Name: Key Date: 12/20/17

CC ALGEBRA 2 TROICI

LESSON #1: THE UNIT CIRCLE

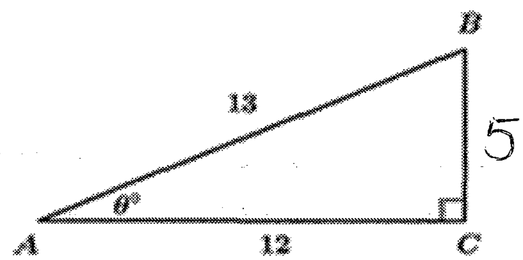
Do Now:

a. Fill in the missing sides for the Pythagorean Triples:

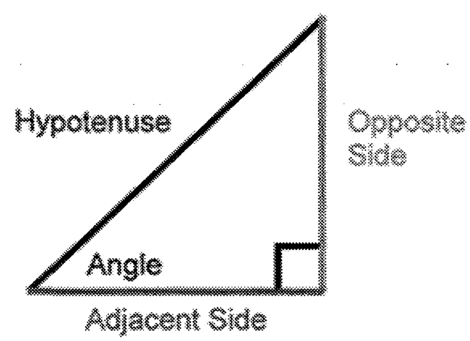
3, 4, 5 5, 12, 13 8, 15, 17 7, 24, 25

b. Given the following right triangle $\triangle ABC$ with $m\angle A = \theta°$, find in fraction form:

- $\sin \theta° = \frac{O}{H} = \frac{5}{13}$
- $\cos \theta° = \frac{A}{H} = \frac{12}{13}$
- $\tan \theta° = \frac{O}{A} = \frac{5}{12}$

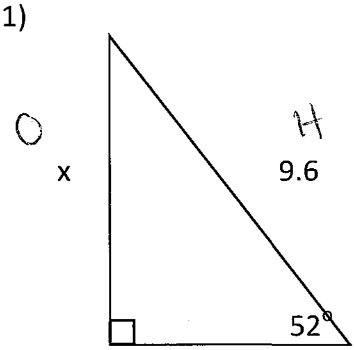


Sine =	$\frac{\textit{opposite}}{\textit{hypotenuse}}$	$s = \frac{o}{h}$	SOH
Cosine =	$\frac{\textit{adjacent}}{\textit{hypotenuse}}$	$c = \frac{a}{h}$	CAH
Tangent =	$\frac{\textit{opposite}}{\textit{adjacent}}$	$t = \frac{o}{a}$	TOA



Find the value of x to the nearest tenth:

1)



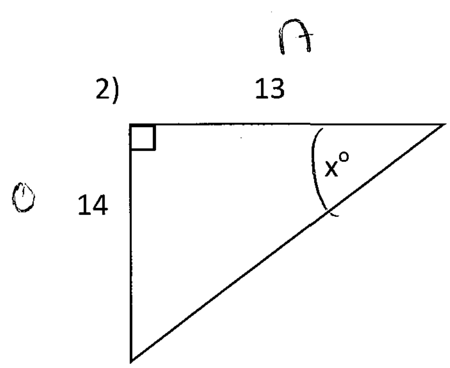
$\boxed{x = 7.6}$

$\sin 52 = \frac{x}{9.6}$

~~9.6 sin 52~~

$x = 9.6 \sin 52$

2)

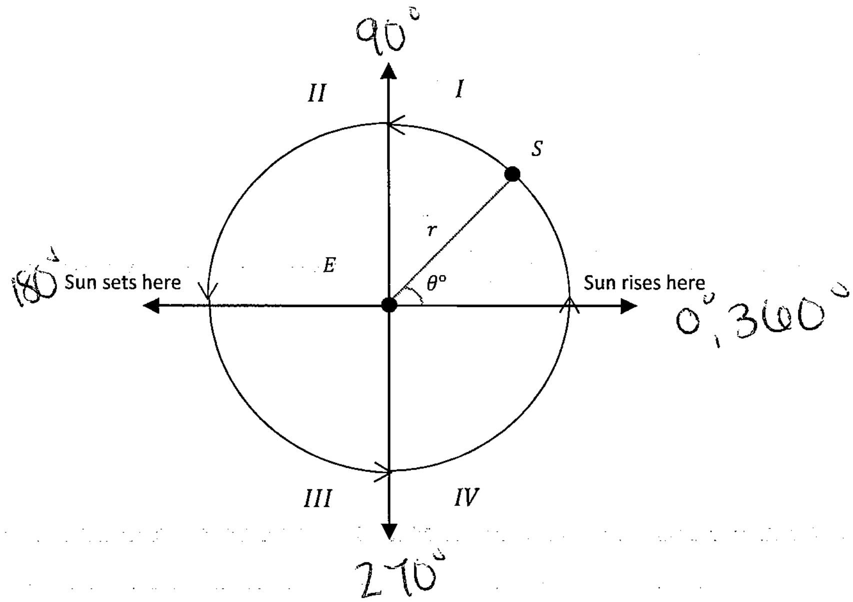


$\tan x = \frac{14}{13}$

$\boxed{x = 47.1°}$

To find an angle, use the 2nd key on the calculator!

- Just as the sun rises in the east and has an angle of elevation of 0 degrees at its easternmost point, we consider the point furthest to the right to be our point of reference. Our quadrants are numbered based on the sun rising in the east.



3) Write the equation of the circle whose center is at the origin and whose radius is 1 unit.

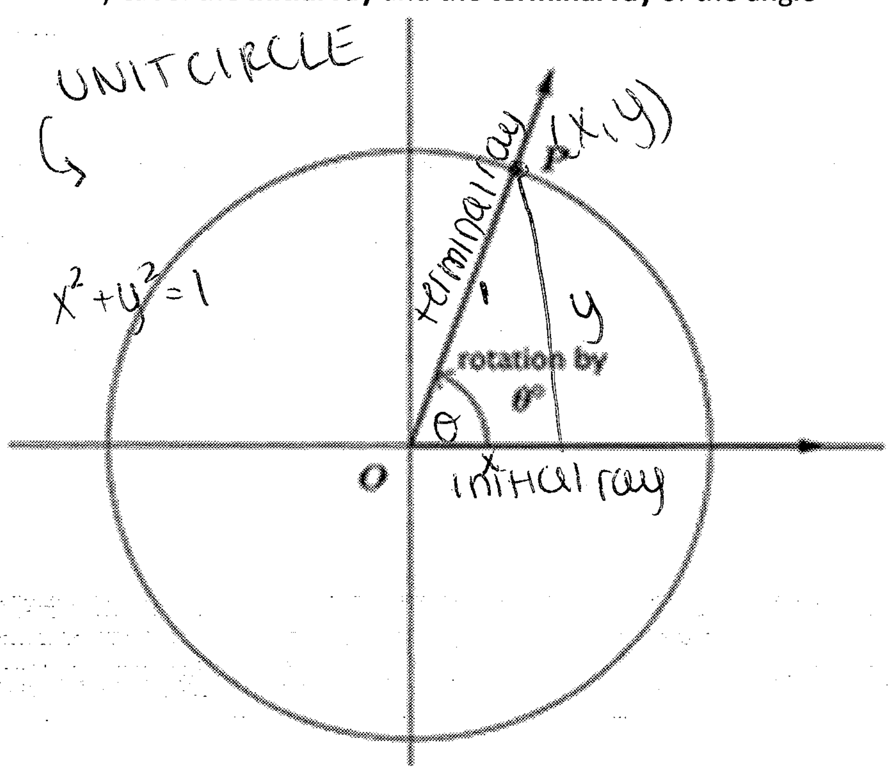
center = (0,0)
radius = 1

$(x-0)^2 + (y-0)^2 = r^2$

$x^2 + y^2 = 1$

- This circle is known as the **UNIT CIRCLE**
- The angle drawn in the unit circle below is considered to be in standard form:
  - Standard form: Its initial ray lies on the x-axis.
  - Its terminal ray rotates counter-clockwise.

4) Label the **initial ray** and the **terminal ray** of the angle



- $\sin\theta° = \frac{o}{h} = \frac{y}{1} = y$
- $\cos\theta° = \frac{a}{h} = \frac{x}{1} = x$
- $\tan\theta° = \frac{o}{a} = \frac{y}{x} =$ ~~[illegible]~~
- $\tan\theta° = \frac{\sin\theta}{\cos\theta}$

$(x, y) =$
~~(sinθ)~~
$(\cos\theta, \sin\theta)$ alphabetical order

5) P is a point on a unit circle with coordinates $(\frac{3}{4}, \frac{\sqrt{7}}{4})$, find:

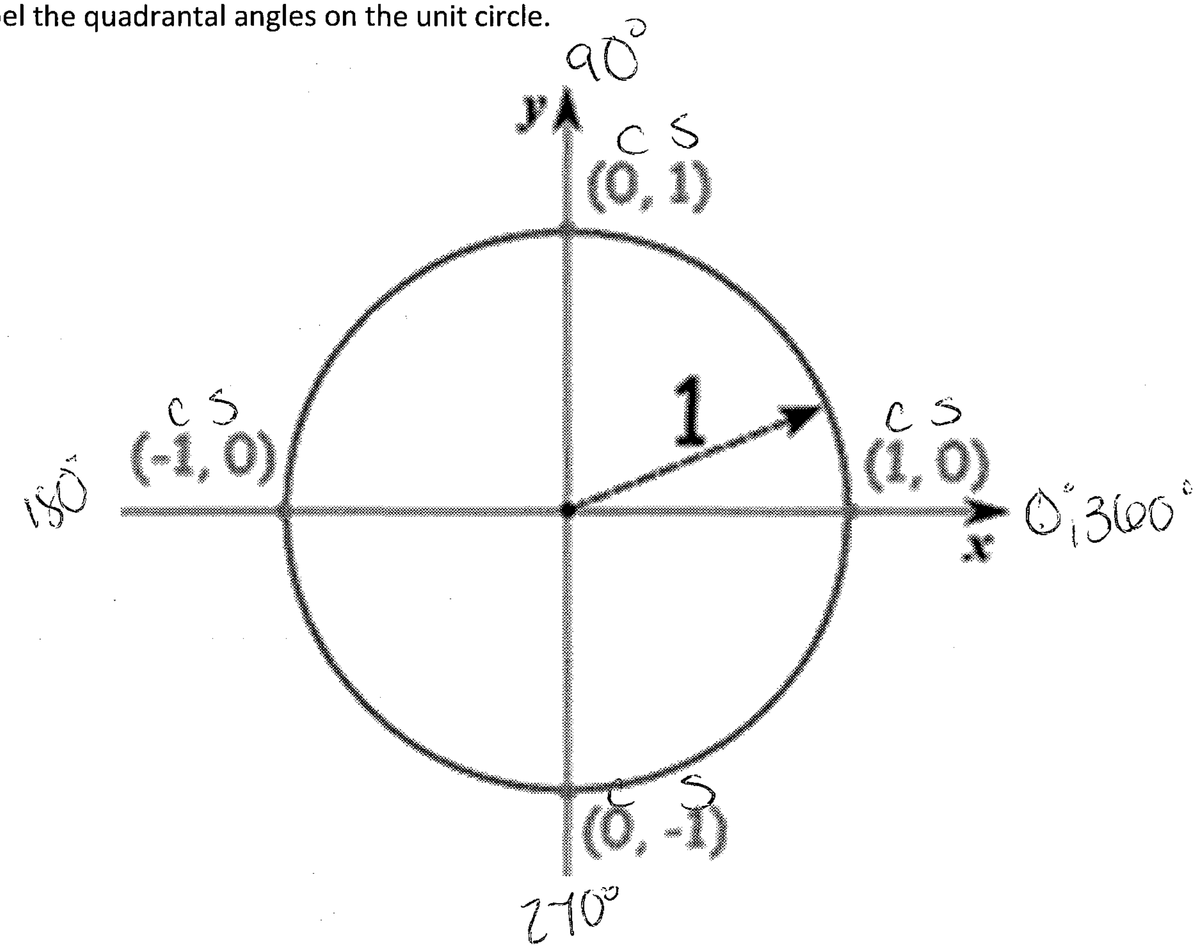
a. $\cos\theta = x$ $\boxed{\frac{3}{4}}$

b. $\sin\theta = y$ $\boxed{\frac{\sqrt{7}}{4}}$

c. $\tan\theta = \frac{y}{x} = \frac{\frac{\sqrt{7}}{\cancel{4}}}{\frac{3}{\cancel{4}}} = \boxed{\frac{\sqrt{7}}{3}}$

QUADRANTAL ANGLES: angles that lie on the axes.

6) Label the quadrantal angles on the unit circle.



7) Fill in the following table:

θ	0°	90°	180°	270°	360°
Sin θ	0	1	0	-1	0
Cos θ	1	0	-1	0	1
Tan θ	0	und.	0	und.	0

Let's check some values in the calculator!

ex) sin90 = 1 ✓
tan270 = error ✓

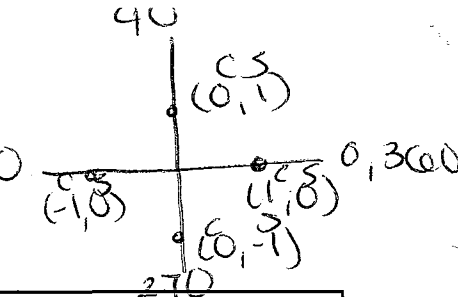
Calculator must be in DEGREE MODE

8) Using your calculator, find the value of θ:

a) $\sin\theta = -1$ 2nd sin(−1) = −90° OR 270°

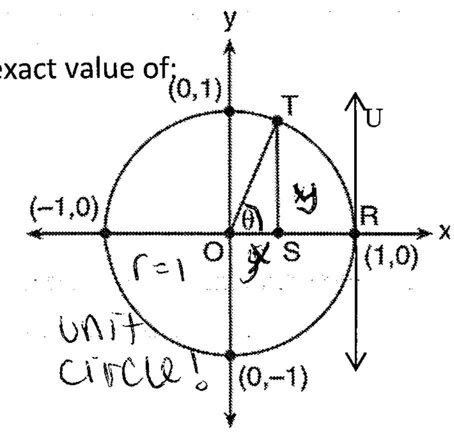
b) $\cos\theta = 0$ 2nd cos(0) = 90° OR 270°

c) $\tan\theta = 0$ 2nd tan(0) = 0°, 180°, 360°



When the value is 1, -1, or 0, use the unit circle to find the angles because the calculator will not give you all the angles!

9) In the diagram below, the length of which line segment is equal to the exact value of:



a) $\sin\theta$ = y = $\overline{TS}$

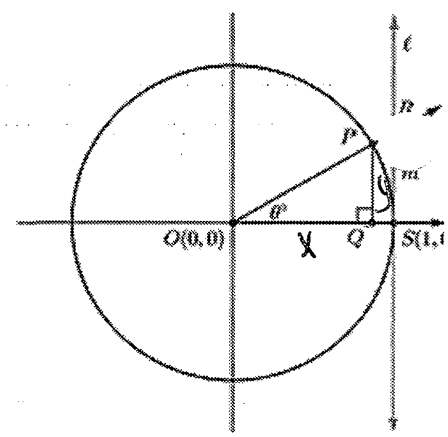
b) $\cos\theta$ = x = $\overline{OS}$

c) $\tan\theta$ = $\frac{y}{x}$ = $\frac{\overline{TS}}{\overline{OS}}$ OR $\overline{UR}$

b/c it is tangent to the circle

PRACTICE:

10) Given the accompanying diagram, find the length of each segment in terms of the value of a trigonometric function. ($\sin\theta$, $\cos\theta$, or $\tan\theta$)



a) OQ= cos θ

b) PQ = sin θ

c) RS = tan θ

11) P is a point on a unit circle with coordinates (0.6,0.8). Find:

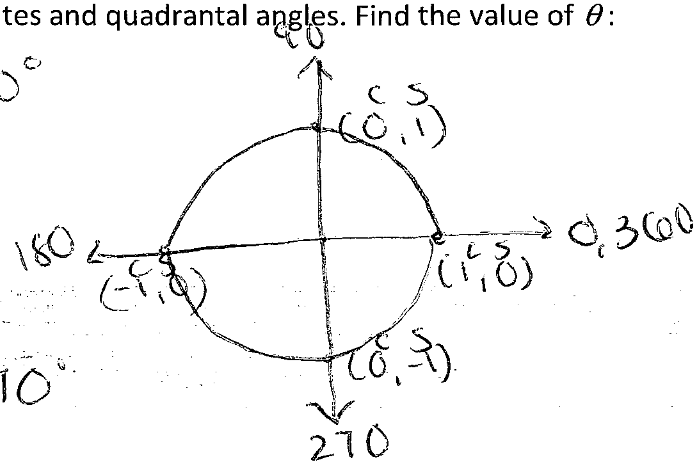
c s

a) $\cos\theta$ = .6

b) $\sin\theta$ = .8

c) $\tan\theta$ = $\frac{.8}{.6}$ = $1.\bar{3}$ or $\frac{4}{3}$

12) Draw the unit circle and label all coordinates and quadrantal angles. Find the value of θ:



a) $\sin\theta = 0$ θ = 0°, 180°, 360°

b) $\cos\theta = 1$ θ = 0°, 360°

c) $\tan\theta$ = undefined θ = 90°, 270°