EQ: SRT.8 How do I use trig to find missing side lengths of right triangles?

Essential Question Essential Question Essential Question Essential Question Essential Question Essential Question Essential Question

Week 8, Lesson 1

1. Warm Up
2. Left-side Practice
3. finish Poster Problems
4. Choice Boards
5. Closure

44

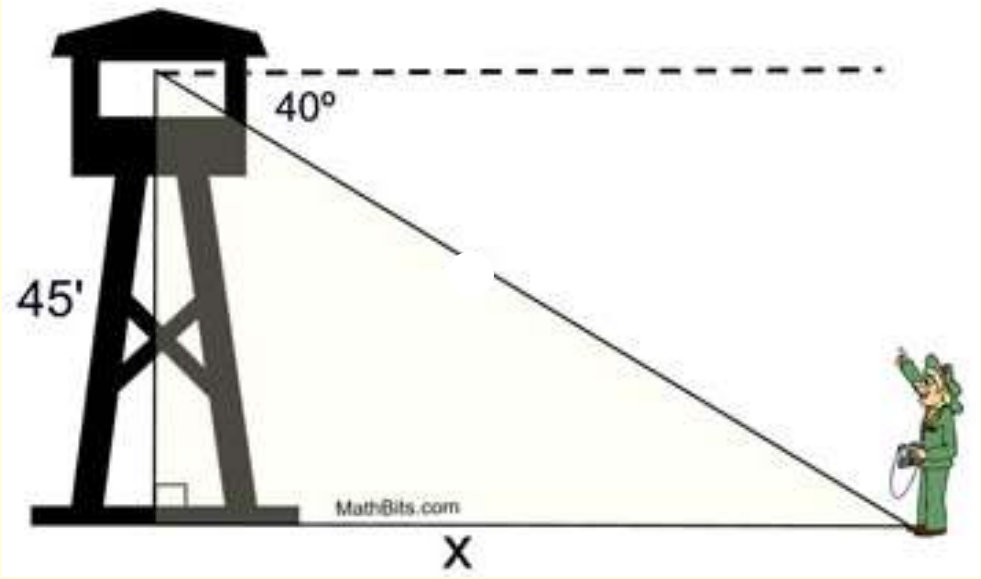
Not a new page! Please use the same ones as last week.

45

Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-u

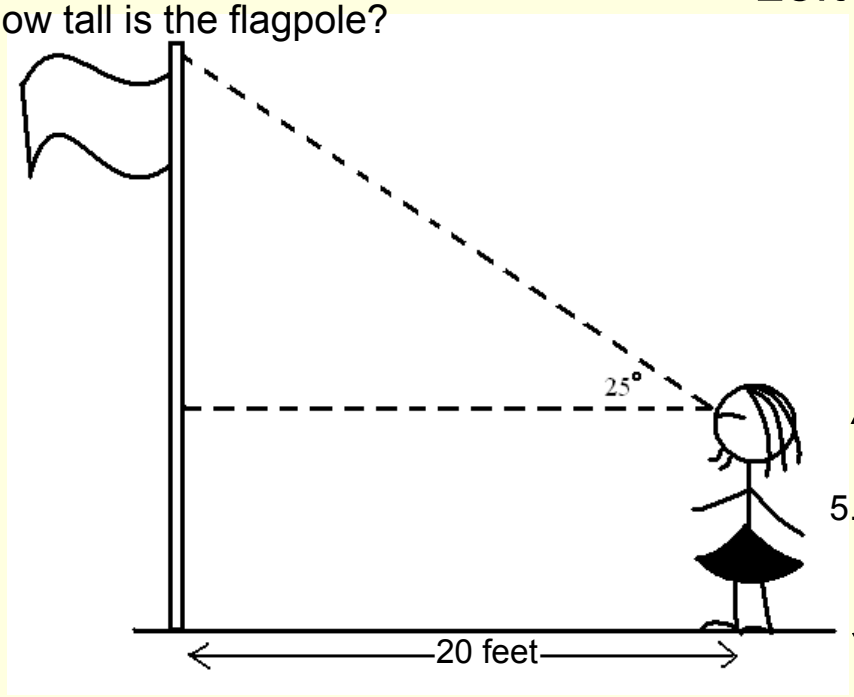
Warm Up:

From the top of a fire tower, a forest ranger sees his partner on the ground at an angle of depression of 40 degrees. How far is his partner from the base of the tower, to the nearest tenth of a foot?

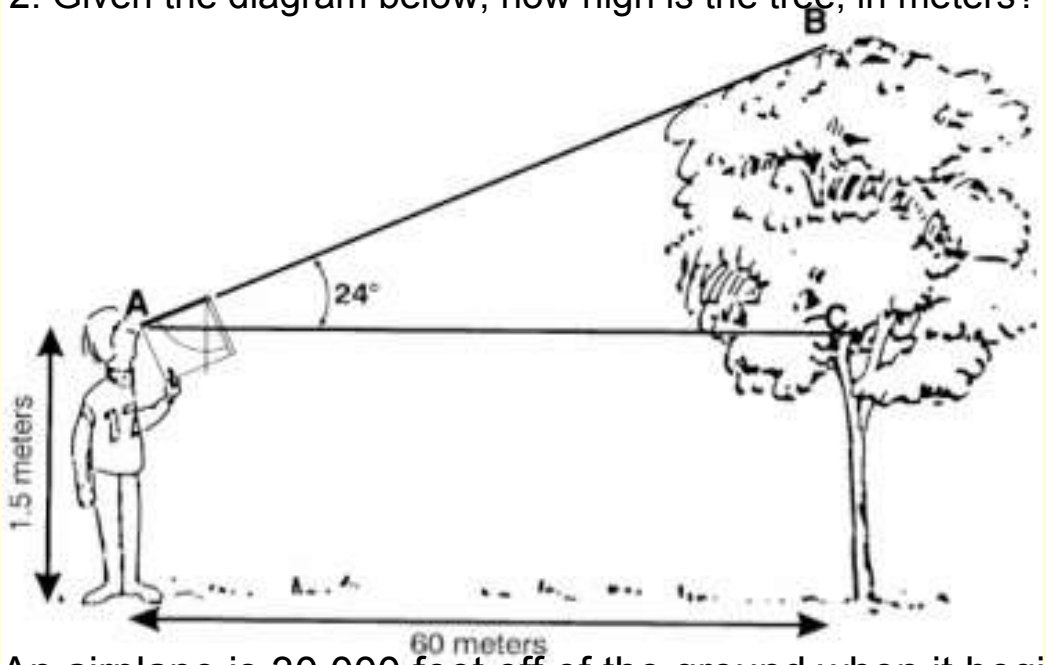


Left-Side Review

1. Given the following diagram, how tall is the flagpole?



2. Given the diagram below, how high is the tree, in meters?



An airplane is 30,000 feet off of the ground when it begins its approach to the runway. How far is the plane from the runway if the pilot lowers the nose of the plane at an angle of depression of 12°?

(a) Draw and label a picture.
(b) Set up a trig equation.
(c) Solve with the correct units. Round to the nearest foot.

Poster Problems!

Each group will get 3 problems.

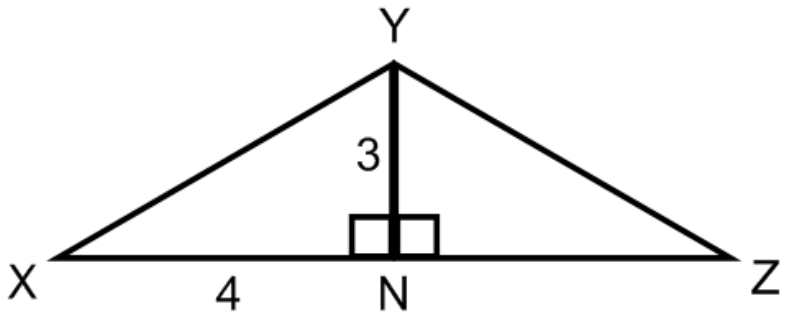
One problem is common- everyone has the same one. You will tape it onto your poster and answer it together.

Two problems are unique (slightly different for each group). You will draw and label a diagram for the **first problem** and then use trigonometry to solve it. Show your equations and as much work as you can.

You will find the four ways to solve the **second problem** Cut out the picture given and attach it to your poster next to your solutions.

Finally, don't forget to add in a title to your poster! This can be unique and creative... but always classroom-appropriate! :)

Alfred found the following picture. He then followed this reasoning:



- $\triangle ZYN$ is a reflection of $\triangle XYN$, therefore, the two triangles are congruent.
- Since $\overline{XN}$ is 4, $\overline{ZN}$ must also be 4. $\overline{YN}$ is congruent to itself.
- Using the Pythagorean Theorem, $\overline{XY}$ and $\overline{ZY}$ are both 5.
- Therefore, the sin X = sin Z = $\frac{4}{5}$ and the cos X = cos Z = $\frac{3}{5}$.

Alfred made a wrong assumption somewhere. What was his mistake and how should he fix it?

Trigonometry Choice Board Name _____ pd ___

5 pts	1) Which ratio would be used to find $\frac{opposite}{hypotenuse}$?	2) Which ratio would be used to find $\frac{adjacent}{hypotenuse}$?	3) Which ratio would be used to find $\frac{opposite}{adjacent}$?

10 pts	1 C	**20 pts**	16 is

50 pts

Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure

Right Side...

Write a summary that answers the essential question.

Left Side...

Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure

EQ: SRT.8 How do I use trig to find missing angles of right triangles?

Essential Question Essential Question Essential Question Essential Question Essential Question Essential Question Essential Question

Week 8, Lesson 2

1. Warm Up
2. SRT.8 Quiz
3. Notes
4. Left-Side Practice
5. Closure

44

Poster Problems

45

Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-u

Warm Up:

In order to prepare for the quiz, take a few minutes to review pages 34-39 in your IAN. Then, self-assess with the following questions:

1. Do you know how to set up and solve a trig equation?
2. Do you know where to put angles of depression/elevation?
3. Do you know how to solve for x using both angles?

SRT.8 Quiz

EQ: SRT.8 How do I use trig to find missing angles of right triangles?

Essential Question Essential Question Essential Question Essential Question Essential Question Essential Question Essential Question

Week 8, Lesson 3

1. Warm Up
2. Notes
3. Left-Side Practice
4. Closure

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Find Missing Angles

47

Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-u

Warm Up:

In order to prepare for the quiz, take a few minutes to review pages 34-39 in your IAN. Then, self-assess with the following questions:

1. Do you know how to set up and solve a trig equation?
2. Do you know where to put angles of depression/elevation?
3. Do you know how to solve for x using both angles?

Using Inverses of Trig Functions

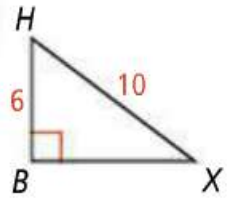
- If you know the sine, cosine, or tangent ratio for an angle, you can use the inverse trig function to find the measurement of the angle.

- Inverse notation:

$\sin^{-1}$ $\cos^{-1}$ $\tan^{-1}$

Example

What is $m\angle X$ to the nearest degree?



Step 1: Set up a trig ratio using the angle you want and the sides you have.

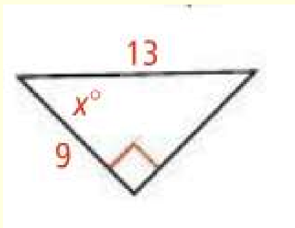
Step 2: NSolve OR use the inverse trig function on your calculator.

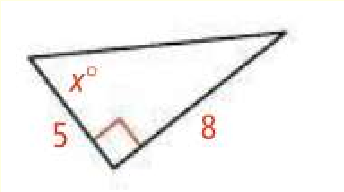
$\text{nSolve}\left(\sin(x)=\frac{6}{10}, x\right)$ 36.8699

$\sin^{-1}\left(\frac{6}{10}\right)$ 36.8699

Summary:

Left-Side Practice

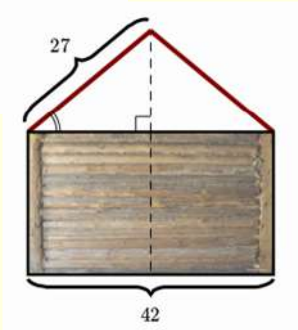




Barbara is building a wooden cabin. The cabin is 42 meters wide. She obtained a bunch of 27 meters long wooden beams for the roof of the cabin.

Naturally, she wants to place the roof beams in such an angle that each pair of opposite beams would meet exactly in the middle.

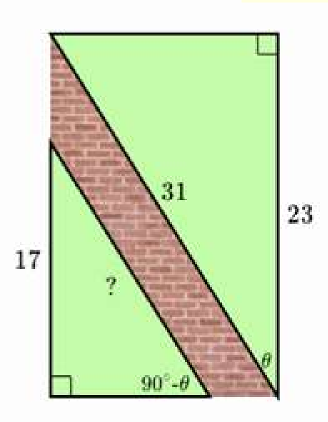
What should be the angle between the roof beams and the cabin?
Round your answer, if necessary, to two decimal places.



Oscar is designing a garden in a 23 meters long rectangular area. He wants to put a walkway with fences on each side through the garden, so he needs to know the length of the fences.

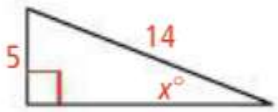
One side of the walkway is the diagonal of the garden, which is 31 meters long. The other, shorter, side of the walkway defines a triangle whose length is 17 meters.

How long is the shorter side of the walkway?
Round your answer, if necessary, to two decimal places.

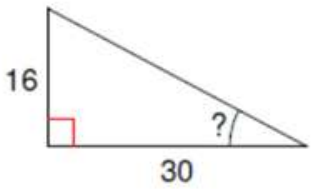


Inverse Trig

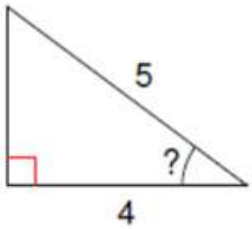
1.



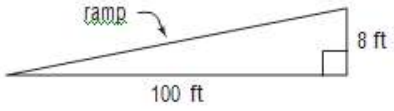
2.



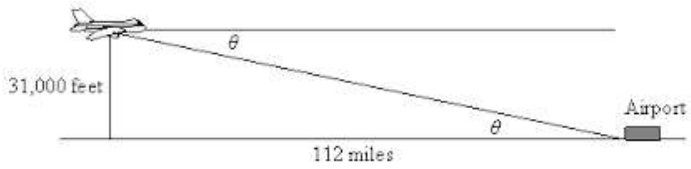
3.



4. An architect is designing a wheelchair ramp for a new building. The dimensions are shown in the figure at the right. What is the angle of elevation of the ramp?



5. Given the diagram at the right, what must be the airplane's angle of descent? (1 mile = 5280 feet)



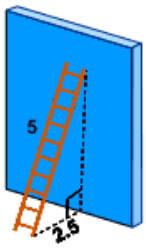
6. The circus is in town and you are part of the crew that is setting up its enormous tent! The center pole that holds up the tent is 70 feet tall. To keep it in place, a support cable is attached to the top of the pole so that the cable is 20 feet from the base of the pole.

(a) Draw a label a picture.

(b) What is the angle that the cable makes with the ground?

(c) How long of a cable was used?

7. A ladder is 5-feet long and leans against the wall, 2.5 feet away. What is the angle that the ladder makes with the ground?



Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure

Right Side...

Write a summary that answers the essential question.

Left Side...

Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure Closure

EQ: SRT.7 How are sine and cosine related?

Essential Question Essential Question Essential Question Essential Question Essential Question Essential Question Essential Question

Week 8, Lesson 3

1. Warm Up
2. Introductory activity
3. Notes
4. Practice
5. Closure

48

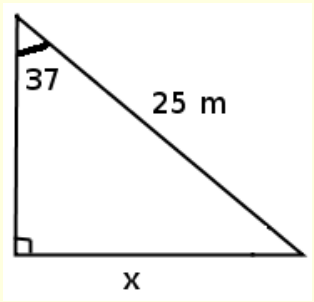
Relationship of Sin and Cos

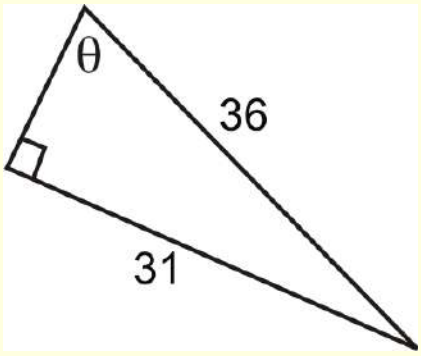
49

Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-u

Warm Up:

Solve for the missing variable in each of the following problems.



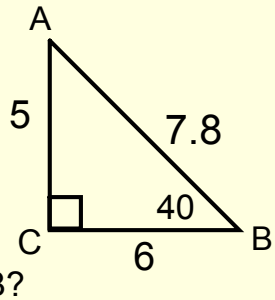


Left-Side Introduction

Using the numbers in the diagram below, fill in the following information, then answer the questions that follow as a group.

Problem 1...

- What is the measure of angle A?



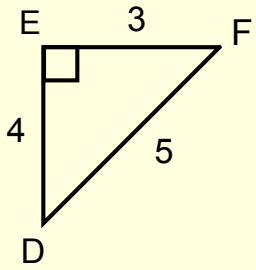
cos A =

sin B =

- What do you notice about the cos A and sin B?

Problem 2...

sin D = cos F =



- What do you notice about the sin D and cos F?

- If you know angle D, how would you find angle F?

Problem 3...

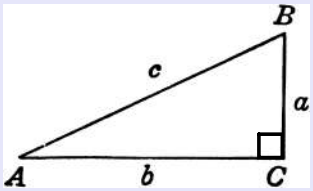
After doing several problems like the ones above, a student made a table of sine and cosine values for different angles. What are some things you notice about the table they created?

Degree	Sine
10	0.1736
9	0.1564
8	0.1392
7	0.1219
6	0.1045
5	0.0872
4	0.0698
3	0.0523
2	0.0349
1	0.0175
0	0.0000

Degree	Cosine
80	0.1736
81	0.1564
82	0.1392
83	0.1219
84	0.1045
85	0.0872
86	0.0698
87	0.0523
88	0.0349
89	0.0175
90	0.0000

The relation between cos and sin

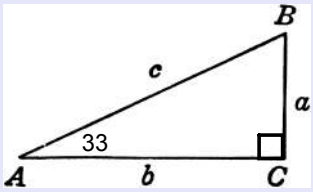
- The *cos* of one angle and the *sin* of the complementary angle are <u>equal</u> in right triangles.



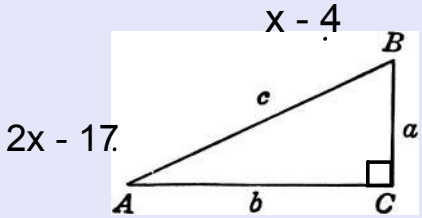
- The two non-right angles will <u>always</u> ADD to 90°.

Ex: Write cos 25° in terms of sine. Then explain how cosine and sine are related in a given triangle.

Example 1: What is the measure of angle B?



Example 2: What is the measure of angle B?



Example 3: What is the measure of each angle?

cos (5x - 26) = sin (x - 10)

Summary:

Name _____ pd ____ IAN page 42

SRT.6, SRT.7, SRT.8 Review

1. Draw a diagram and use trigonometric ratios to solve each of the following problems.

(a) Juan is flying a kite at the park and realizes that all 500 feet of string are out. Margie measures the angle of the string with the ground with her clinometer and finds it to be 42.5°. How high is Juan's kite above the ground?

(b) Nell's kite has a 350 foot string. When it is completely out, Ian measures the angle to be 47.5°. How far would Ian need to walk to be directly under the kite?

* 2. Write the cos 18° in terms of the sine. Then, explain how cosine and sine are related in a given triangle.

_____

_____

*3. Let A and B be the two non-right angles in a right triangle.

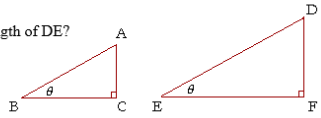
(a) If tan A = ½, what is tan B? _____

(b) If sin A = 7/10, what is cos B? _____

(c) If cos A = ¼. what is sin B? _____

*4. What is the solution to the following equation? cos (5x + 15) = sin (5x + 5)

5. $\triangle ABC \sim \triangle DEF$. If the sin B = 0.8 and DF = 12, what is the length of DE?

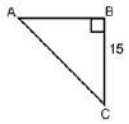


6. Given the following trig ratios, what is the length of AC?

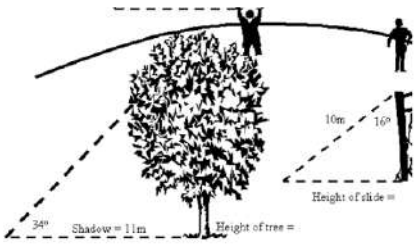
$\sin C = \frac{12}{13}$

$\cos C = \frac{5}{13}$

$\tan C = \frac{12}{5}$

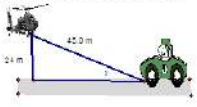


7. Use your knowledge of trigonomtry to find the missing values in the picture below.

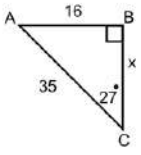


Height of tree = _____ Height of slide = _____

8. A helicopter is hovering above a road at an altitude of 24 m. At a certain time, the distance between the helicopter and a car on the road is 45.0 m. Calculate the angle of elevation of the helicopter from the car.



9. List all of the ways to find the value of x in the triangle (HINT: There are FOUR different ways using trig).



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Right Side...

Write a summary that answers the essential question.

Left Side...

EQ: SRT.7 How are sine and cosine related?

Essential Question Essential Question Essential Question Essential Question Essential Question Essential Question Essential Question

Week 8, Lesson 4

1. Warm Up
2. Rotation Review
3. Finish Practice from yesterday
4. Closure

42

Not a new page - Please use the same one as yesterday! :)

43

Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-u

Warm Up:

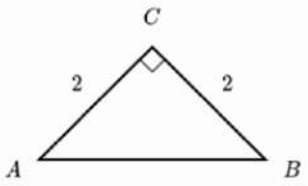
1. Write sin 38 in terms of cosine. Then, explain how cosine and sine are related in a given triangle.

2. What is the solution to the following equation?

$$\cos(6x - 25) = \sin(4x - 15)$$

ROTATION 1

Abigail drew the following isosceles right triangle, where $m\angle C = 90°$ and $\overline{AC} = \overline{BC} = 2$ cm



Then Abigail claimed:

- The base angles of this isosceles right triangle are $45°$ each.
- By the Pythagorean theorem, the length of $\overline{AB}$ is $2 \cdot \sqrt{2}$ cm.
- $$\tan(\angle A) = \frac{BC}{AB} = \frac{2}{2 \cdot \sqrt{2}} = \frac{1}{\sqrt{2}}$$
- Therefore, $\tan(45°) = \frac{1}{\sqrt{2}}$

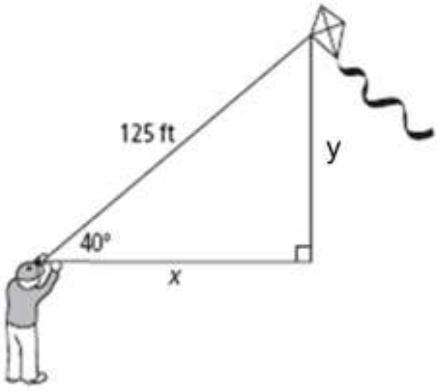
ROTATION 2

(Please write all answers in your IAN.)

You are flying a kite – you love flying kites! The angle of depression is 40° and you are about 5.5 feet tall.

(a) How far away are you from your kite (x)?

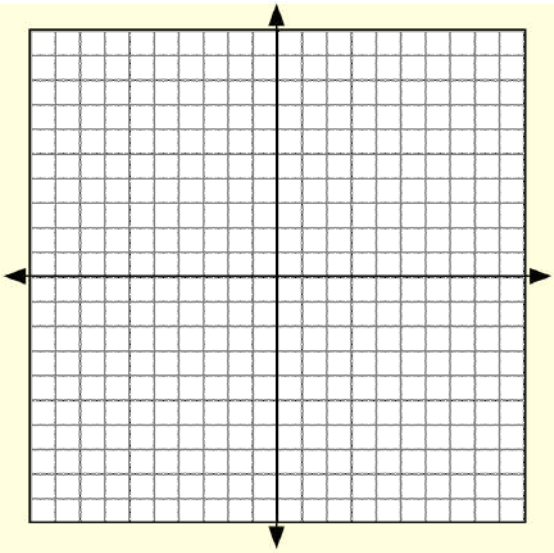
(b) How high is the kite off of the ground?



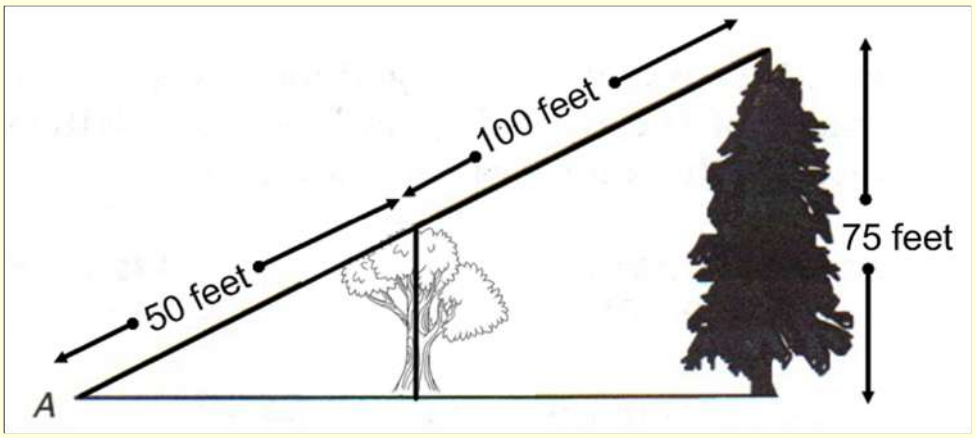
ROTATION 3

(Please write all answers in your IAN.)

A line segment joins two points A(-2,-2) and B(10,7). Point P lies on AB such that it divides AB into a ratio of 1:2. What are the coordinates of P?



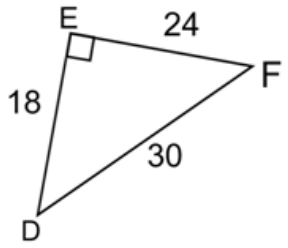
ROTATION 4



ROTATION 5

(Please write all answers in your IAN.)

In the right triangle DEF, angle D and F are complementary angles. Which statement is TRUE?



(a) The cos D and the sin F both equal 4/5

(b) The cos D = 3/5 and the sin F = 4/5

(c) The cos D and the sin F both equal 3/5

(d) The cos D = 4/5 and the sin F = 3/5

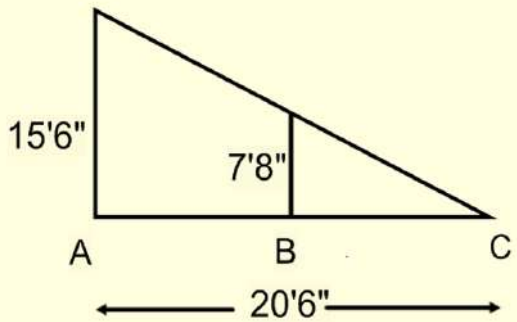
2. Complete the following statement:

Two polygons are similar if their corresponding angles are _____ and their corresponding sides are _____.

ROTATION 6

On a safari, a car full of tourists has a height of 7'8" and is parked at point B. Next to the car, an adult elephant stands with a height of 15'6" at point A. If the elephant casts a shadow that is 20'6" long, how far away is the elephant from the car?

Round to the nearest foot.



ROTATION 7

(Please write all answers in your IAN.)

If $\triangle ABC \sim \triangle DEF$ and tan A = ¾, what is sin D?

Step 1: Draw two right triangles. Label one ABC and the other DEF.

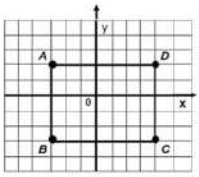
Step 2: Fill in where the 3 and the 4 should go on triangle ABC, since tan A = ¾.

Step 3: Use the Pythagorean Theorem to find the last side.

Step 4: ABC and DEF are similar. Write the sin of angle D using your values from ABC.

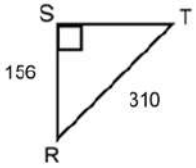
ROTATION 8

1. Rectangle ABCD is shown at the right.



Jennifer sketched the dilation of ABCD with center (0,0) and scale factor 5. What is the perimeter of Jennifer's dilated figure? _____

2. Given the triangle at the right, which of the following statements are true?



(a) cos R > sin T (b) cos R < sin T

(c) cos R = sin T (d) cos R = sin R

Name _____ pd ____ IAN page 42

SRT.6, SRT.7, SRT.8 Review

1. Draw a diagram and use trigonometric ratios to solve each of the following problems.

(a) Juan is flying a kite at the park and realizes that all 500 feet of string are out. Margie measures the angle of the string with the ground with her clinometer and finds it to be 42.5°. How high is Juan's kite above the ground?

(b) Nell's kite has a 350 foot string. When it is completely out, Ian measures the angle to be 47.5°. How far would Ian need to walk to be directly under the kite?

* 2. Write the cos 18° in terms of the sine. Then, explain how cosine and sine are related in a given triangle.

_____

_____

*3. Let A and B be the two non-right angles in a right triangle.

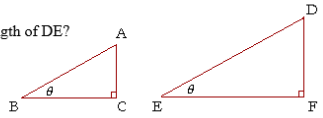
(a) If tan A = ½, what is tan B? _____

(b) If sin A = 7/10, what is cos B? _____

(c) If cos A = ¼. what is sin B? _____

*4. What is the solution to the following equation? cos (5x + 15) = sin (5x + 5)

5. $\triangle ABC \sim \triangle DEF$. If the sin B = 0.8 and DF = 12, what is the length of DE?

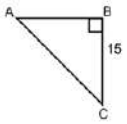


6. Given the following trig ratios, what is the length of AC?

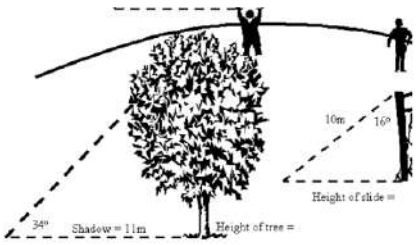
$\sin C = \frac{12}{13}$

$\cos C = \frac{5}{13}$

$\tan C = \frac{12}{5}$

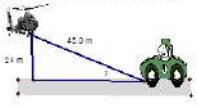


7. Use your knowledge of trigonomtry to find the missing values in the picture below.

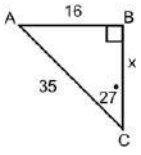


Height of tree = _____ Height of slide = _____

8. A helicopter is hovering above a road at an altitude of 24 m. At a certain time, the distance between the helicopter and a car on the road is 45.0 m. Calculate the angle of elevation of the helicopter from the car.



9. List all of the ways to find the value of x in the triangle (HINT: There are FOUR different ways using trig).



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Right Side...

Write a summary that answers the essential question.

Left Side...

EQ: SRT.8 How do I use trig to findmissing angles of right triangles?

Essential Question Essential Question Essential Question Essential Question Essential Question Essential Question Essential Question

Week 8, Lesson 5

1. Warm Up
2. Study Guide
3. Closure

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Still the same page :)

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Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-up Warm-u

Warm Up:

1. A ladder makes a 34° angle with the ground. If the ladder is 15 feet long, how far up the wall does the ladder reach?

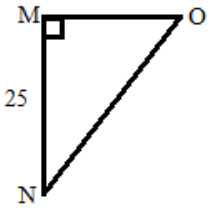
2. A ladder makes a 42° angle with the ground. If the ladder is 8 feet from the base of the wall, how long is the ladder?

Geometry 2: Trigonometry
Unit Review

Name _____
Period _____ Date _____

G.SRT.6 *Learning Target:* *Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute ratios.*

1) Given the following trig ratios, what is the length of NO?



$\sin N = \frac{12}{13}$

$\cos N = \frac{5}{13}$

$\tan N = \frac{12}{5}$

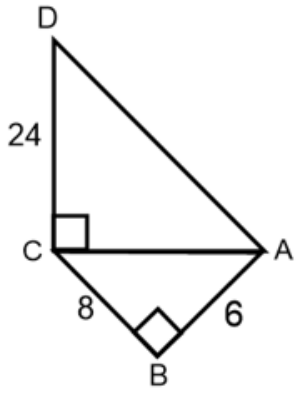
Answer: _____

2). Complete the following trig ratios. Write the answers in simplest form.

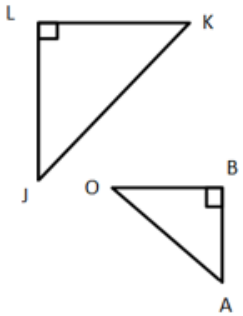
$\sin \angle CAD =$

$\cos \angle CAD =$

$\tan \angle CAD =$

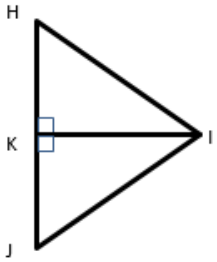


3) Given $\Delta ABO \sim \Delta KLJ$. If the $\cos A = 0.6$ and JK = 4, what is the length of LK?



Answer:
_____

4) Darren started with a 5-12-13 right triangle ($\triangle HKI$) and then reflected it horizontally to get a congruent triangle, $\triangle JKI$. The length of $\overline{HK}$ is 5 cm.



Then, Darren claimed the following:

- Since HK is 5 cm, then JK is also 5 cm. and KI is 12 cm.
- Using the Pythagorean Theorem, the length of HI and JI is 13 cm.
- The length of HJ is 10 cm.
- Therefore, $\tan(\angle IHK) = \frac{5}{12} = 0.42$ (rounded)

Sadly, Darren went wrong somewhere in his assumptions. Find his mistake and correct it.

_____
_____
_____
_____
_____

G.SRT.7 *Learning Target:* *Explain and use the relationship between the sine and cosine of complementary angles.*

5. (a) Given that two angles of a right triangle are complementary, explain how to find the sine of one angle, given the cosine of the complementary angle.

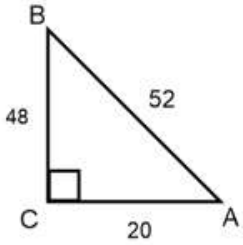
_____

_____

_____

(b) Write sin 50° in terms of cosine.
Answer: _____

6) In the right triangle ABC, ∠A and ∠B are complementary angles. Which of the following statements is TRUE?



a) The cos A and the sin B are both equal to $\frac{12}{13}$.

b) The cos $A = \frac{12}{13}$ and the sin $B = \frac{5}{13}$.

c) The cos A and the sin B are both equal to $\frac{5}{13}$

d) The cos $A = \frac{5}{13}$ and the sin $B = \frac{12}{13}$.

7). What is the solution to the following equation? Round your answer to the nearest tenth.

$\cos(2x + 19)° = \sin(4x + 5)°$

x = _____

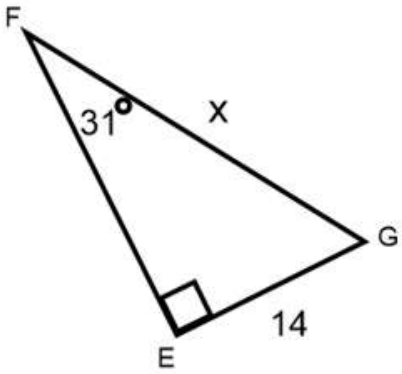
Justify how you found your answer.

_____

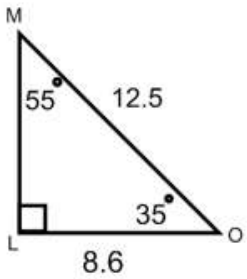
_____

G.SRT.8 Learning Target: *Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems*

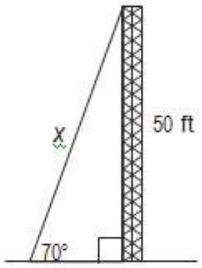
8) Given the triangle shown below, write TWO different equations to find the value of x.



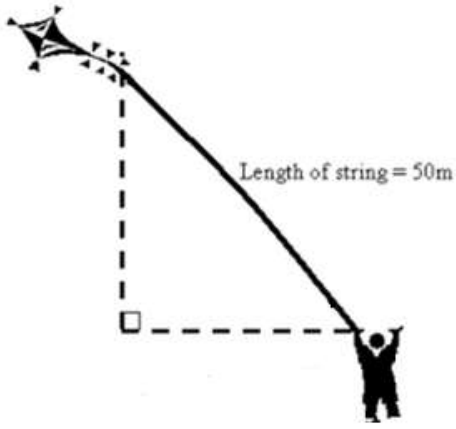
9) Write FOUR possible expressions to find the length of $\overline{LM}$. Be sure to write them in terms of x.



10). How long is the guy wire shown in the figure if it is attached to the top of a 50-ft antenna and makes a 70° angle with the ground? Round to the nearest tenth.



11). You are flying a kite!! The angle of depression is 23°. If your eyes are five feet high, how high off the ground is the kite? Round your answer to the nearest tenth.



12) A shark, 32 feet below the surface of the ocean, spots a baby seal. Given the information in the diagram, how far will the shark have to swim to get to the seal? Round to the nearest hundredth.

(Diagram not drawn to scale.)