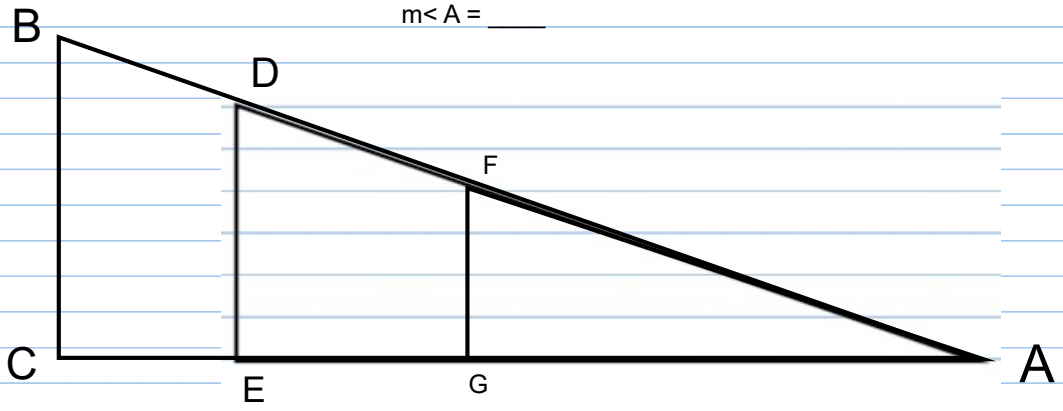
Ratios of Right Triangles & Angles

Exploration: In the Triangle (s) below, measure the angle of

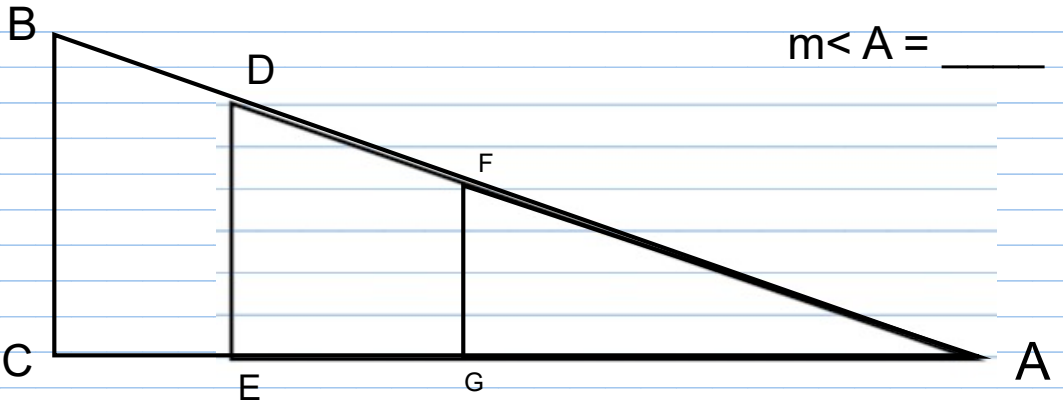
m< A = ____



Next **measure** each dimension from point to point, and create ratios comparing the legs from one triangle to the next on the 3 different triangles, as given:

That is find $\frac{BC}{AC}, \frac{DE}{AE}, \frac{FG}{AG}$ = ____ , ____ , ____

[This ratio is known as Opposite over adjacent]



m< A = ____

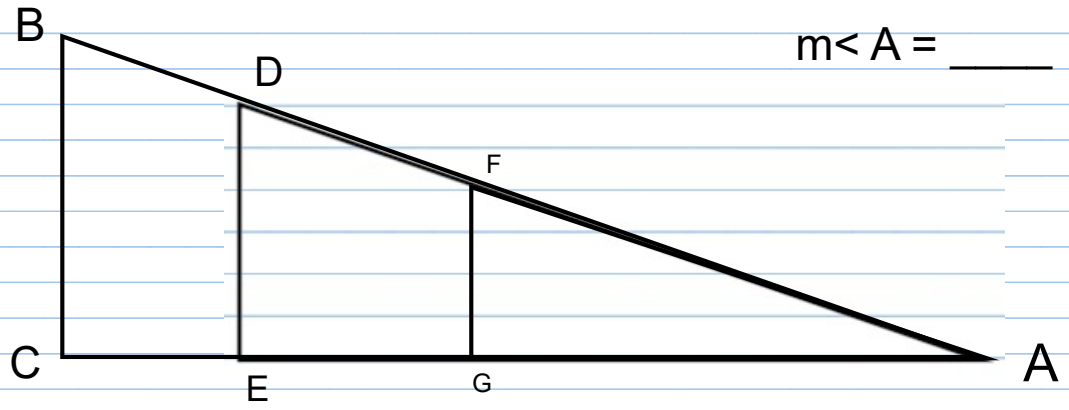
Next **measure** each dimension from point to point, and create 3 ratios comparing all the short legs of the triangles to their Hypotenuses.

That is find: $\frac{BC}{BA}, \frac{DE}{DA}, \frac{FG}{FA}$ = ____ , ____ , ____

[This ratio is known as Opposite over Hypotenuse]

Question: SIde BC is said to be "Opposite." Opposite to what? _____

Intro to Trig.Sample



m< A = _____

NOW create 3 ratios comparing all the LONGER legs of the triangles to their Hypotenuses.

That is find: $\frac{CA}{BA}, \frac{EA}{DA}, \frac{GA}{FA} = $ ____, ____, ____

[This ratio is known as Adjacent over Hypotenuse]

Question: SIde CA is said to be "Adjacent." What does adjacent mean? _____

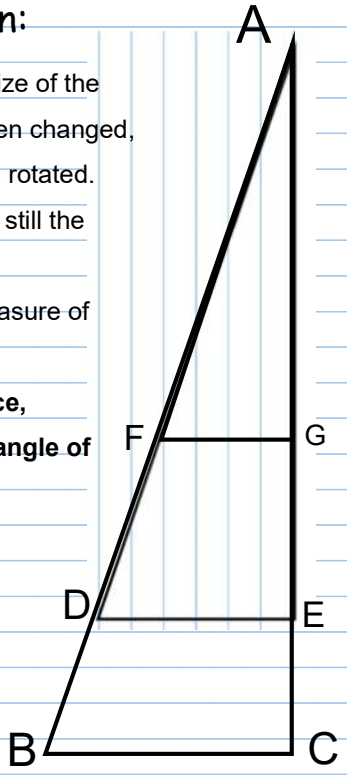
Hence, CA is adjacent to _____

Your Turn:

"Oh no... the size of the triangle has been changed, and it has been rotated. Yet the m<A, is still the same.

What is the measure of Angle B?

On this practice, B is the main angle of perspective.



m< B = _____

Find the ratios that are Opposite over Adjacent, to angle B:

Find the ratios Opposite over Hypotenuse to angle B:

Find the ratios Adjacent over Hypotenuse to angle B:

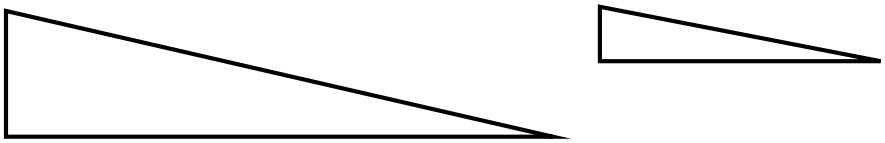
CLOSURE: What observations can you make from the explored ratios from <A's perspective, to <B's perspective?

Adriant Sanchez Geometry

Intro to Trig.Sample

WARM UP. Per.1. Geometry A Name _____

Find the scale factor between the triangles.

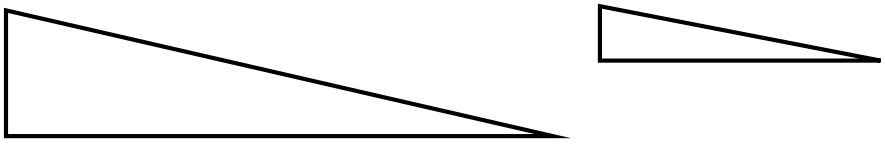


WARM UP Name _____

Find the scale factor between the triangles.

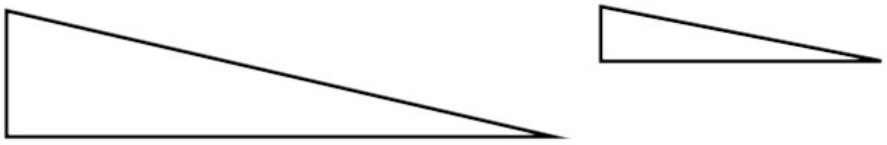
WARM UP. Per.1. Geometry A Name _____

Find the scale factor between the triangles.



WARM UP Name _____

Find the scale factor between the triangles.



Adriant Sanchez Geometry

Intro to Trig.Sample

Your Turn:

"Oh no... the size of the triangle has been changed, and it has been rotated. Yet the m<A, is still the same.

What is the measure of Angle B?

On this practice, B is the main angle of perspective.

A

m< B =

GOOD MORNING,

PLEASE TAKE OUT OUR LAST EXPLORATION HAND OUT. WE WILL USE FOR TODAY'S LESSON. =)

Reminder there is Make Up work in our Google Classroom, code njcqa5

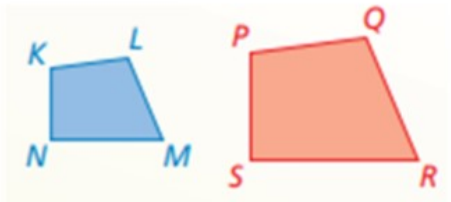
F

D E

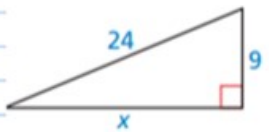
B C

CLOSURE: What observations can you make from the explored ratios from <A's perspective, to <B's perspective?

Use prior knowledge, a ruler, a calculator, to prove/disprove the polygons below are similar.

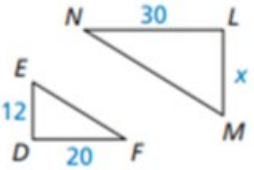


Use pythagorean thm. to find x.

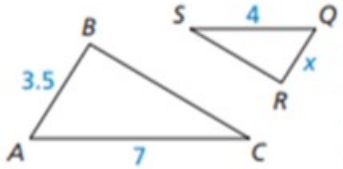


Find the value of x. *(Section 8.1)*

26. $\triangle DEF \sim \triangle LMN$



27. $\triangle ABC \sim \triangle QRS$

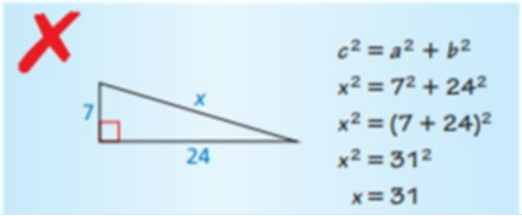


Adriant Sanchez Geometry

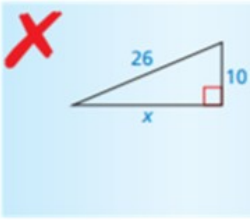
Intro to Trig.Sample

Find the scale factor between the triangles.

ERROR ANALYSIS. Find, then write a description of the error on each problem. Correct the error afterwards on each problem.



$c^2 = a^2 + b^2$
$x^2 = 7^2 + 24^2$
$x^2 = (7 + 24)^2$
$x^2 = 31^2$
$x = 31$

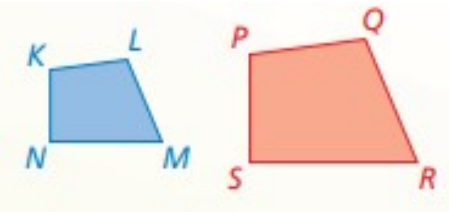


$c^2 = a^2 + b^2$
$x^2 = 10^2 + 26^2$
$x^2 = 100 + 676$
$x^2 = 776$
$x = \sqrt{776}$
$x \approx 27.9$

Intro to Trig.Sample

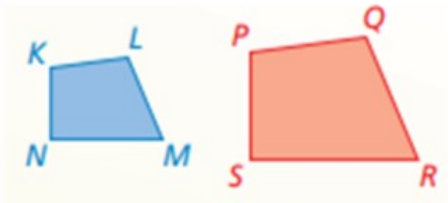
WARM UP NAME _____

Use prior knowledge, a ruler, a calculator, to prove/disprove the polygons below are similar.



WARM UP NAME _____

Use prior knowledge, a ruler, a calculator, to prove/disprove the polygons below are similar



WARM UP NAME _____

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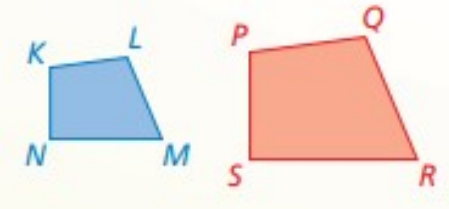
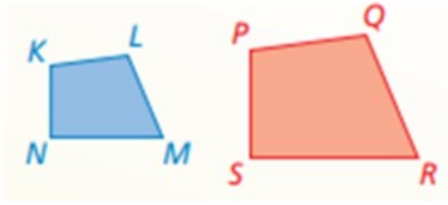


WARM UP NAME _____

Use prior knowledge, a ruler, a calculator, to prove/disprove the polygons below are similar



Adriant Sanchez Geometry

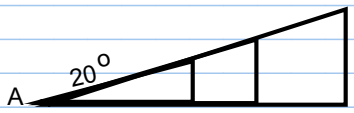
What is Trigonometry?

First, lest recap on what we have learned from our "Ratios of Right Triangles" exploration given the 20 degree triangles, when we compared the 3 different ratios:

> Short Leg to Larger Leg, ratio = --

> Short Leg to Hypotenuse, ratio = --

> Larger leg to Hypotenuse, ratio = --



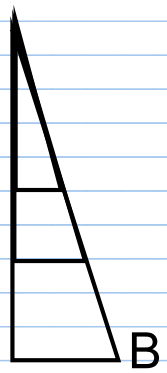
Then what happened when the Triangle got rotated?

What happened to the ratios when compared everything from angle B's perspective? Angle B measures ____

> Ratio of Opposite Leg and Adjacent to angle B = ____

> Ratio of Opposite Leg and Hypotenuse to B = ____

> Ratio of Adjacent Leg and Hypotenuse to B = ____



What do you notice in the ratios?_____

_____

TRIGONOMETRY CONNECTS...

Explain if the ratios would change if the size of the Triangle increases to the size of a building, or it decreases to the size the tip of a pen, if its "Angle A" is still 20 degrees?

Now imagine other Right Triangles that exist in situations, with other angle measurements...

They all have a main angle of reference, and sizes, yet their ratios will be the same, according to the angle of reference. **Trigonometry, is the branch in Geometry, that connects the measurement of Angles, with the Lengths of Triangles, using ratios**.

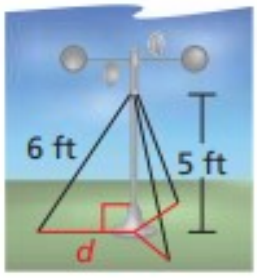
How cool is that :?) ...

Connecting "Feet" (length) with Degrees° (Angles).

No other math algorithm can combine 2 Different Units.

Trigonometry can. For example in the figure to the right,

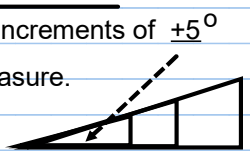
Trigonometry, can find the base Angle of the given Figure, by using the ratio of the lengths given.

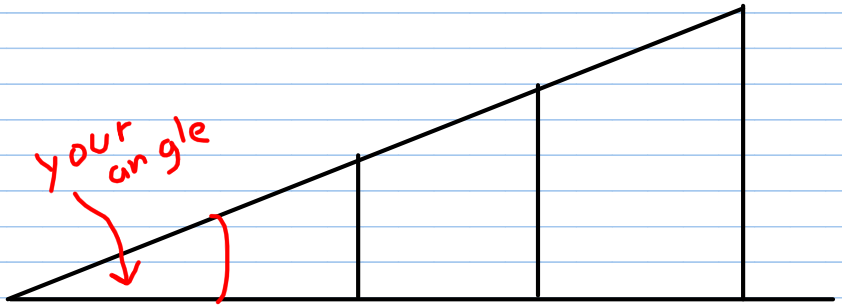


Draw a stick figure with your "WOW" face:

More Exploration ...

You will be assigned an angle measurement higher than 20 degrees, in increments of +5° degrees. You will construct a Triangle family of 3 right triangles, then measure. Then find its 3 popular ratios, per Triangle (3 ratios):





> "Opps. over Adjacent" (of angle given __) = ----- = ----- = ------ = _____

> "Opps. over Hypotenuse" (of ___) = ----- = ----- = ------ = _____

> "Adjacent over Hypotenuse" (of ___) = ----- = ----- = ------ = _____

Collect Data ...

Degrees

RATIOS	20	25	30	35	40	45	50
$\frac{\text{OPPS}}{\text{ADJ.}}$							
$\frac{\text{OPPS.}}{\text{HYP.}}$							
$\frac{\text{ADJ.}}{\text{HYP.}}$							

Observations and Predictions:

Describe where the numbers are "heading to" for each ratio:

How large do you think the ratios go up to for each type?...

Collect Data ... Degrees

GOOD MORNING,

PLEASE TAKE OUT OUR LAST EXPLORATION HAND OUT. WE WILL USE FOR TODAY'S LESSON.

Your Final will be a similar project. ~ 20 Test pts. and 20 Participation pts. (Process).

Reminder there is Make Up work in our Google Classroom, code njcqa5

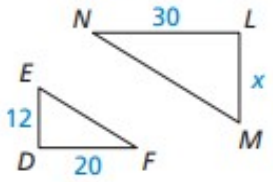
How large do you think the ratios go up to for each type?...

Final final exam prep Warm Up.

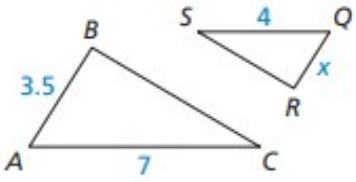
Maintaining Mathematical Proficiency Reviewing what you learned in previo

Find the value of x. *(Section 8.1)*

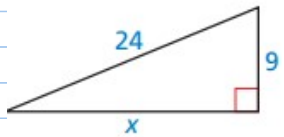
26. $\triangle DEF \sim \triangle LMN$



27. $\triangle ABC \sim \triangle QRS$



Use pythagorean thm. to find x.



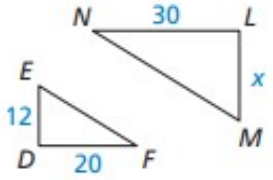
Final final exam prep Warm Up.

Maintaining Mathematical Proficiency

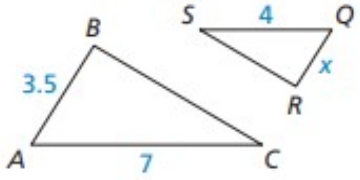
Reviewing what you learned in previo

Find the value of x. *(Section 8.1)*

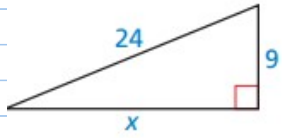
26. $\triangle DEF \sim \triangle LMN$



27. $\triangle ABC \sim \triangle QRS$



Use pythagorean thm. to find x.



Collect Data ...

Degrees

RATIOS	20	25	30	35	40	45	50
$\frac{OPPS}{ADJ.}$							
$\frac{OPPS.}{HYP.}$							
$\frac{ADJ.}{HYP.}$							

Observations and Predictions:

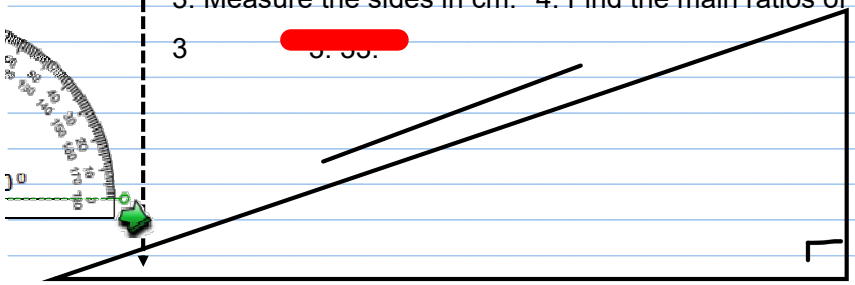
Describe where the numbers are "heading to" for each ratio:

How large do you think the ratios go up to for each type?...

Last Pre-Trig. Practice

1. Measure the angle of reference (pointed).
2. Label the sides as Hypotenuse, Adjacent, Opposite.
3. Measure the sides in cm. 4. Find the main ratios of the triangle.

3 [redacted]

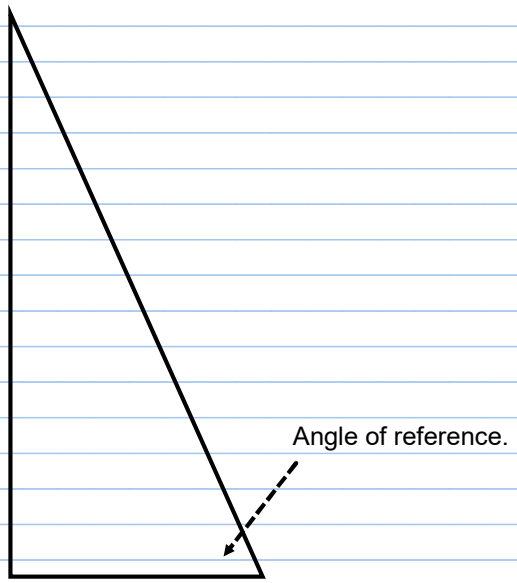


RATIOS	Angle __ °
OPPS / ADJ.	
OPPS. / HYP.	
ADJ. / HYP.	

5. What is the measure of the other angles? ____ , _____
6. All three angles add up to _____ degrees.

Your Turn 1

Follow steps 1 - 4 from above problem, and show and label here.

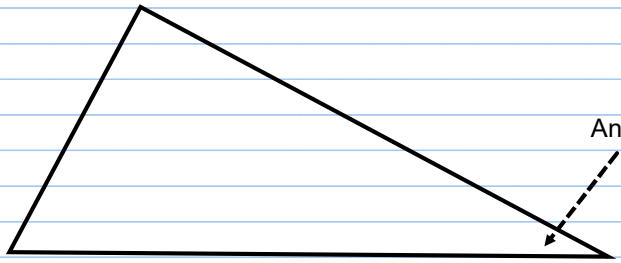


RATIOS	Angle __ °
OPPS / ADJ.	
OPPS. / HYP.	
ADJ. / HYP.	

Intro to Trig.Sample

Your Turn 2

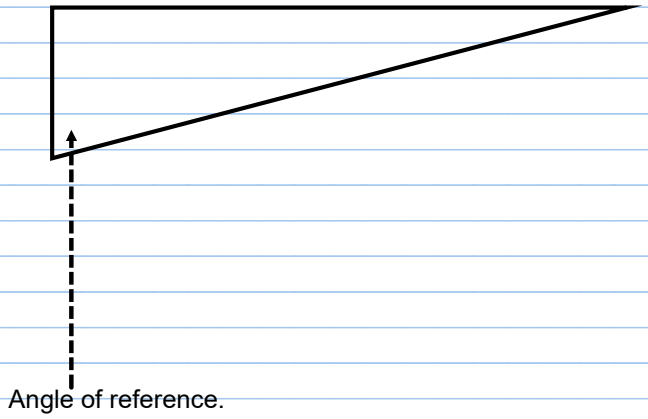
Follow steps 1 - 4 from before, and show and label here.



RATIOS	Angle __ °
$\frac{\text{OPPS}}{\text{ADJ.}}$	
$\frac{\text{OPPS.}}{\text{HYP.}}$	
$\frac{\text{ADJ.}}{\text{HYP.}}$	

Your Turn 3

Follow steps 1 - 4 from before, and show and label here.



RATIOS	Angle __ °
$\frac{\text{OPPS}}{\text{ADJ.}}$	
$\frac{\text{OPPS.}}{\text{HYP.}}$	
$\frac{\text{ADJ.}}{\text{HYP.}}$	

[WE WILL DO REAL TRIGONOMETRY NEXT TIME. BE READY. BE HERE. BE AWESOME!]

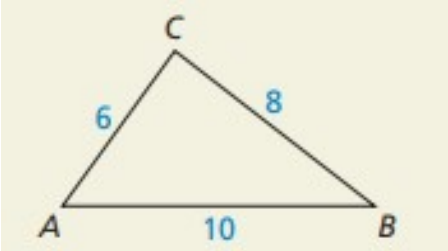
Adriant Sanchez Geometry

Intro to Trig.Sample

Warm Up. Name _____

CHALLENGE: Show two different ways to show the triangle below, could be a right triangle.

1.

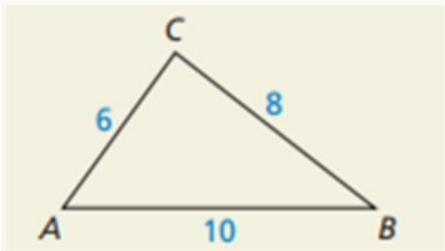


2.

Warm Up. Name _____

CHALLENGE: Show two different ways to show the triangle below, could be a right triangle.

1.

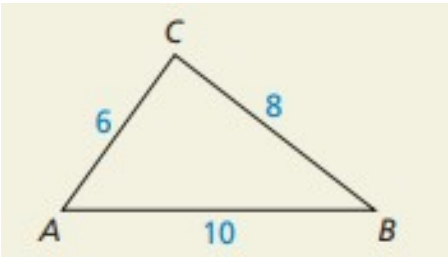


2.

Warm Up. Name _____

CHALLENGE: Show two different ways to show the triangle below, could be a right triangle.

1.

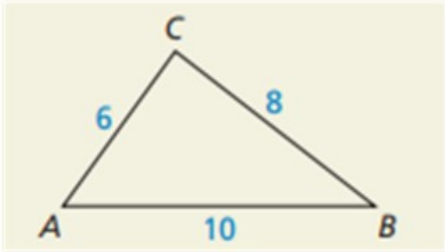


2.

Warm Up. Name _____

CHALLENGE: Show two different ways to show the triangle below, could be a right triangle.

1.

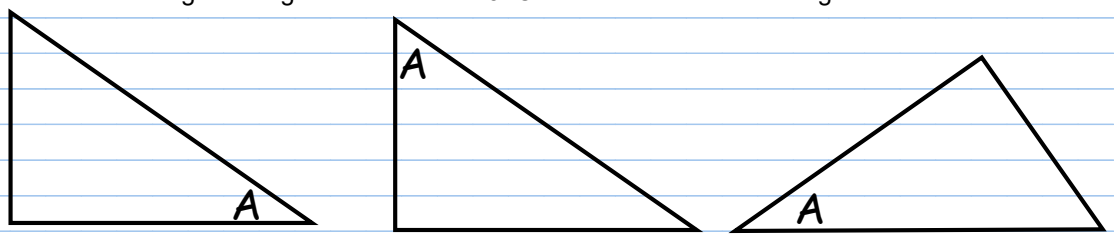


2.

THE 4 STEPS OF TRIGONOMETRY TO FIND a SIDE given an ANGLE

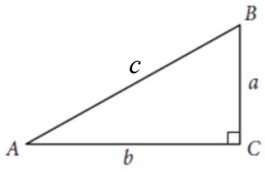
1. LABEL!: ADJACENT, OPPOSITE, HYPOTENUSE

Let's label the Right Triangles below as "ADJ. OPPs. and HYP." to the angle A.

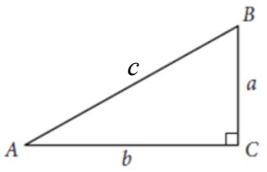


Now given Triangle ABC, and their respective sides a, b,c;

label the Triangle if Angle A is the Angle of reference.



Label the Triangle according to <B:



To determine the "Adjacent side": _____

To determine the "Opposite side." _____

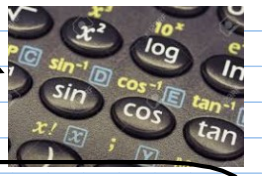
2. CHOOSE From Sine, Cosine, or Tangent:

"SOH-CAH-TOA"

SINe = _____

COSine = _____

TAN gent = _____



These 3 ratios combine an angle measurement to lengths, so we can find lengths, given an angle, and vice versa.

You will choose from the 3 ratios. Yet, choose wisely according to what you are given, and what you have to find.

The rest is simple: 3. Substitute.

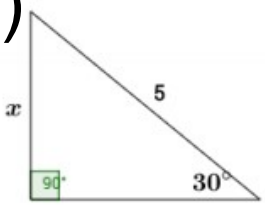
4. Cross multiply and solve

The 4 Steps: 1. Label 2. Choose from "SOH-CAH-TOA" 3. Substitute 4. Solve (Cross-product)

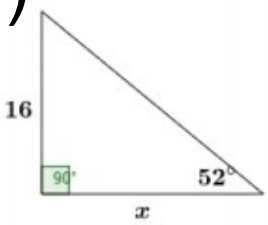
Exemplars:

Trig.Ratio $\_\_^{o} = \frac{\square}{\square}$

a)



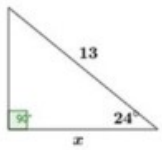
b)



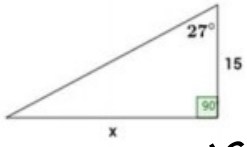
CLO: Students will understand Trigonometry is a tool of 3 ratios used to find lengths of Right Triangles. Will also understand how to label a triangle, choose the ratio, then solve

Use the trig functions to find the missing side lengths. Round to the nearest hundredth.

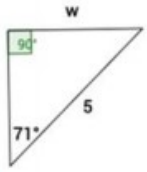
41)



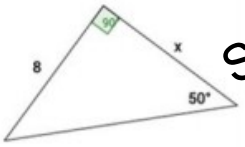
42)



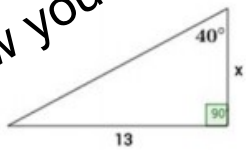
43)



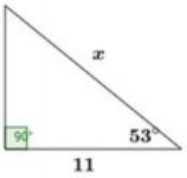
44)



45)

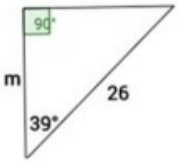


46)

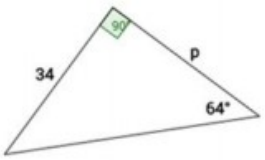


Show your labels here

47)



48)

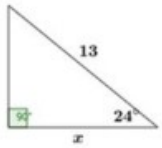


please do neat step work, and staple to another sheet.

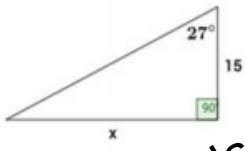
Intro to Trig.Sample

Use the trig functions to find the missing side lengths. Round to the nearest hundredth.

41)



42)



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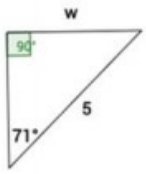
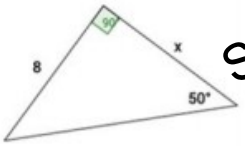


Show your labels here

44)



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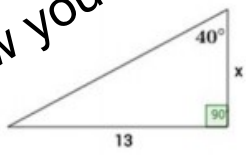

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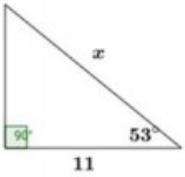

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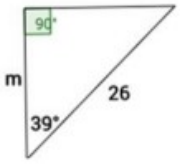

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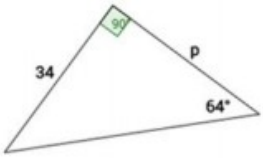
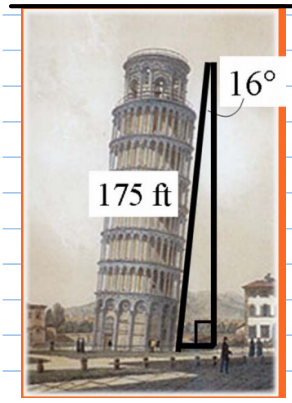


please do neat step work, and staple to another sheet.

The 4 Steps: 1. Label 2. Choose from "SOH-CAH-TOA" 3. Substitute 4. Solve (Cross-product)

Adj
Opp
Hyp

Trig.Ratio $\_\_^{\circ} = \frac{\square}{\square}$

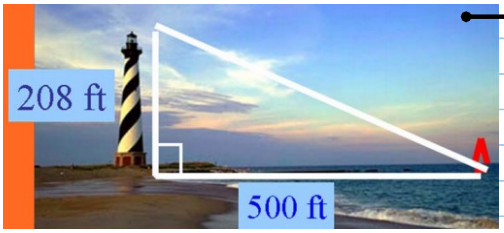


How high is the famous leaning tower of Pisa?

A ladder makes a 48° angle with the ground.

How long is the ladder?

Intro to Trig.Sample



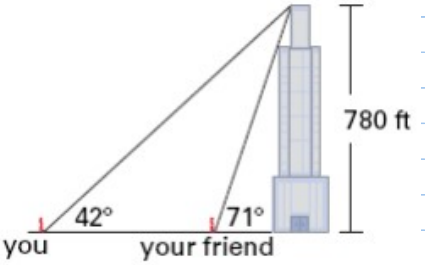
→ [Wait for Teacher. Extra step involved $\_\_\_^{-1}$]

Find the angle of depression from the lighthouse to the buoy?

A ladder leaning against a house makes an angle of 30° with the ground. The foot of the ladder is 7 feet from the foot of the house. How long is the ladder?

TRIG. APPLICATIONS

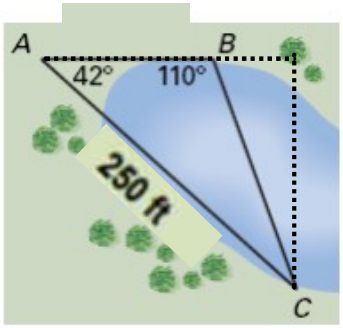
You are a block away from a skyscraper that is 780 feet tall. Your friend is between the skyscraper and yourself. The angle of elevation from your position to the top of the skyscraper is 42°. The angle of elevation from your friend's position to the top of the skyscraper is 71°. To the nearest foot, how far are you from your friend?



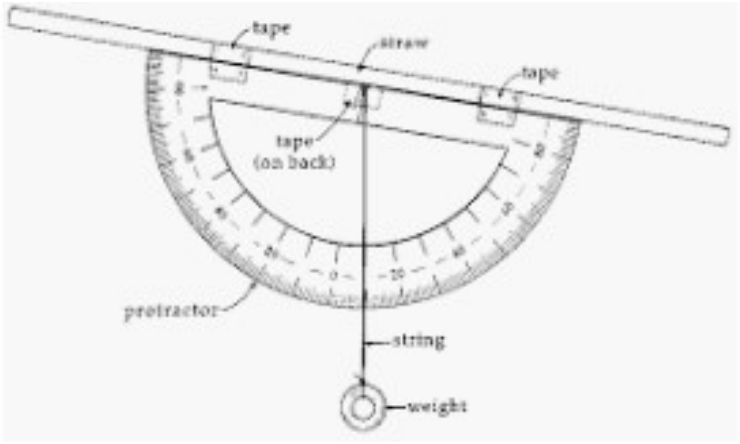
Intro to Trig.Sample

Sometimes you need to add lines to your drawing to create right triangles.

Find the distance of BC.



TRIG. APPLICATIONS

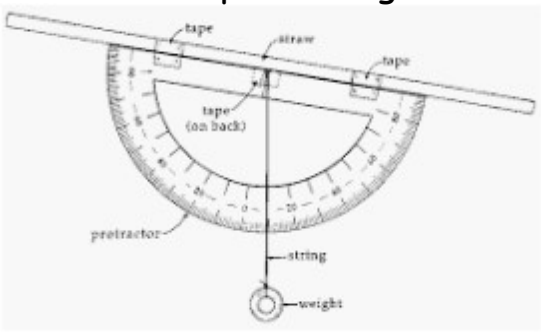


Poke a small hole in your **protractor** in the middle of the flat edge, where indicated. Attach a piece of **string** about 8" long. Attach a small weight to the other end of the **string**, like a small washer or screw. Tape a regular drink **straw** to the flat edge of your **protractor**.

Build Your Own Clinometer - Brain Chase

Clinometer Logistics & Practice

Units: "Steps to Target" then we'll convert to feet.



How do you read a clinometer?

Towards target

How many steps to target from Point A to Point B?

Practice 1: How tall is this ceiling in "steps"?

"Steps" length

CLINOMETER OUTDOOR PARTNER ACTIVITY

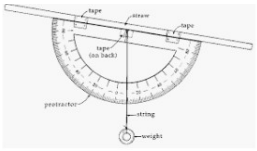
names: _____, _____

HEIGHT FROM FLOOR TO EYE OF "STUDENT 1" : _____ (in Feet and Inches)

Length of shoe size of "Student 2" : _____ (in inches)

Leave space here for calculations:

FLAGPOLE	L.A.BUILDING	TALLEST TREE



Lester Arnold Scavenger Height Data Recordings:

Steps to:	Flagpole	Top of Building	Tallest Tree
 Towards target			
Degrees			

Space here for conversions:

Steps to feet unit

Height of Flagpole: _____

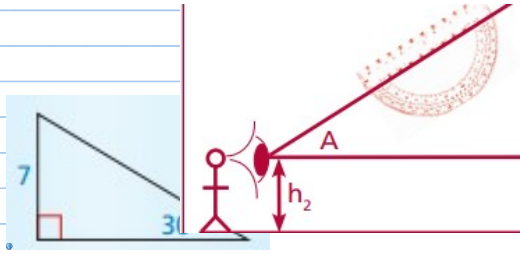
Lester Arnold Building:____

Tallest tree: _____

Extra WOrk Space:

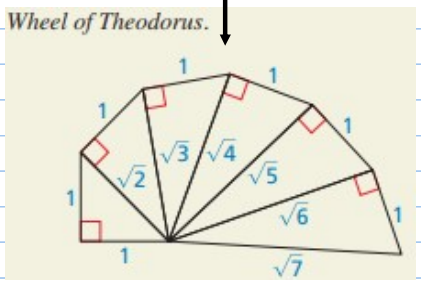
Conjecture: 1. Write about how accurate are the heights found? 2. How many variables exist to which can cause a margin(s) of error towards the actual height of our subjects? 3. Other takeaways please:

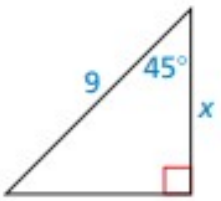
Intro to Trig.Sample

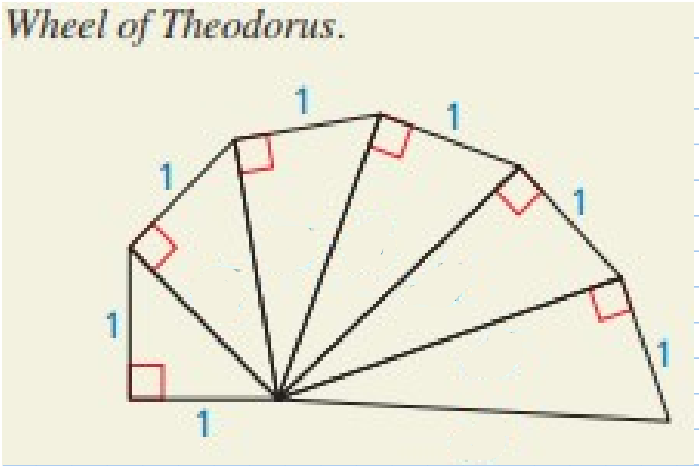


more, in

Final Project....???







CHALLENGE:

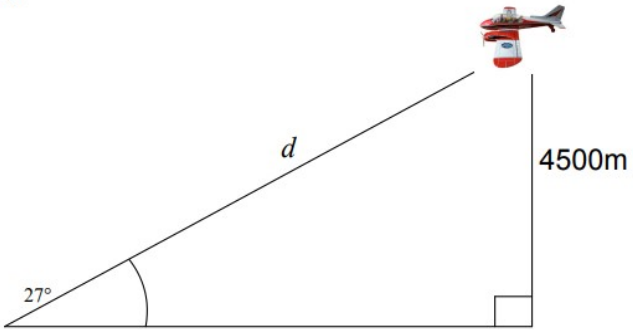
Find the missing Hypotenuses on the 6 given triangles of the famous "Theodorus Wheel."

{Extra Project. Due on Monday: Construct and complete the Wheel, all the way around, full circle. [1 = 1 inch]
Include any and all computations. Title is: **WHEEL OF THEODORUS -Geometry A**. }

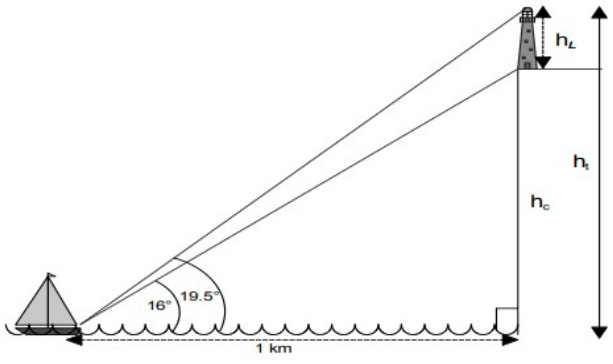
Adriant Sanchez Geometry

Intro to Trig.Sample

The angle of elevation of a plane at an altitude of 4500m is 27°to the horizontal. In a direct line, how far away is the plane.

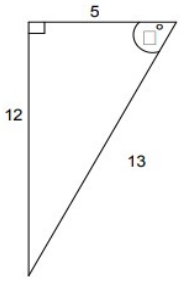


A ship is 1km out to sea from the base of a cliff. On top of the cliff is a lighthouse. From the ship, the ang of elevation to the base of the lighthouse is 16° and the angle of elevation to the top of the lighthouse is 19.5°. Calculate the height of the lighthouse. The diagram is;

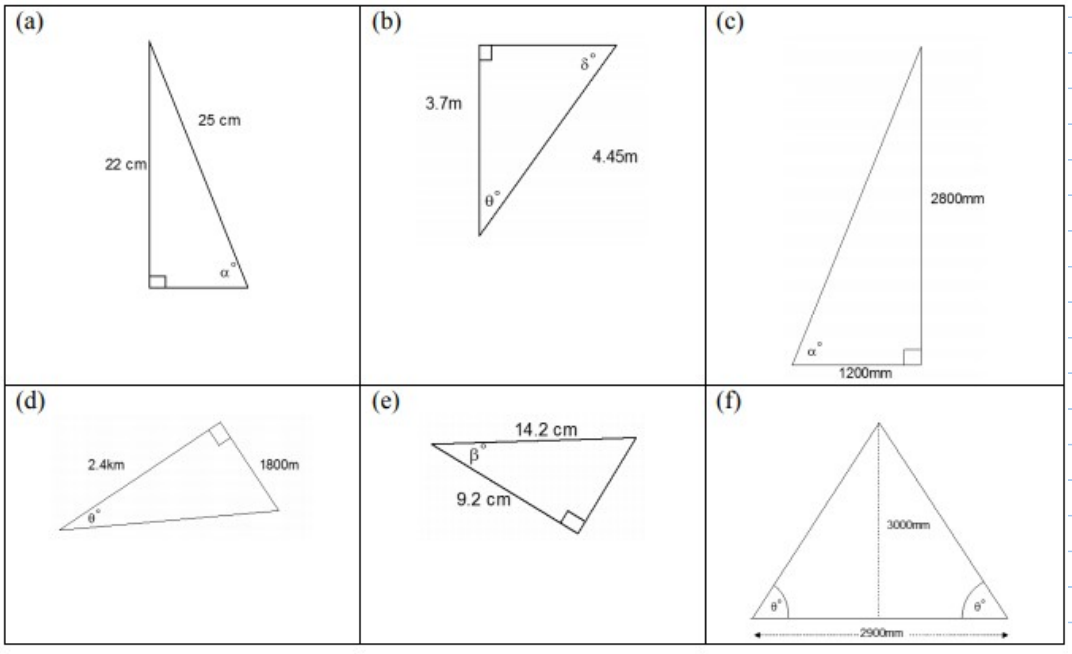


Intro to Trig.Sample

Show three different ways to find the missing angle. Show neat steps.



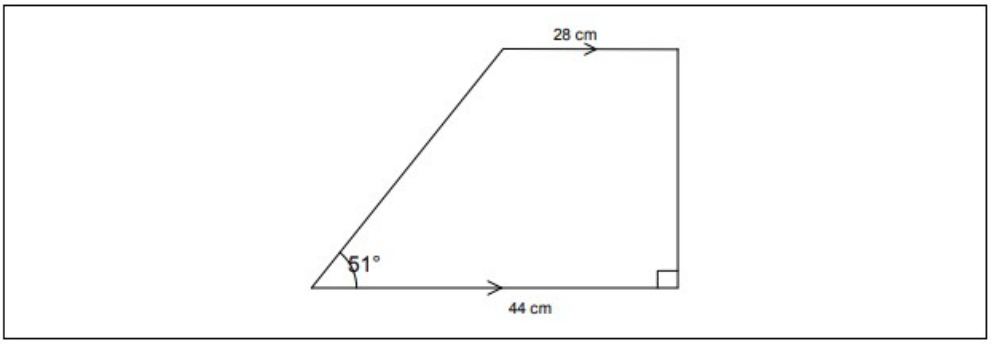
3. For the following triangles, find the size of the missing angle.



6. A plane is flying at altitude of 5000m. The pilot observes a boat at an angle of depression of 12°, calculate the horizontal distance which places the plane directly above the boat.

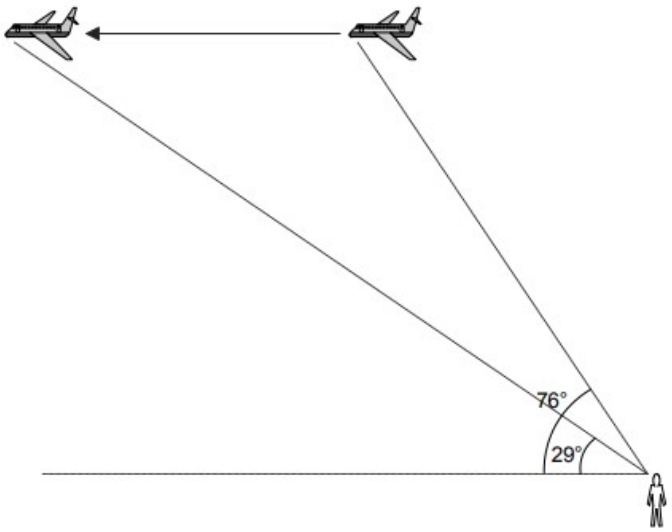
7. A walker decides to take a direct route to a landmark. They walk 1.7 km at a bearing of 78°T. How far did they walk in a northerly and easterly direction?

8. Find the perimeter of this trapezium.



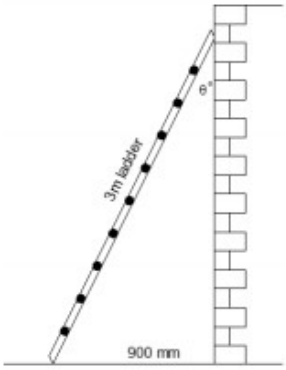
9. A kite is attached to a 45m line. On a windy day, the kite flies at an angle of elevation of 28°. Calculate the height of the kite above the ground.

10. A plane flying at an altitude of 10 000m is flying away from a person. The angle of elevation of the plane is 76° when initially observed. After 1 minute 15 seconds, the plane is at an angle of elevation of 29°. Ignoring the height of the person, what is the speed of the plane in km/hr?



Intro to Trig.Sample

A three metre ladder is placed against a brick wall. The base of the ladder is 900mm from the base of the wall. Find the angle the ladder makes with the wall.



10. In $\Delta ABC : \angle A = 90°, a = 16.9, b = 6.5, calculate \angle B$.