4.1 Angles

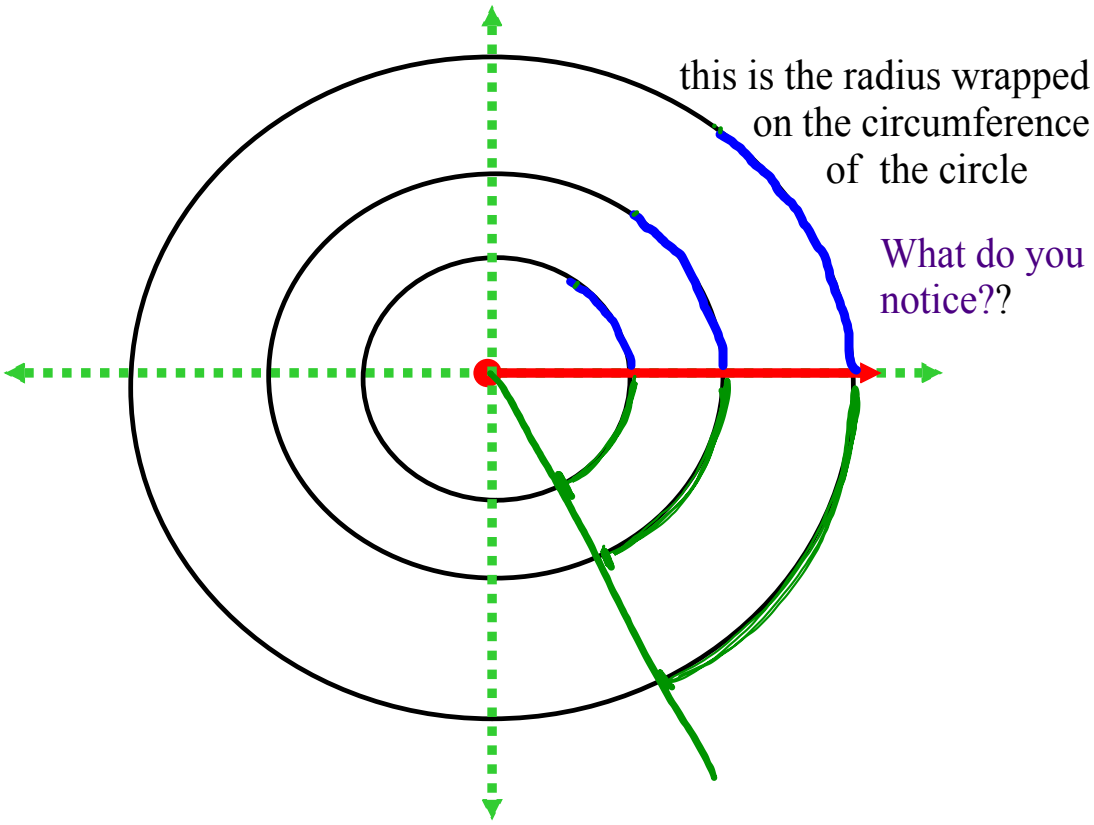
Radians vs. Degrees

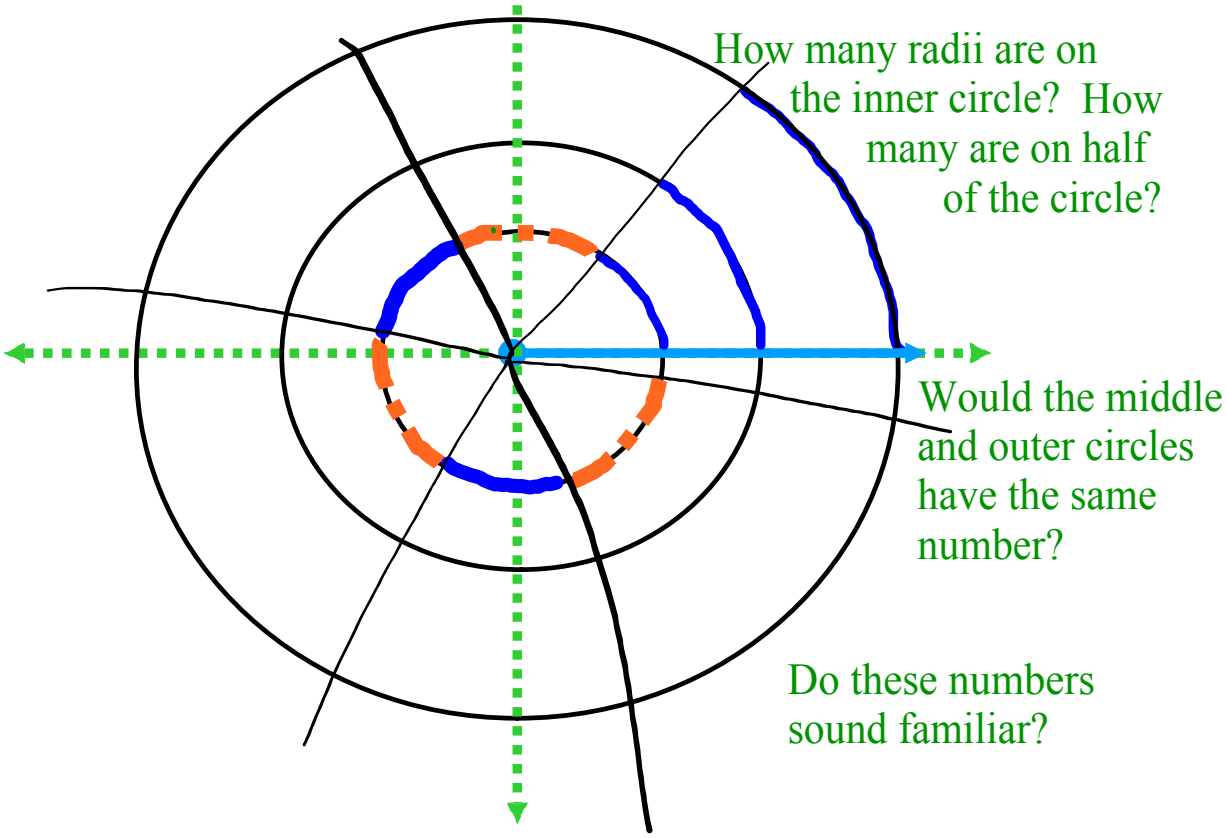
angles are usually named with Greek letters θ, α, β for example

there are 2 units used to measure angles:

degrees: 360^{o} in a circle

radians:





4.1 Angles

Radians vs. Degrees

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there are 2 units used to measure angles:

degrees: 360^{o} in a circle

radians: 2π radians in a circle

What is a radian?

A central angle of a circle has a measure of 1 RADIAN if it intercepts an arc with the same length as the radius

How many degrees are in half a circle? How many degrees are in π? 180°

What ratio do I use to convert between degree and radian angle measures?

radians to degrees: $\frac{\pi}{6} \cdot \frac{180^\circ}{\pi} = \frac{180^\circ}{6} = 30^\circ$

degrees to radians: $\frac{60^\circ}{1} \cdot \frac{\pi}{180^\circ} = \frac{60^1 \pi}{180^3}$

$= \frac{\pi}{3}$

Examples:

Convert to degrees:

$2\pi/3$ $\frac{2\pi}{3} \cdot \frac{180}{\pi}$ $\frac{360}{3} = 120^\circ$

$5\pi/4$ $\frac{5\pi}{4} \cdot \frac{180}{\pi}$ $\frac{900}{4} = 225^\circ$

Convert to radians:

$\frac{150^\circ}{1} \cdot \frac{\pi}{180^\circ}$ $\frac{15\pi}{18}$ $\frac{5\pi}{6}$

$\frac{315^\circ}{1} \cdot \frac{\pi}{180} = \frac{7\pi}{4}$

Arc Length

$$C = r(2\pi)$$

Circumference — radius — # of radians in an entire circle

Since radians are related to arc length we can use the circumference formula to help us find arc length

$$C = r(2\pi)$$

Replace with s (arc length) — radius (doesn't change) — Replace with # of radians in your arc

$$s = r\theta$$

when s is the arc length and θ is the angle measured in radians

Arc Length cont.

Arc length formula using degrees

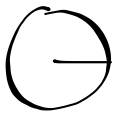
$$s = r\theta$$

θ is supposed to be in radians, if θ is degrees how do you convert from degrees to radians? mult. by $\frac{\pi}{180^\circ}$

Examples:

$s = r\theta$

use the appropriate arc length formula to find the missing information



s	r	θ
?	2 in	25 rad.

$s = 2(25) = 50\text{in}$

40 cm	?	

$\left(\frac{9}{\pi}\right)\frac{40}{1} = r\left(\frac{\pi}{9}\right)\left(\frac{9}{\pi}\right)$

$\frac{360}{\pi\text{ cm}} = r \approx 114.59\text{cm}$

$\frac{20^{\circ}}{1}\cdot\frac{\pi}{180^{\circ}} = \frac{2\pi}{18} = \frac{\pi}{9}$