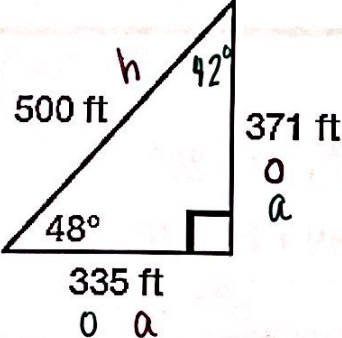
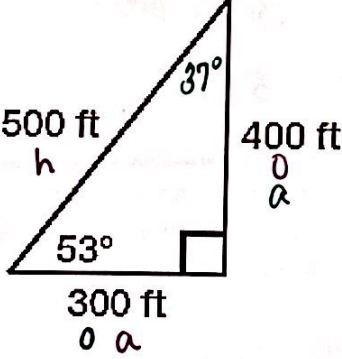


Day 6 – Sine and Cosine Identities – Notes

Activity: For each triangle below, calculate the sine, cosine, and tangent ratios. Once you create your ratios in fraction form, convert them to a decimal (round three places past the decimal).

	Ratio	Decimal	
	$\sin 48^\circ = 0.743$	$\frac{371}{500}$	0.742
	$\cos 48^\circ = .669$	$\frac{335}{500}$	0.67
	$\tan 48^\circ = 1.11$	$\frac{371}{335}$	1.11
	Now find the ratio of the missing angle in the triangle. Convert to a decimal.		
	$\sin 42^\circ = 0.669$	$\frac{335}{500}$	0.67
	$\cos 42^\circ = 0.743$	$\frac{371}{500}$	0.742
	$\tan 42^\circ = 0.9$	$\frac{335}{371}$	0.903

	Ratio	Decimal	
	$\sin 53^\circ = 0.799$	$\frac{400}{500}$	0.80
	$\cos 53^\circ = 0.602$	$\frac{300}{500}$	0.60
	$\tan 53^\circ = 1.327$	$\frac{400}{300}$	1.33
	Now find the ratio of the missing angle in the triangle. Convert to a decimal.		
	$\sin 37^\circ = 0.602$	$\frac{300}{500}$	0.60
	$\cos 37^\circ = 0.799$	$\frac{400}{500}$	0.80
	$\tan 37^\circ = 0.754$	$\frac{300}{400}$	0.75

		Ratio	Decimal
	$\sin 60^\circ = 0.866$	$\frac{433}{500}$	0.866
	$\cos 60^\circ = 0.5$	$\frac{250}{500}$	0.5
	$\tan 60^\circ = 1.73$	$\frac{433}{250}$	1.732
	Now find the ratio of the missing angle in the triangle. Convert to a decimal.		
	$\sin 30^\circ = 0.5$	$\frac{250}{500}$	0.5
	$\cos 30^\circ = 0.866$	$\frac{433}{500}$	0.866
$\tan 30^\circ = 0.577$	$\frac{250}{433}$	0.577	

Observation: Answer the following questions below about your observations:

What do the two angles, other than the right angle, always add to? Why?

They add to 90°. If you take 180° - 90° angle, you are always left with 90° remaining.

What did you notice about the sine ratio of one angle compared to the cosine ratio of the second angle?

They are equal.
 $\sin 30^\circ = \cos 60^\circ$
 $\cos 30^\circ = \sin 60^\circ$

The value of the sine and cosine ratio was always less than 1....why?

They are always over the hypotenuse, which is the longest side.

Making sure your calculator is in DEGREE mode, calculate $\sin 48^\circ$, $\sin 53^\circ$, $\sin 60^\circ$, etc. What do you notice about the number from the calculator and the decimal answer of the ratio of side lengths?

Sine and cosine are called **cofunctions** because the value of one ratio for one angle is the same as the value of the other ratio for the other angle. Since the two remaining angles of a right triangle add to 90° , you can use the sine of one acute angle to find the cosine of the other acute angle and vice versa.

<p>Sine and Cosine Cofunction Identities</p> <p>$\sin \theta = \cos (90^\circ - \theta)$</p> <p>$\cos \theta = \sin (90^\circ - \theta)$</p>

examples
 $\sin 37^\circ = \cos 53^\circ$
 $\cos 8^\circ = \sin 82^\circ$
 $\sin 20^\circ = \cos 70^\circ$

Application of the Sine and Cosine Cofunctions

Practice: Determine a value of θ for which $\cos \theta = \sin \underline{\quad}$ is true or $\sin \theta = \cos \underline{\quad}$ is true.

a. $\cos 35^\circ = \sin \underline{55^\circ}$

b. $\cos 27^\circ = \sin \underline{63^\circ}$

c. $\cos 83^\circ = \sin \underline{7^\circ}$

d. $\sin 67^\circ = \cos \underline{23^\circ}$

e. $\sin 6^\circ = \cos \underline{84^\circ}$

f. $\sin 42^\circ = \cos \underline{48^\circ}$

g. $\sin x^\circ = \cos \underline{(90-x)}$

h. $\cos j^\circ = \sin \underline{(90-j)}$

i. $\sin \beta^\circ = \cos \underline{(90-\beta)}$

Answer the Following:

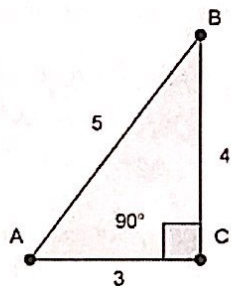
a. $\sin 40^\circ \approx 0.643$. What is $\cos 50^\circ$?

$\cos 50^\circ \approx 0.643$

b. Find $\sin 28^\circ$ if $\cos 62^\circ = 0.469$.

$\sin 28^\circ = 0.469$

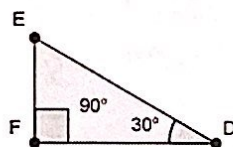
c.



$\text{sine } A = 4/5$ $\text{sine } B = \underline{3/5}$

$\text{cosine } A = 3/5$ $\text{cosine } B = \underline{4/5}$

d.



$m\angle E = \underline{60^\circ}$

$\text{sine } D = 0.5000$

$\text{sine } E = \underline{0.866}$

$\text{cosine } D = 0.8660$

$\text{cosine } E = \underline{0.5}$