(A) Lesson Context

BIG PICTURE of this UNIT:	• How do I determine the measure of angles in geometric shapes, without direct measurement? • How do I solve for sides or angles in right triangles? • How do I model real world scenarios using right triangles?		
CONTEXT of this LESSON:	Where we've been You know how to work with sides and angles of right triangles.	Where we are What is the relationship between the ratios of sides of right triangles and the measure of the non-right angles in the right triangle	Where we are heading How can I solve problems that require geometric models using right triangles?

(B) Lesson Objectives:

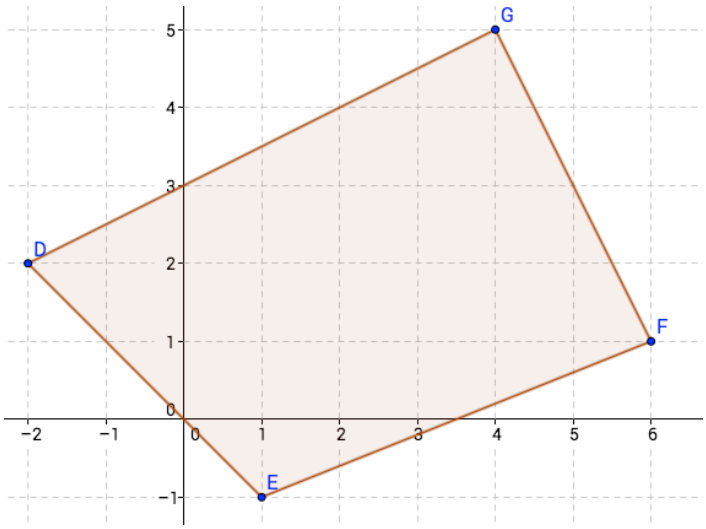
a. Exploring the relationship between the ratio of the sides of a right triangle and the measurement of the non-right angles
b. Introduce terminology used in trigonometry

(C) FAST FIVE: Exploring Connections: Angles & Slope Ratios

a. Open GEOGEBRA
b. Create the axes & grid as usual
c. Construct a right triangle, where vertex A will be at (0,0)
d. Determine the measure of the angle at vertex A.
e. Calculate the slope of the hypotenuse.
f. Record observations on the board.
g. Any patterns/connections??
h. APPLICATION: Determine the measures of the angles in the quadrilateral defined by D(-2,-2), E(-1,-1), F(6,1), G(4,5)

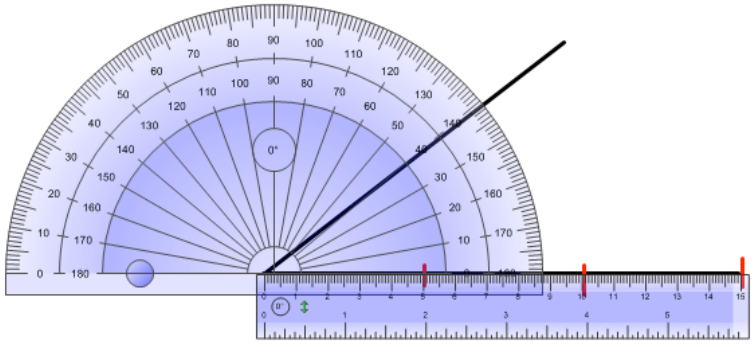
Class Data TABLE (EXAMPLE)

Length BC	Length AB	Angle	Slope Ratio

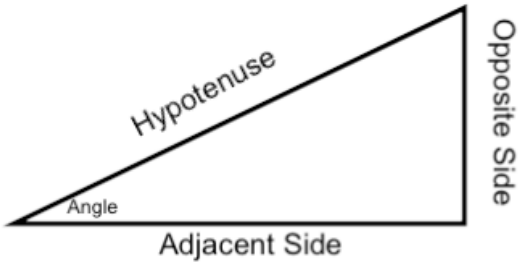


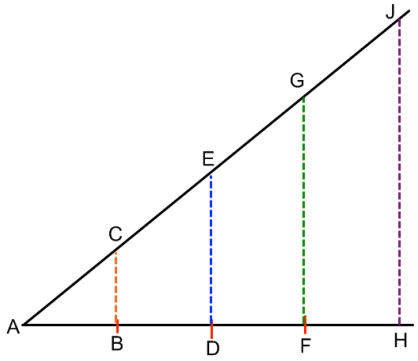
(D) **Exploring Ratios – PART 2**

Step 1: Draw a 20° angle. Mark tick marks every 5 cm along one side. (Four of them)



Step 2: Draw Perpendicular line segments from the four of the tick marks to intersect with the other side of the angle.





Step 3: Identify the four triangles that are formed in this figure. Measure the legs of each triangle to the nearest tenth of a centimeter. Then fill out the table below.

Triangle 20°	Opposite Side	Adjacent Side	Hypotenuse	$\frac{opposite}{adjacent}$	$\frac{opposite}{hypotenuse}$	$\frac{adjacent}{hypotenuse}$
ΔABC						
ΔADE						
ΔAFG						
ΔAHJ						

Triangle 50^o	Opposite Side	Adjacent Side	Hypotenuse	$\frac{opposite}{adjacent}$	$\frac{opposite}{hypotenuse}$	$\frac{adjacent}{hypotenuse}$
ΔABC						
ΔADE						
ΔAFG						
ΔAHJ						

Step 4: Describe the pattern in the ratio $\frac{Opposite}{Adjacent}$

20^o _____

_____

50^o _____

_____

Step 5: Describe the pattern in the ratio $\frac{Opposite}{Hypotenuse}$

20^o _____

_____

50^o _____

_____

Step 6: Describe the pattern in the ratio $\frac{Adjacent}{Hypotenuse}$

20^o _____

_____

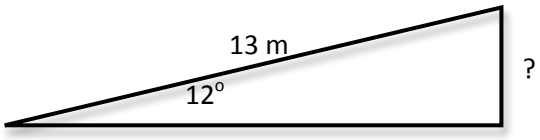
50^o _____

_____

Now Mr. Smith and Mr. Santowski have gone through and measured a lot of triangles for angles between 1° and 89° .

Angle θ	Opp/Hyp	Adj/Hyp	Opp/Adj		Angle θ	Opp/Hyp	Adj/Hyp	Opp/Adj
θ = 7°	.1219	.9925	.1228		θ = 48°	.7431	.6691	1.1101
θ = 12°	.2079	.9781	.2126		θ = 50°	.7660	.6428	1.1918
θ = 15°	.2588	.9695	.2679		θ = 52°	.7880	.6157	1.2799
θ = 21°	.3584	.9336	.3839		θ = 68°	.9272	.3746	2.4751
θ = 25°	.4226	.9063	.4663		θ = 71°	.9455	.3256	2.9042
θ = 29°	.4848	.8746	.5543		θ = 75°	.9659	.2588	3.7321
θ = 32°	.5299	.8480	.6249		θ = 82°	.9903	.1392	7.1154
θ = 39°	.6293	.7771	.8098		θ = 86°	.9976	.0698	14.3007
θ = 43°	.6820	.7313	.9325		θ = 89°	.9998	.0176	57.29
θ = 45°	.7071	.7071	1.0000					

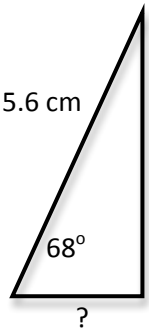
… This took a while. We found the same ratios that you did and here were our findings. See if you can use this table to help you find the missing lengths in the triangles given. Please explain your reasoning, show your work… etc.



θ =

Side Given:

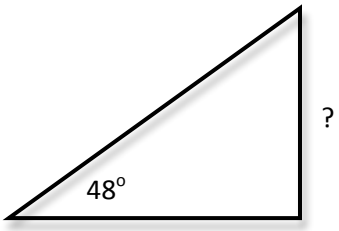
Looking For:



θ =

Side Given:

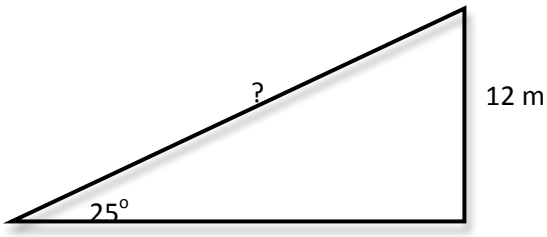
Looking For:



θ =

Side Given:

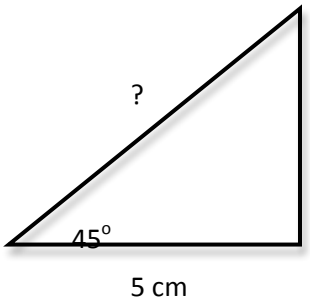
Looking For:



θ =

Side Given:

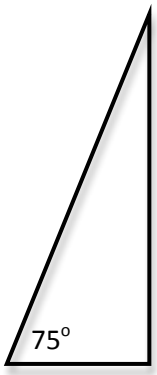
Looking For:



θ =

Side Given:

Looking For:



θ =

Side Given:

Looking For:

Now, all these ratios don't require the arduous measuring work that we had to do to get them. They actually have all of them in your calculator already. Please fill out the following table using your sin(θ), cos(θ), and tan(θ) on your calculator. Make sure your calculator is in degree mode. What is the which trig function goes with which ratio???

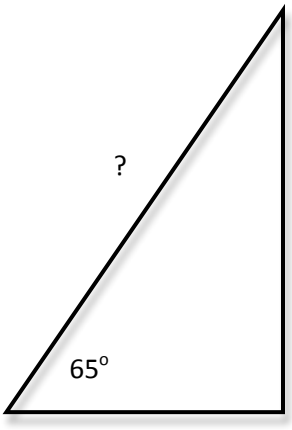
Angle θ	Sin(θ)	Cos(θ)	Tanθ)
θ = 12			
θ = 25			
θ = 45			
θ = 48			
θ = 68			
θ = 75			
θ = 23			
θ = 65			
θ = 2			

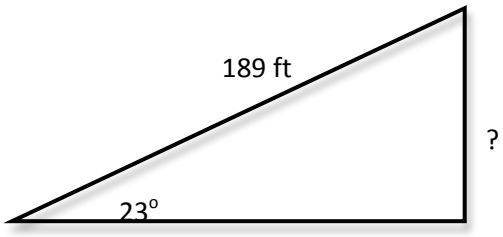
The Big Idea: This is the main idea of Right Triangle Trig…

Sin(θ) = _____

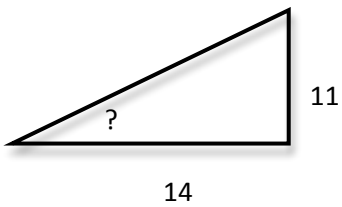
Cos(θ) = _____

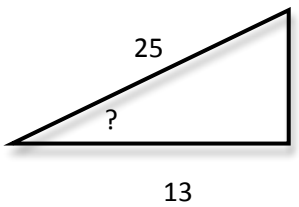
Tan(θ) = _____

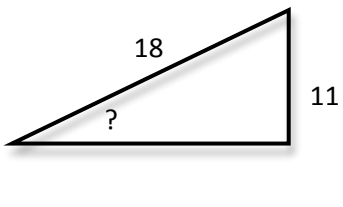




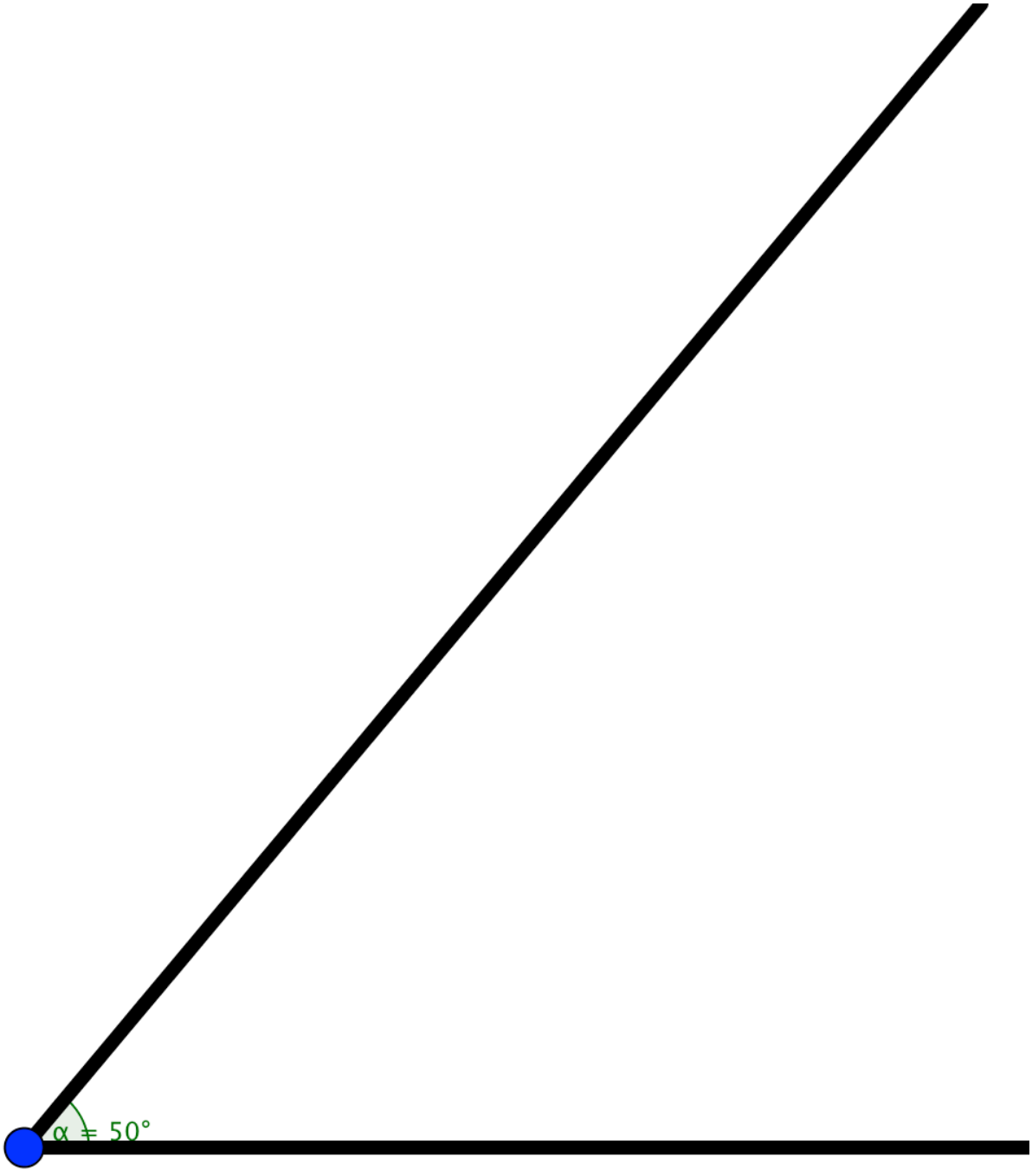
Where we are headed next… Can you find the angle???







This angle measures 50°



This angle measures 20°