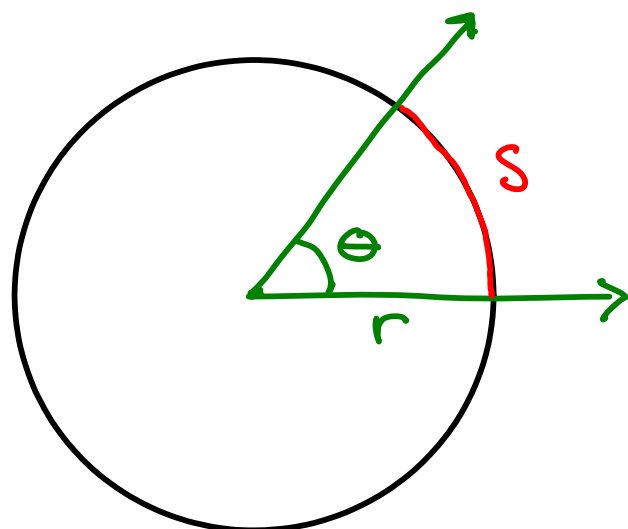


WHAT IS π ? (IT'S A NUMBER)

How big is π° ?

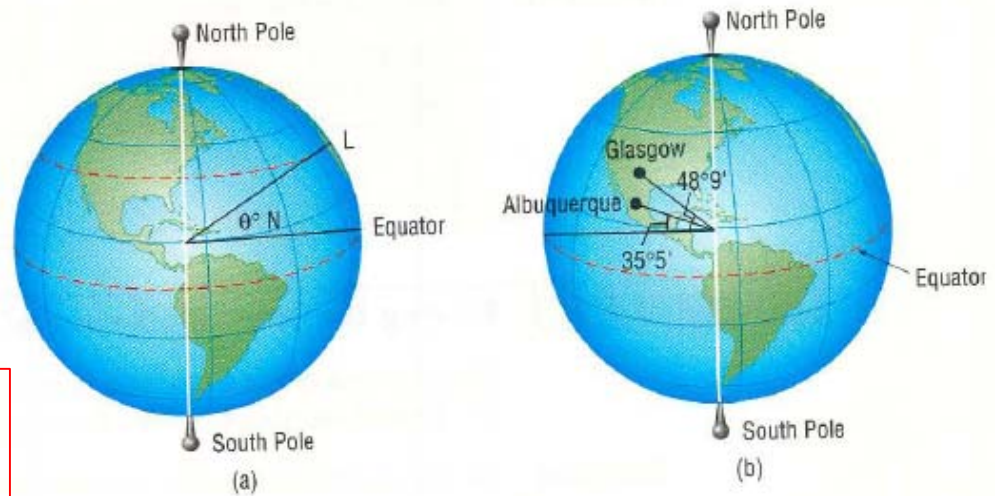
WHAT ABOUT THE OTHER NUMBERS?

ARCLength FORMULA: $s = r\theta$



EXAMPLE 6**Finding the Distance between Two Cities**

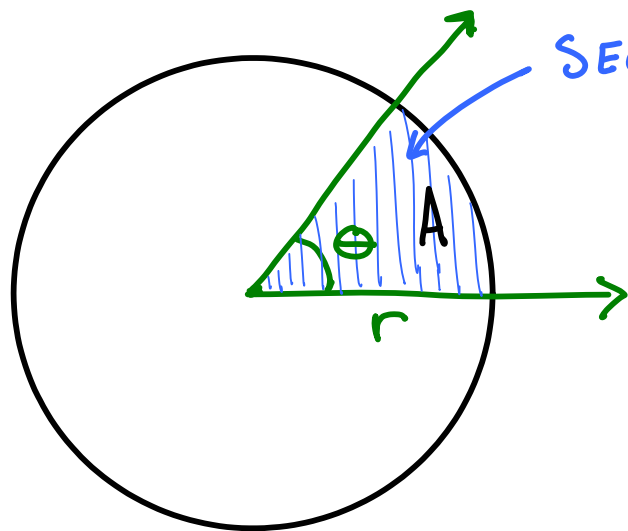
See Figure 13(a). The latitude of a location L is the angle formed by a ray drawn from the center of Earth to the Equator and a ray drawn from the center of Earth to L . See Figure 13(b). Glasgow, Montana, is due north of Albuquerque, New Mexico. Find the distance between Glasgow ($48^{\circ}9'$ north latitude) and Albuquerque ($35^{\circ}5'$ north latitude). Assume that the radius of Earth is 3960 miles.

Figure 13**NOTE**

$$13.0667 \cdot \frac{\pi}{180} \text{radian} \approx 0.228 \text{radian}$$

$$3960 \cdot 0.228 \approx 903 \text{ miles}$$

THE AREA OF A SECTOR $A = \frac{1}{2} r^2 \theta$



SECTOR (Piece of pie)
but no π 's here

PROOF

CONSIDER RATIOS

TRIVIAL CASE:

CIRCULAR MOTION

LINEAR SPEED $\left(\frac{\text{LENGTH}}{\text{TIME}}\right): v = \frac{s}{t}$

Sure, you're going around a race car track but your speedometer doesn't know that.

ANGULAR SPEED $\left(\frac{\text{ANGLE}}{\text{TIME}}\right): \omega = \frac{\theta}{t}$

Here, ω is a greek letter pronounced "omega".

If you drive 10 laps per hour (1 lap = 2π rad), your angular speed is $\frac{20\pi}{\text{hour}}$ rad.

What does your speedometer say?

It depends on the size of the lap. (radius)

How do we convert between the two?

$$v = r\omega$$

PROOF
↪

* USE THE FACT THAT $s = r\theta$

WHEN WORKING PROBLEMS,

LET THE UNITS LEAD THE WAY.

Example:

A child receives a toy remote controlled car for Christmas. Unfortunately, it is the crummy kind that has a 2 foot cable that goes from the car to the "remote" control. Also, the car can only turn to the left and only when going in reverse. Consequently, the child becomes bored rather quickly and finds it more entertaining to swing the car around his head from the cable attached to the remote control. He spins the car at a rate of 180 revolutions per minute. When the cable breaks and the car flies across the room, at what speed does the car slam into the boy's little sister? Assume no loss of speed after leaving the cable.

