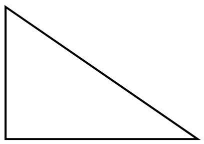
1.1 Trigonometry-Finding a missing side

Recall: Pythagorean Theorem $a^2 + b^2 = c^2$

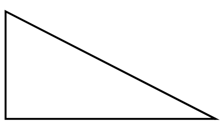
→We used this formula to find a missing side of a right triangle when we knew the other 2 sides.

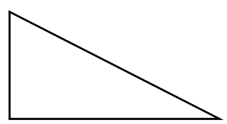


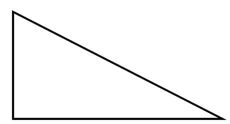
Trigonometry looks at the relationships between __________ lengths and ____________ in triangles.

In this course we are going to focus on right triangles. These triangles have one 90˚ angle and two acute (smaller than 90˚) angles.

Sides are labeled specific to one of the two acute angles involved in the triangle (never the right angle). We describe the angle that we are labeling our sides in respect to as "theta" θ. The sides are labeled **O**pposite (to θ), **A**djacent (to θ) and the **H**ypotenuse.







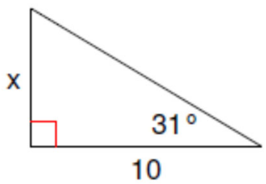
The angle θ is related to the opposite, adjacent and hypotenuse sides by the following trig ratios:

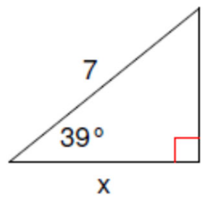
SIN θ = ______________________ COS θ = ____________________ TAN θ = ____________________

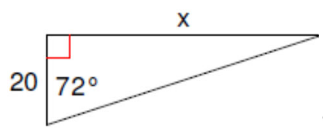
TO REMEMBER THE DIFFERENT TRIGONOMETRIC RELATIONSHIPS USE:
SOHCAHTOA

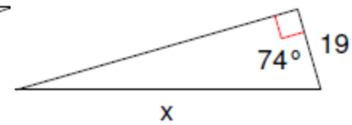
You choose the appropriate trig function depending on the information given in the question. If you are given (and/or want to know what is) the **O***pposite* side and the **H***ypotenuse* side then you use ______________.

The most important step of the process of finding a missing side length or angle is being able to accurately label the sides…Let's practice labeling the sides of right triangles as O, A and H.









Next we have to choose the correct trig ratio which will depend on the information given; sides you know and sides you want to know. Then we use ________________________________to solve for a missing side or angle.

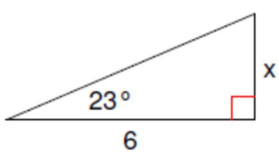
Let's practice cross-multiplying:

1. $\frac{x}{2} = \frac{10}{4}$
2. $\frac{3}{5} = \frac{a}{10}$
3. $\frac{1}{s} = \frac{4}{9}$
4. $\frac{x}{4} = \frac{\sin 90°}{1}$
5. $\frac{\cos 36°}{1} = \frac{x}{18}$
6. $\frac{1}{x} = \frac{\tan 45°}{9}$

Cross-Multiplying *Shortcut* Steps:

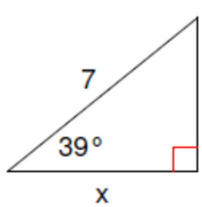
1. multiply where there's numbers on the diagonal
2. divide by the only other number left over

Ex. Find the missing side"x".



Steps:

You try: Find the missing side"x".



HW: p111 #4, 5ab, 9a, 10b

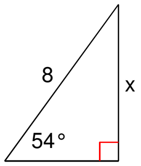
FPMa10 Name________________________________

Intro Trigonometry WS#1

Period____

Find the missing side. Round to the nearest tenth.

1)



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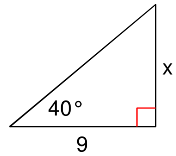
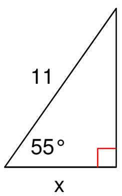
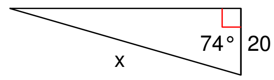


3)



4)



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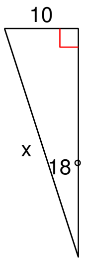

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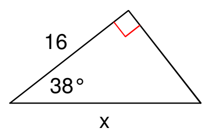

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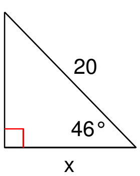

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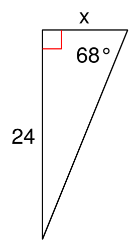

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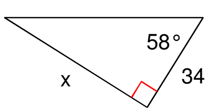
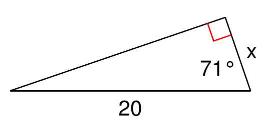


10)



Find the value of each trigonometric ratio to the nearest ten-thousandth.

11) sin 27°

12) cos 50°

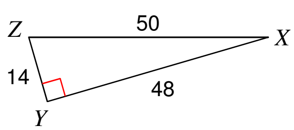
13) sin 6°

14) cos 40°

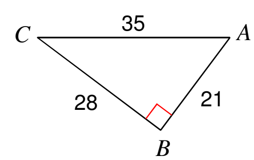
15) sin 17°

16) sin 29°

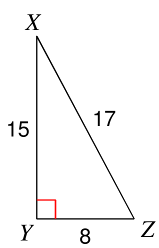
17) tan X



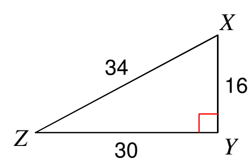
18) tan C



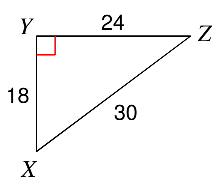
19) sin X



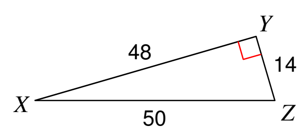
20) cos Z



21) cos Z

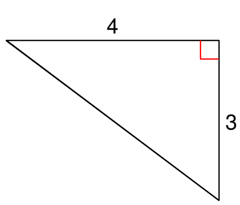


22) sin Z

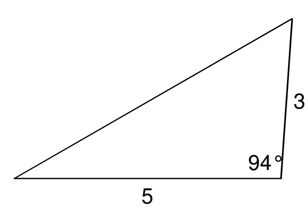


Find the area of each figure. Round your answer to the nearest tenth.

23)



24)



1.2 Trigonometry – Finding a missing angle

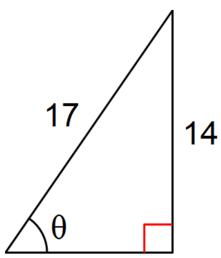
So far we've looked at finding a missing side given another side and an angle in a right triangle. We can also use trigonometry to find missing angles as long as we know 2 sides of a right triangle. This is called "Inverse Trig" and we choose and set up the trig ratio the same way as we did when looking for a missing side.

Our Inverse Trig buttons are located very close to the regular Trig buttons on our calculator. They look like this:

SIN^{-1} COS^{-1} TAN^{-1}

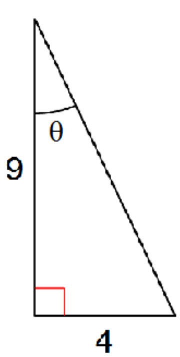
We use these buttons **only** when finding a missing angle!

Ex. Find the missing angle "θ". Steps:

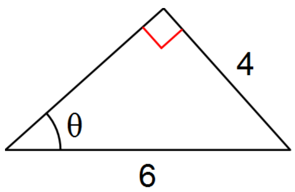


Once we have solved the missing angle in the right triangle then we can find the other acute angle by remembering that all angles in every triangle must add to ________. How could we find the remaining unknown side of this triangle?

You try: Find the missing angle "θ".



<u>Try again</u>: Find all the missing angles and sides of this triangle.



HW: p95 #5-7(a,c only), 9 and p111 #3, 9b, 10a

Foundations and Pre-Calculus Math 10
Chapter 2 Checkpoint Assignment

Name:________________ Block:______

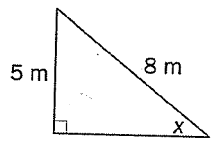
1. Find each of the following to 3 decimal places.

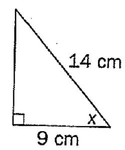
(a) sin 27º (b) cos 56º (c) tan 78º

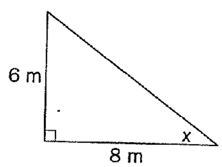
2. Find the measure of each angle, to the nearest degree.

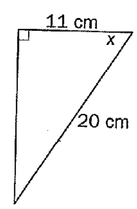
(a) sin D = 0.602 (b) cos Z = 0.309 (c) tan X = 0.445

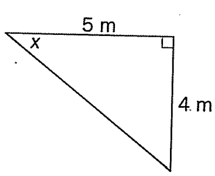
3. Find the measure of angle X, to the nearest degree.

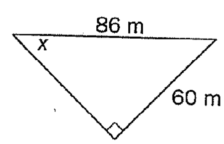
(a)


(b)


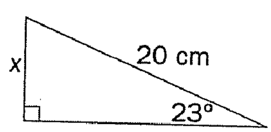
(c)


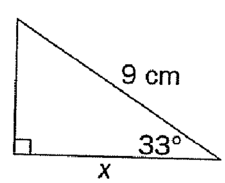
(d)


(e)


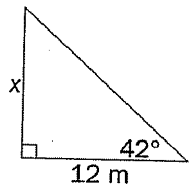
(f)


4. Calculate the length of side x to the nearest tenth.

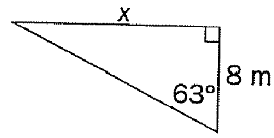
(a)


(b)


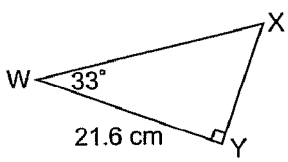
(c)



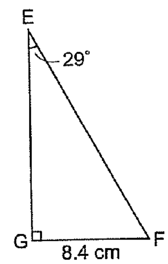
(d)



(e) Find side WX



(f) Find side EF



5. In ΔDEF, ∠E= 90º, DF = 11.5cm and DE = 2.7cm. Find the measure of ∠D, to the nearest tenth of a degree. Draw the triangle.

6. A goal post casts a shadow that is 3.6m long. The angle of elevation of the sun is 39º. What is the height of the goal post, to the nearest tenth of a metre? Sketch a diagram.

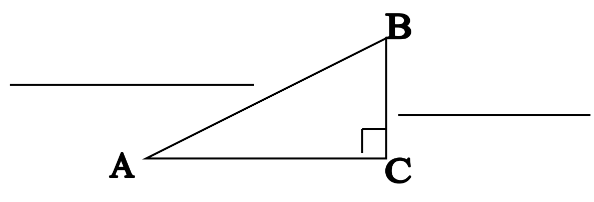
7. In ΔFGH, ∠H= 90º, FH = 6cm and ∠F = 31º, find the area of the triangle to the nearest tenth of a square cm. Sketch a diagram.

1.3 Applying the Trigonometric Ratios

Solving a triangle means to determine the measures of all the ________________

and the ____ in the triangle.

We can use any of the three primary trigonometric ratios to do this.

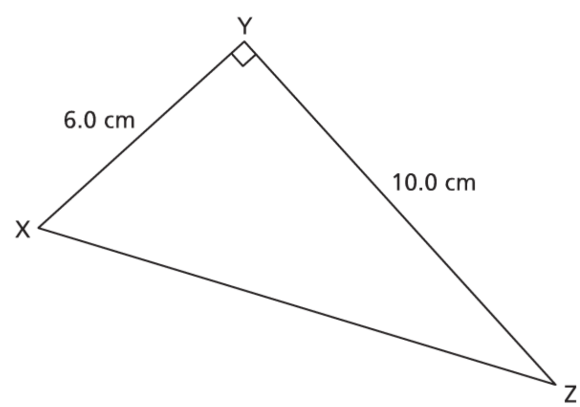


sin A=__________; cos A =__________; tan A = __________

To recall these trigonometric ratios quickly, remember the acronym:

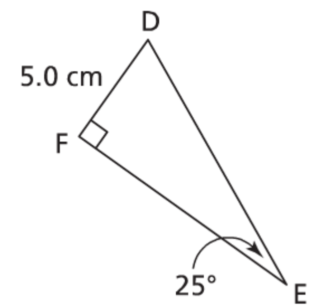
___ ___ ___ ___ ___ ___ ___ ___ ___

Ex. #1: Solve this triangle. Give the measures to the nearest tenth where necessary.



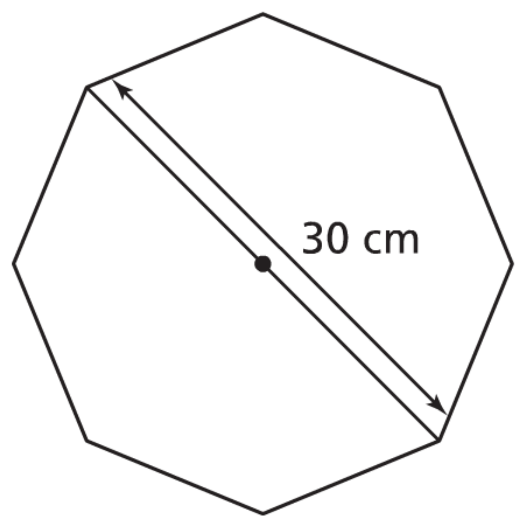
On a Separate Piece of Paper Complete Check Your Understanding #1 p. 106

Ex. #2: Solve this triangle. Give the measures to the nearest tenth where necessary.



On a Separate Piece of Paper Complete Check Your Understanding #2 p. 108

Ex. #3: A small table has the shape of a regular octagon. The distance from one vertex to the opposite vertex, measured through the centre of the table, is approximately 30 cm. There is a strip of wood veneer around the edge of the table. What is the length of this veneer to the nearest centimetre?

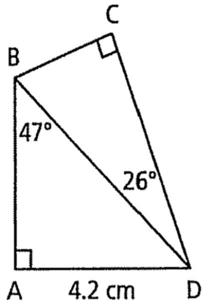


On a Separate Piece of Paper Complete Check Your Understanding #3 p. 109

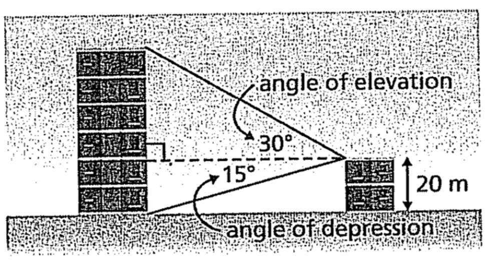
HW p111 #6, 11, 12b

1.4 – Solving Problems Involving More than One Right Triangle

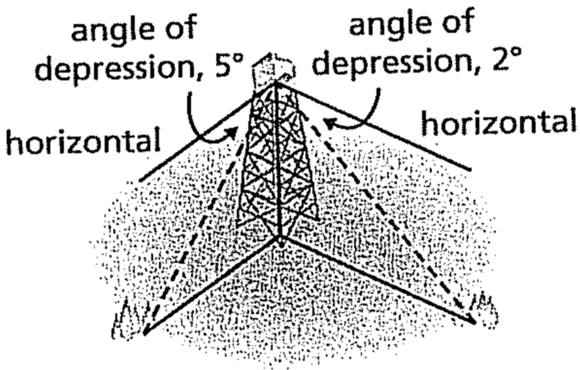
Example #1: Calculate the length of $\overline{CD}$ to the nearest tenth of a centimetre



Example #2: Determine the height of the taller building to the nearest tenth of a

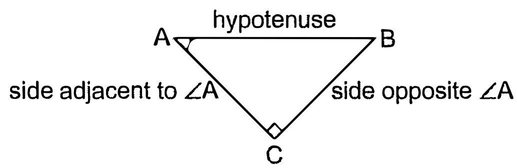
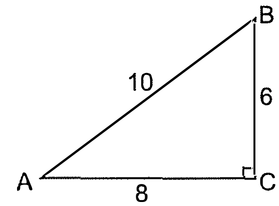
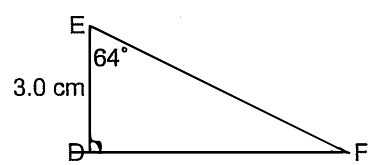


Example #3: How far apart are the fires to the nearest foot?



HW: p111 #6,11,12b and p118 #3,5,6

Chapter 2 Study Guide

Skill	Description	Example
Find a trigonometric ratio.	In △ABC,  $\sin A = \frac{\text{opposite}}{\text{hypotenuse}}$ $\cos A = \frac{\text{adjacent}}{\text{hypotenuse}}$ $\tan A = \frac{\text{opposite}}{\text{adjacent}}$	 $\sin A = \frac{\text{opposite}}{\text{hypotenuse}}$ $\sin A = \frac{BC}{AB}$ $\sin A = \frac{6}{10}$, or 0.6
Find the measure of an angle.	To find the measure of an acute angle in a right triangle: **1.** Use the given lengths to write a trigonometric ratio. **2.** Use the inverse function on a scientific calculator to find the measure of the angle.	To find the measure of ∠B in △ABC above: $\tan B = \frac{\text{opposite}}{\text{adjacent}}$ $\tan B = \frac{AC}{BC}$ $\tan B = \frac{8}{6}$ $\angle B = \tan^{-1}\left(\frac{8}{6}\right)$ $\angle B \doteq 53°$
Find the length of a side.	To find the length of a side in a right triangle: **1.** Use the measure of an angle and the length of a related side to write an equation using a trigonometric ratio. **2.** Solve the equation.	To find the length of EF in △DEF:  $\cos E = \frac{\text{adjacent}}{\text{hypotenuse}}$ $\cos E = \frac{DE}{EF}$ $\cos 64° = \frac{3.0}{EF}$ $EF \cos 64° = 3.0$ $EF = \frac{3.0}{\cos 64°}$ $EF = 6.8435...$ $EF \doteq 6.8$ cm

<u>From text</u>: p124 #1-4, 5a, 6, 8, 9, 11-13, 15, 18ab, 20, 22