# Alg. 2-BE | Tuesday 1-5-10

**Recall:** (A) the *domain* of a *function* are the values of the first number in the set of ordered pairs. In other words, the "x" in (x, y).

(B) in some functions "x" is any real number, in other functions, "x" may be restricted in some way.

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① $y = f(x) = 2x + 3$ domain = ?

② $y = f(x) = \sqrt{x}$ domain = ?

③ $y = f(x) = \frac{1}{x-2}$ domain = ?

④ $y = f(\theta) = \sin(\theta)$ domain = ? *Tip:* look at trig. table

$\theta$ in degrees

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See the problem? We only know $\sin(\theta)$ for $0 \leq \theta \leq 90$ degrees.

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We want to define $y = \sin(\theta)$ for ANY $\theta$

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THE "UNIT CIRCLE" – A powerful tool.

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unity = 1

∴ UNIT CIRCLE = Circle WITH A radius of 1

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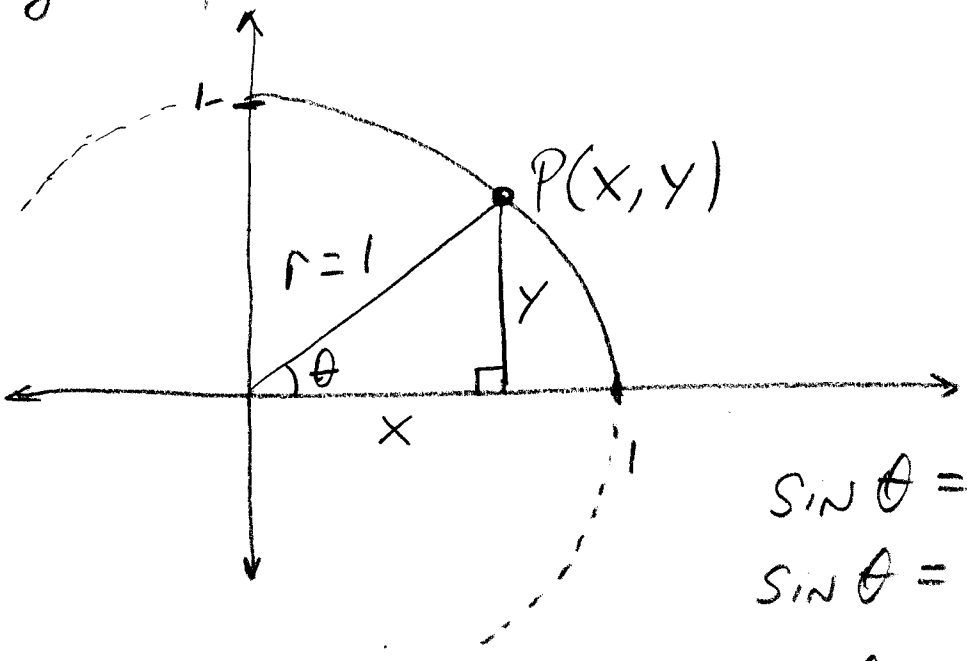
Why so powerful?




$\sin\theta = ?$

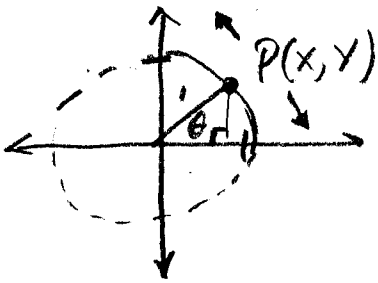
$\sin\theta = \frac{y}{1} = y$

$\cos\theta = \frac{x}{1} = x$

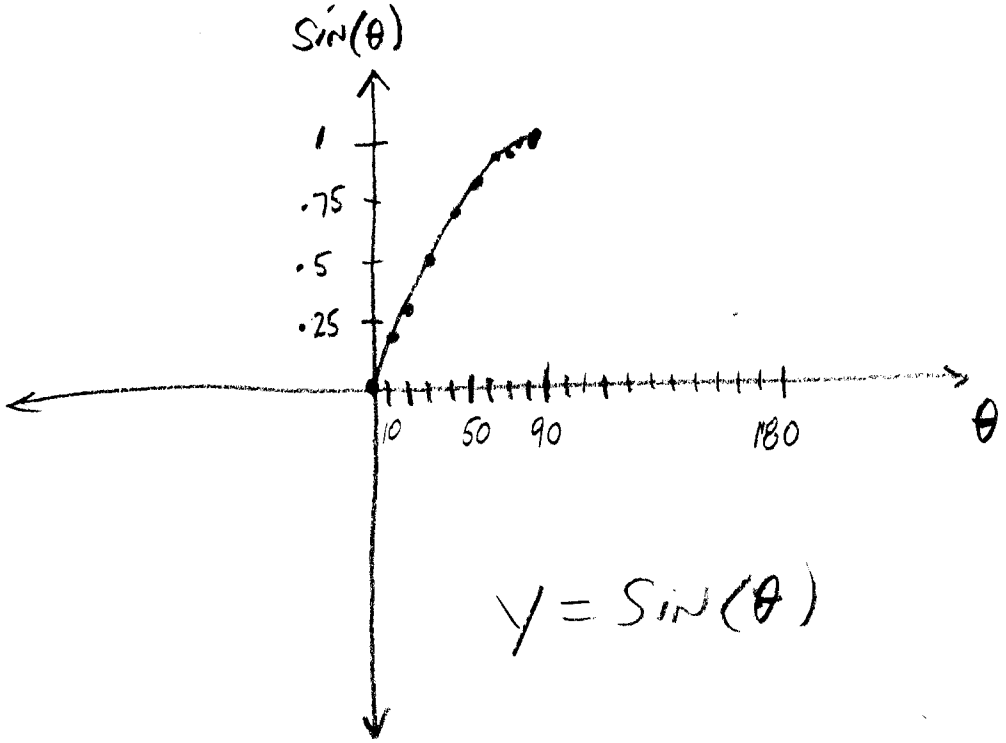
# Lets graph $y = \sin(\theta)$ in Quadrant I

How?

| $\theta$ | $Y = \sin(\theta)$ |
|---|---|
| 0 | 0 |
| 10 | .2 |
| 20 | .3 |
| 30 | .5 |
| 40 | .7 |
| 50 | .8 |
| 60 | .9 |
| 70 | .9 |
| 80 | 1.0 |
| 90 | 1.0 |

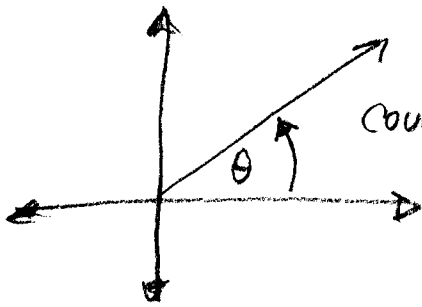



How does Y change as P goes from 0 to 1?



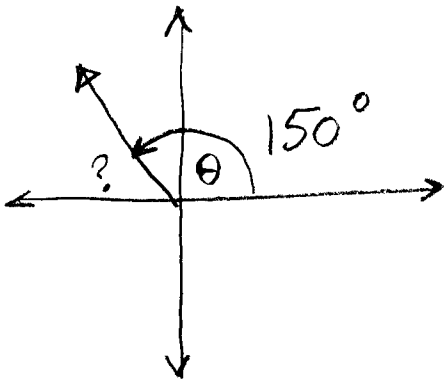

$y = \sin(\theta)$

To get values for $y = \sin(\theta)$ for $\theta$ that is $> 90^\circ$, we need to Agree on a way to measure angles.



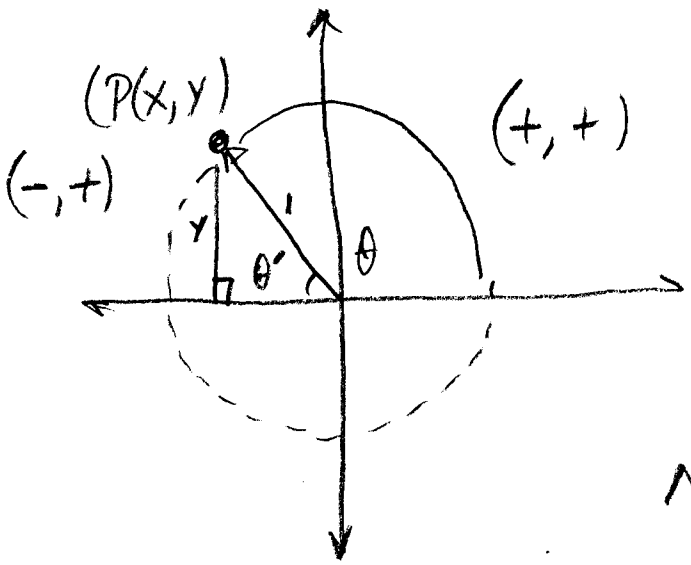

counterclockwise is a positive angle

x is the reference side




? = reference angle

$\theta'$ = reference angle = $30^\circ$




USING THE UNIT CIRCLE where $y = \sin(\theta)$

$y = \sin(\theta) = \sin(\theta')$

$\therefore \quad \sin(150^\circ) = \sin(30^\circ)$

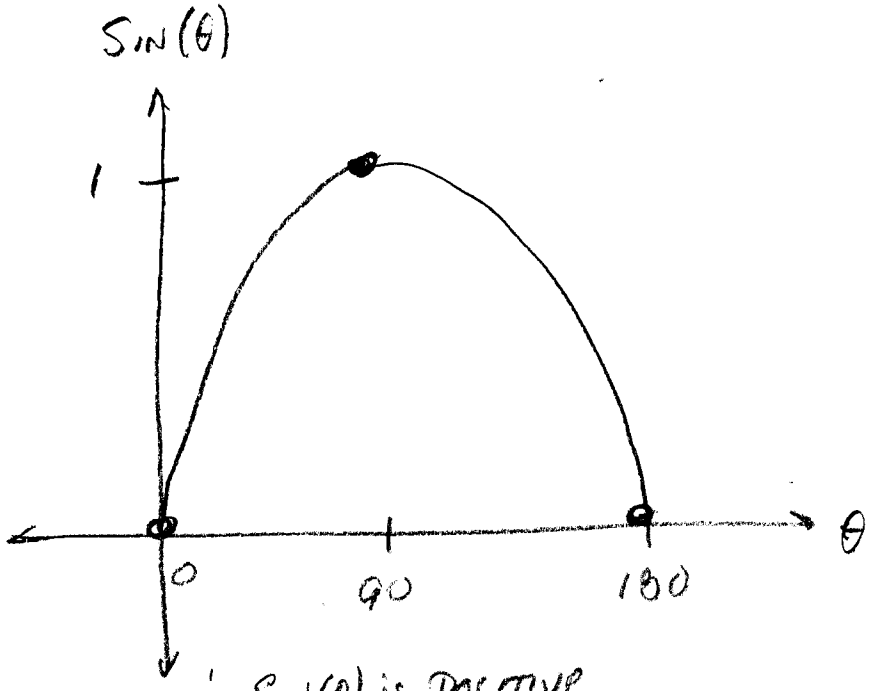
NOTE: y is + in Quadrant II

What does the graph of $y = \sin(\theta)$ look like for $90 < \theta \leq 180$ ?

Recall:

| $\theta$ | $\sin(\theta)$ |
|---|---|
| 0 | 0 |
| 10 | .2 |
| 20 | .3 |
| 30 | .5 |
| 40 | .7 |
| 50 | .8 |
| 60 | .9 |
| 70 | .9 |
| 80 | 1.0 |
| 90 | 1.0 |

| | | |
|---|---|---|
| 100 | 1.0 | $\theta' = 80$ |
| 110 | .9 | $\theta' = 70$ |
| 120 | .9 | $\theta' = 60$ |
| 130 | .8 | $\theta' = 50$ |
| 140 | .7 | $\theta' = 40$ |
| 150 | .5 | $\theta' = 30$ |
| 160 | .3 | $\theta' = 20$ |
| 170 | .2 | $\theta' = 10$ |
| 180 | 0 | $\theta' = 0$ |

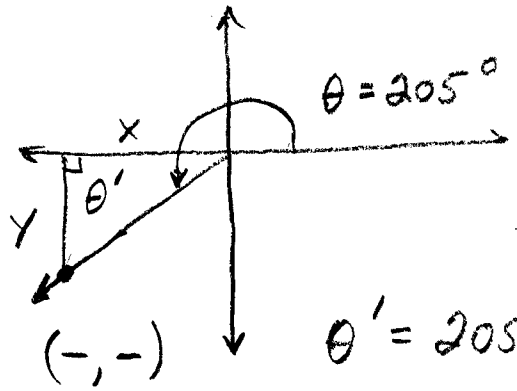



SIN(θ) is positive in Quadrants I and II.

WHAT ABOUT QUADRANT III ANGLES?

$180° < \theta < 270°$

(Ex)



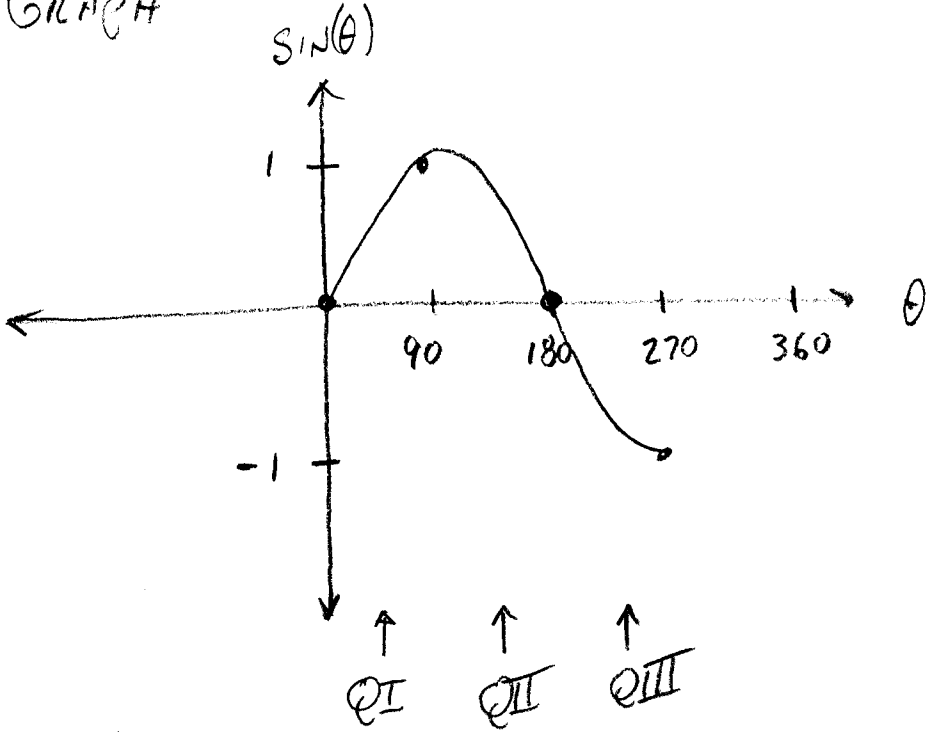

$\theta' = 205 - 180$

$\theta' = 25°$

BUT $y$ is (−) IN QUADRANT III

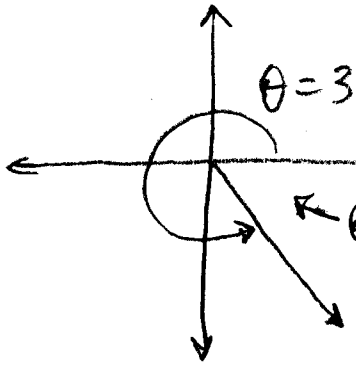
$\therefore \sin(205) = -\sin(25) = -.4226$

GRAPH?



QUADRANT IV ? $270^\circ < \theta < 360^\circ$

(EX)




NOTE
$+300^\circ = -60^\circ$

$\therefore \quad \sin(300) = -\sin(60) = -.8660$

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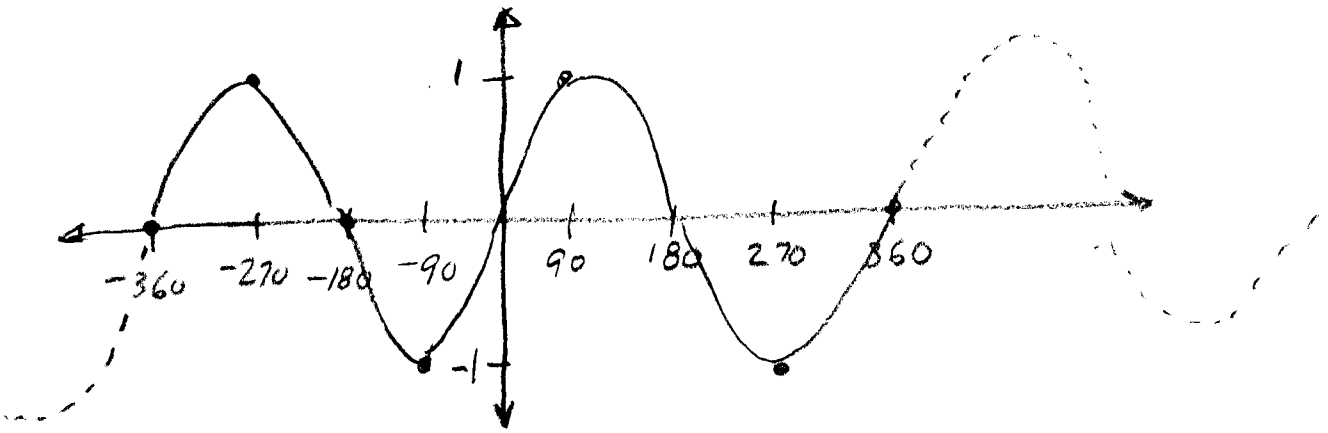
GRAPH of $y = \sin(\theta)$ $\theta$ in degrees




THE $\sin(\theta)$ is A PERIODIC function.

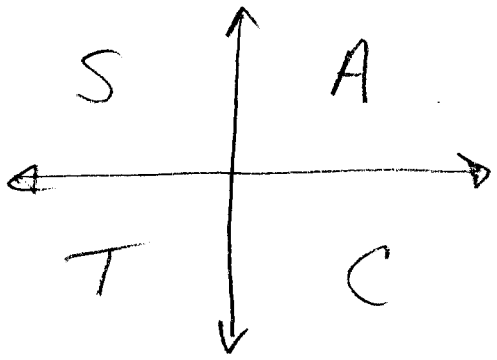
The period is $360^\circ$. IT REPEATS.

DOMAIN = ALL real NUMBERS

RANGE = $-1 \leq y \leq 1$

SINE = from Latin for SINUOUS = CURVY

Famous Memory Aid
(Almost as big as SOHCAHTOA)




A Smart Trig Class

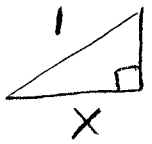
Tell you where the SIN, COS, TAN are ⊕

A ⇒ All ⊕

S ⇒ SIN ⊕

T ⇒ TAN ⊕

C ⇒ COS ⊕

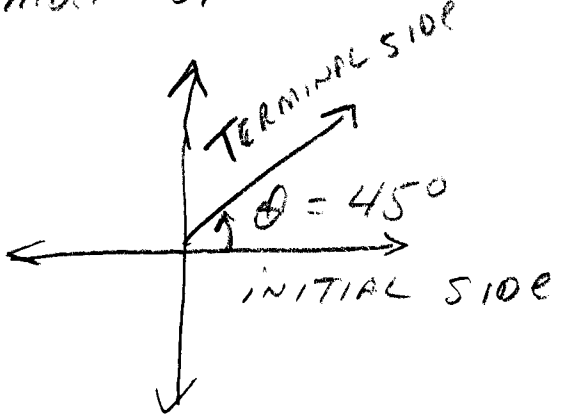



$SIN = \frac{+Y}{1}$

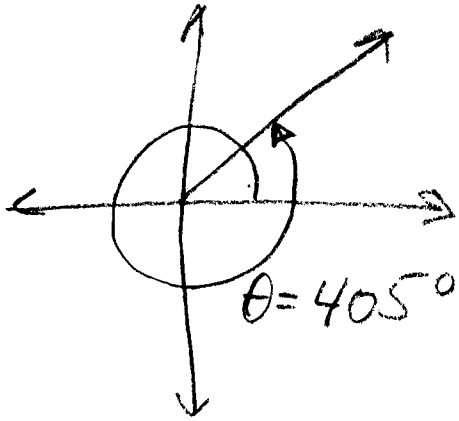
$COS = \frac{+X}{1}$

$TAN = \frac{+Y}{+X}$

Because the angles repeat every 360° any particular angle has an infinite number of co-terminal angles.




OR




OR $\theta = 765^\circ$ OR $\theta = -315^\circ$

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Homework: Ch 13-2

Pg. 712 # 4-7, 14, 15, 17

Ch 13-3

Pg 722 # 7, 9, 10

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