https://www.desmos.com/calculator/ie7t023ltt

New Seat Chart

Name or paper on your desk

where
do I sit?

Like a scavenger hunt

HW
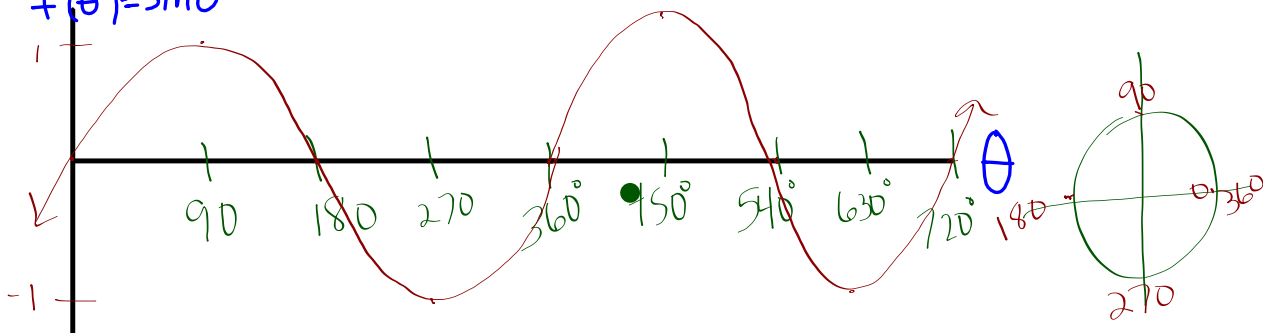Questions

Pick Up
the
Warm Up

Correction:

#4, part 3

missing Angle

measure: 340

Warm Up 7.1.4 day 1

Without using a calculator or your notes, *sketch and label* two cycles of a sine curve

$f(\theta) = \sin\theta$
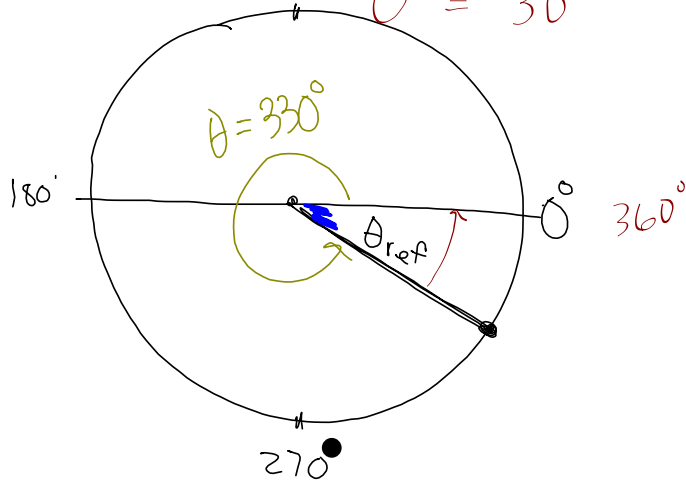
looking at your sketch list the first two $\theta - axis$ intercepts that are greater than 360° $540°$ $720°$

Determine the size of the *reference angles* associated with the following angles of rotation. Draw unit circles with a horizontal midlines to help. (a vertical axis might cause confusion so leave it off)

$\theta = 330°$

$\theta_{ref} = 360° - \theta$

$\theta' = 30°$

$\theta = 330°$

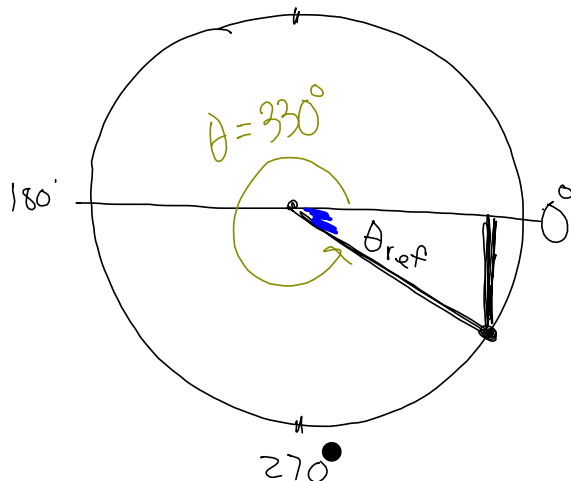θ_{ref}

$180°$

$0°$

$360°$

$270°$

Determine the size of the *reference angles* associated with the following angles of rotation. Draw unit circles with a horizontal midlines to help. (a vertical axis might cause confusion so leave it off)

$\theta = 330°$ $\theta_{ref} = 30°$
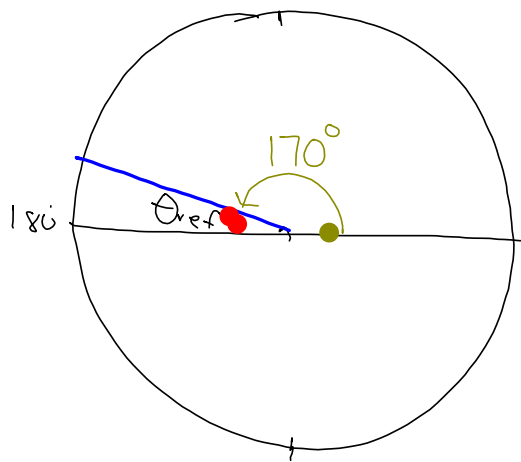
$360° - 330° = 30°$
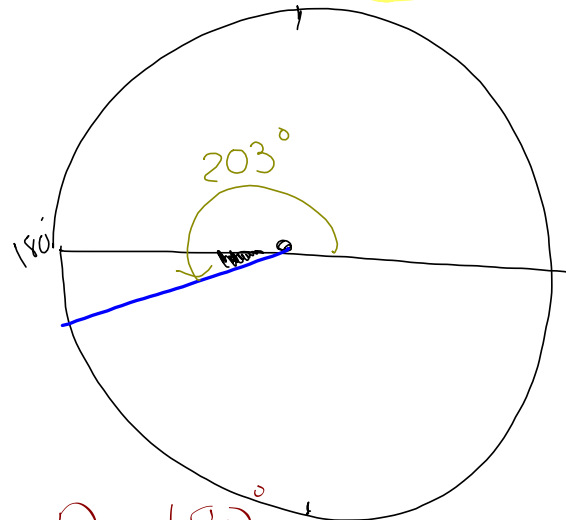
$\theta = 330°$

$180°$

θ_{ref}

$0°$

$270°$

$\theta = 170°$

$\theta_{ref} = 10°$

$170°$

180

θ_{ref}

$180 - \theta$

$\theta = 203°$

$\theta_{ref} = 23°$

$203°$

180

$\theta - 180°$ $270°$

Name another rotation angle
with the same **vertical
height as** as 40°.

via a Sine Graph

$180 - 40 = 140°$

Name another rotation angle with the same **vertical height as** as 250°.

$\theta = 290°$

REV   0°

270°
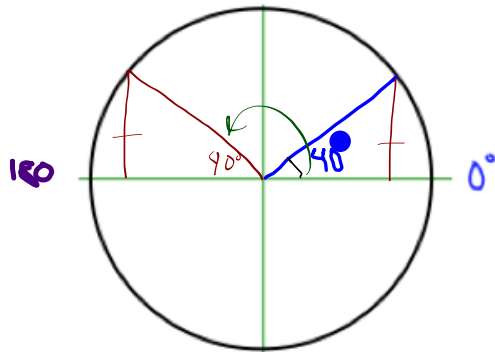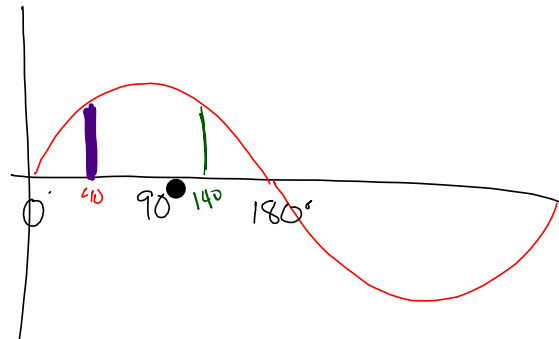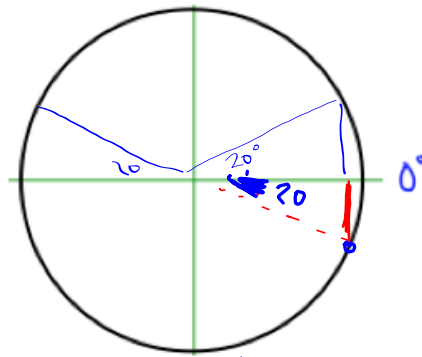
250°
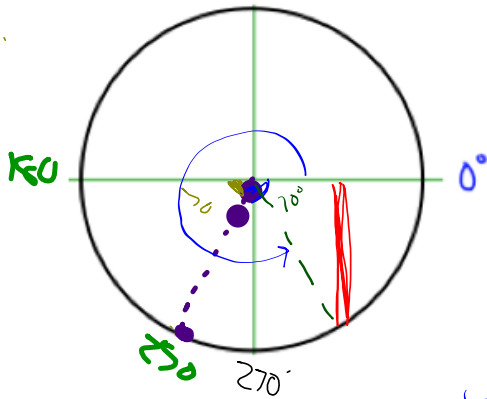
$\begin{array}{r} 360 \\ -70 \\ \hline 290 \end{array}$

tricky -Name an another rotation angle whose **vertical height** is the opposite of the height from a rotation of 340°.
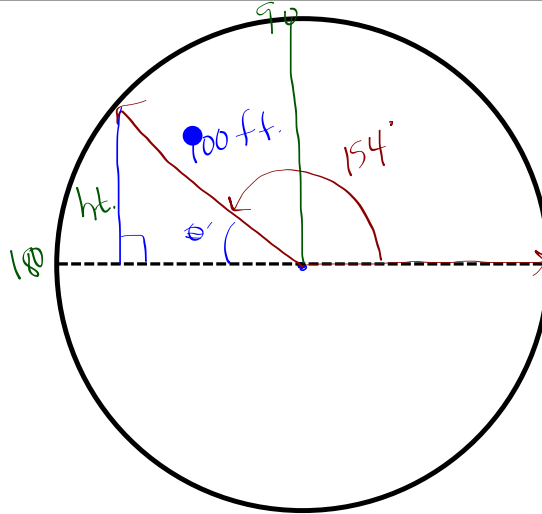
$20°$ or $160°$

0°

180°

$180 - 20° = 160°$

5. Suppose your best friend was stuck on the *Screamer* Ferris Wheel when it had rotated 154°. How high was the climb down to the ground level?
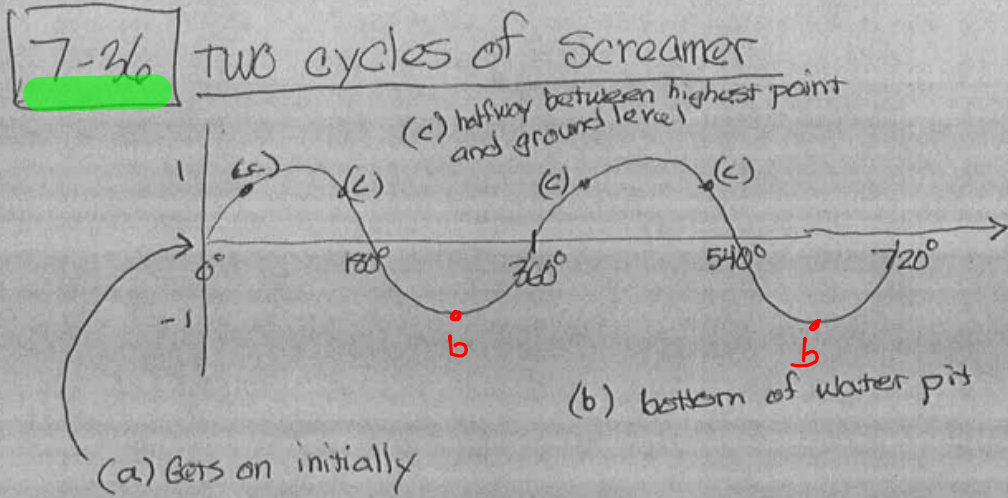

$$180$$
$$- 154$$
$$\theta' = 26°$$

$$\sin 26° = \frac{ht}{100}$$

$$ht = 100 \cdot \sin 26°$$

$$ht \approx 43.8 \text{ ft.}$$

Q on HW

7-36 two cycles of Screamer

(c) halfway between highest point
and ground level

(c)   (c)   (c)   (c)

1

0°   180°   360°   540°   720°

−1

b   b

(b) bottom of water pit
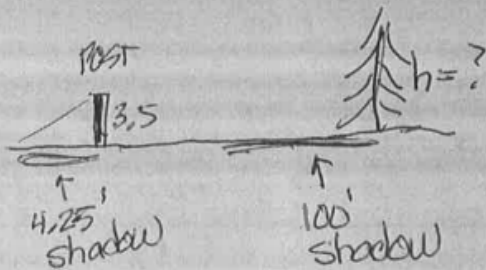
(a) Gets on initially

7-37
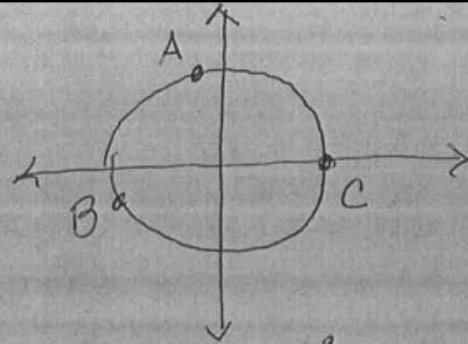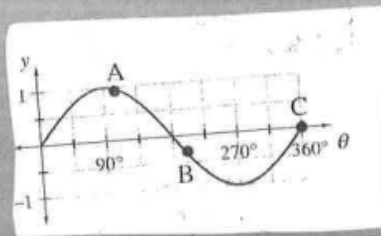
(a) The rider is just past the highest point.

(b) Just below ground

(c) Back to the starting point.

7-38

POST

3.5

↑
4.25'
shadow

↑
100'
shadow

h=?

proportional thinking

$$\frac{3.5}{4.25} = \frac{h}{100}$$

cross multiply

$$h(4.25) = 100(3.5)$$

$$h = \frac{100(3.5)}{4.25} \approx 82.4 \text{ feet}$$

7-40 $y = 3x^2 + 6x + 1$

y-int
Set x=0

x-int (set y=0)

$3x^2 + 6x + 1 = 0$

can't be factored
So use Quadratic
formula

$a = 3 \quad b = 6 \quad c = 1$

$y = 1$

$(0, 1)$

$X = \dfrac{-(6) \pm \sqrt{(6)^2 - 4(3)(1)}}{2(3)}$

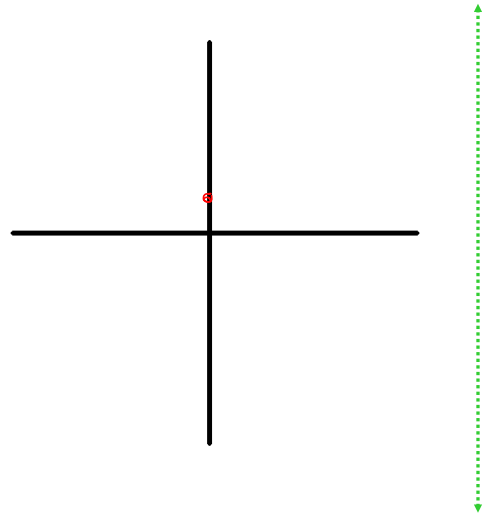$X = \dfrac{-6 \pm \sqrt{24}}{6} = \dfrac{-6 \pm 2\sqrt{6}}{6}$

$\dfrac{2\left[-3 \pm \sqrt{6}\right]}{6} = \dfrac{-3 \pm \sqrt{6}}{3}$

$\left(\dfrac{-3 \pm \sqrt{6}}{3}, \ 0\right)$

41) $y = 3x^2 + 6x + 1$

Sketch

7-44

Forty total pennents $\rightarrow$ $W + C + P = 40$
Five fewer from Washington $\rightarrow$ $W = C - 5$
than California

twice as many Calif. pennants $\rightarrow$ $C = 2P$
than in Pennsylvania

$$P = \frac{C}{2}$$

$W = C - 5$

$$W + C + P = 40$$

$$C - 5 + C + \frac{C}{2} = 40$$

multiply by 2

$2c - 10 + 2c + c = 80$

$5c - 10 = 80$

$5c = 90$

$c = 18$

$w = 18 - 5$

$= 13$

$P = \frac{18}{2} = 9$

18 from California

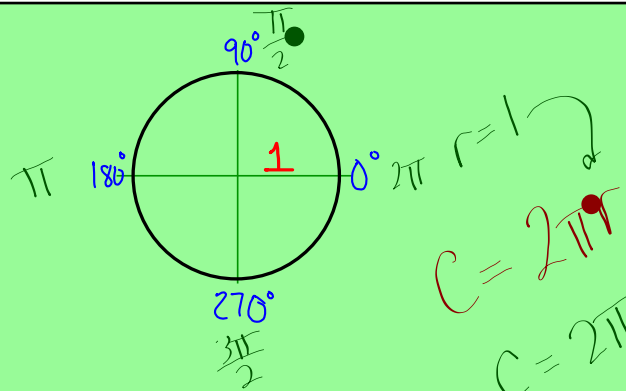13 from Washington

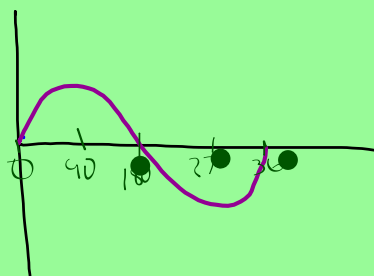9 from Pennsylvania

TODAY Cosine gets involved

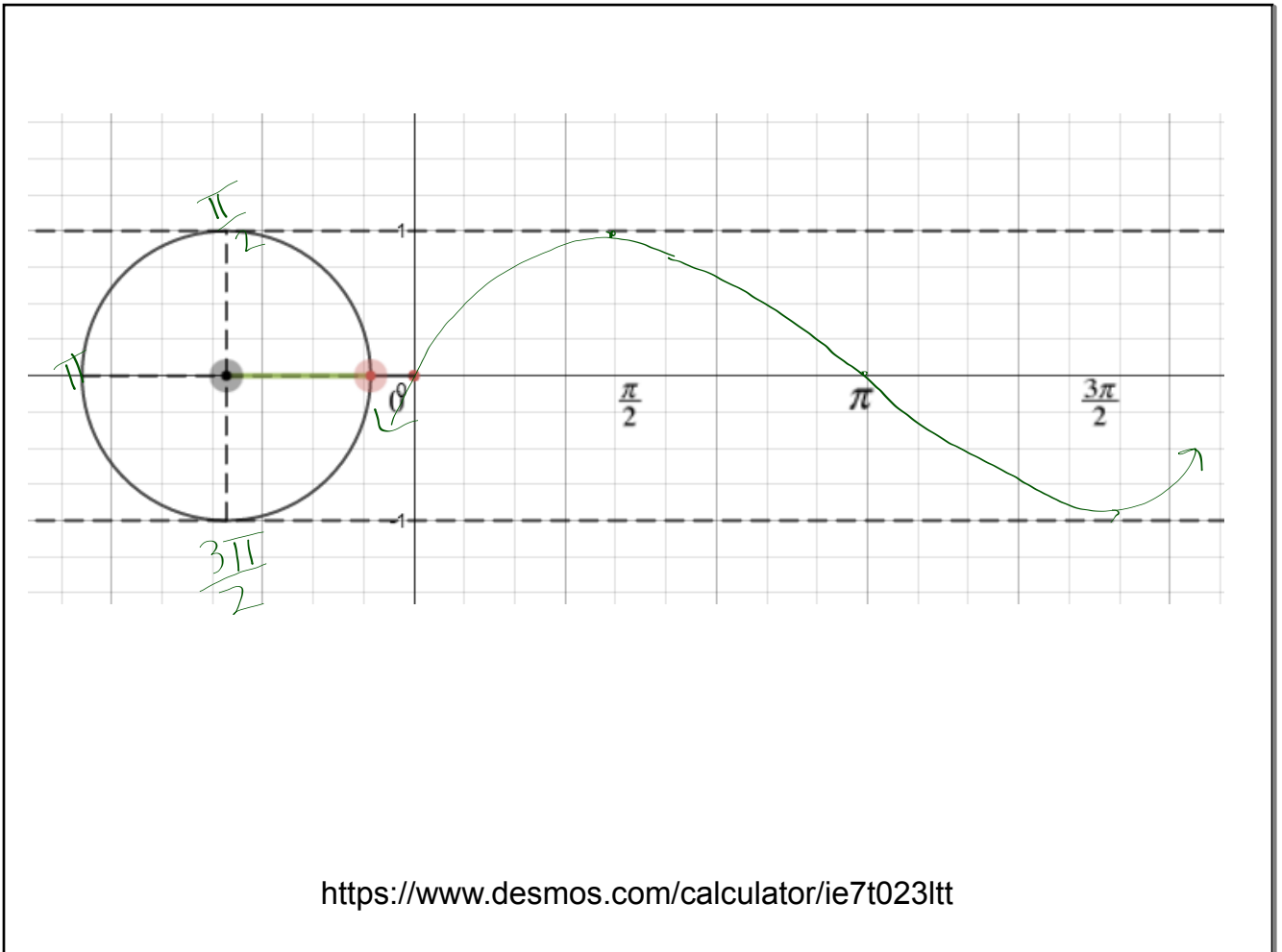Aim: **Generate the Unit Circle Definition of Sine and Cosine**

For the next few minutes,

do not pick up any writing implement of any kind.

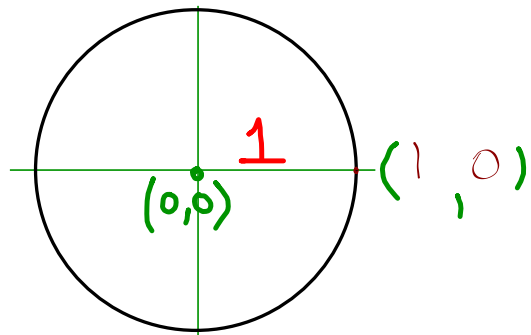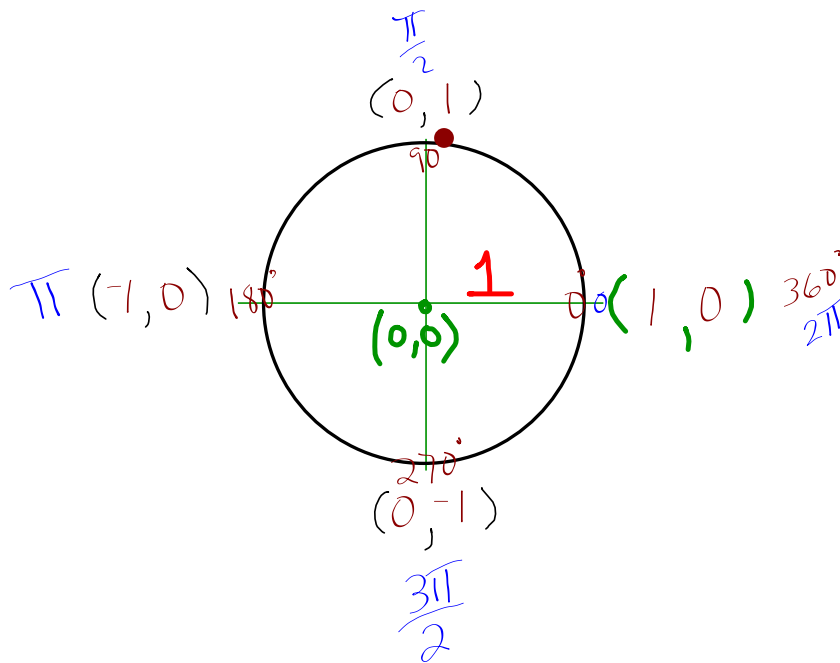We've been working with **UNIT CIRCLES**

and the connection to the **Sine Function**

90° $\frac{\pi}{2}$

180° π

0° 2π

270°

$\frac{3\pi}{2}$

1

$r = 1$

$C = 2\pi r$

$C = 2\pi$

0   90   180   2   3

$\pi/2$

π

$3\pi/2$

0

1

$\frac{\pi}{2}$

π

$\frac{3\pi}{2}$

-1

https://www.desmos.com/calculator/ie7t023ltt

NOTES

$\frac{\pi}{2}$

$(0, 1)$

90

Π $(-1, 0)$ 180

1

$(0,0)$

0 $(1, 0)$ $360°$

2Π

270

$(0, -1)$

$\frac{3\Pi}{2}$

Core Problem

WORK ON $\boxed{7 - 45}$ $\boxed{\text{and } 46}$
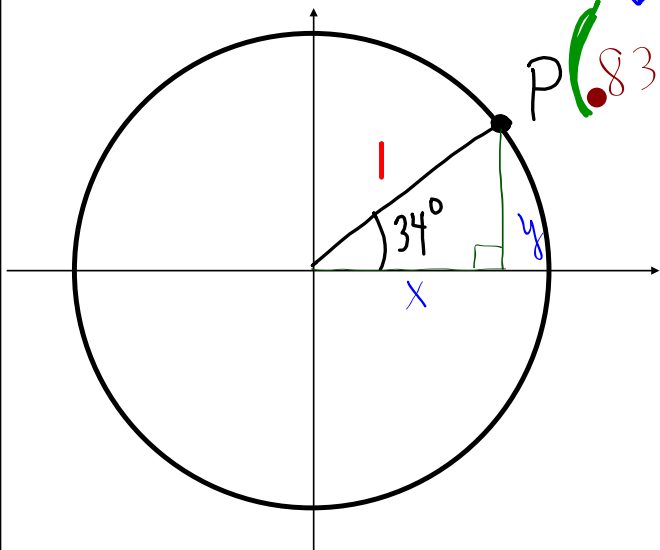
in your notes

p. 327

Find the coordinates accurate to **2** decimal places.

Unit Circle

P(.83, .56)

How can you find ?

Is there more than one way?

SOH-CAH-TOA

$\sin 34° = \dfrac{y}{1}$
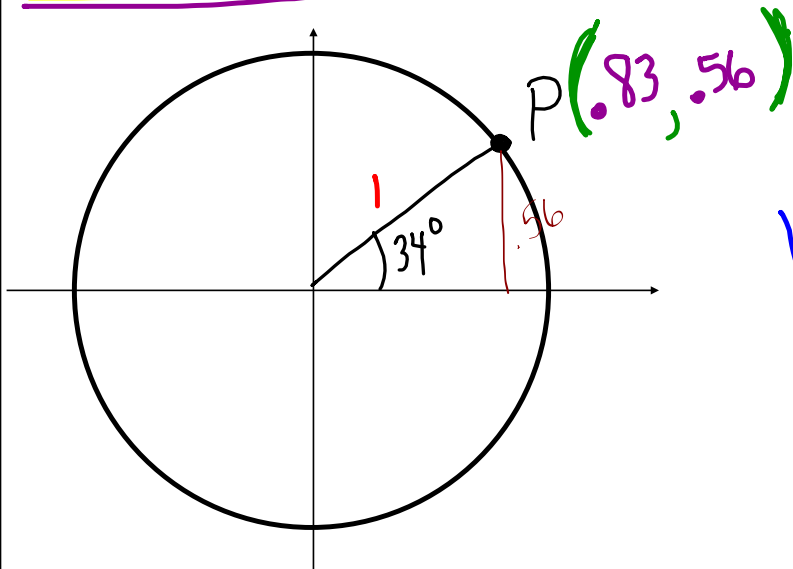
$1 \cdot \sin 34° = y$

$\sin 34° \approx .56$

$\cos 34° = \dfrac{x}{1}$

$\cos 34° \approx .83$

ANSWER 7-45

P(.83, .56)

1

34°

.56

Volunteer to
explain how you
got their answer?

Use sin & cos

Pythagorean
relationship

y

x   y

Vertical distace
from x-axis
(Sine)

P(.83, .56)

1

34°

y

x

X

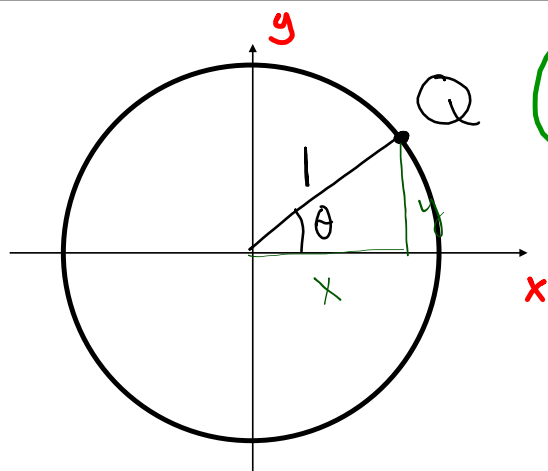Horizontal distance
from y-axis
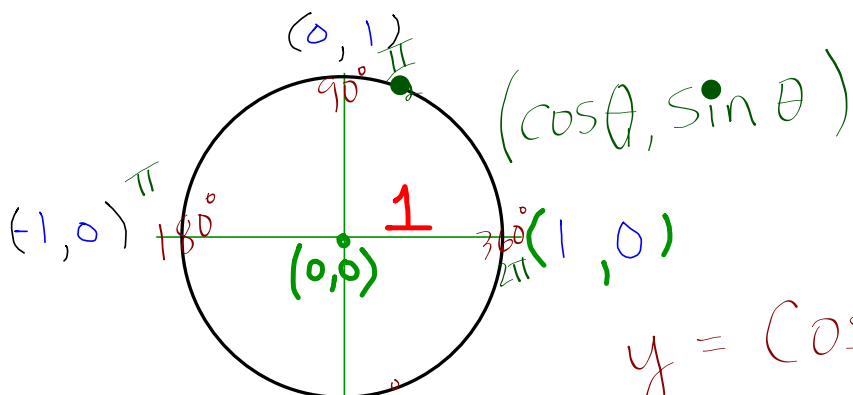(cosine)
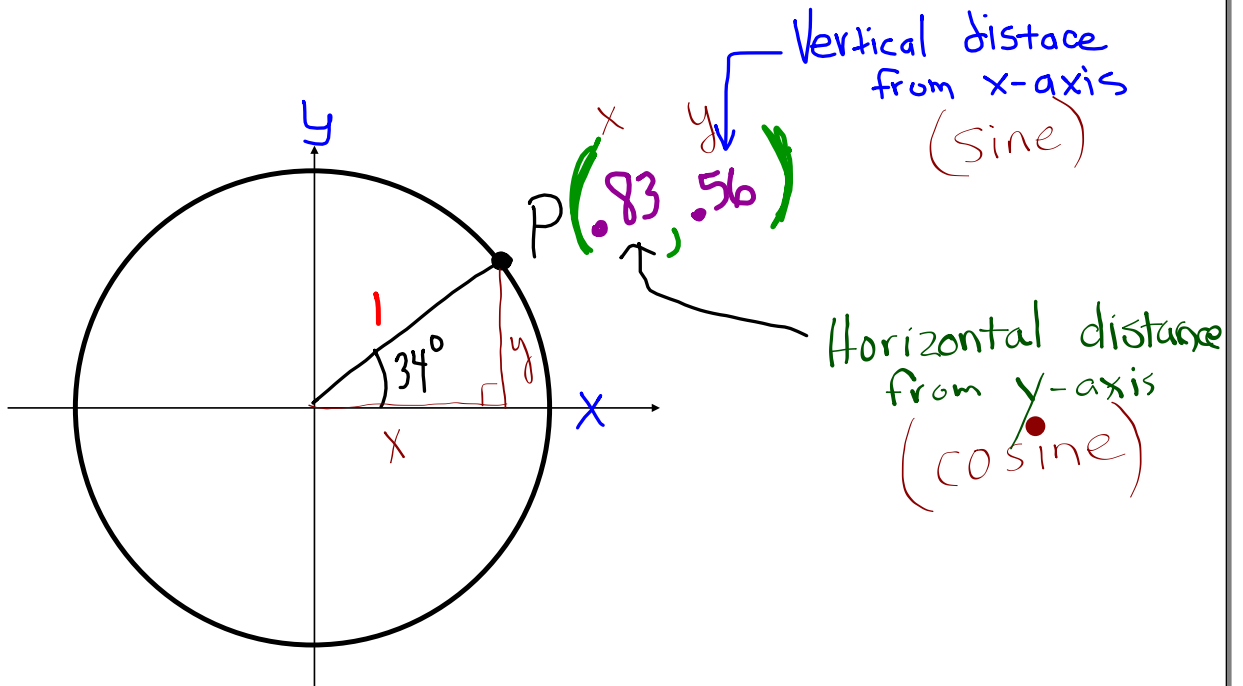
Generalize.. .. .. ..
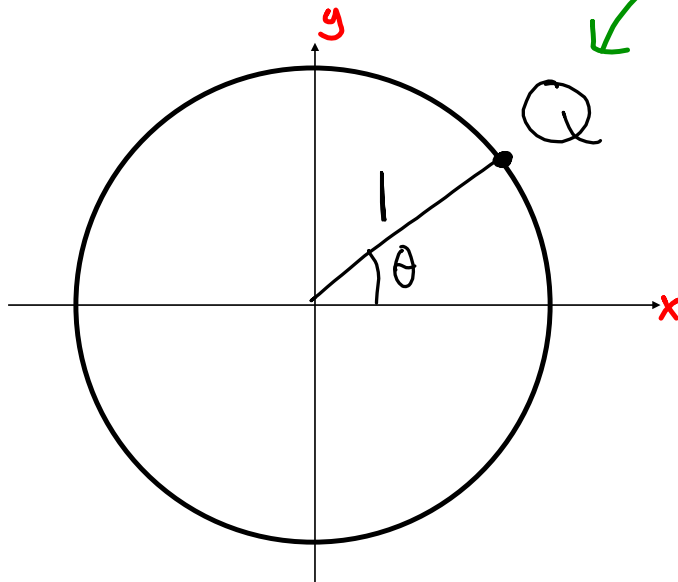
looking for its
coordinates

$Q \quad (\cos \theta, \sin \theta)$

Possible Answers

$(\cos \theta, \sin \theta)$

$\left(\sqrt{1 - \sin^2 \theta}, \sin \theta\right)$

(0, 1)

90°

$(\cos\theta, \sin\theta)$

π

(-1, 0)

180°

1

360°

(1, 0)

(0,0)

270°

$y = \cos\theta$

270°

(0, -1)

$\frac{3\pi}{2}$

1

90°   180°   270°   360

-1
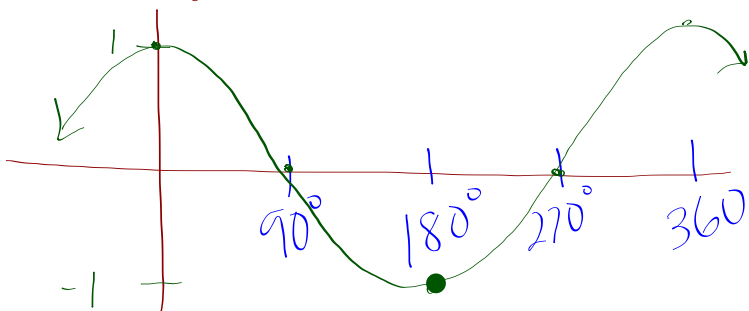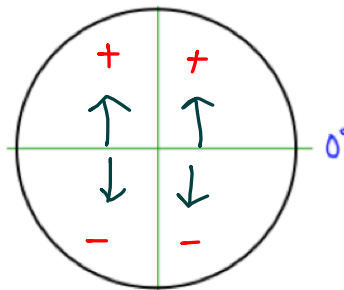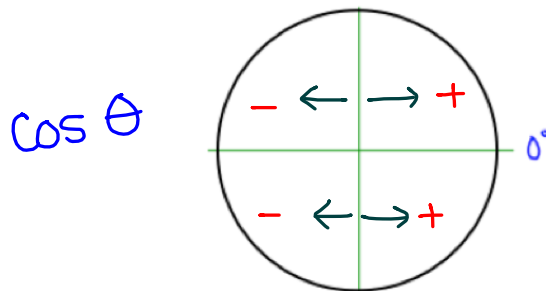
Summary

The **sine** is the **height** (vertical) distance
from the **x-axis**)

$\sin \theta$

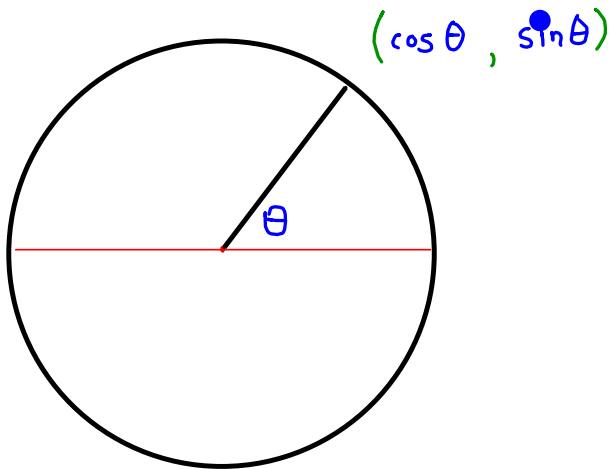The cosine tells you about the horizontal distance from the y-axis.

$\cos \theta$

$0°$

Estimate the
coordinates of

105

0°
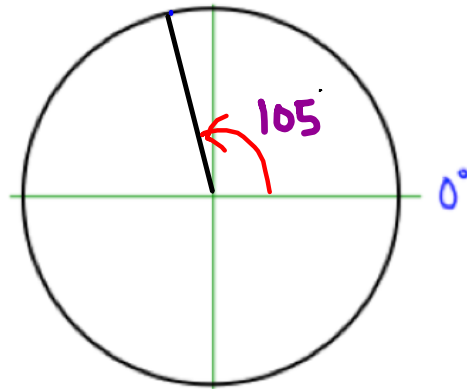
B. B.

The Pythagorean Identity

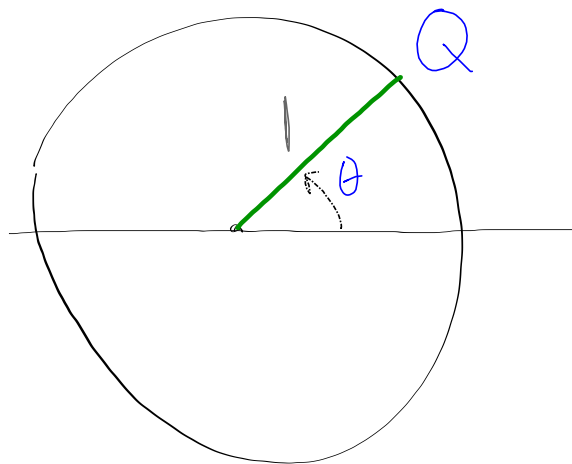$(\cos \theta , \sin \theta)$

θ

excercise   NO GPC

An angle on a unit circle has
a cosine ratio of $\frac{3}{4}$

what is the sine ratio ??

(and find the exact
coordinates of Q)

$$\cos(\theta) = \frac{3}{4}$$

$$\cos^2(\theta) + \sin^2(\theta) = 1$$

LCQ

You may use GCD and Notes

Wednesday Assignment:

7....53-55, 58-60, 67