LT 6.1: Special Right Triangles

Due: _____

Name:

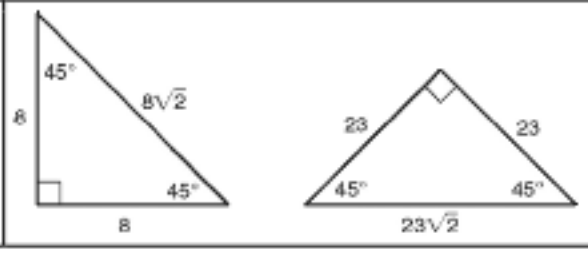
Date:

Period:

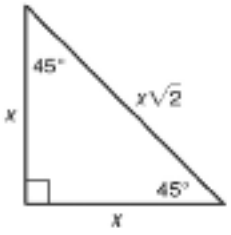
LESSON 5-8

Reteach

Applying Special Right Triangles

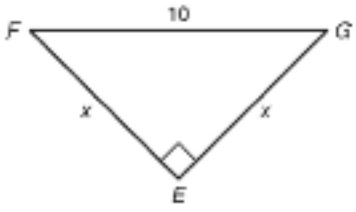
Theorem	Example
45°-45°-90° Triangle Theorem In a 45°-45°-90° triangle, both legs are congruent and the length of the hypotenuse is $\sqrt{2}$ times the length of a leg.	

In a 45°-45°-90° triangle, if a leg length is x, then the hypotenuse length is $x\sqrt{2}$.



Use the 45°-45°-90° Triangle Theorem to find the value of x in $\triangle EFG$.

Every isosceles right triangle is a 45°-45°-90° triangle. Triangle EFG is a 45°-45°-90° triangle with a hypotenuse of length 10.



$10 = x\sqrt{2}$ Hypotenuse is $\sqrt{2}$ times the length of a leg.

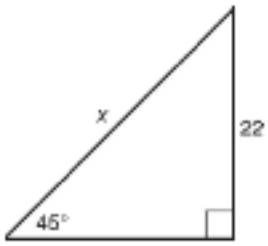
$\frac{10}{\sqrt{2}} = \frac{x\sqrt{2}}{\sqrt{2}}$ Divide both sides by $\sqrt{2}$.

$5\sqrt{2} = x$ Rationalize the denominator.

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

1.

2.



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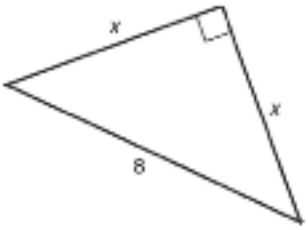

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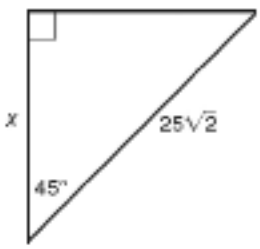

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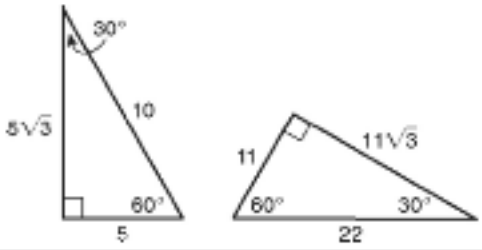
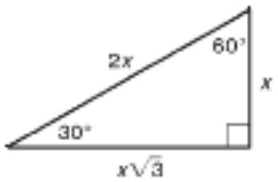
LESSON 5-8

Reteach

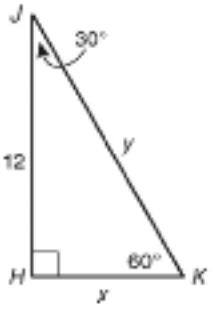
Applying Special Right Triangles *continued*

Theorem	Examples
30°-60°-90° Triangle Theorem In a 30°-60°-90° triangle, the length of the hypotenuse is 2 multiplied by the length of the shorter leg, and the longer leg is $\sqrt{3}$ multiplied by the length of the shorter leg.	

In a 30°-60°-90° triangle, if the shorter leg length is x, then the hypotenuse length is $2x$ and the longer leg length is x.



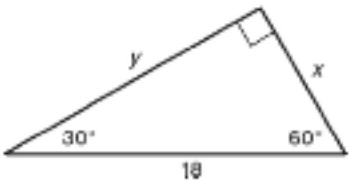
Use the 30°-60°-90° Triangle Theorem to find the values of x and y in $\triangle HJK$.



$12 = x\sqrt{3}$	Longer leg = shorter leg multiplied by $\sqrt{3}$.
$\frac{12}{\sqrt{3}} = x$	Divide both sides by $\sqrt{3}$.
$4\sqrt{3} = x$	Rationalize the denominator.
$y = 2x$	Hypotenuse = 2 multiplied by shorter leg.
$y = 2(4\sqrt{3})$	Substitute $4\sqrt{3}$ for x.
$y = 8\sqrt{3}$	Simplify.

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

5.



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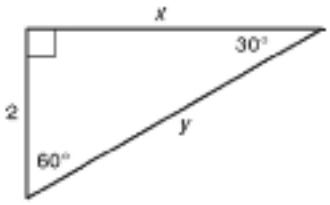

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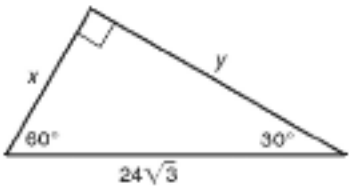

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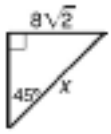
LESSON 5-8

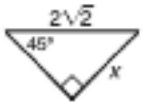
Practice B

Applying Special Right Triangles

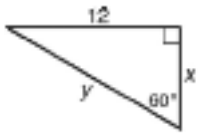
Find the value of *x* in each figure. Give your answer in simplest radical form.

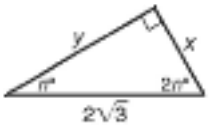
1. 

2. 

3. 

4. 

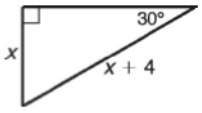
5. 

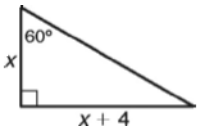
6. 

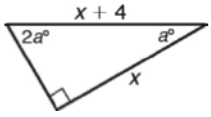
4. $x =$ _____ $y =$ _____

5. $x =$ _____ $y =$ _____

6. $x =$ _____ $y =$ _____

7. 

8. 

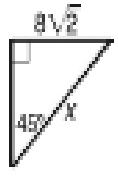
9. 

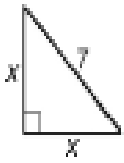
LESSON 5-8

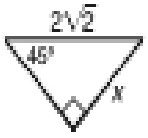
Practice B

Applying Special ht Triangles

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

10. 

11. 

12. 

LT 6.2: Right Triangle Trigonometry

Due: _____

Name:

Date:

Period:

LESSON 8-2

Reteach

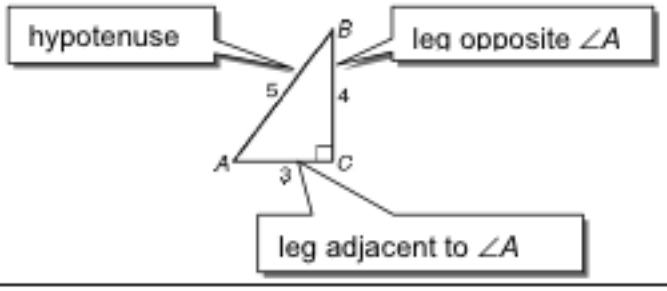
Trigonometric Ratios

Trigonometric Ratios

$$\sin A = \frac{\text{leg opposite } \angle A}{\text{hypotenuse}} = \frac{4}{5} = 0.8$$

$$\cos A = \frac{\text{leg adjacent to } \angle A}{\text{hypotenuse}} = \frac{3}{5} = 0.6$$

$$\tan A = \frac{\text{leg opposite } \angle A}{\text{leg adjacent to } \angle A} = \frac{4}{3} \approx 1.33$$



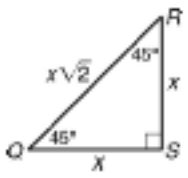
You can use special right triangles to write trigonometric ratios as fractions.

$$\sin 45^\circ = \sin Q = \frac{\text{leg opposite } \angle Q}{\text{hypotenuse}}$$

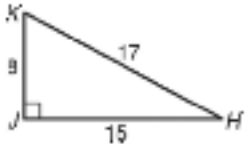
$$= \frac{x}{x\sqrt{2}} = \frac{1}{\sqrt{2}}$$

$$= \frac{\sqrt{2}}{2}$$

So $\sin 45^\circ = \frac{\sqrt{2}}{2}$.



Write each trigonometric ratio as a fraction and as a decimal rounded to the nearest hundredth.



1. sin K

2. cos H

3. cos K

4. tan H

Use a special right triangle to write each trigonometric ratio as a fraction.

5. cos 45°

6. tan 45°

7. sin 60°

8. tan 30°

LESSON 8-2

Reteach

Trigonometric Ratios *continued*

You can use a calculator to find the value of trigonometric ratios.

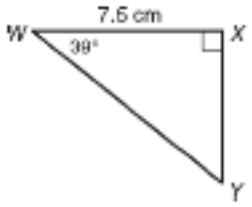
$\cos 38° \approx 0.7880107536$ or about 0.79

You can use trigonometric ratios to find side lengths of triangles.

Find *WY*.

$\cos W = \frac{\text{adjacent leg}}{\text{hypotenuse}}$ Write a trigonometric ratio that involves *WY*.

$\cos 39° = \frac{7.5 \text{ cm}}{WY}$ Substitute the given values.



$WY = \frac{7.5}{\cos 39°}$ Solve for *WY*.

$WY \approx 9.65$ cm Simplify the expression.

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

9. sin 42°

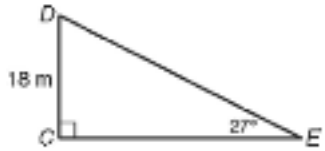
10. cos 89°

11. tan 55°

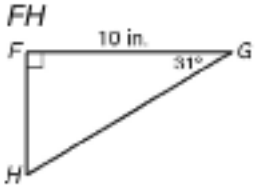
12. sin 6°

Find each length. Round to the nearest hundredth.

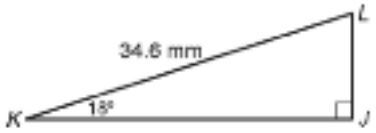
13. *DE*



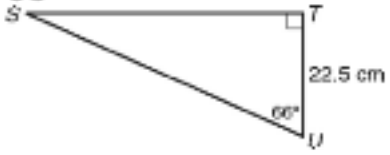
14. *FH*



15. *JK*



16. *US*

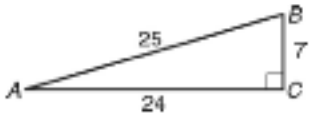


LESSON 8-2

Practice B

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° _____

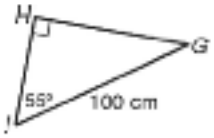
15. tan 15° _____

Find each length. Round to the nearest hundredth.

16.

XZ _____

17.



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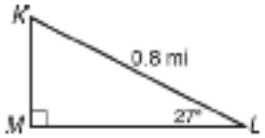
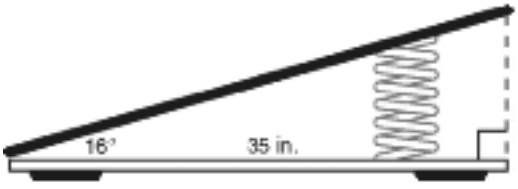
18.



KM _____

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



20. Find the measure of the angle formed between the line $y = \ldots x$ and the x-axis.

LESSON 8-3

Reteach

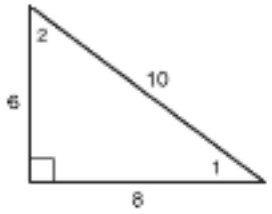
Solving Right Triangles

Use the trigonometric ratio sin $A = 0.8$ to determine which angle of the triangle is $\angle A$.

$$\sin \angle 1 = \frac{\text{leg opposite } \angle 1}{\text{hypotenuse}} \qquad \sin \angle 2 = \frac{\text{leg opposite } \angle 2}{\text{hypotenuse}}$$

$$= \frac{6}{10} \qquad = \frac{8}{10}$$

$$= 0.6 \qquad = 0.8$$

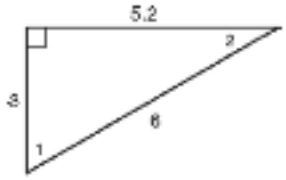


Since $\sin A = \sin \angle 2$, $\angle 2$ is $\angle A$.

If you know the sine, cosine, or tangent of an acute angle measure, then you can use your calculator to find the measure of the angle.

Inverse Trigonometric Functions	
Symbols	**Examples**
$\sin A = x \Rightarrow \sin^{-1} x = m\angle A$	$\sin 30° = \frac{1}{2} \Rightarrow \sin^{-1}\left(\frac{1}{2}\right) = 30°$
$\cos B = x \Rightarrow \cos^{-1} x = m\angle B$	$\cos 45° = \frac{\sqrt{2}}{2} \Rightarrow \cos^{-1}\left(\frac{\sqrt{2}}{2}\right) = 45°$
$\tan C = x \Rightarrow \tan^{-1} x = m\angle C$	$\tan 76° \approx 4.01 \Rightarrow \tan^{-1}(4.01) \approx 76°$

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



1. $\sin A = \frac{1}{2}$

2. $\cos A = \frac{13}{15}$

3. $\cos A = 0.5$

4. $\tan A = \frac{15}{26}$

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

5. $\sin^{-1}(0.8)$

6. $\cos^{-1}(0.19)$

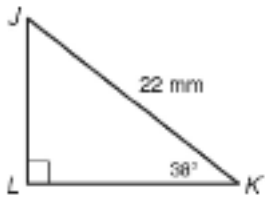
7. $\tan^{-1}(3.4)$

8. $\sin^{-1}\left(\frac{1}{5}\right)$

Reteach

Solving Right Triangles continued

To *solve a triangle* means to find the measures of all the angles and all the sides of the triangle.



Find the unknown measures of $\triangle JKL$.

Step 1: Find the missing side lengths.

$$\sin 38^\circ = \frac{JL}{22} \quad \begin{matrix}\leftarrow \text{leg opposite } \angle K \\ \leftarrow \text{hypotenuse}\end{matrix}$$

$13.54 \text{ mm} \approx JL$

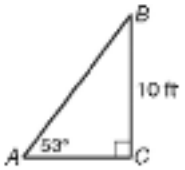
$JL^2 + LK^2 = JK^2$	Pythagorean Theorem
$13.542 + LK^2 = 22^2$	Substitute the known values.
$LK \approx 17.34 \text{ mm}$	Simplify.

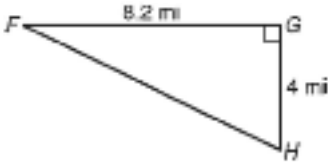
Step 2: Find the missing angle measures.

$m\angle J = 90^\circ - 38^\circ$	Acute $\measuredangle$ of a rt. $\triangle$ are complementary.
$= 52^\circ$	Simplify.

So $JL \approx 13.54$ mm, $LK \approx 17.34$ mm, and $m\angle J = 52^\circ$.

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

9. 

10. 

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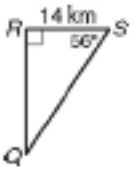
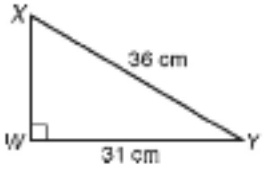
11. 

12. 

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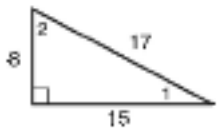
LESSON 8-3

Practice B

Solving Right Triangles



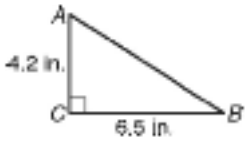
Use the given trigonometric ratio to determine which angle of the triangle is $\angle A$.

1. $\sin A = \frac{8}{17}$ _____
2. $\cos A = \frac{15}{17}$ _____
3. $\tan A = \frac{15}{8}$ _____
4. $\sin A = \frac{15}{17}$ _____
5. $\cos A = \frac{8}{17}$ _____
6. $\tan A = \frac{8}{15}$ _____

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

7. $\sin^{-1}(0.82)$ _____
8. $\cos^{-1}\left(\frac{11}{12}\right)$ _____
9. $\tan^{-1}(5.03)$ _____
10. $\sin^{-1}\left(\frac{3}{8}\right)$ _____
11. $\cos^{-1}(0.23)$ _____
12. $\tan^{-1}\left(\frac{1}{9}\right)$ _____

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

13. 

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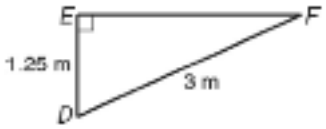
14. 

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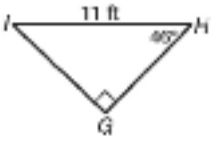
15. 

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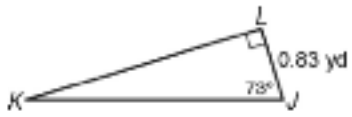
16. 

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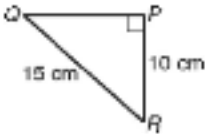
17. 

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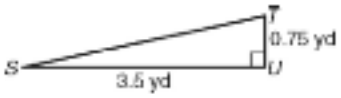
18. 

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_____

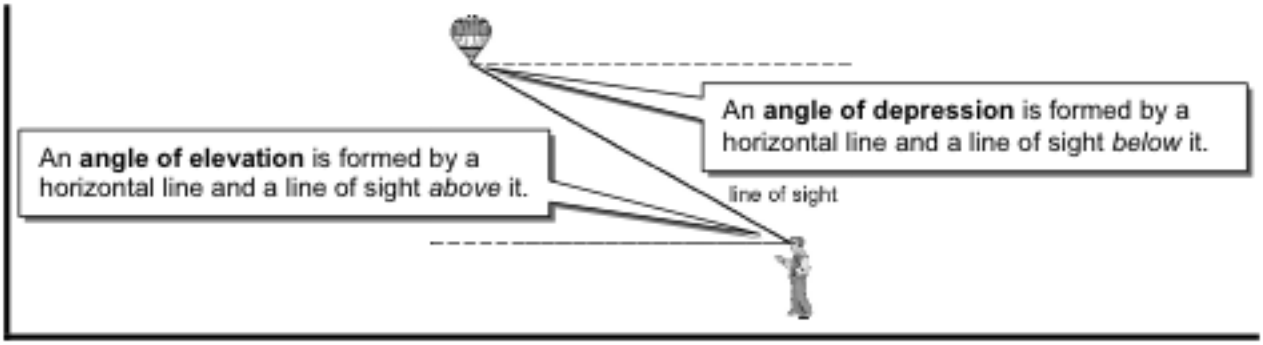
For each triangle, find all three side lengths to the nearest hundredth and all three angle measures to the nearest degree.

19. $B(-2, -4)$, $C(3, 3)$, $D(-2, 3)$

LESSON 8-4

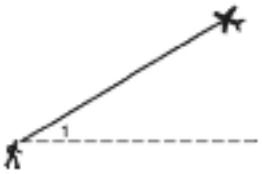
Reteach

Angles of Elevation and Depression



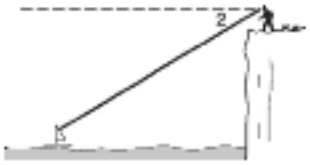
Classify each angle as an angle of elevation or an angle of depression.

1. ∠1



_____

2. ∠2



_____

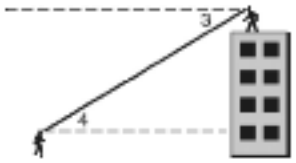
Use the figure for Exercises 3 and 4. Classify each angle as an angle of elevation or an angle of depression.

3. ∠3

_____

4. ∠4

_____



Use the figure for Exercises 5–8. Classify each angle as an angle of elevation or an angle of depression.

5. ∠1

_____

6. ∠2

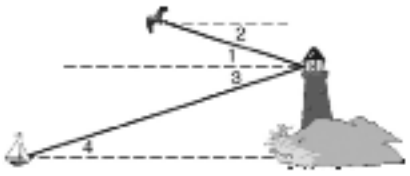
_____

7. ∠3

_____

8. ∠4

_____



LESSON 8-4

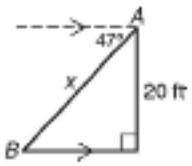
Reteach

Angles of Elevation and Depression *continued*

You can solve problems by using angles of elevation and angles of depression.

Sarah is watching a parade from a 20-foot balcony. The angle of depression to the parade is 47°. What is the distance between Sarah and the parade?

Draw a sketch to represent the given information. Let A represent Sarah and let B represent the parade. Let x represent the distance between Sarah and the parade.



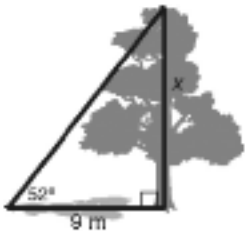
$m\angle B = 47°$ by the Alternate Interior Angles Theorem. Write a sine ratio using $\angle B$.

$$\sin 47° = \frac{20 \text{ ft}}{x} \quad \begin{matrix} \leftarrow \text{leg opposite } \angle B \\ \leftarrow \text{hypotenuse} \end{matrix}$$

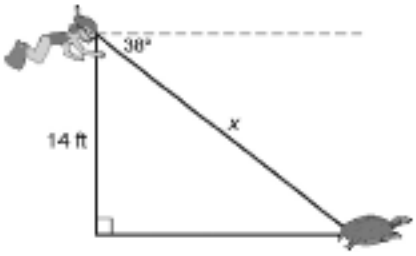
$x \sin 47° = 20$ ft	Multiply both sides by x.
$x = \frac{20}{\sin 47°}$ ft	Divide both sides by $\sin 47°$.
$27 \text{ ft} \approx x$	Simplify the expression.

The distance between Sarah and the parade is about 27 feet.

9. When the angle of elevation to the sun is 52°, a tree casts a shadow that is 9 meters long. What is the height of the tree? Round to the nearest tenth of a meter.



10. A person snorkeling sees a turtle on the ocean floor at an angle of depression of 38°. She is 14 feet above the ocean floor. How far from the turtle is she? Round to the nearest foot.



11. Jared is standing 12 feet from a rock-climbing wall. When he looks up to see his friend ascend the wall, the angle of elevation is 56°. How high up the wall is his friend? Round to the nearest foot.

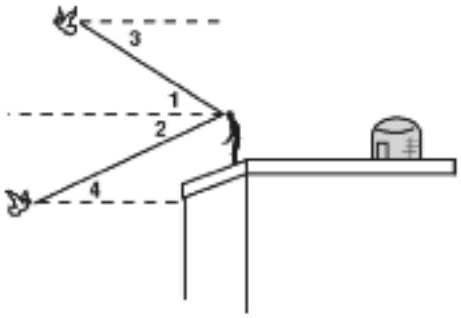
12. Maria is looking out a 17-foot-high window and sees two deer. The angle of depression to the deer is 26°. What is the horizontal distance from Maria to the deer? Round to the nearest foot.

LESSON 8-4

Practice B

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.

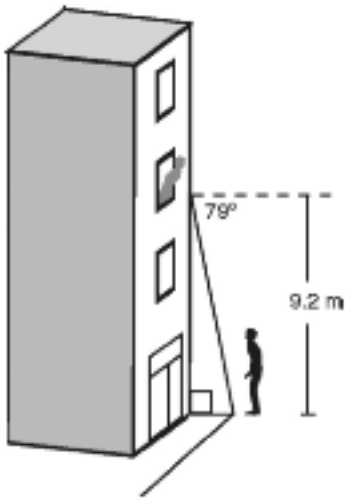


1. ∠1 _____
2. ∠2 _____
3. ∠3 _____
4. ∠4 _____

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.

LT 6.3: Law of Sines and Law of Cosines

Due: _____

Name:

Date:

Period:

LESSON 8-5

Reteach

Law of Sines and Law of Cosines

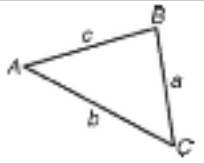
You can use a calculator to find trigonometric ratios for obtuse angles.

$\sin 115° \approx 0.906307787$ $\cos 270° = 0$ $\tan 96° = -9.514364454$

The Law of Sines

For any $\triangle ABC$ with side lengths a, b, and c that are opposite angles A, B, and C, respectively,

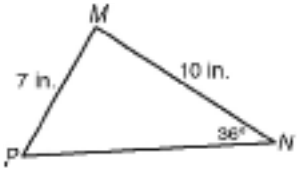
$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}.$$



Find m∠*P*. Round to the nearest degree.

$\frac{\sin P}{MN} = \frac{\sin N}{PM}$ Law of Sines

$\frac{\sin P}{10 \text{ in.}} = \frac{\sin 36°}{7 \text{ in.}}$ $MN = 10$, m∠$N = 36°$, $PM = 7$



$\sin P = 10 \text{ in.} \cdot \frac{\sin 36°}{7 \text{ in.}}$ Multiply both sides by 10 in.

$\sin P \approx 0.84$ Simplify.

m∠$P \approx \sin^{-1}(0.84)$ Use the inverse sine function to find m∠P.

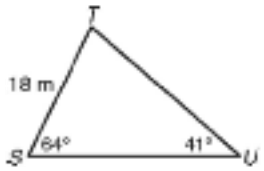
m∠$P \approx 57°$ Simplify.

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

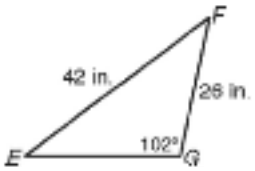
1. cos 104° _____
2. tan 225° _____
3. sin 100° _____

Find each measure. Round the length to the nearest tenth and the angle measure to the nearest degree.

4. *TU*



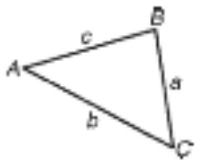
5. m∠*E*



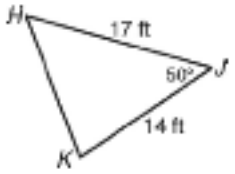
_____ _____

Reteach

Law of Sines and Law of Cosines continued

The Law of Cosines	
For any $\triangle ABC$ with side lengths a, b, and c that are opposite angles A, B, and C, respectively, $a^2 = b^2 + c^2 - 2bc \cos A$, $b^2 = a^2 + c^2 - 2ac \cos B$, $c^2 = a^2 + b^2 - 2ab \cos C$.	

Find *HK*. Round to the nearest tenth.



$HK^2 = HJ^2 + JK^2 - 2(HJ)(JK) \cos J$ Law of Cosines

$= 289 + 196 - 2(17)(14) \cos 50°$ Substitute the known values.

$HK^2 \approx 179.0331 \text{ ft}^2$ Simplify.

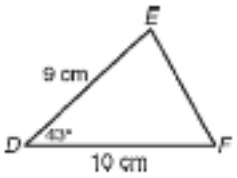
$HK \approx 13.4$ ft Find the square root of both sides.

You can use the Law of Sines and the Law of Cosines to solve triangles according to the information you have.

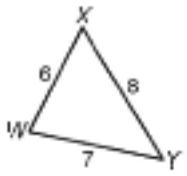
Use the Law of Sines if you know	Use the Law of Cosines if you know
• two angle measures and any side length, or • two side lengths and a nonincluded angle measure	• two side lengths and the included angle measure, or • three side lengths

Find each measure. Round lengths to the nearest tenth and angle measures to the nearest degree.

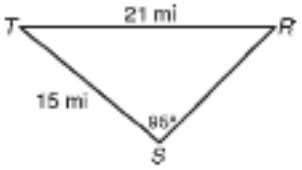
6. *EF*



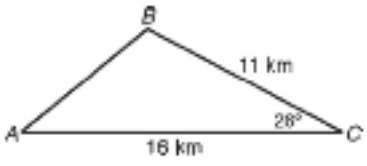
7. m∠*X*



8. m∠*R*



9. *AB*



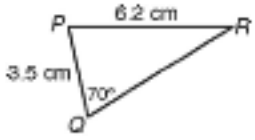
LESSON 8-5

Practice A

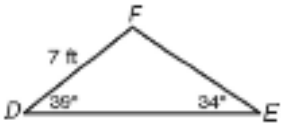
Law of Sines and Law of Cosines

Use the Law of Sines or Law of Cosines to find each measure. Round lengths to the nearest tenth and angle measures to the nearest degree.

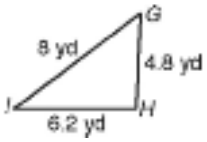
1. m$\angle R$



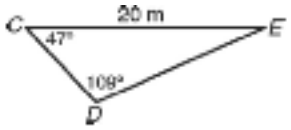
2. EF



3. m$\angle H$



4. DE



5. m$\angle N$

6. TU