MEA 2013-2014
Teacher: Claudia Valle
Start Date:

Course: Geometry B
Student: ________________
Completed Date:

Unit 2: Right Triangles and Trigonometry

Objectives: Students will understand how to use various methods to solve real life problems involving right triangle.

Essential Questions: How can you use similar triangles and their applicable theorems to solve real life problems? What are some methods for solving right triangles based on their angles?

TEKS Standards: G.1.B, G.5.B, G.5.D, G.7.A, G.8.C, G.11.A, G.11.B, G.11.C

Geometry

(1) Geometric structure. The student understands the structure of, and relationships within, an axiomatic system. The student is expected to:

(5) Geometric patterns. The student uses a variety of representations to describe geometric relationships and solve problems. The student is expected to:

(B) use numeric and geometric patterns to make generalizations about geometric properties, including properties of polygons, ratios in similar figures and solids, and angle relationships in polygons and circles;

(D) identify and apply patterns from right triangles to solve meaningful problems, including special right triangles (45-45-90 and 30-60-90) and triangles whose sides are Pythagorean triples.

(7) Dimensionality and the geometry of location. The student understands that coordinate systems provide convenient and efficient ways of representing geometric figures and uses them accordingly. The student is expected to:

(A) use one- and two-dimensional coordinate systems to represent points, lines, rays, line segments, and figures;

(8) Congruence and the geometry of size. The student uses tools to determine measurements of geometric figures and extends measurement concepts to find perimeter, area, and volume in problem situations. The student is expected to:

(C) derive, extend, and use the Pythagorean Theorem;

(11) Similarity and the geometry of shape. The student applies the concepts of similarity to justify properties of figures and solve problems. The student is expected to:

(A) use and extend similarity properties and transformations to explore and justify conjectures about geometric figures;

(B) use ratios to solve problems involving similar figures;

(C) develop, apply, and justify triangle similarity relationships, such as right triangle ratios, trigonometric ratios, and Pythagorean triples using a variety of methods;

Turn In:

Assignment #	Activity	TEKS
8	Similarity in Right Triangles	G.5.B, G.5.D, G.7.A, G.8.C, G.11.A, G.11.B, G.11.C
9	Trigonometric Ratios	G.5.D, G.7.A, G.8.C, G.11.B, G.11.C
10	Solving Right Triangles	G.5.D, G.11.C
11	Angles of Elevation and Depression	G.5.D, G.11.C
12	Law of Sines and Law of Cosines	G.5.B, G.5.D, G.7.A, G.11.A, G.11.C
13	Vectors	G.1.B, G.7.A, G.11.C
14	Unit 2 Test	G.1.B, G.5.B, G.5.D, G.7.A, G.8.C, G.11.A, G.11.B, G.11.C

Name ______________________ Date ______________ Class ______________

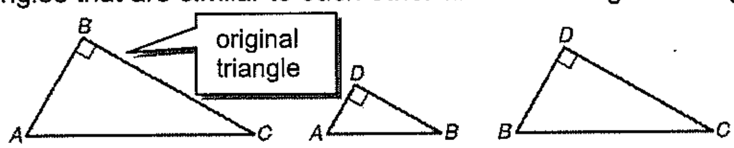
LESSON 8-1

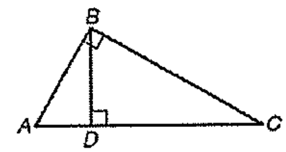
Reteach

Similarity in Right Triangles

Altitudes and Similar Triangles

The altitude to the hypotenuse of a right triangle forms two triangles that are similar to each other and to the original triangle.





Similarity statement: $\triangle ABC \sim \triangle ADB \sim \triangle BDC$

The **geometric mean** of two positive numbers is the positive square root of their product.

Find the geometric mean of 5 and 20.

Let x be the geometric mean.

$x^2 = (5)(20)$	Definition of geometric mean
$x^2 = 100$	Simplify.
$x = 10$	Find the positive square root.

So 10 is the geometric mean of 5 and 20.

$$\frac{a}{x} = \frac{x}{b}$$

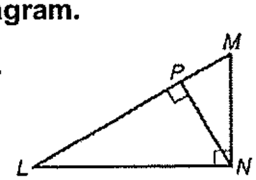
x is the geometric mean of a and b.

$$x^2 = ab$$

$$x = \sqrt{ab}$$

Write a similarity statement comparing the three triangles in each diagram.

1.



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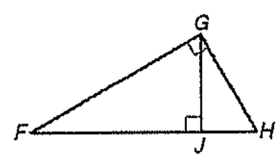
2.



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Find the geometric mean of each pair of numbers. If necessary, give the answer in simplest radical form.

3. 3 and 27

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4. 9 and 16

____

5. 4 and 5

____

6. 8 and 12

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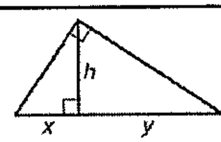
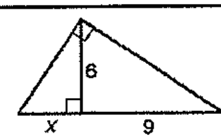
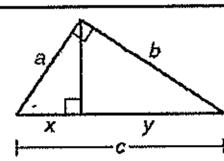
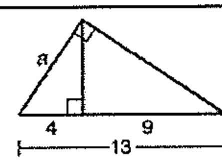
Name ______________________ Date ______________ Class ______________

LESSON 8-1

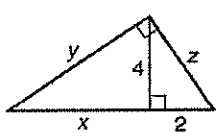
Reteach

Similarity in Right Triangles continued

You can use geometric means to find side lengths in right triangles.

Geometric Means		
Words	**Symbols**	**Examples**
The length of the altitude to the hypotenuse of a right triangle is the geometric mean of the lengths of the two segments of the hypotenuse.	 $h^2 = xy$	 $h^2 = xy$ $6^2 = x(9)$ $36 = 9x$ $4 = x$
The length of a leg of a right triangle is the geometric mean of the length of the hypotenuse and the segment of the hypotenuse adjacent to that leg.	 $a^2 = xc$ $b^2 = yc$	 $a^2 = xc$ $a^2 = 4(13)$ $a^2 = 52$ $a = \sqrt{52} = 2\sqrt{13}$

Find *x*, *y*, and *z*.

7. 

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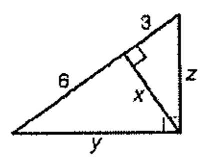
8. 

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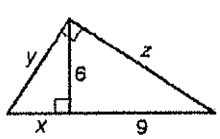
9. 

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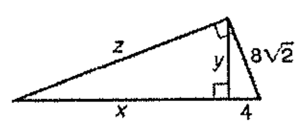
10. 

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Name ______________________ Date ______________ Class ______________

LESSON 8-1

Problem Solving

Similarity in Right Triangles

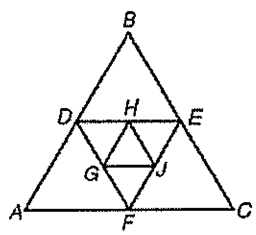
1. A sculpture is 10 feet long and 6 feet wide. The artist made the sculpture so that the height is the geometric mean of the length and the width. What is the height of the sculpture to the nearest tenth of a foot?

____

2. The altitude to the hypotenuse of a right triangle divides the hypotenuse into two segments that are 12 mm long and 27 mm long. What is the area of the triangle?

____

3. The perimeter of $\triangle ABC$ is 56.4 cm, and the perimeter of $\triangle GHJ$ is 14.1 cm. The perimeter of $\triangle DEF$ is the geometric mean of these two perimeters. What is the perimeter of $\triangle DEF$?



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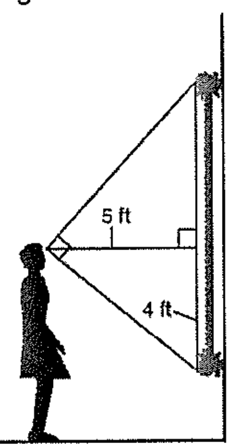
4. Tamara stands facing a painting in a museum. Her lines of sight to the top and bottom of the painting form a 90° angle. How tall is the painting?



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Choose the best answer.

5. The altitude to the hypotenuse of a right triangle divides the hypotenuse into two segments that are x cm and $4x$ cm, respectively. What is the length of the altitude?

   A $2x$ C $5x$

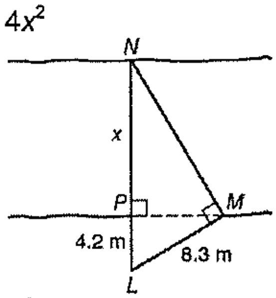
   B $2.5x$ D $4x^2$

6. Jack stands 9 feet from the primate enclosure at the zoo. His lines of sight to the top and bottom of the enclosure form a 90° angle. When he looks straight ahead at the enclosure, the vertical distance between his line of sight and the bottom of the enclosure is 5 feet. What is the height of the enclosure?

   F 16.2 ft H 23.8 ft

   G 21.2 ft J 28.8 ft

7. A surveyor sketched the diagram at right to calculate the distance across a ravine. What is x, the distance across the ravine, to the nearest tenth of a meter?



   A 7.2 m C 16.4 m

   B 12.2 m D 64.7 m

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LESSON 8-2

Reteach

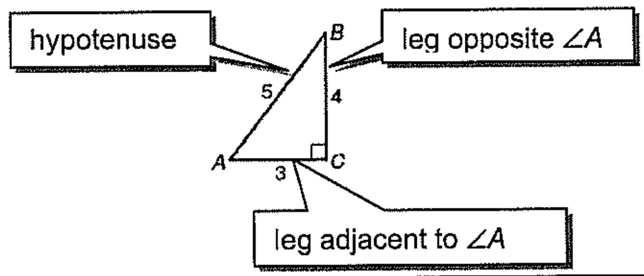
Trigonometric Ratios

Trigonometric Ratios

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

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

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

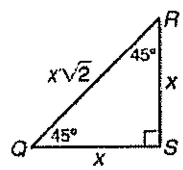


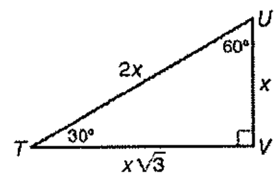
You can use special right triangles to write trigonometric ratios as fractions.

$\sin 45° = \sin Q = \dfrac{\text{leg opposite } \angle Q}{\text{hypotenuse}}$

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

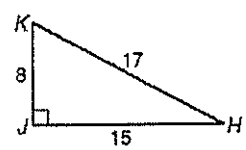
$= \dfrac{\sqrt{2}}{2}$





So $\sin 45° = \dfrac{\sqrt{2}}{2}$.

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°

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LESSON 8-2

Reteach

Trigonometric Ratios continued

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

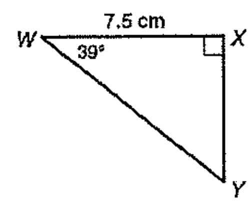
$\cos 38° \approx 0.7880107536$ or about 0.79

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° ______________________

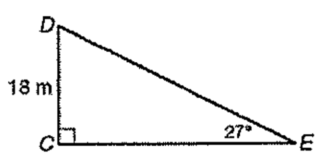
10. cos 89° ______________________

11. tan 55° ______________________

12. sin 6° ______________________

Find each length. Round to the nearest hundredth.

13. *DE*



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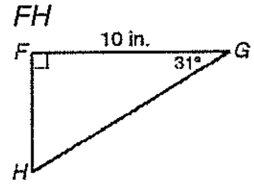
14. *FH*



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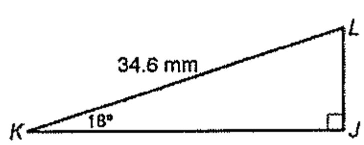
15. *JK*



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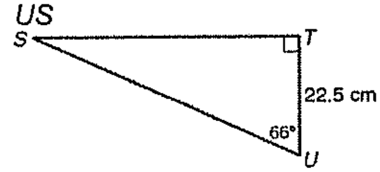
16. *US*



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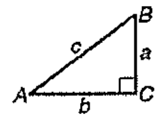
Name ______________________ Date ______________ Class ______________

LESSON 8-2

Practice A

Trigonometric Ratios

In Exercises 1–3, fill in the blanks to complete each definition. Then use side lengths from the figure to complete the indicated trigonometric ratios.



1. The sine (sin) of an angle is the ratio of the length of the leg ______________ the angle to the length of the ______________.

   $\sin A = \frac{\square}{c}$ $\sin B = \frac{\square}{\square}$

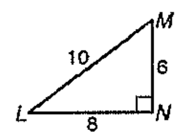
2. The cosine (cos) of an angle is the ratio of the length of the leg ______________ to the angle to the length of the ______________.

   $\cos A = \frac{\square}{c}$ $\cos B = \frac{\square}{\square}$

3. The tangent (tan) of an angle is the ratio of the length of the leg ______________ the angle to the length of the leg ______________ to the angle.

   $\tan A = \frac{a}{\square}$ $\tan B = \frac{\square}{\square}$

Use the figure for Exercises 4–6. Write each trigonometric ratio as a simplified fraction and as a decimal rounded to the nearest hundredth.

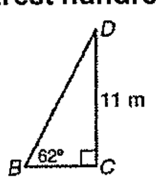


4. sin *L* ______________
5. cos *L* ______________
6. tan *M* ______________

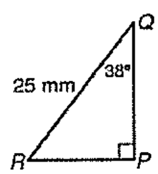
Use a calculator to find each trigonometric ratio. Round to the nearest hundredth.

7. sin 33° ______________
8. cos 47° ______________
9. tan 81° ______________

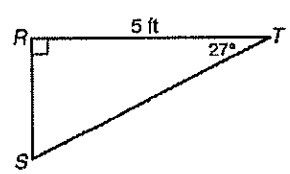
Use a calculator and trigonometric ratios to find each length. Round to the nearest hundredth.

10. 

    BD ______________

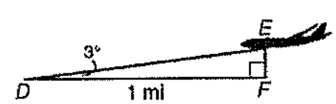
11. 

    QP ______________

12. 

    RS ______________

13. The glide slope is the path a plane uses while it is landing on a runway. The glide slope usually makes a 3° angle with the ground. A plane is on the glide slope and is 1 mile (5280 feet) from touchdown. Use the tangent ratio and a calculator to find *EF*, the plane's altitude, to the nearest foot. ______________



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LESSON 8-3

Reteach

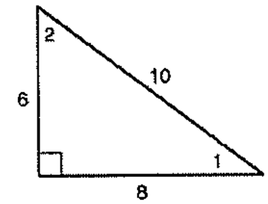
Solving Right Triangles

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

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

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

$$= 0.6 \qquad = 0.8$$

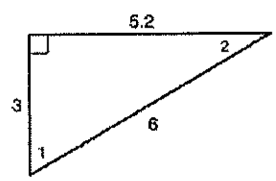


Since $\sin A = \sin \angle 2$, ∠2 is ∠*A*.

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 ∠*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. $\sin^{-1}\left(\frac{1}{5}\right)$ ______________________

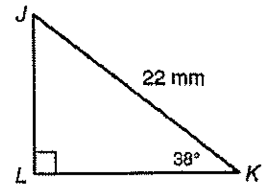
Name ______________________ Date ______________ Class ______________

LESSON 8-3

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.

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

$13.54 \text{ mm} \approx JL$

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

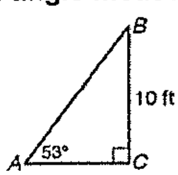
Step 2: Find the missing angle measures.

$m\angle J = 90° - 38°$	Acute ∡ of a rt. △ are complementary.
$= 52°$	Simplify.

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

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

9.



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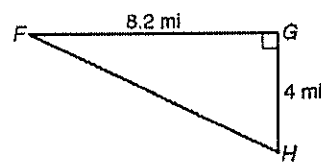
10.



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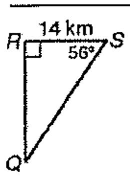
11.



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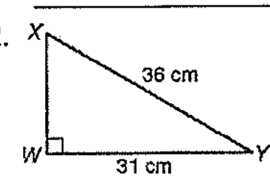
12.



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

13. $M(-5, 1)$, $N(1, 1)$, $P(-5, 7)$

____

____

14. $J(2, 3)$, $K(-1, -4)$, $L(-1, 3)$

____

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Name ______________________ Date ______________ Class______________

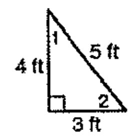
LESSON 8-3

Practice A

Solving Right Triangles

In Exercises 1–3, fill in the blanks to complete the description of the inverse trigonometric ratios.

1. If $\sin A = x$, then $\sin^{-1} x =$ ________.
2. If $\cos A =$ ________, then $\cos^{-1} x = m\angle A$.
3. If $\tan A = x$, then ________ $= m\angle A$.



Use the given trigonometric ratio to determine whether ∠1 or ∠2 is ∠A in each exercise.

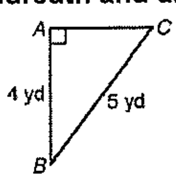
4. $\sin A = \frac{4}{5}$ ________
5. $\cos A = \frac{4}{5}$ ________
6. $\tan A = \frac{3}{4}$ ________
7. $\sin A = \frac{3}{5}$ ________
8. $\cos A = \frac{3}{5}$ ________
9. $\tan A = \frac{4}{3}$ ________

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

10. $\sin^{-1}(0.33)$ ________
11. $\cos^{-1}(0.47)$ ________
12. $\tan^{-1}(1.21)$ ________
13. $\sin^{-1}\left(\frac{9}{10}\right)$ ________
14. $\cos^{-1}\left(\frac{1}{5}\right)$ ________
15. $\tan^{-1}\left(2\frac{3}{4}\right)$ ________

Use a calculator and inverse trigonometric ratios to find the unknown side lengths and angle measures. Round lengths to the nearest hundredth and angle measures to the nearest degree.

16.

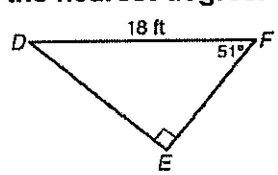


$AC =$ ________

$m\angle B =$ ________

$m\angle C =$ ________

17.

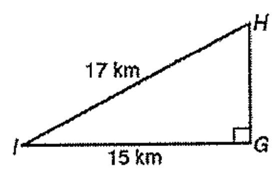


$DE =$ ________

$EF =$ ________

$m\angle D =$ ________

18.



$GH =$ ________

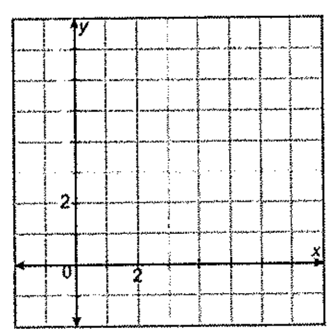
$m\angle H =$ ________

$m\angle I =$ ________

△*XYZ* has vertices *X*(6, 6), *Y*(6, 3), and *Z*(1, 3). Complete Exercises 19–21 to find the side lengths to the nearest hundredth and the angle measures to the nearest degree.

19. Plot the points and draw △*XYZ*.
20. Tell which angle is the right angle. ________
21. Find *XY* and *YZ* from the graph. Use the Pythagorean Theorem to find *XZ*.

    $XY =$ ________ $YZ =$ ________ $XZ =$ ________

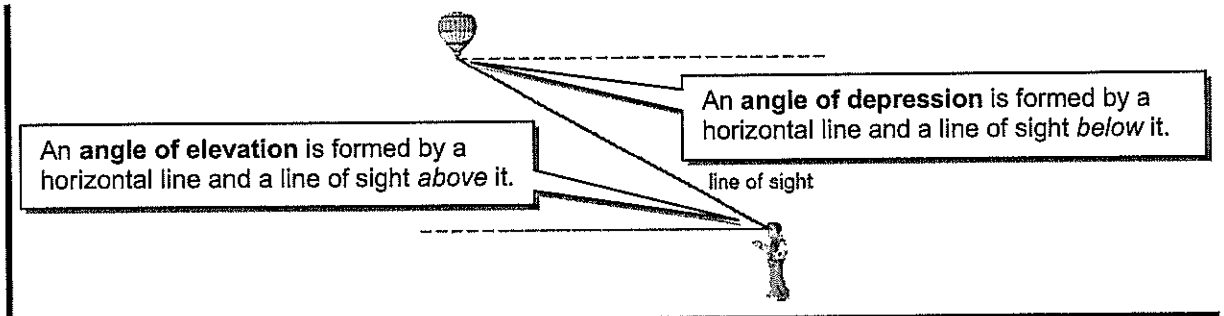


Name ______________________ Date ____________ Class ____________

LESSON 8-4

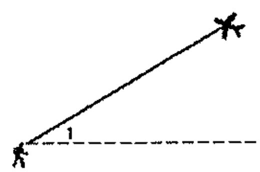
Reteach

Angles of Elevation and Depression



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

1. ∠1



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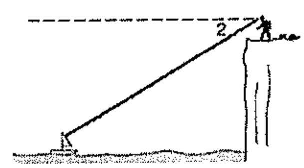
2. ∠2



____

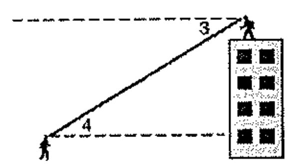
Use the figure for Exercises 3 and 4. Classify each angle as an angle of elevation or an angle of depression.

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

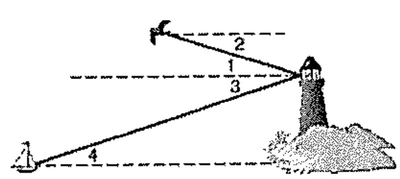
____

7. ∠3

____

8. ∠4

____



Name ______________________________ Date ______________ Class______________

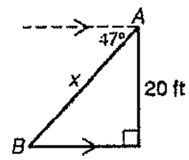
LESSON 8-4

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.

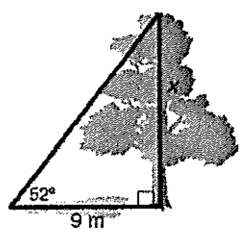
$m\angle B = 47°$ by the Alternate Interior Angles Theorem. Write a sine ratio using $\angle B$.

$\sin 47° = \frac{20}{x}$ ft ← leg opposite $\angle B$, ← hypotenuse

$x \sin 47° = 20$ ft	Multiply both sides by *x*.
$x = \frac{20}{\sin 47°}$ ft	Divide both sides by sin 47°.
27 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.



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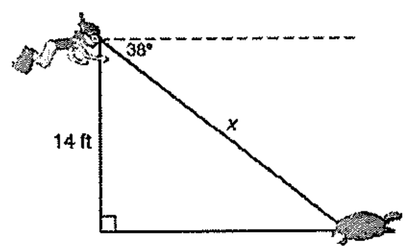
10. A person snorkeling sees a turtle on the ocean floor at an angle of depression of 38°. She is 14 feet above the ocean floor. How far from the turtle is she? Round to the nearest foot.



____

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.

____

Name ______________________ Date ______________ Class ______________

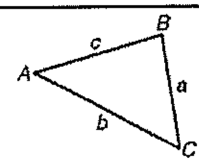
LESSON 8-5

Reteach

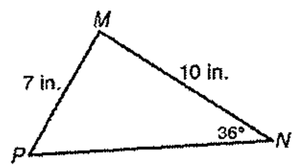
Law of Sines and Law of Cosines

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.



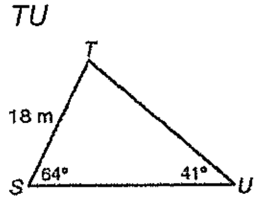
$\frac{\sin P}{MN} = \frac{\sin N}{PM}$	Law of Sines
$\frac{\sin P}{10 \text{ in.}} = \frac{\sin 36°}{7 \text{ in.}}$	$MN = 10$, $m\angle N = 36°$, $PM = 7$
$\sin P = 10 \text{ in.} \cdot \frac{\sin 36°}{7 \text{ in.}}$	Multiply both sides by 10 in.
$\sin P \approx 0.84$	Simplify.
$m\angle P \approx \sin^{-1}(0.84)$	Use the inverse sine function to find m∠P.
$m\angle P \approx 57°$	Simplify.

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

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

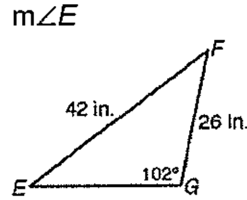
Find each measure. Round the length to the nearest tenth and the angle measure to the nearest degree.

4. *TU*



____

5. m∠*E*



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Name ______________________ Date ____________ Class ____________

LESSON 8-5

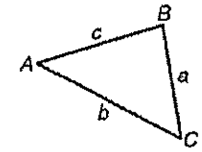
Reteach

Law of Sines and Law of Cosines continued

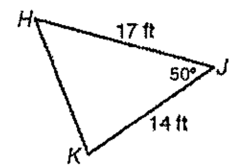
The Law of Cosines

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.



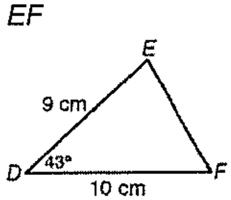
$HK^2 = HJ^2 + JK^2 - 2(HJ)(JK) \cos J$	Law of Cosines
$= 289 + 196 - 2(17)(14) \cos 50°$	Substitute the known values.
$HK^2 \approx 179.0331 \text{ ft}^2$	Simplify.
$HK \approx 13.4$ ft	Find the square root of both sides.

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*



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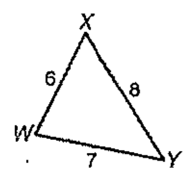
7. m∠*X*



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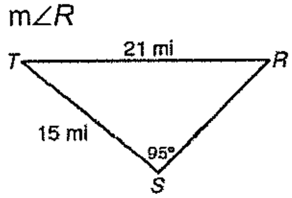
8. m∠*R*



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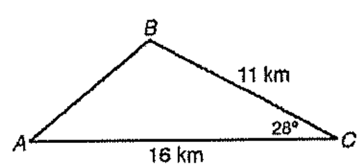
9. *AB*



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Name ______________________ Date ______________ Class ______________

LESSON 8-5

Practice A

Law of Sines and Law of Cosines

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

1. sin 168° ________ 2. cos 147° ________ 3. tan 107° ________
4. sin 97° ________ 5. cos 94° ________ 6. tan 140° ________
7. sin 121° ________ 8. cos 170° ________ 9. tan 135° ________

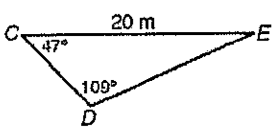
In Exercises 10 and 11, fill in the blanks to complete the theorems.

10. For any $\triangle ABC$ with side lengths a, b, and c, $\frac{\sin A}{a} = \frac{\square}{b} = \frac{\sin C}{\square}$.

11. For any $\triangle ABC$ with side lengths a, b, and c, $a^2 = b^2 + c^2 - 2bc \cos A$,

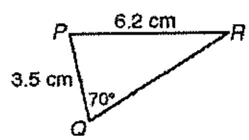
$b^2 = a^2 + c^2 - 2ac$ ________, and ________ $= a^2 + b^2 - 2ab \cos C$.

For Exercises 12 and 13, substitute numbers into the given Law of Sines ratio to find each measure. Round lengths to the nearest tenth and angle measures to the nearest degree.

12. 

$\frac{\sin D}{CE} = \frac{\sin C}{DE}$

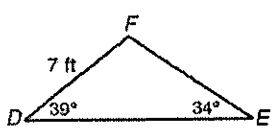
DE ______________________

13. 

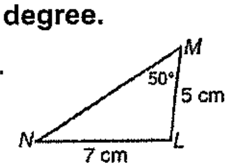
$\frac{\sin Q}{PR} = \frac{\sin R}{PQ}$

m∠R ______________________

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

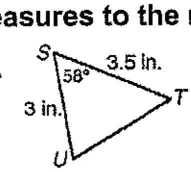
14. 

EF ______________________

15. 

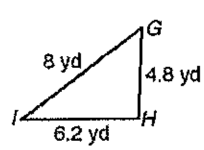
m∠N ______________________

For Exercises 16 and 17, substitute numbers into the Law of Cosines to find each measure. Round lengths to the nearest tenth and angle measures to the nearest degree.

16. 

TU ________

$TU^2 = ST^2 + SU^2 - 2(ST)(SU)(\cos S)$

17. 

m∠H ________

$GI^2 = GH^2 + HI^2 - 2(GH)(HI)(\cos H)$

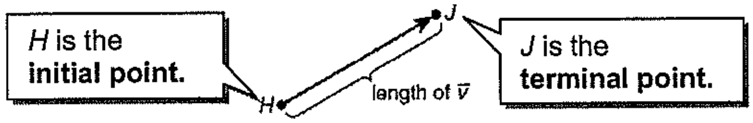
Name ______________________ Date ______________ Class ______________

LESSON 8-6

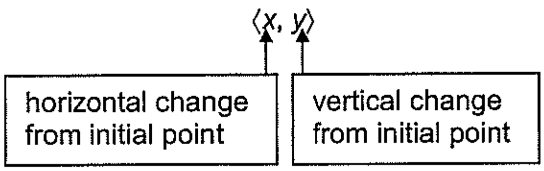
Reteach

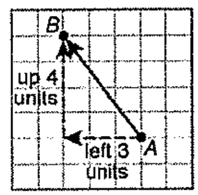
Vectors

A **vector** is a quantity that has both length and direction. The vector below may be named $\overline{HJ}$ or $\vec{v}$.



The **component form** of a vector lists the horizontal and vertical change from the initial point to the terminal point.





So the component form of $\overline{AB}$ is ⟨–3, 4⟩.

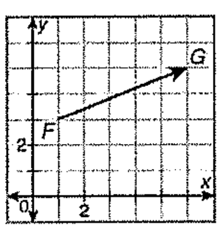
You can also find the component form of a vector if you know the coordinates of the vector. Suppose $\overline{JK}$ has coordinates *J*(6, 0) and *K*(1, 3).

$\overline{JK} = \langle x_2 - x_1, y_2 - y_1 \rangle$	Subtract the coordinates of the initial point from the coordinates of the terminal point.
$\overline{JK} = \langle 1 - 6, 3 - 0 \rangle$	Substitute the coordinates of points *J* and *K*.
$\overline{JK} = \langle -5, 3 \rangle$	Simplify.

The component form of $\overline{JK}$ is ⟨–5, 3⟩.

Write each vector in component form.

1. $\overline{FG}$



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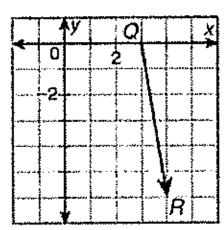
2. $\overline{QR}$



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3. $\overline{LM}$ with initial point *L*(6, 2) and terminal point *M*(–1, 5)

____

4. The vector with initial point *C*(0, 5) and terminal point *D*(2, –3)

____

Name ______________________ Date ______________ Class ______________

LESSON 8-6

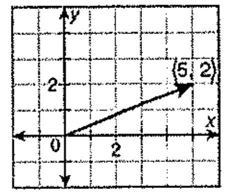
Reteach

Vectors continued

The **magnitude** of a vector is its length. The magnitude of $\overrightarrow{AB}$ is written $|\overrightarrow{AB}|$.

The **direction** of a vector is the angle that it makes with a horizontal line, such as the *x*-axis.

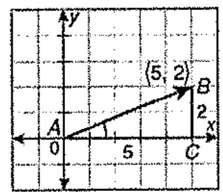
Draw the vector ⟨5, 2⟩ on a coordinate plane. Find its magnitude and direction.



To draw the vector, use the origin as the initial point. Then (5, 2) is the terminal point.

Use the Distance Formula to find the magnitude.

$$|\langle 5, 2\rangle| = \sqrt{(5-0)^2 + (2-0)^2} = \sqrt{29} \approx 5.4$$



To find the direction, draw right triangle *ABC*. Then find the measure of $\angle A$.

$$\tan A = \frac{2}{5}$$

$$m\angle A = \tan^{-1}\left(\frac{2}{5}\right) \approx 22°$$

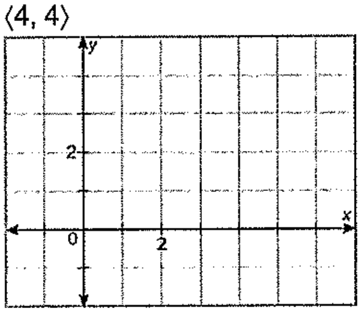
Find the magnitude of each vector to the nearest tenth.

5. ⟨3, −1⟩ ______________________

6. ⟨−4, 6⟩ ______________________

Draw each vector on a coordinate plane. Find the direction of each vector to the nearest degree.

7. ⟨4, 4⟩



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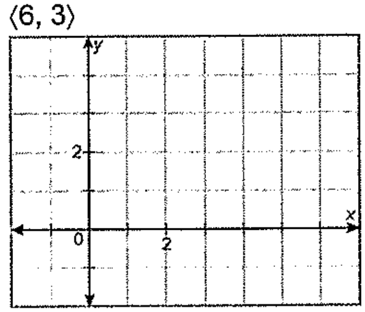
8. ⟨6, 3⟩



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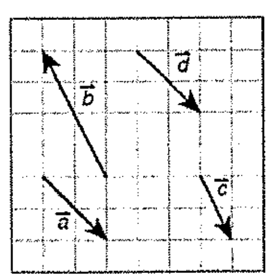
Equal vectors have the same magnitude and the same direction. **Parallel vectors** have the same direction or have opposite directions.

Identify each of the following.



9. equal vectors

____

10. parallel vectors

____

Name ______________________ Date ____________ Class ____________

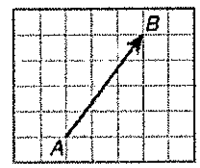
LESSON 8-6

Practice A

Vectors

In Exercises 1–5, fill in the blanks to complete each definition.

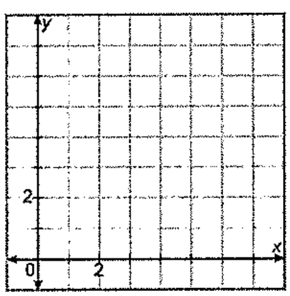
1. A ____________________ is a quantity that has both length and direction.
2. The ____________________ of a vector is the angle that it makes with a horizontal line.
3. The magnitude of a vector is its ____________________.
4. Two vectors are ____________________ vectors if they have the same direction or if they have opposite directions.
5. Two vectors are ____________________ vectors if they have the same magnitude and the same direction.



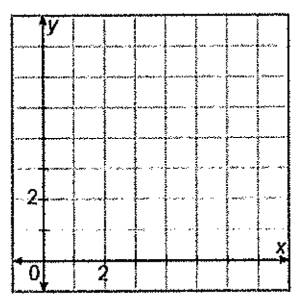
Write each vector in component form, ⟨change in *x*, change in *y*⟩.

6. $\overline{AB}$ ____________________
7. $\overline{MN}$ with $M(0, 0)$ and $N(9, 5)$ ____________________
8. The vector with initial point $S(1, 2)$ and terminal point $T(6, 6)$ ____________________

Draw each vector on a coordinate plane. Then use the Distance Formula to find each vector's magnitude to the nearest tenth.

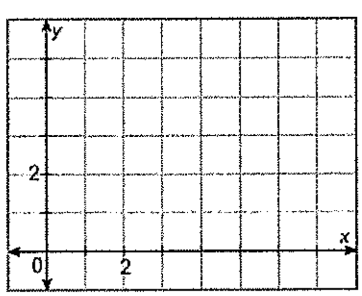
9. 

⟨3, 4⟩ ________

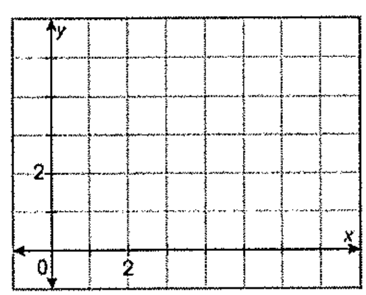
10. 

⟨2, 7⟩ ________

Draw each vector on a coordinate plane. Then use the inverse tangent function to find each vector's direction to the nearest degree.

11. 

⟨5, 5⟩ ________

12. 

⟨4, 1⟩ ________