

Before we begin, are there any questions from last day's work? **4.2.4**

(on next 2 slides)

(Wednesday's quiz will be based on this material)

Today's Learning Goal(s):

By the end of the class, I will be able to:

- a) sketch the sine and cosine functions.
- b) determine "any" angle
using the "CAST Rule" with the "raa" (related acute angle).

4.2.4 Practice (The solutions to 3 and 4 are on 4.1.2 from last day)

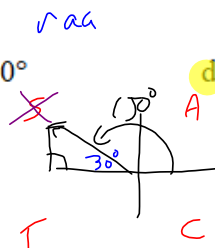
3. Find the exact value of each trigonometric ratio.

a) $\sin 30^\circ$

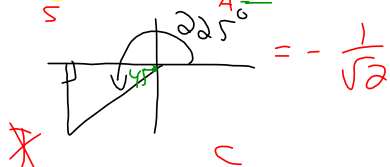
b) $\tan 315^\circ$

c) $\cos 240^\circ$

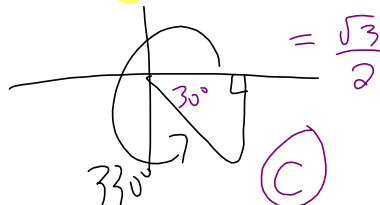
d) $\tan 150^\circ = -\tan 30^\circ = -\frac{1}{\sqrt{3}}$



e) $\cos 225^\circ = -\cos 45^\circ$ f) $\sin 45^\circ$



g) $\cos 330^\circ = \pm \cos 30^\circ$ h) $\sin 300^\circ$



4. Find the exact value of each trigonometric ratio.

a) $\sin 225^\circ$

b) $\tan 330^\circ$

c) $\cos 30^\circ$

d) $\cos 315^\circ$

e) $\tan 240^\circ$

f) $\cos 210^\circ$

g) $\sin 150^\circ$

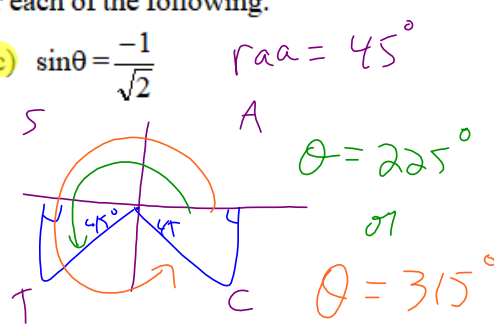
h) $\cos 135^\circ$

5. Use the special angles to determine two possible answers for each of the following.

a) $\cos\theta = \frac{\sqrt{3}}{2}$

b) $\sin\theta = \frac{\sqrt{3}}{2}$

c) $\sin\theta = \frac{-1}{\sqrt{2}}$

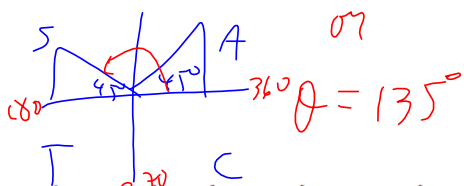


d) $\sin\theta = \frac{1}{\sqrt{2}}$

e) $\cos\theta = \frac{1}{2}$

f) $\sin\theta = \frac{-1}{2}$

Handwritten notes for problem d: $\text{raa} = 45^\circ$, $\theta = 45^\circ$



6. a) Based on the previous question, why are there two values for every stated value?

b) Is this true for all of the stated values? Why or why not?

5a) $30^\circ, 330^\circ$

b) $60^\circ, 120^\circ$

c) $225^\circ, 315^\circ$

d) $45^\circ, 135^\circ$

e) $60^\circ, 300^\circ$

f) $210^\circ, 330^\circ$

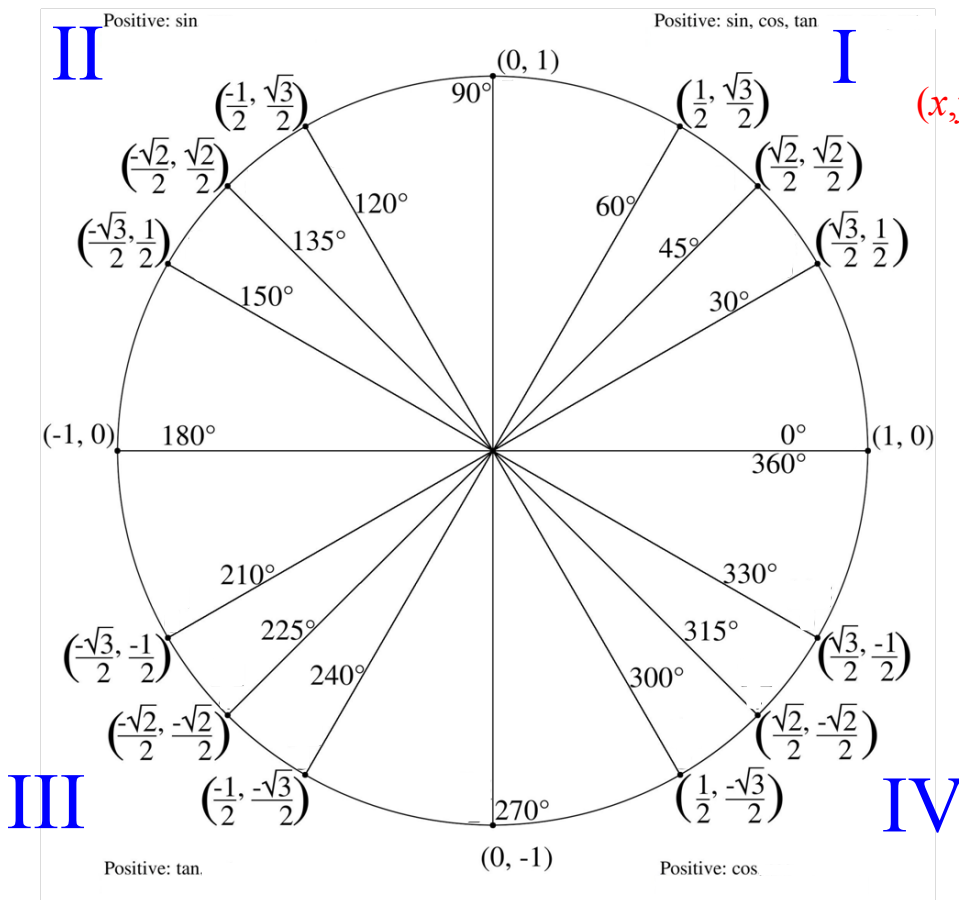
Warm-up

Complete the chart below:
(Did you Memorize it as instructed?)

θ	30°	45°	60°
$\sin \theta$	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$
$\cos \theta$	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$
$\tan \theta$	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$

4.3.1 The Unit Circle

Date: Oct. 28/19



$(x, y) = (\cos\theta, \sin\theta)$

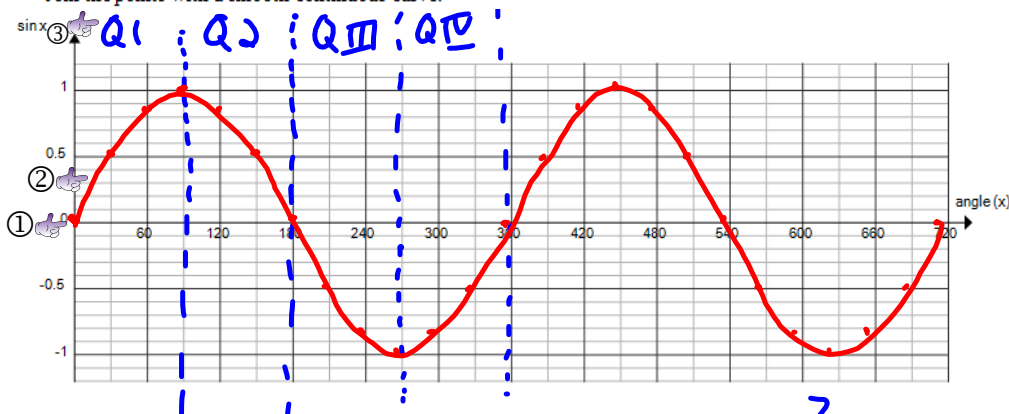
4.3.2 Investigating the Properties of Sinusoidal Functions Date: _____

A. Graphing $y = \sin \theta$ ($y = \sin x$)

1. Complete the table.

Angle θ ($^\circ$)	0	30	60	90	120	150	180	210	240	270	300	330	
Exact value of y ($\sin \theta$)	0	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	
Decimal value of y (2 decimal places)	0	0.5	0.86	1	0.86	0.5	0	-0.5	-0.86	-1	-0.86	-0.5	
	360	390	420	450	480	510	540	570	600	630	660	690	720
Exact value of y ($\sin \theta$)	0	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	0
Decimal value of y (2 decimal places)	0	0.5	0.86	1	0.86	0.5	0	-0.5	-0.86	-1	-0.86	-0.5	0

2. Use the decimal values of $\sin \theta$, and plot the ordered pairs $(\theta, \sin \theta)$ on the grid below. Join the points with a smooth continuous curve.



3. Properties of the function $y = \sin x$

- ④ a) Length of the period: 360° b) Domain: $\{x \in \mathbb{R}\}$
 c) Maximum value of $\sin x$: 1 e) Range: $\{y \in \mathbb{R} \mid -1 \leq y \leq 1\}$
 d) Minimum value of $\sin x$: -1

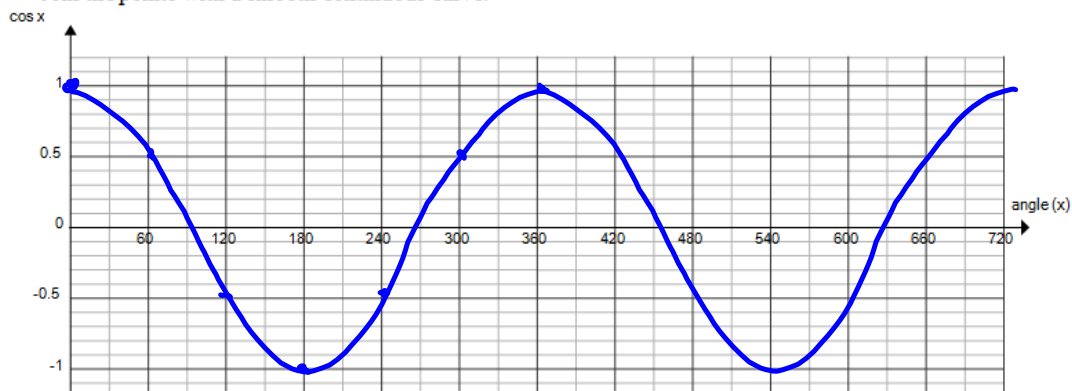
B. Graphing $y = \cos \theta$ ($y = \cos x$)

1. Complete the table.

Angle θ ($^\circ$)	0	30	60	90	120	150	180	210	240	270	300	330	
Exact value of y ($\cos\theta$)	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	0	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	
Decimal value of y (2 decimal places)	1	0.86	0.5	0	-0.5	-0.86	-1	-0.86	-0.5	0	0.5	0.86	
	360	390	420	450	480	510	540	570	600	630	660	690	720
Exact value of y ($\cos\theta$)	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	0	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	1
Decimal value of y (2 decimal places)	1	0.86	0.5	0	-0.5	-0.86	-1	-0.86	-0.5	0	0.5	0.86	1

2. Use the decimal values of $\cos\theta$, and plot the ordered pairs $(\theta, \cos\theta)$ on the grid below.

Join the points with a smooth continuous curve.



3. Properties of the function $y = \cos x$

a) Length of the period: 360°

b) Domain: $\{x \in \mathbb{R}\}$

c) Maximum value of $\cos x$: 1

d) Minimum value of $\cos x$: -1

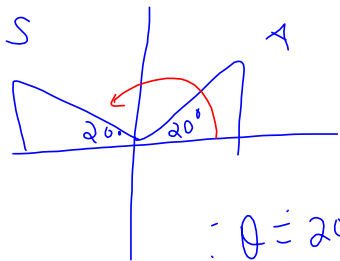
e) Range: $\{y \in \mathbb{R} \mid -1 \leq y \leq 1\}$

4.3.3 Determining the Measure of an Angle from ANY Given Trigonometric Ratio

1. Use each trigonometric ratio to determine all of the values of θ , to the nearest degree, if $0^\circ \leq \theta < 360^\circ$.

a) $\sin\theta = 0.3423$

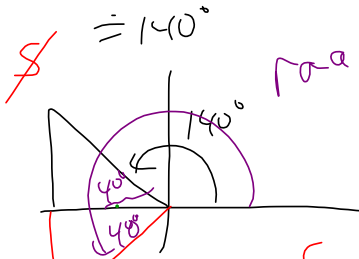
$\theta = \sin^{-1}(0.3423)$
 ≈ 20.01
 $\approx 20^\circ$



$\therefore \theta = 20^\circ$
 or $\theta = 160^\circ$

b) $\cos\theta = -0.766$

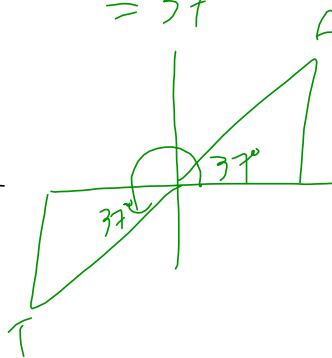
$\theta = \cos^{-1}(-0.766)$
 $\approx 140^\circ$



$\theta = 140^\circ$
 or $\theta = 220^\circ$

c) $\tan\theta = 0.753$

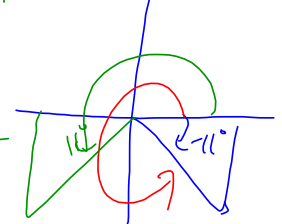
$\theta = \tan^{-1}(0.753)$
 $\approx 37^\circ$



$\theta = 37^\circ$
 or $\theta = 217^\circ$

d) $\sin\theta = -0.1908$

$\theta = \sin^{-1}(-0.1908)$
 $\approx -11^\circ$
 or $\theta = 11^\circ$



$\theta = 349^\circ$
 or $\theta = 191^\circ$

Today's Homework: 4.3.3 #1, 8, 9, 12, 13

(already complete on next slide)

4.3.3 Determining the Measure of an Angle from ANY Given Trigonometric Ratio

1. Use each trigonometric ratio to determine all of the values of θ , to the nearest degree, if $0^\circ \leq \theta < 360^\circ$.

a) $\sin \theta = 0.3423$

$\theta = \sin^{-1}(0.3423)$

$\theta \approx 20.0$

$\approx 20^\circ$ *naa*



or $\theta = 160^\circ$

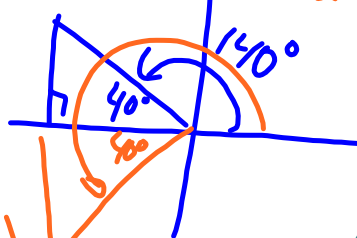
b) $\cos \theta = -0.766$

$\theta = \cos^{-1}(-0.766)$

≈ 139.9

$\approx 140^\circ$

or $\theta = 220^\circ$



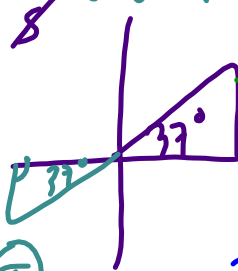
c) $\tan \theta = 0.753$

$\theta = \tan^{-1}(0.753)$

$\approx 36.9^\circ$

$\approx 37^\circ$

or $\theta = 217^\circ$



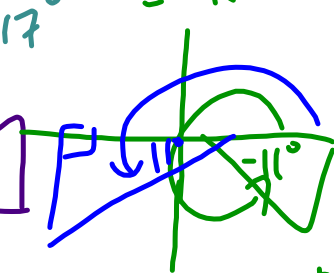
(T)

d) $\sin \theta = -0.1908$

$\theta = \sin^{-1}(-0.1908)$

≈ -10.9

$\approx -11^\circ$



$\therefore \theta = 349^\circ$

or $\theta = 191^\circ$

Today's Homework: 4.3.3 #1, 8, 9, 12, 13

sin θ



- ☞ over 2
- ☞ square root sign
- ☞ fingers away from 0

sin θ
0

$$\frac{\sqrt{0}}{2}$$

0

30

$$\frac{\sqrt{1}}{2}$$

$\frac{1}{2}$

45

$$\frac{\sqrt{2}}{2}$$

60

$$\frac{\sqrt{3}}{2}$$

90

$$\frac{\sqrt{4}}{2}$$

1