

$$\frac{167\pi}{6}$$

Thinking to "mod out the 2π "

$$7 \text{ modulo } 3 = 1$$

$$\left(\frac{167}{6} \right) \pi \quad \begin{array}{l} 27 \\ \overline{162} \end{array} \rightarrow \begin{array}{l} 167 - 162 \\ = 5 \end{array}$$

Division

$$= \left(27 + \frac{5}{6} \right) \pi$$

Quotient + *Remainder*

$$= 27\pi + \frac{5}{6}\pi$$

$$167 = (27)(6) + 5$$

162 + 5

$$= 26\pi + \underbrace{\pi + \frac{5}{6}\pi}_{\text{Ditch}}$$

$$\frac{12\pi}{6} = 2\pi$$

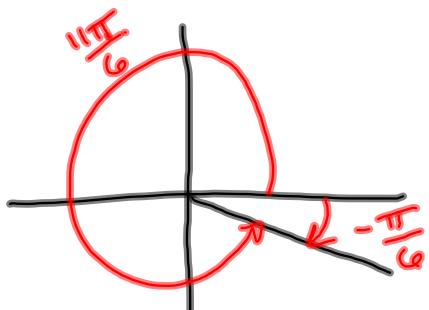
$$\pi + \frac{5\pi}{6} = \frac{6\pi + 5\pi}{6} = \frac{11\pi}{6}$$

is positive angle θ , with
 $0 < \theta < 2\pi$

It's coterminal with

$$\frac{167}{6}\pi$$

$\frac{11\pi}{6} - 2\pi$ gives us
 a negative angle.



#s 1-6,
ALL.
write out
the entire
statement.

7-57 odds, 60, 63, 69

Due Wednesday

Complementary Angles are positive angles,
whose sum is $\frac{\pi}{2}$ (or 90°). two

Non-example What's the complement of 107° ?

They ain't one!

Need both to be positive.

$$37^\circ + 53^\circ = 90^\circ$$

$$\frac{\pi}{7} \not\in \frac{5\pi}{14}$$

$$\frac{\pi}{2} - \frac{\pi}{7} = \frac{7\pi - 2\pi}{14} = \frac{5\pi}{14}$$

Supplementary Angles - Positive angles (two)
whose sum is π (180°)

$$\text{Comp: } \alpha, \beta > 0, \alpha + \beta = \frac{\pi}{2} \quad (\alpha + \beta = 90^\circ, \text{i.e.})$$

$$\text{Supp: } \alpha, \beta > 0, \alpha + \beta = \pi \quad (\alpha + \beta = 180^\circ, \text{i.e.})$$

Fig 1.10 degrees to radians.

$$360^\circ = 2\pi \text{ rad}$$

$$(360)(1^\circ) = 2\pi \text{ rad}$$

$$1^\circ = \frac{2\pi}{360} = \frac{\pi}{180} \text{ rad.}$$

$$\left(30^\circ\right)\left(\frac{\pi \text{ rad}}{1^\circ}\right) = \frac{\pi}{6} \text{ rad}$$

$$2\pi \text{ rad} = 360^\circ$$

$$(2\pi)(1 \text{ rad}) = 360^\circ$$

$$1 \text{ rad} = \frac{360^\circ}{2\pi} = \frac{180}{\pi} \text{ degrees.}$$

$$\left(\frac{\pi}{4} \text{ rad}\right)\left(\frac{180}{\pi} \frac{\text{degrees}}{1 \text{ rad}}\right) = 45 \text{ degrees.}$$

$$3 \text{ rad} = (3 \text{ rad})\left(\frac{180}{\pi \text{ rad}}\right) = \frac{540}{\pi} \text{ degrees}$$

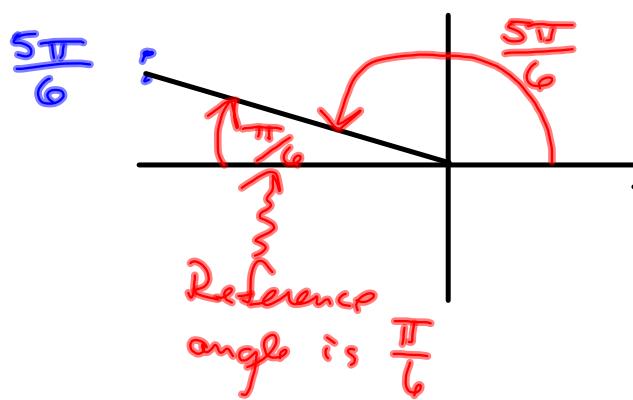
$$\frac{3\pi}{2} \text{ radians}$$

2 radian

Default measure is radians.

If no "degrees" or " $^\circ$ " in it,
then it's radians.

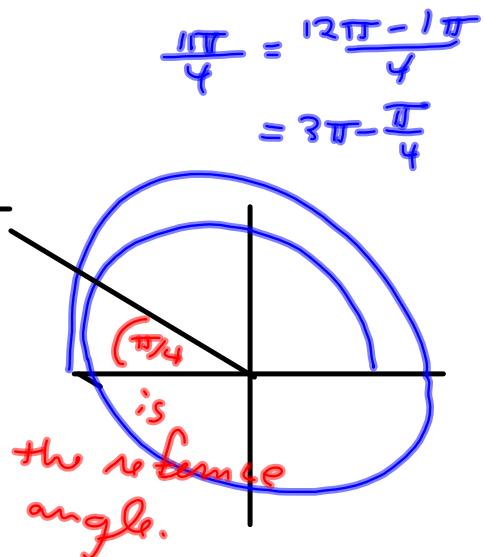
Reference angle in trig : The acute angle (less than 90° ($\frac{\pi}{2}$)) obtained by measuring from the x-axis.



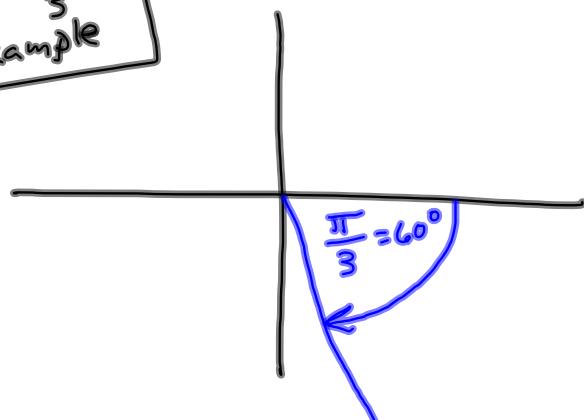
$$\pi - \frac{\pi}{6} = \frac{6\pi}{6} - \frac{\pi}{6}$$

$8\pi - \frac{\pi}{3} = \frac{23\pi}{3}$
Build example

$$\frac{23\pi}{3} = \frac{24\pi - 1\pi}{3}$$



Ref. angle is $\frac{\pi}{3}$



Arc Length :

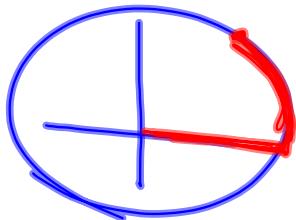
For a circle of radius r , a central angle θ sweeps an arc of length s , given by

$$s = r\theta \quad (\text{This is just algebra on } \theta = \frac{s}{r})$$

Example
Arc length if
 $r = 5, \theta = 45^\circ$

$$r\theta = 5 \cdot \frac{\pi}{4} = \frac{5\pi}{4}$$

$$\text{Radian Measure} = \theta = \frac{s}{r}$$



1 rad when $s = r$
2 rad when $s = 2r$

E How far does a wheel of diameter 26 inches travel, if it revolves $5\frac{1}{2}$ times?

$$r = 13 \text{ inches}$$

$$\Theta = ?$$

$$\text{Goal: } r\Theta = s$$

$$5\frac{1}{2} \text{ revolutions} = \frac{11}{2} \text{ revolutions}$$

$$= \left(\frac{\frac{11}{2} \text{ revs}}{1 \text{ rev}} \right) \left(2\pi \text{ radians} \right) = 11\pi \text{ radians} = \Theta$$

$$\text{Now, } r\Theta = (13)(11\pi \text{ radians})$$

$$(13 \text{ in}) \left(11\pi \text{ radians} \right) = 143\pi \text{ in.}$$

Teacher struggling with units, after
Technically, radians is a pure number

$$\Theta = \frac{s}{r} = \frac{\text{inches}}{\text{inches}} = \text{unitless.}$$

$$1 \text{ rev} = 2\pi \text{ radians}$$

$$\frac{2\pi \text{ rad}}{1 \text{ rev}} = 1$$