

Sine, Cosine , and Tangent of Obtuse Angles

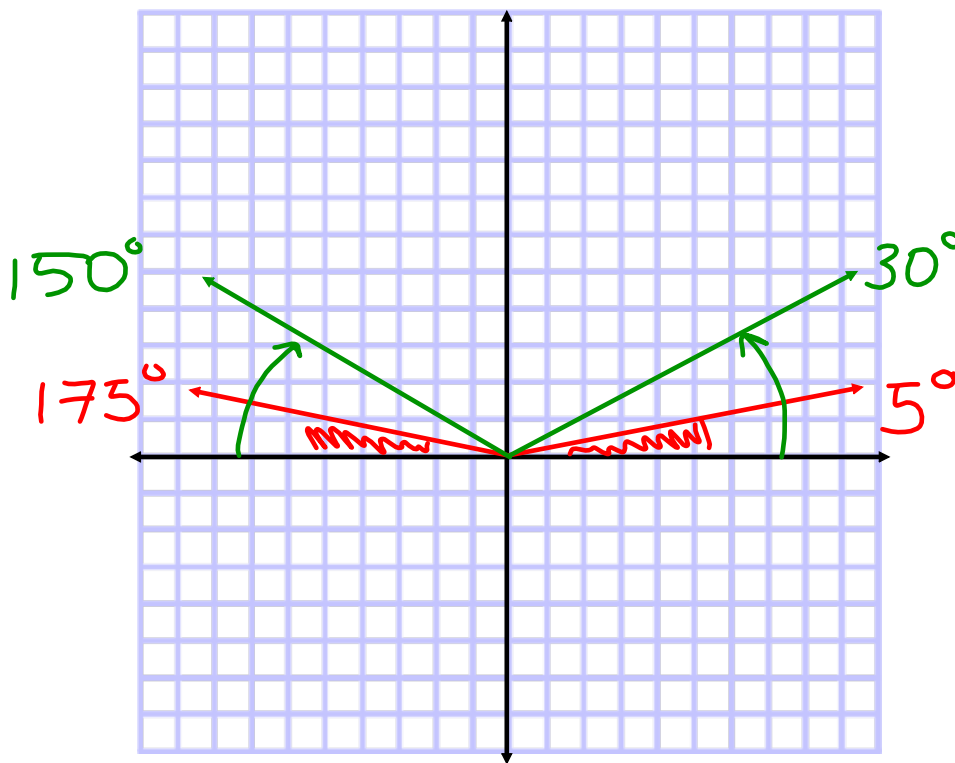
Learning Goals

- investigate measures of obtuse angles
- find and use rules to determine obtuse angles

1. Use your calculator to find the value of each of the following primary trigonometric ratios.
2. Make sure you note if the values are positive or negative.

Primary Angle, B	$\sin B$	$\cos B$	$\tan B$
5°	0.087	0.996	0.087
10°	0.174		
25°	0.423		
30°	0.5		
89°	0.9998		
91°	0.9998		
150°	0.5		
155°	0.423		
170°	0.174		
175°	0.087	-0.996	-0.087

3. Draw the angles on the graph paper. (5° , 175° , 30° , 150°)



1. What do you notice about the signs of Sin B?

$$0^\circ \rightarrow 180^\circ \Rightarrow (+)$$

2. What do you notice about the values of Sin B?

repeat

3. What do you notice about the signs of Cos B?

$$0^\circ - 90^\circ \Rightarrow (+) \quad 90^\circ - 180^\circ \Rightarrow (-)$$

4. What do you notice about the values of Cos B?

repeat

5. What do you notice about the signs of Tan B?

$$0^\circ - 90^\circ \Rightarrow (+) \quad 90^\circ - 180^\circ \Rightarrow (-)$$

6. What do you notice about the values of Tan B?

repeat

For angles (5° and 175°)

Are the values for Sin B the same? *yes*

Does that also work for Cos B and Tan B?

same value but a different sign

How are the angles related to each other?

The distance (angle) away from the x-axis.

Are there any other pairs of angles where you notice the same things?
Which ones?

*$10^\circ \rightarrow 170^\circ$
 $25^\circ \rightarrow 155^\circ$
 $30^\circ \rightarrow 150^\circ$
 $89^\circ \rightarrow 91^\circ$*

Why is this important?

$$\sin 5^\circ = 0.087$$

$$\sin 175^\circ = 0.087$$

Try going backwards...

$$\sin \theta = 0.087$$

$$\sin^{-1}$$

$$\theta = 5^\circ$$

Summary

Acute angle - calculator gives you the answer

Obtuse angle

Sin $180 - A$ $180^\circ - 5^\circ = 175^\circ$

Cos calculator gives you the answer

Tan $180 + A$

↑
answer given by
the calculator

Ex 3) The measure of $\angle N$ is between 0° and 180° . Determine all possible measures of $\angle N$.

a) $\tan N = -0.5407$

$$\tan^{-1}$$

$$N = -28^\circ$$

$$\begin{aligned} \tan &\Rightarrow 180^\circ + \text{Ans} \\ &= 180^\circ + (-28^\circ) \\ &= 152^\circ \end{aligned}$$

b) $\sin N = 0.8290$

$$\sin^{-1}$$

$$N = 56^\circ$$

$$\begin{aligned} \textcircled{*} \text{ Obtuse angle} \\ &180^\circ - \text{Ans} \\ &= 180^\circ - 56^\circ \\ &= 124^\circ \end{aligned}$$

On the Boards...

1. Find the angle for the following. (some may have 2)

$$\sin A = 0.8$$

$$A_1 = 53^\circ$$

$$A_2 = 127^\circ$$

$$\sin B = 0.3$$

$$B_1 = 17^\circ$$

$$B_2 = 163^\circ$$

$$\cos C = 0.5$$

$$C = 60^\circ$$

$$\cos D = -0.7$$

$$D = 134^\circ$$

$$\tan E = 0.27$$

$$E = 15^\circ$$

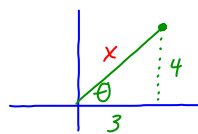
$$\tan F = -2.75$$

$$F = -70^\circ$$

$$\rightarrow F = 110^\circ$$

2. Sketch the point (3,4) on an x-y-axis.

- Draw a line to the x-axis to make a triangle
- Find the length of each side
- Find all primary trigonometric ratios
- Find the angle at the origin



$$3^2 + 4^2 = x^2$$

$$9 + 16 = x^2$$

$$25 = x^2$$

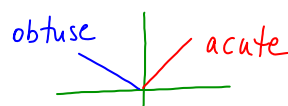
$$5 = x$$

$$\sin \theta = \frac{4}{5} \quad \cos \theta = \frac{3}{5} \quad \tan \theta = \frac{4}{3}$$

$$\Rightarrow \theta = 53^\circ$$

Do we need to find the obtuse angle?

No, because the angle is in the 1st quadrant.



Seatwork

pg 19 # 1-6

pg 23 # 1, 4, 7