Geometry: *Hutschenreuter* Name KEY

Section 7.6: Apply the Sine and Cosine Ratios

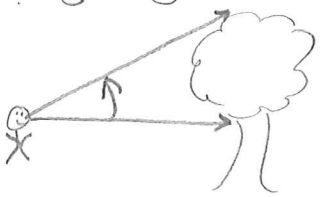
Essential Question:
How can you find the lengths of the legs of a right triangle when you are given the length of the hypotenuse and one acute angle?

VOCABULARY:

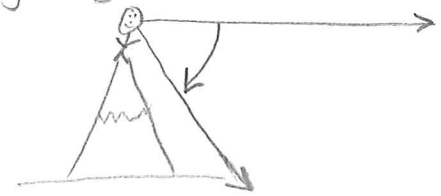
Sine The ratio of the opposite side of an acute angle to the hypotenuse in a right triangle

Cosine The ratio of the adjacent side of an acute angle to the hypotenuse in a right triangle

Angle of Elevation
When you look up at an object it is the angle your line of sight makes with a horizontal line

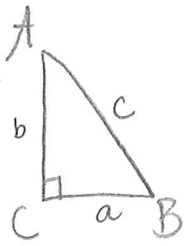


Angle of Depression
When you look down at an object it is the angle your line of sight makes with a horizontal line



Key Concept: Sine Ratio

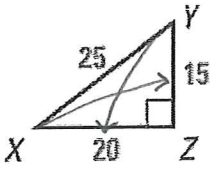
In a right triangle, the **sine (sin)** of an acute angle is equal to the ratio of the length of the opposite side to the length of the hypotenuse.



Given

$\sin A = \frac{a}{c}$ $\sin B = \frac{b}{a}$ } in general $\sin\theta = \frac{opp}{hyp}$

A1. Find sin *X* and sin *Y*.
Write each answer as a simplified fraction and as a decimal rounded to four places

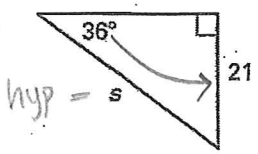


$\sin X = \frac{15}{25} \div 5$ $\sin X = \frac{3}{5} = .6$

$\sin Y = \frac{20}{25} \div 5$ $\sin Y = \frac{4}{5} = .8$

A2. Find the variable value using the sine ratio. Round to the tenth.

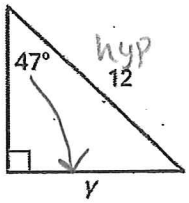
a.



$\frac{\sin 36^\circ}{1} = \frac{21}{s}$

$s = \frac{1(21)}{\sin 36^\circ} = 35.7$ un

b.



$\frac{\sin 47^\circ}{1} = \frac{y}{12}$

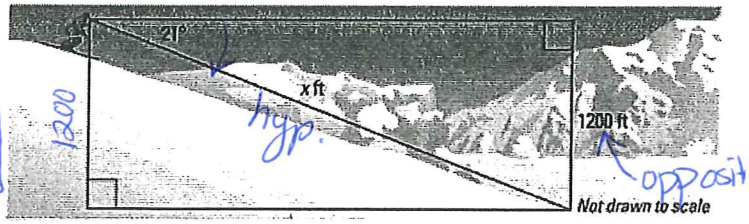
$y = \frac{12(\sin 47^\circ)}{1}$

$y = 8.8$ un

A3. You are skiing on a mountain with an altitude of 1200 meters. The angle of depression is 21°. About how far do you ski down the mountain?

$\frac{\sin 21°}{1} = \frac{1200}{x}$

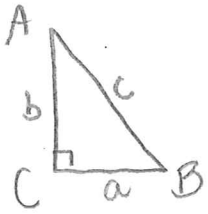
$x = \frac{1(1200)}{\sin 21°} \approx$ 3348.51 ft



Key Concept: Cosine Ratio

In a right triangle, the **cosine (cos)** of an acute angle is equal to the ratio of the length of the adjacent side to the length of the hypotenuse.

Given

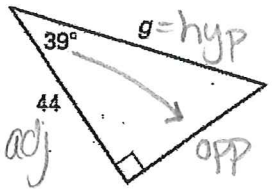


$\cos A = \frac{b}{c}$ $\quad \cos B = \frac{a}{c}$ } in general: $\cos\theta = \frac{adj}{hyp}$

A4. Find the value of g.

$\frac{\cos 39°}{1} = \frac{44}{g}$ adj / hyp $\quad g = \frac{1(44)}{\cos 39°}$

$g =$ 56.602 un

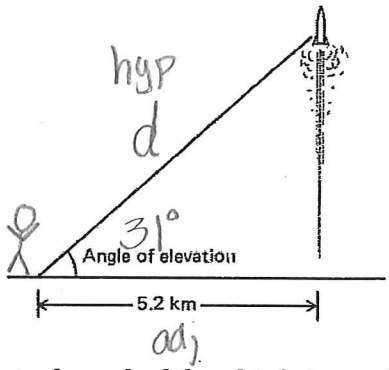


A5. Find the distance from the observer to the rocket using an angle of elevation of 31° and the observation platform 5.2 km away from the launching pad.

$\cos\theta = \frac{adj}{hyp}$

$\frac{\cos 31°}{1} = \frac{5.2}{d}$ $\quad d = \frac{1(5.2)}{\cos 31°}$

$d \approx$ 6.07 km

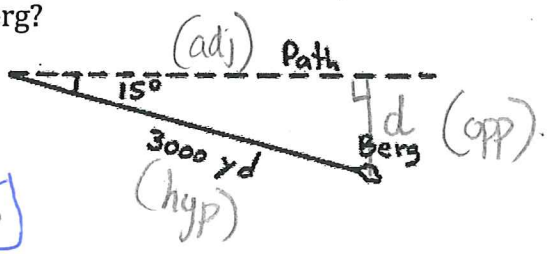


A6. A navigator sees an iceberg 3000 yds away at an angle of 15° starboard of the ship's intended path. What is the closest the ship will come to the iceberg?

$\sin\theta = \frac{opp}{hyp}$

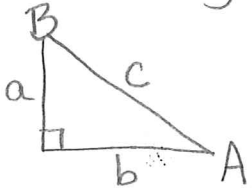
$\frac{\sin 15°}{1} = \frac{d}{3000}$ $\quad d = \frac{3000(\sin 15°)}{1}$

$d \approx$ 776.46 yds



Section 7.6 Summary:

If given the length of the hypotenuse and one acute angle you can find a leg length by using the sine or cosine ratio.



$\cos A = \frac{b}{c}$ $\quad \sin A = \frac{a}{c}$

$\cos B = \frac{a}{c}$ $\quad \sin B = \frac{b}{c}$