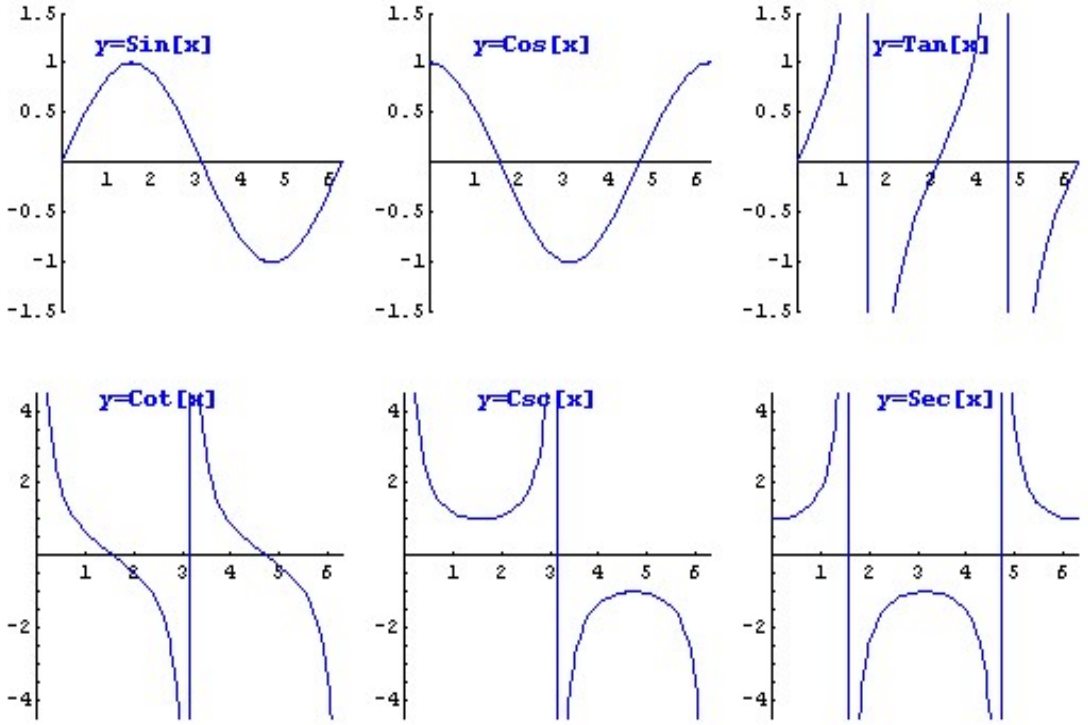
Ch.6 Trig Functions (triangle approach)

Ch.5 Trig Functions (unit circle approach)

- Sine
- Cosine
- Tangent
- Cosecant
- Secant
- Cotangent



Notes: 5.1

The Unit Circle

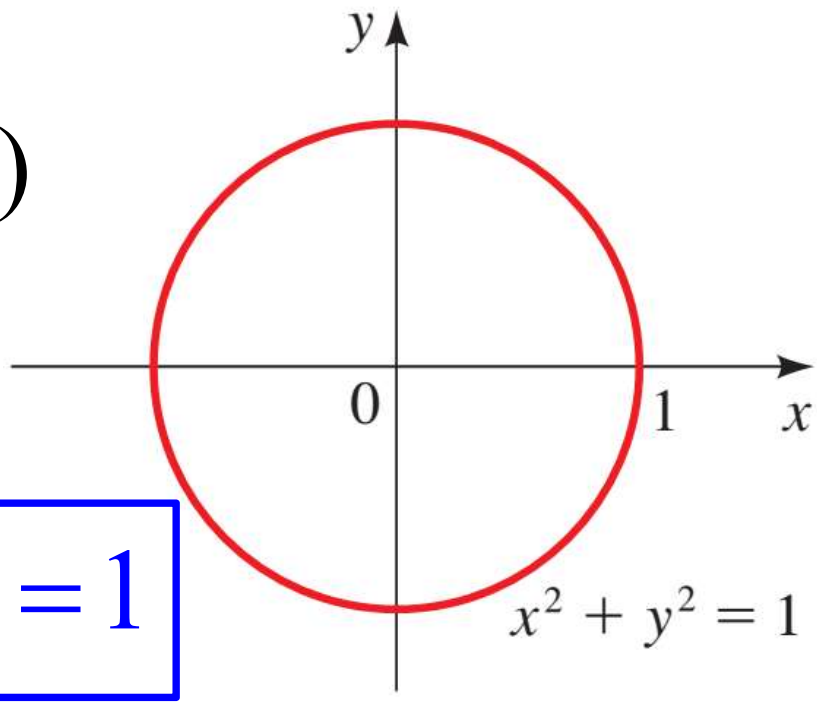
Radius = 1

Center at the origin (0, 0)

Equation of a circle:

$$x^2 + y^2 = r^2$$

since r = 1 $\rightarrow$ $\boxed{x^2 + y^2 = 1}$



Notes: 5.1

reference number = reference angle from ch. 6 (in radians instead of degrees)

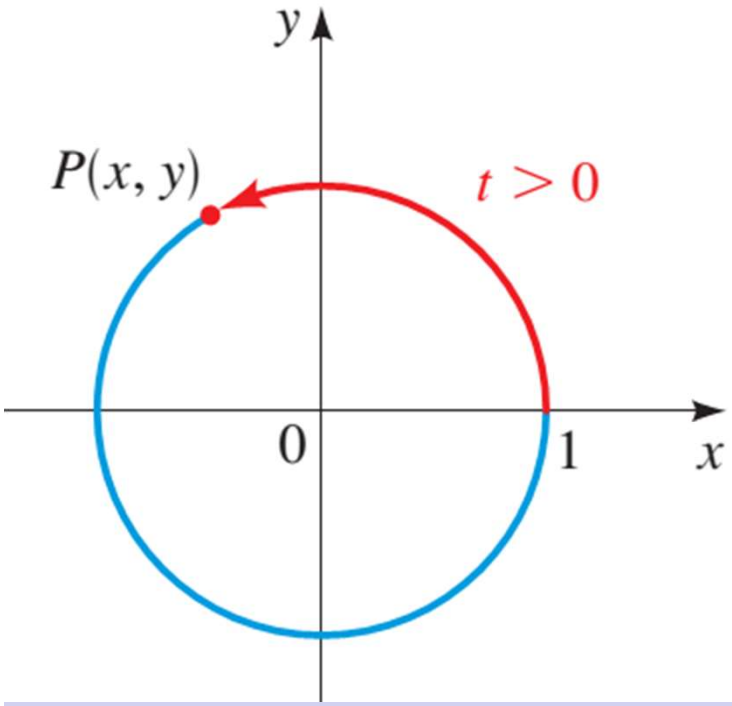
t = distance traveled along unit circle in radians

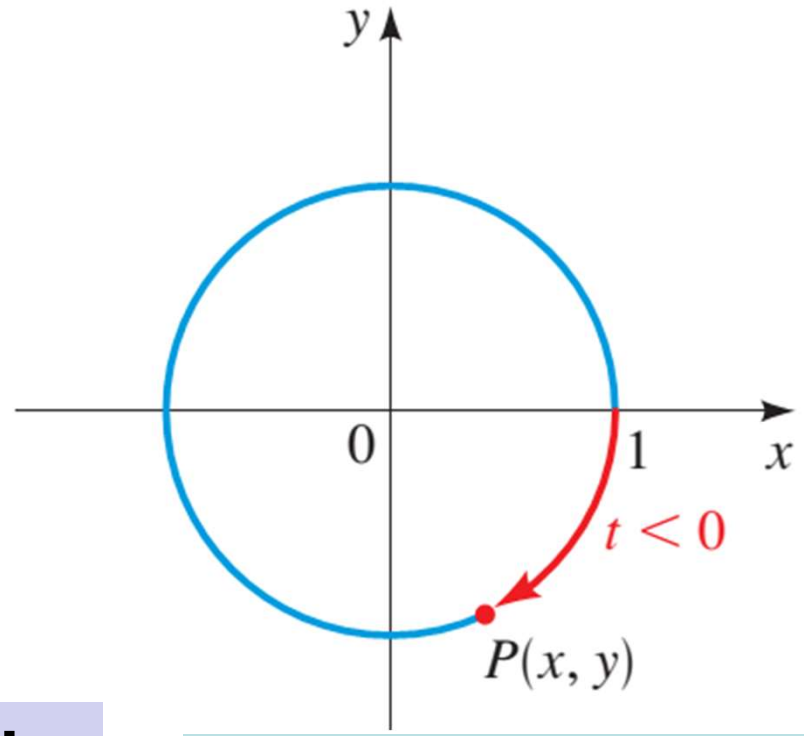
$\bar{t}$ = reference number (angle)

P = terminal Point…referred to as P = (x, y) (similar to terminal side from ch.6)

Notes: 5.1

The point $P(x, y)$ is called the **terminal point** determined by the real number t.





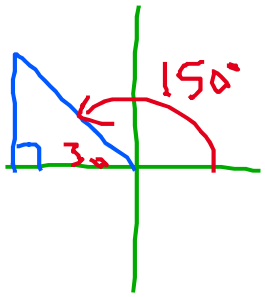
t is the distance traveled around the circle. A positive t value moves counter-clockwise to P(x, y)

A negative t value moves clockwise to terminal point P(x, y)

Notes: 5.1

reference number = reference angle from chapter 6 (in radians instead of degrees)

EXAMPLES → Find the reference angle:



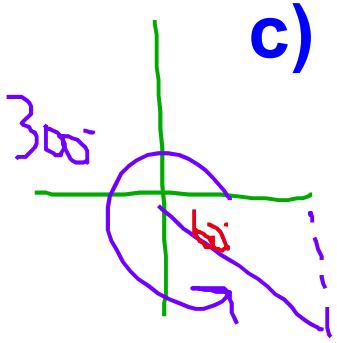
a) 150°

180
−150
ref angle 30°

b) $\frac{5\pi}{6}$

ref angle = $\frac{\pi}{6}$

c) 300°



360
− 300
60°

d) $\frac{5\pi}{3}$

ref angle: $\frac{\pi}{3}$

From chapter 6↑ *New representation in chapter 5 ↑*

Summary→ No work necessary if it is in reduced form. Just write the problem and its reference number/angle.

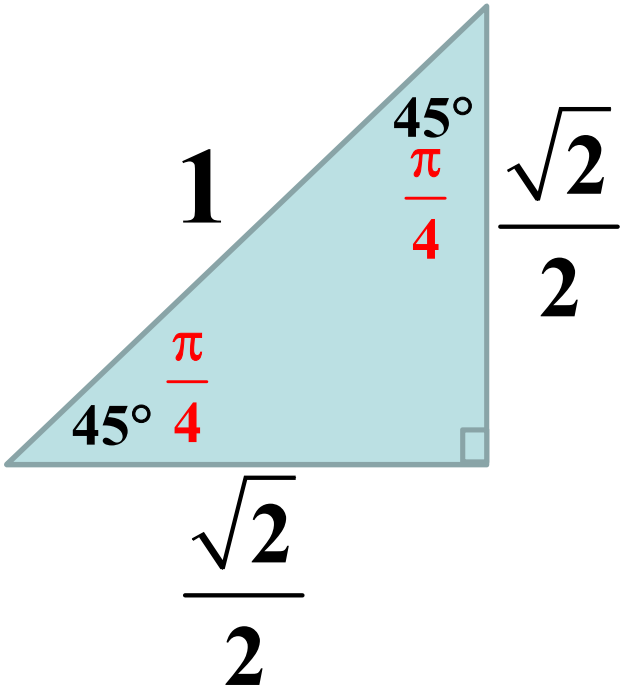
$$\frac{5\pi}{4} \rightarrow \text{reference angle is } \frac{\pi}{4}$$

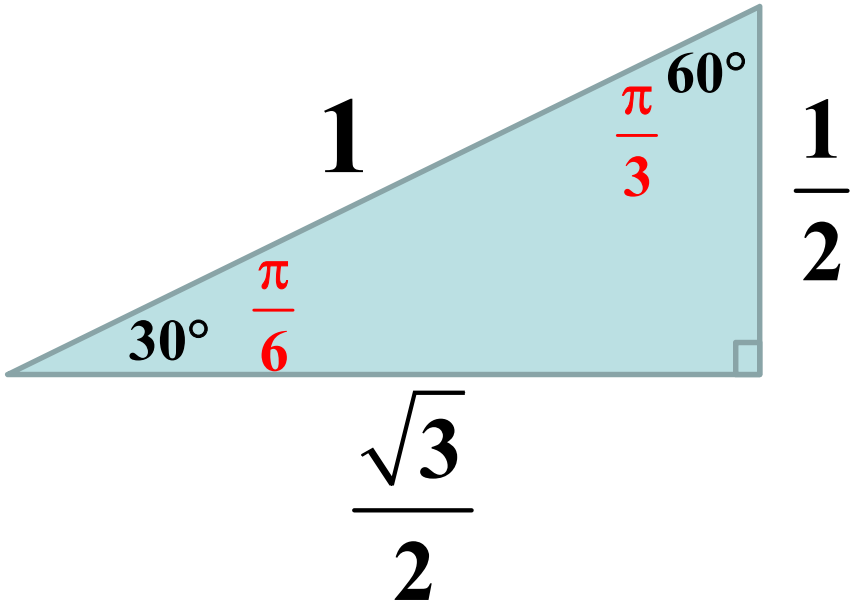
$$\frac{8\pi}{6} \rightarrow \quad \frac{4\pi}{3} \rightarrow \text{reference angle is } \frac{\pi}{3}$$

$$\frac{5\pi}{6} \rightarrow \text{reference angle is } \frac{\pi}{6}$$

Special Triangles in the unit circle:

hypotenuse must be 1 so legs are now fractions since they are less than 1.





Today's assignment: 5.1 #11-19odd, 21-36, 37a-c, 38a-c, 41-50

9–14 Points on the Unit Circle Find the missing coordinate of P, using the fact that P lies on the unit circle in the given quadrant.

	Coordinates	Quadrant
9.	$P\left(-\frac{3}{5}, \square\right)$,	III
10.	$P\left(\square, -\frac{7}{25}\right)$	IV
11.	$P\left(\square, \frac{1}{3}\right)$	II

	Coordinates	Quadrant
12.	$P\left(\frac{2}{5}, \square\right)$	I
13.	$P\left(\square, -\frac{2}{7}\right)$	IV
14.	$P\left(-\frac{2}{3}, \square\right)$	II

$P\left(\underset{x}{\square}, \underset{y}{\frac{1}{3}}\right) \rightarrow$ find x

equation of a unit circle $x^2 + y^2 = 1$

$x^2 + \left(\frac{1}{3}\right)^2 = 1$

$x^2 + \frac{1}{9} = 1$

$x^2 = \frac{9}{9} - \frac{1}{9}$

$x^2 = \frac{8}{9}$

$x = \pm\sqrt{\frac{8}{9}}$ $\quad \pm\frac{\sqrt{8}}{\sqrt{9}}$

$x = \pm\frac{\sqrt{8}}{3}$ ← simplify

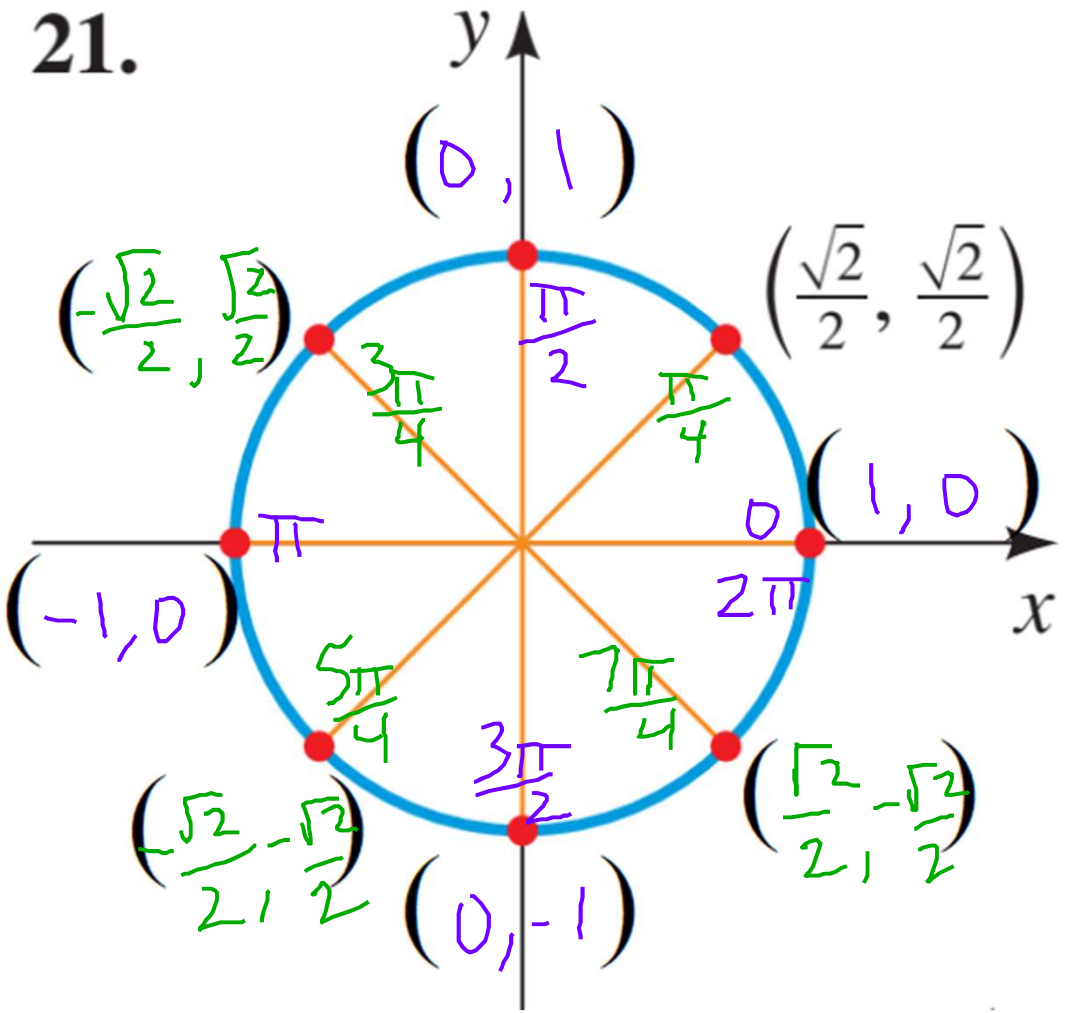
choose negative given Quad II

$x = -\frac{2\sqrt{2}}{3}$

$P\left(\underset{x}{-\frac{2\sqrt{2}}{3}}, \underset{y}{\frac{1}{3}}\right)$

Label the coordinates AND radian value for each highlighted point on the unit circle.

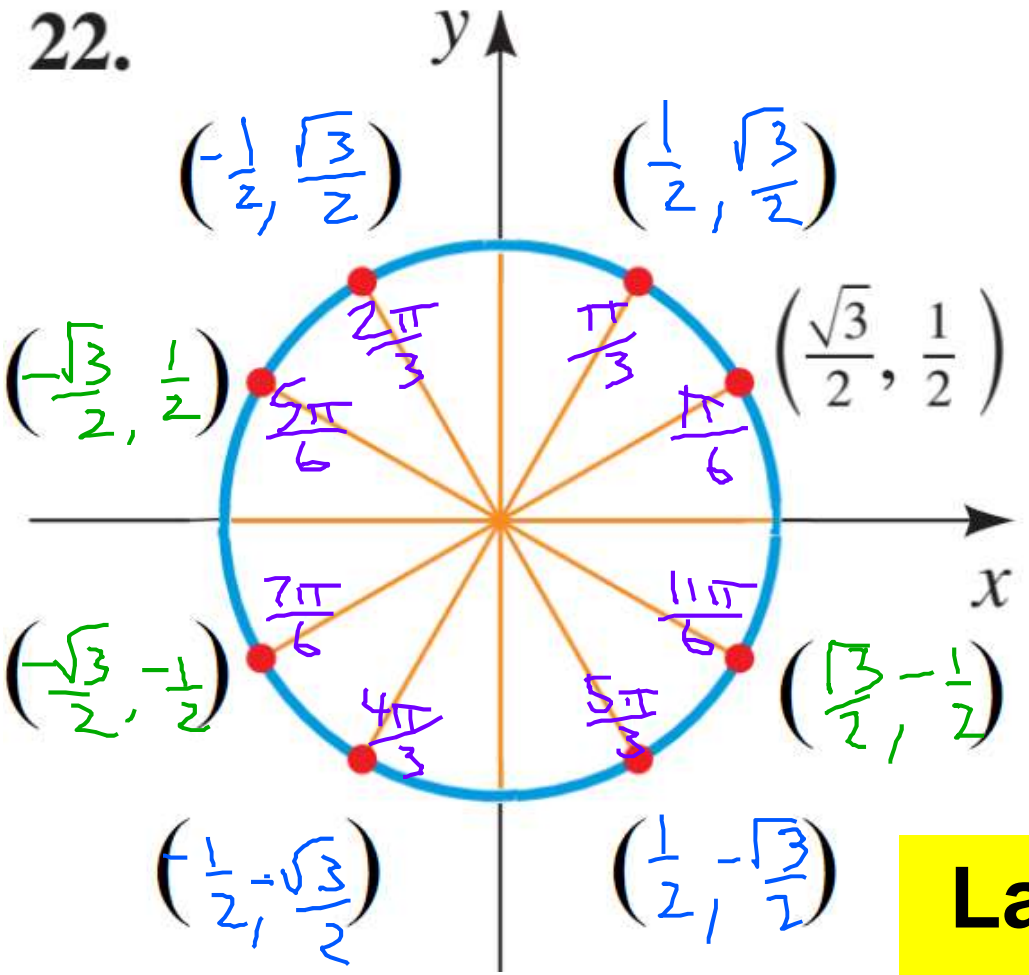
21.



Please put #21,22 on resource page

Label radian values AND coordinates of highlighted points.

22.



Label radian values AND coordinates of highlighted points.

23–36 ■ Terminal Points Find the terminal point $P(x, y)$ on the unit circle determined by the given value of t.

23. $t = 4\pi$ too large

-2π $\quad 2\pi(1)$

2π coterminal

$P = (1, 0)$

24. $t = -3\pi$ too small

$+4\pi$ $\quad 2\pi(2)$

π coterminal

$P = (-1, 0)$

25. $t = \dfrac{3\pi}{2}$ as is $P = (0, -1)$

26. $t = \dfrac{5\pi}{2}$ too large $- \dfrac{2\pi(2)}{1(2)} = \dfrac{5\pi}{2} - \dfrac{4\pi}{2}$

$= \dfrac{\pi}{2}$

$P = (0, 1)$

27. $t = -\dfrac{\pi}{6} + \dfrac{2\pi(6)}{1(6)}$

$= \dfrac{-\pi}{6} + \dfrac{12\pi}{6} = \dfrac{11\pi}{6}$ $\quad P = \left(\dfrac{\sqrt{3}}{2}, -\dfrac{1}{2}\right)$

28. $t = \dfrac{7\pi}{6}$ as is

#37, 38a-c→ No work necessary if in reduced form.
Write the problem and then its reference number (angle)

37–40 ■ Reference Numbers Find the reference number for each value of t.

37. **(a)** $t = \dfrac{4\pi}{3}$ **(b)** $t = \dfrac{5\pi}{3}$

(c) $t = -\dfrac{7\pi}{6}$

38. **(a)** $t = 9\pi$

(c) $t = \dfrac{25\pi}{6}$

Similar to example (parts b & d) given in today's notes

#41- 50

→No work needed for reference number (angle).

→Work may need to be shown to find coterminal angle to identify the terminal point.

41–54 ■ Terminal Points and Reference Numbers Find **(a)** the reference number for each value of t and **(b)** the terminal point determined by t.

41. $t = \dfrac{11\pi}{6}$

42. $t = \dfrac{2\pi}{3}$

43. $t = -\dfrac{4\pi}{3}$

44. $t = \dfrac{5\pi}{3}$