

Lesson 8-7: Complementary Sine and Cosine

AGENDA:

- Check HW 8-6
- Turn in Cumulative Review #7
- Notes 8.7 with Applications

HOMEWORK:8-7

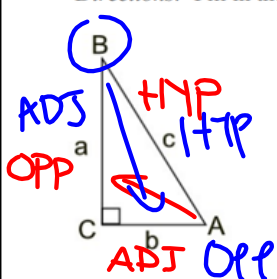
- Worksheet 8-7

Name _____ Date _____ Section _____

Geometry 8-7R/8-8LAB Complementary Sine and Cosine (Co-Functions)

Exploring Complementary Sine and Cosine

Directions: Fill in the missing pieces to the following questions. All work deals with degrees.



1. Express $\sin A = \frac{a}{c}$

2. Express $\cos B = \frac{a}{c}$

3. Express $\sin B = \frac{b}{c}$

4. Express $\cos A = \frac{b}{c}$

5. $m\angle C = 90^\circ$

6. $m\angle A + m\angle B = 90^\circ$

1. a) What term, based upon the answer to #6, can be used to describe $\angle A$ and $\angle B$? **COMPLEMENTARY**
- b) Express $m\angle A$ in terms of $m\angle B$: $m\angle A = 90^\circ - m\angle B$
 $m\angle A + m\angle B = 90$
2. What observation(s) can be made regarding the sine and cosine of angles A and B ?

SINE OF AN ACUTE \angle IS
 EQUAL TO THE COSINE OF ITS
 COMPLEMENTARY \angle .

3. Fill the table with the trigonometric values for each acute angle measure

	θ						
	0°	20°	30°	45°	60°	70°	90°
Sin θ	0.0000	0.3420	0.5000	0.7071	0.8660	0.9396	1.0000
Cos θ	1.0000	0.9396	0.8660	0.7071	0.5000	0.3420	0.0000

Does the table support your observations in #2?

YES

$m \angle A = 90 - m \angle B$
 Comp of $\theta = 90 - \theta$

4. Summarize your findings: $\sin \theta = \cos(90 - \theta)$ or $\cos \theta = \sin(90 - \theta)$

5. Now look at the table of values on the separate sheet of paper. Does this confirm your findings?

RATIOS = \leftrightarrow \angle 'S COMPLEMENTARY

Types of Problems:

- Given two trig ratios are equal such as $\cos(\) = \sin(\) \rightarrow$ set the two angle measures sum to 90°
- Given angle measures are complementary such as $\cos \alpha = \frac{\square}{\square}$ and $\sin \beta = \frac{\square}{\square} \rightarrow$ set the two trig ratios equal

Practice

$\sin \alpha = \cos \beta$ iff $\alpha + \beta = 90^\circ$ (α & β are complementary)

1. Solve the following.

a) $\sin 42^\circ = \cos 48^\circ$
 $42 + x = 90$

b) $\cos 12^\circ = \sin x^\circ$
 $12 + x = 90$
 $x = 78$

c) $\sin 45^\circ = \cos 45^\circ$
 $45 + x = 90$

d) $\cos 0^\circ = \sin 90^\circ$
 $0^\circ + x = 90^\circ$
 $x = 90^\circ$

e) $\cos 65^\circ = \sin _____\circ$
 $______ + ______ = 90^\circ$

f) $\sin 78.5^\circ = \cos _____\circ$
 $______ + ______ = 90^\circ$

2. Find the value of x . All problems are in degrees.

A. $\sin(x)^\circ = \cos 31^\circ$

$$\begin{aligned} \underline{x} + \underline{31^\circ} &= 90^\circ \\ x &= 59^\circ \\ \sin 59^\circ &= .8571\dots \\ \cos 31^\circ &= .8571\dots \end{aligned}$$

B. $\sin 75^\circ = \cos(x)^\circ$

$$\begin{aligned} \underline{75^\circ} + \underline{x} &= 90^\circ \\ x &= 15^\circ \\ \sin 75^\circ &= \cos 15^\circ \\ 0.9659\dots &= 0.9659\dots \end{aligned}$$

C. $\cos(2x)^\circ = \sin 30^\circ$

$$\begin{aligned} \underline{2x} + \underline{30} &= 90^\circ \\ 2x &= 60 \\ x &= 30 \\ \cos 60^\circ &= \sin 30^\circ \\ 0.5 &= 0.5 \end{aligned}$$

3. Solve for the unknown. All problems are in degrees.

a) $\sin(x-5)^\circ = \cos 35^\circ$

b) $\sin(2x-17)^\circ = \cos(x-4)^\circ$

$\sin 45^\circ = \cos 45^\circ$
 $0.7077 = 0.7077$
 c) $\sin(x) = \cos(x)$

$$\begin{aligned} \underline{2x-17} + \underline{x-4} &= 90^\circ \\ \underline{3x-21} &= 90 \\ 3x &= 111 \end{aligned}$$

$$\begin{aligned} \underline{x} + \underline{x} &= 90^\circ \\ 2x &= 90 \\ x &= 45^\circ \end{aligned}$$

d) $\sin\left(\frac{3}{4}x\right) = \cos\left(\frac{1}{4}x\right)$

e) $\sin(5x-22)^\circ = \cos(x-10)^\circ$

f) $\sin\left(\frac{3}{4}x-3\right) = \cos 66^\circ$

$$\begin{aligned} \underline{\frac{3}{4}x} + \underline{\frac{1}{4}x} &= 90^\circ \\ 1x &= 90^\circ \\ x &= 90^\circ \end{aligned}$$

$$\begin{aligned} \underline{\frac{3}{4}x-3} + \underline{66} &= 90^\circ \\ \frac{3}{4}x + 63 &= 90^\circ \\ \frac{3}{4}x &= 27^\circ \left(\frac{4}{3}\right) \\ x &= 36^\circ \end{aligned}$$

$$\sin 24^\circ = \cos 66^\circ$$

4. Given right triangle ABC with right angle C, solve for x:

A. $\sin 75^\circ = 3x$; $\cos 15^\circ = 5x - 8$

75°
 $+ 15^\circ$ COMPL
 $\frac{90^\circ}{\checkmark}$ CO-FUNCTIONS
 RATIOS =

$$3x = 5x - 8$$

$$8 = 2x$$

$$4 = x$$

B. $\cos 45^\circ = 8x - 6$; $\sin 45^\circ = 3x + 4$

45°
 $+ 45^\circ$
 $\frac{90^\circ}{\checkmark}$

$$8x - 6 = 3x + 4$$

$$5x = 10$$

$$x = 2$$

Geometry Homework 8-7R/8-8LAB

Name _____ Section _____

Complementary Sine & Cosine and Practice Problems

For problems 1-8, find the value of x. All problems are in degrees.

1. $\sin(2x + 14) = \cos(x - 5)$

2. $\sin(x) = \cos(x + 10)$

3. $\sin(x) = \cos(x - 40)$

4. $\sin(x) = \cos(x)$

5. $\sin\left(\frac{x}{3} + 30\right) = \cos(x)$

6. $\sin(x) = \cos 60^\circ$

7. $\sin 50^\circ = 2x - 27$; $\cos 40^\circ = 13$

8. $\sin 20^\circ = x^2$; $\cos 70^\circ = 8x - 16$

Attachments

Bridge to 8.docx

Quiz 1 L.pdf