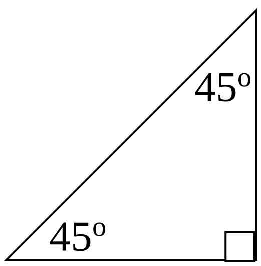
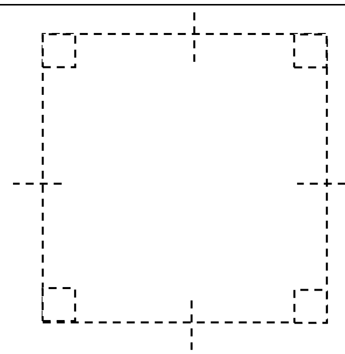
Distance between 2 points (x_1, y_1) *and* (x_2, y_2) = $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

8.2: 45-45-90 Triangles

Targets

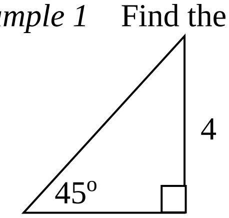
- I can find side lengths of special right triangles using 45-45-90.
- I can find side lengths of special right triangles using 30-60-90.
- I can find perimeter of figures using properties of special right triangles.

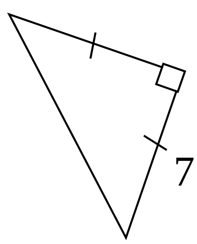
Instruction

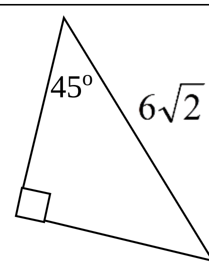
Term/Concept	Definition/Example	Picture
45^o-45^o-90^o Triangle 	 In a 45^o-45^o-90^o triangle, **both legs are congruent**, and the length of the **hypotenuse** is the **length of a leg times** $\sqrt{2}$ **.**	

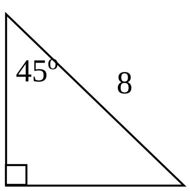
Instruction

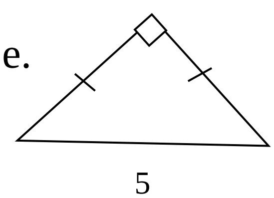
Example 1 Find the missing side lengths.

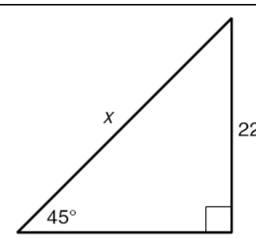
a.


b.


c.


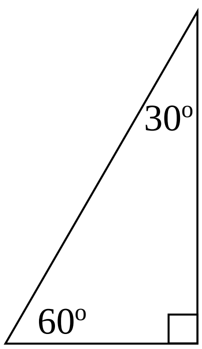
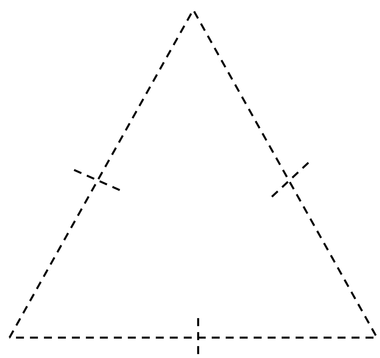
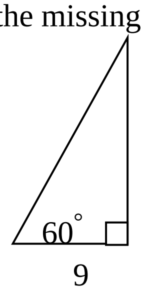
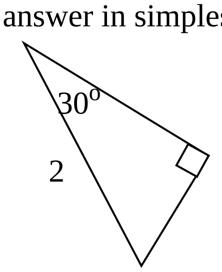
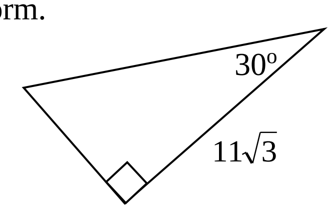
d.


e.


f.


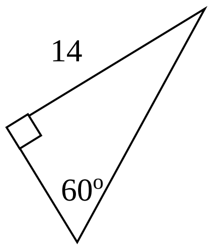
	Example 2: Find the diagonal of a square that has a perimeter of 20 in.	*Example 3:* Find the perimeter of a square with a diagonal of 12 cm.

8.3: 30-60-90 Triangles

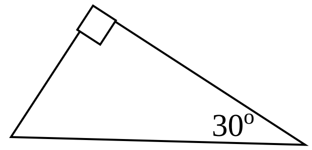
Instruction	Term/Concept	Definition/Example	Picture
	30^o-60^o-90^o Triangle 	 In a 30^o-60^o-90^o triangle, the length of the **hypotenuse** is **2 times** the length of the **shorter leg**, and the length of the **longer leg** is the length of the shorter leg times $\sqrt{3}$ **.**	
Instruction	*Example 2* Find the missing side lengths. Give your answer in simplest radical form. a.  b.  c. 		

Your Turn!

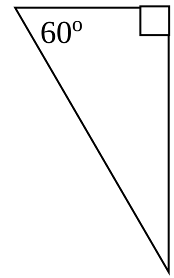
d.



e.



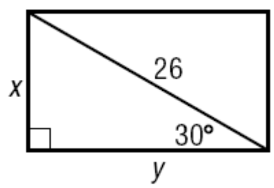
f.



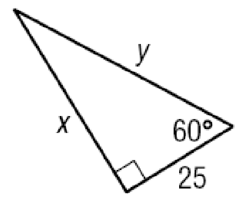
Your Turn

Find the values of *x* and/or *y*. Give your answer in simplest radical form.

1.



2.



Instruction

Example 3

The perimeter of an equilateral triangle is 24 cm. Find the length of an altitude of the triangle.

Example 4

An altitude of an equilateral triangle is 8 m. Find the perimeter of the triangle.

8.4: Right Triangle Trigonometry

Targets

- I can find trigonometric ratios using right triangles (SOH CAH TOA).
- I can solve problems using trigonometric ratios (SOH CAH TOA).

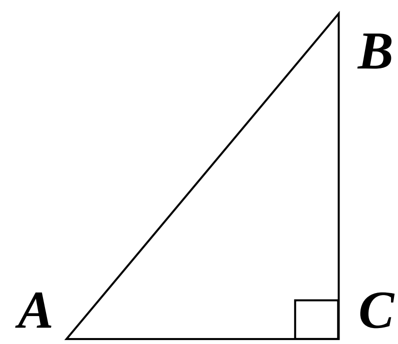
Instruction

Term/Concept	Definition/Example	Picture
Ratio	A **ratio** is a comparison of two amounts. *Example*: There are 12 boys and 11 girls in this class. What is the ratio of boys to girls?	
Trigonometry	**Trigonometry** is a branch of mathematics that deals with the relationships between the sides and angles of triangles.	
Trigonometric Ratio	A **trigonometric ratio** is a ratio of the lengths of the sides of a **right triangle**. The 3 most common trigonometric ratios are **sine**, **cosine**, and **tangent**.	

sine:

cosine:

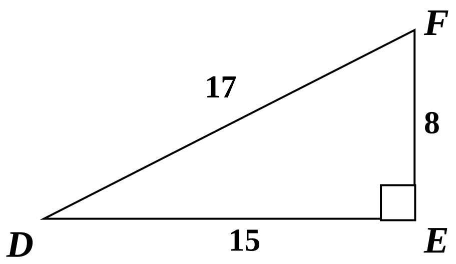
tangent:



SOH	CAH	TOA
$\sin\angle = \dfrac{opposite}{hypotenuse}$	$\cos\angle = \dfrac{adjacent}{hypotenuse}$	$\tan\angle = \dfrac{opposite}{adjacent}$

Instruction

Example 1
Find the following trig ratios. Write your answer as a reduced fraction.

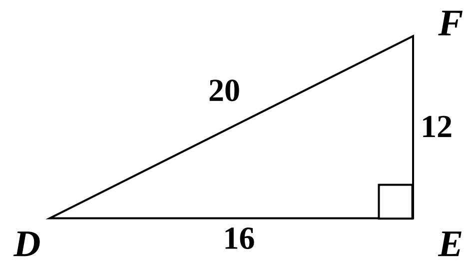


sin *D*

cos *D*

tan *D*

Example 2
Find the following trig ratios. Write your answer as a reduced fraction.



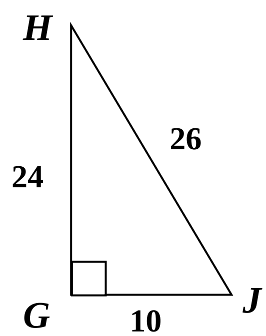
sin *F*

cos *F*

tan *F*

Your Turn

Find the following trig ratios. Write your answer as a reduced fraction.



sin *J*

cos *J*

tan *J*

Instruction

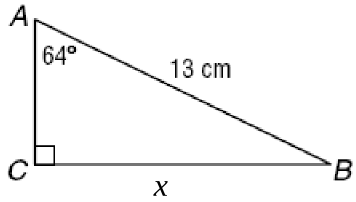
Example 3
Use a calculator to find the following values to the nearest <u>hundredth</u> (2 decimal places).

a. sin 47^{o} b. cos 32^{o} c. tan 84^{o}

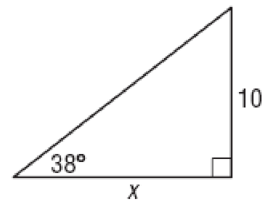
Example 4

Find the value of *x*. Round to the nearest <u>hundredth</u>.

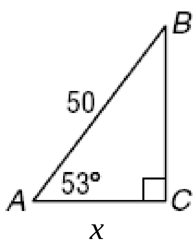
a.



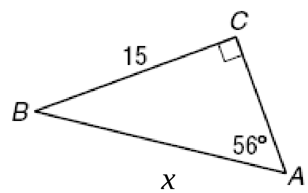
b.



c.



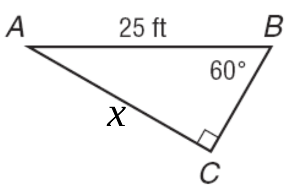
d.



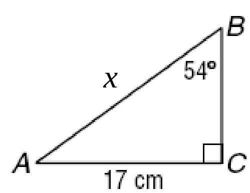
Your Turn

Find the value of *x*. Round to the nearest <u>hundredth</u>.

a.



b.

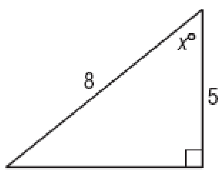


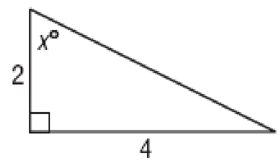
8.5: Solving for a Missing Angle using Trigonometry

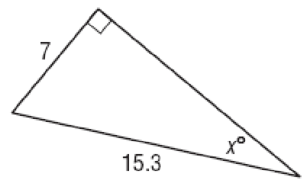
Example 1:
Use a calculator to find the measure of each angle to the nearest degree.

a. $\sin K = 0.5150$ b. $\tan M = 7.1154$ c. $\cos R = 0.2756$

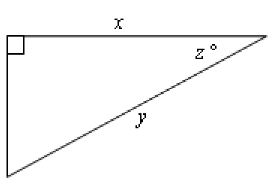
Example 2:
Find the missing angle measure in each triangle to the nearest degree.

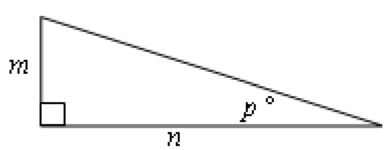
a.


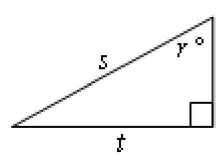
b.


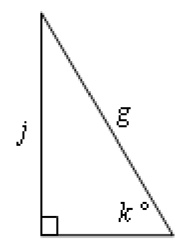
c.


Example 3:
Given each picture below, determine if you would use sine, cosine, or tangent to find the missing angle measure. Set up an equation that would solve for the missing angle.







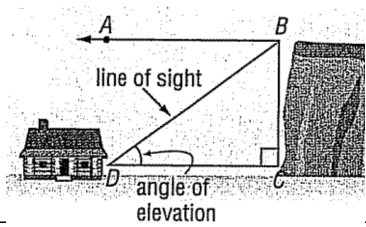
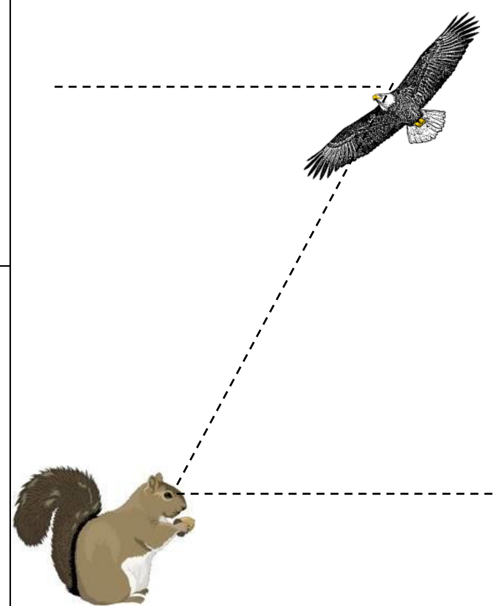
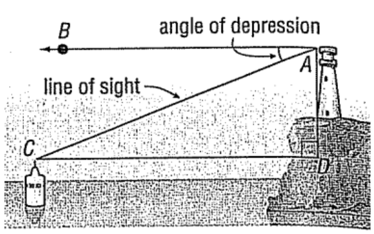


8.6: Angles of Elevation and Depression

Targets

- I can solve problems involving angles of elevation using SOH CAH TOA.
- I can solve problems involving angles of depression using SOH CAH TOA.

Vocabulary

Term/Concept	Definition/Example	Picture
Angle of Elevation 	○ the angle formed by a horizontal line and a line of sight __________ it	
Angle of Depression 	○ the angle formed by a horizontal line and a line of sight __________ it	

Instruction

Example 1:
A ladder leaning against a building makes an angle of 78° with the ground. The foot of the ladder is 5 feet from the building. How long is the ladder?

Example 2:
Find the angle of elevation to the sun when a 12.5 meter tall telephone pole casts an 18-meter long shadow.

	Example 3: A salvage ship uses sonar to determine that the angle of depression to a wreck on the ocean floor is 13.25^o. The depth chart shows that the ocean floor is 40 meters below the surface. How far must a diver lowered from the salvage ship walk along the ocean floor to reach the wreck?
Instruction	*Example 4:* A ski run is 1000 yards long with a vertical drop of 208 yards. Find the angle of depression from the top of the ski run to the bottom.
	Example 5: A person whose eyes are 5 feet above the ground is standing on an airport runway 100 feet from the control tower. That person observes an air traffic controller at the window of the 132-foot tower. What is the angle of elevation for the person on the ground looking up at the air traffic controller?
	Example 6: The town of Belmont restricts the height of flagpoles to 25 feet on any property. Lindsay wants to determine whether her school is in compliance with the regulation. Her eye level is 5.5 feet from the ground, and she is standing 36 feet from the flagpole. If the angle of elevation is about 25^o from Lindsay's eyes to the top of the flagpole, what is the height of the flagpole to the nearest tenth?