

This part of the unit is really about equivalence:

$$12 = 1 \quad ?$$

$$12 \text{ inches} = 1 \text{ foot}$$

$$5280 = 1$$

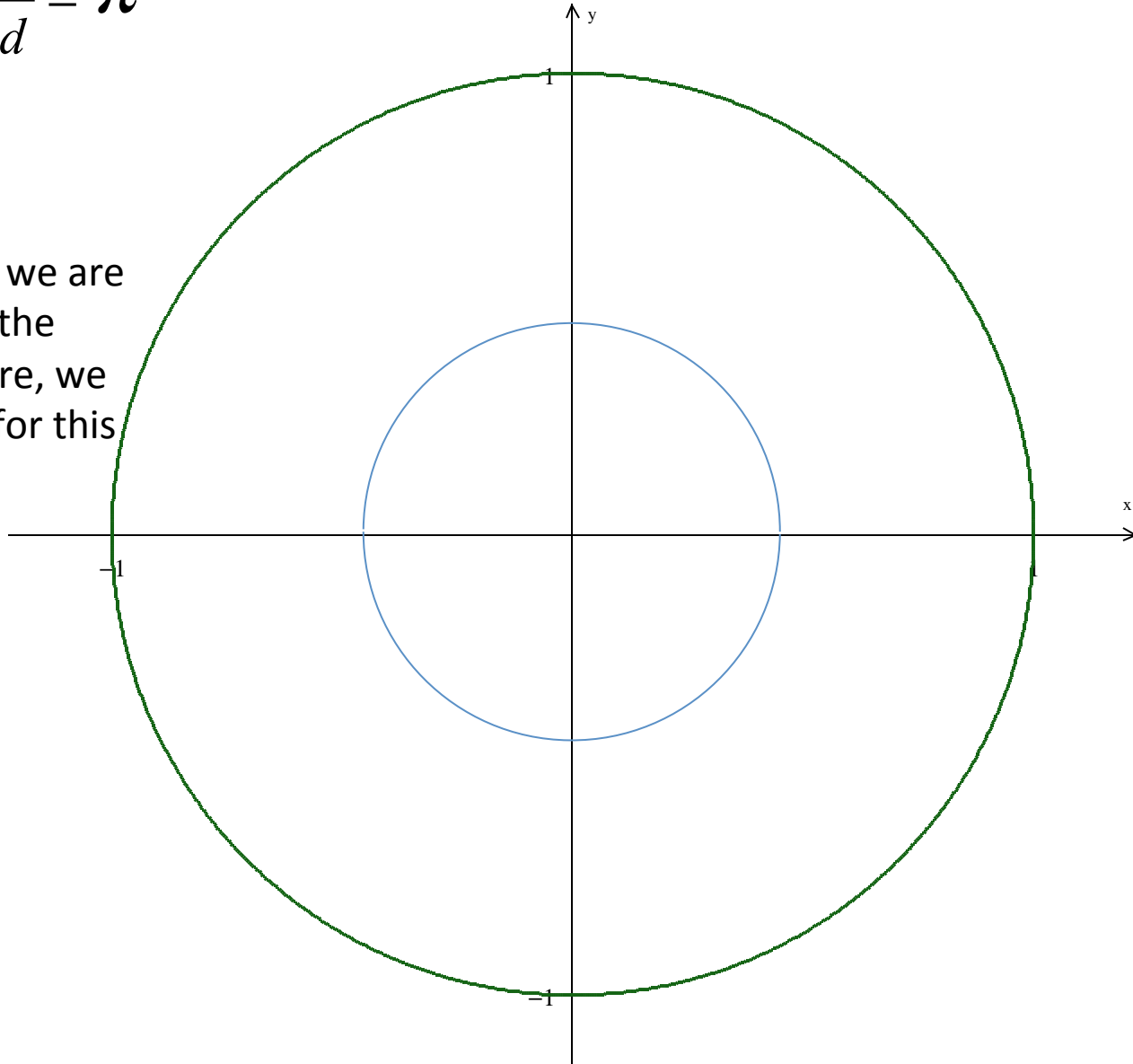
$$5280 \text{ feet} = 1 \text{ mile}$$

Remember: $\frac{C}{d} = \pi$

$$C = 2\pi r$$

And because we are dealing with the unit circle here, we can say that for this special case,

$$C = 2\pi$$



Remember: $\frac{C}{d} = \pi$

$$C = 2\pi$$

Since 30° is $\frac{1}{12}$

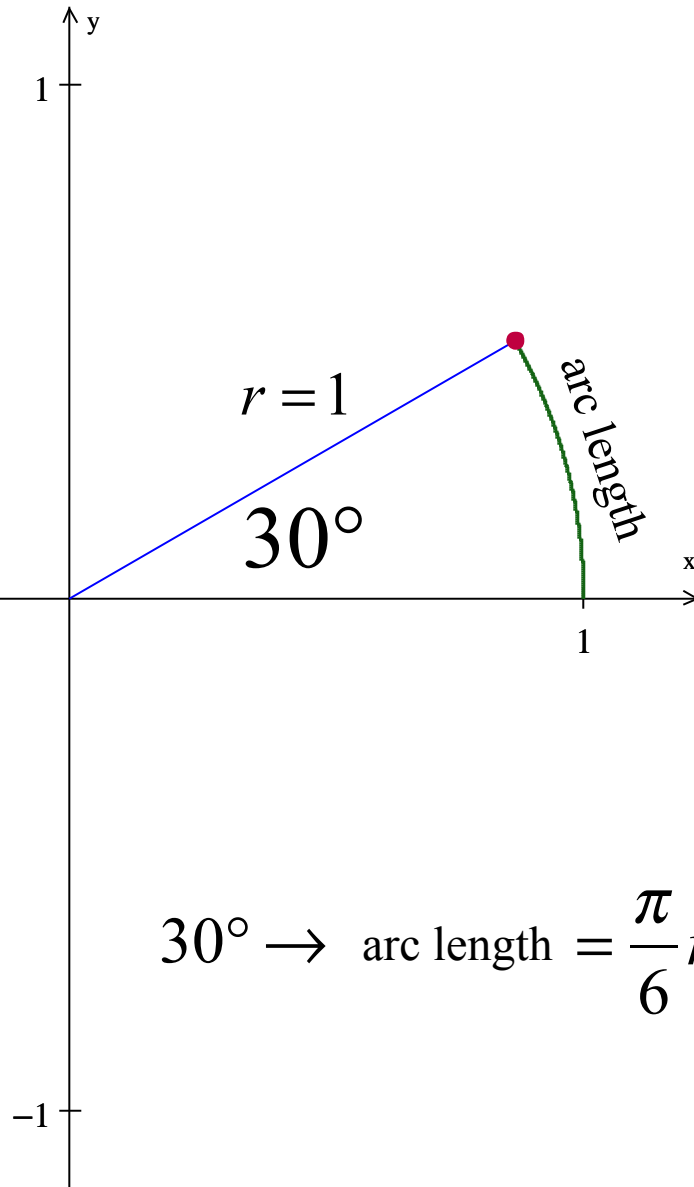
of the way around,
then the length of
this arc is

$$\text{arc length} = \frac{1}{12} C = \frac{1}{12} 2\pi$$

$$\frac{1}{12} C = \frac{\pi}{6}$$

So for any radius r when
the central angle is 30°
the length of the arc is...

$$\frac{\pi}{6} r$$



$$30^\circ \rightarrow \text{arc length} = \frac{\pi}{6} r$$

Remember: $\frac{C}{d} = \pi$

$$C = 2\pi$$

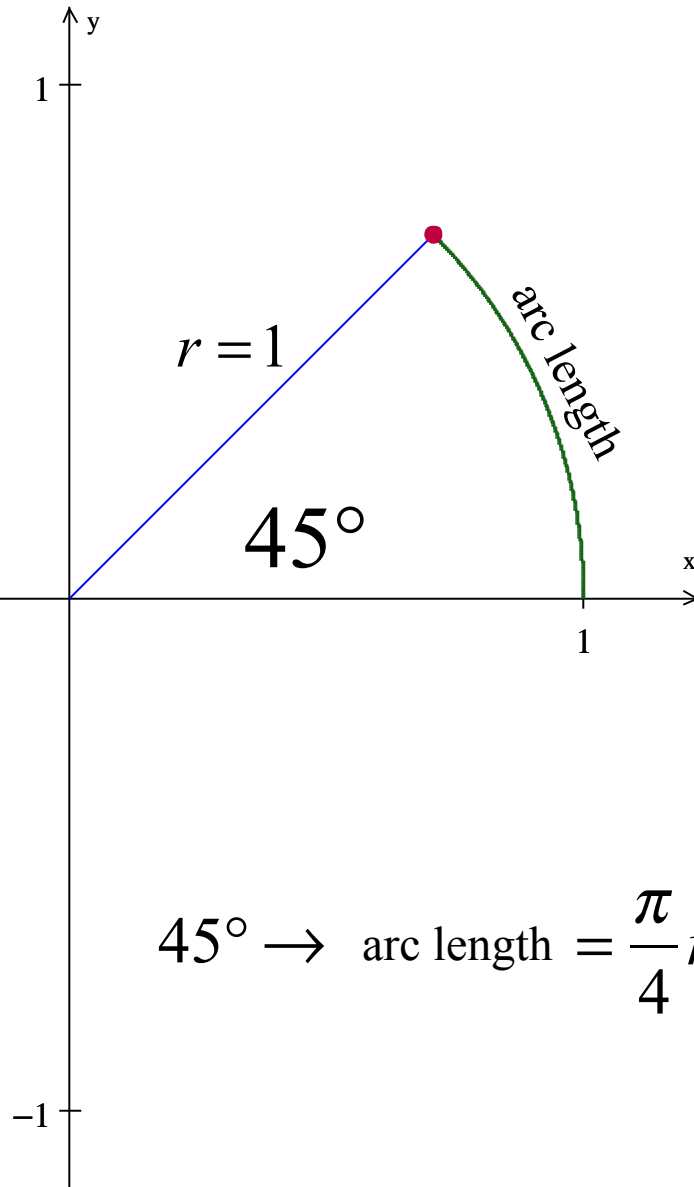
Since 45 is $\frac{1}{8}$

of the way around,
then the length of
this arc is

$$\text{arc length} = \frac{1}{8} C = \frac{1}{8} 2\pi$$

$$\frac{1}{8} C = \frac{\pi}{4}$$

So for any radius r
when the central
angle is 45 $\frac{1}{8} C = \frac{\pi}{4} r$



$$45^\circ \rightarrow \text{arc length} = \frac{\pi}{4} r$$

Remember: $\frac{C}{d} = \pi$

$$C = 2\pi$$

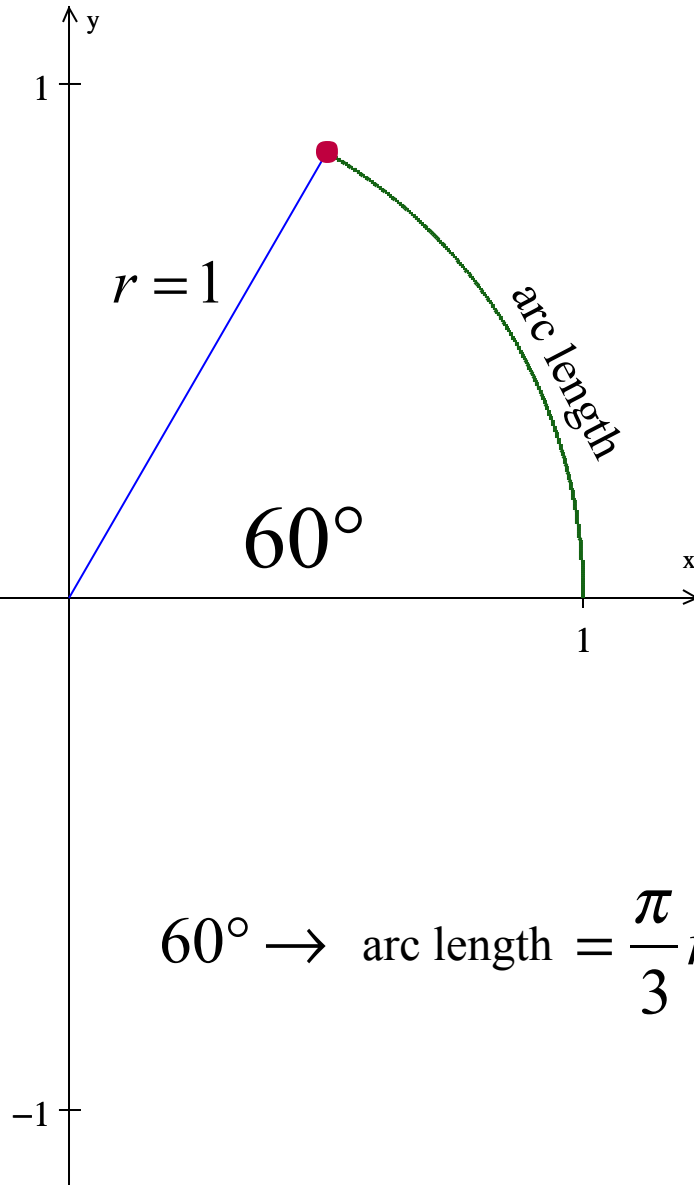
Since 60 is $\frac{1}{6}$

of the way around,
then the length of
this arc is

$$\text{arc length} = \frac{1}{6} C = \frac{1}{6} 2\pi$$

$$\frac{1}{6} C = \frac{\pi}{3}$$

So for any radius r
when the central
angle is 60 $\frac{1}{6} C = \frac{\pi}{3} r$



$$60^\circ \rightarrow \text{arc length} = \frac{\pi}{3} r$$

The relationship between radian and degree measures is how radian measures are defined. Since a full circle is 360° and the perimeter of a circle of radius 1 is 2π , the proportion of degrees to radians in the unit circle is $\frac{2\pi}{360} = \frac{\pi}{180}$. Since radians are a measure of length, trigonometric functions transcend the limitation of being applied to an angle (in degrees) and allow the purely mathematical situation of taking the trigonometric value of a number not related to an angle. This is why radians are important and this course will almost always be in that mode.

$$30^\circ \rightarrow \frac{\pi}{6} \text{ radians}$$

$$45^\circ \rightarrow \frac{\pi}{4} \text{ radians}$$

$$60^\circ \rightarrow \frac{\pi}{3} \text{ radians}$$

θ°	0°	30°	45°	60°	90°
θ^{rad}	0^{rad}	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
$\sin \theta$					
$\cos \theta$					

Recall how to cancel units from past science classes?

Converting degrees to radians

$$\text{Multiply by } \frac{\pi \text{ rad}}{180^\circ}$$

Converting radians to degrees

$$\text{Multiply by } \frac{180^\circ}{\pi \text{ rad}}$$