



Field Goal for the Win

Pre-Assignment Activity

TEACHER NOTES

Main objective: students are to understand that sin and cos values are decimal numbers between 0 and 1.

Part One: An activity to help understand what sine and cosine means.

You will need a scientific or graphing calculator to complete this page.

The mathematics behind the kicking of a football involves two values, called the cosine (pronounced “COH-sign”) of an acute angle and the sine (pronounced “sign”) of an acute angle.

For our purposes, we will only consider angles that are whole numbers.

The cosine of an angle is abbreviated with three letters: cos, but it is still pronounced as ‘cosine’.

The sine of an angle is abbreviated with three letters: sin, but it is still pronounced as ‘sine’.

For example: $\cos(38^\circ)$ or $\cos(38)$ is read as “the cosine of 38 degrees”.

$\sin(57^\circ)$ or $\sin(57)$ is read as “the sine of 57 degrees”.

$\cos(A)$ is read as “the cosine of angle A”.

The cosine and sine values are decimals that a scientific or graphing calculator can calculate and display. Let’s investigate those values.

First make sure that your calculator is in DEG (degree) mode.

If using a TI-83 or TI-84, press the **[mode]** key and look.



On the home screen of a TI-83 or TI84 press **[2nd]** **[mode]** **[quit]** to evaluate the cosine of 20 degrees, $\cos(20)$, type the following:

Press the **[cos]** key, then 20, then the right parenthesis **)**, then **[enter]**.

Therefore, the cosine of 20 degrees is equal to the decimal 0.9396926208.

On other calculators, the procedure is similar and you may get fewer or more digits in your answer.

Use your calculator to evaluate the values in the table below and write your answers with as many digits as your calculator displayed in the table below. Look for patterns.

Measure of angle A	$\cos(A)$	$\sin(A)$
1°	0.9998476952	0.0174524064
20°	0.9396926208	0.3420201433
30°	0.8660254038	0.5
45°	0.7071067812	0.7071067812
60°	0.5	0.8660254038
70°	0.3420201433	0.9396926208
89°	0.0174524064	0.9998476952

Based on the values in the table, answer the following questions:

1. As the measure of the angle gets larger, the value of the cosine of the angle gets smaller (decreases).

2. As the measure of the angle gets larger, the value of the sine of the angle gets larger (increases).

3. Between what two whole numbers are the cosine and sine values? Between 0 and 1.

4. Look at the value for the $\cos(1^\circ)$.

Where else in the table do you see that same value? $\sin(89^\circ)$ has the same value as $\cos(1^\circ)$.

5. Look at the value for the $\sin(1^\circ)$.

Where else in the table do you see that same value? $\cos(89^\circ)$ has the same value as $\sin(1^\circ)$.

6. Are there any other places where you see the same values twice? Yes, several places.

7. When the values are equal, what seems to be true about the angles? The sum of the measures of the angles is 90° . The angles are complementary. Note: the angles don't 'equal 90° ', they add up to 90° .