How to succeed in Trigonometry

- come to class on time every day
- pay attention and take notes in class
- ask questions about lecture in class, after class, during Office Hours, and in the Math Lab
- do your homework as soon as it is assigned
- if you have trouble with your homework, make sure you understand what the question is asking by looking up definitions and examples in your notes & textbook
- ask questions about homework questions you have trouble with in Math Lab (make sure you bring your textbook and notes with you to help the proctors help you!)
- if you still have questions after going to Math Lab, come to my Office Hours
- make a habit of attending Office Hours and Math Lab to work on homework even when you don't think you need help, so that someone is on hand to help if you need it
- don't wait until the night before a quiz or test to study
- learn your definitions
- memorize your formulas

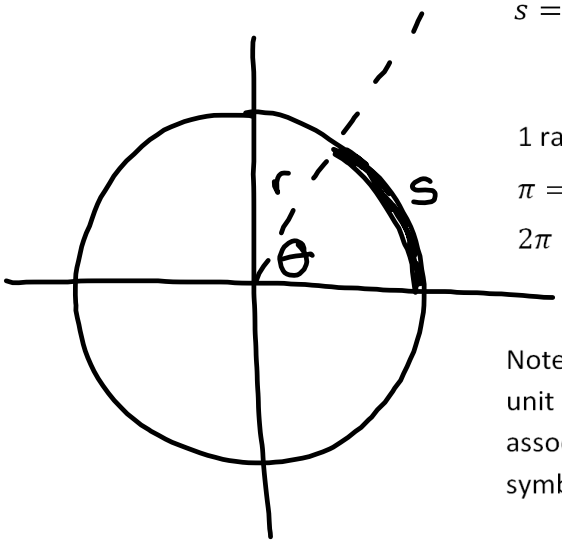
Homework this week:

01: Sign up for Khan Academy with coach code 4CG5S2.

02: Read sections 5.1 and 5.2 in your textbook

03: Textbook problems
5.1 #1, 2, 7-18 all, ~~31-74 all~~ 31-73 odd
5.2: #1-6 all; 15-41 odd; 59-75 odd (NO CALCULATOR!)
This will mostly be completed in class and will be due this Friday.
See syllabus for proper formatting of written homework assignments.

What is a radian?



r = radius length

s = arc length

1 radian $\approx 57.3°$

$\pi = 180°$

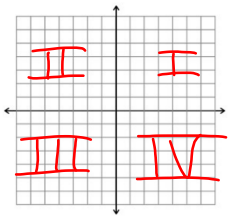
$2\pi = 360°$

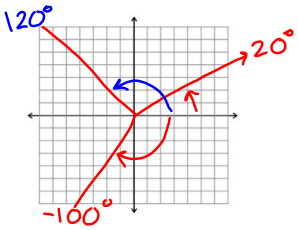
When $s = r$, we say that the corresponding angle θ which is subtended by arc s has measure 1 radian.

circumference $= 2\pi r$
If $r = 1$, $c = 2\pi$

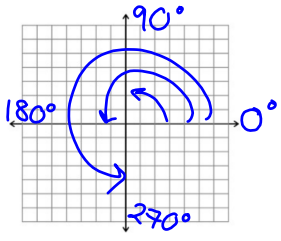
Note that θ is independent of the radius length and any unit of measurement. Therefore radians have no associated units, and any angle measure without a degree symbol is assumed to be in radians.

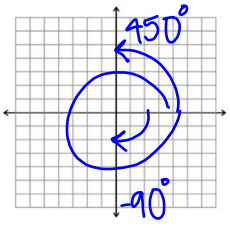
The coordinate plane is divided into four quadrants.



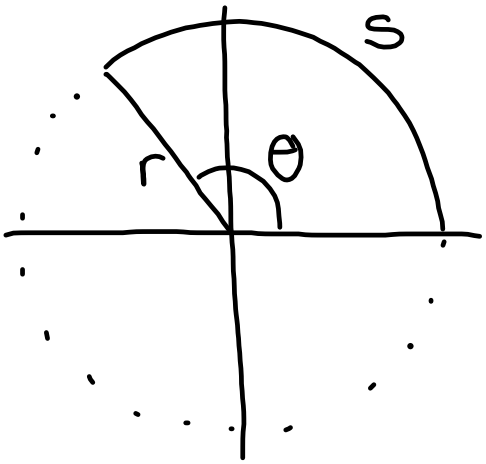


An angle whose terminal side falls on an axis is called a quadrantal angle.





Arc Length & Angular Speed



Arc Length

r = radius or distance from the center of rotation $(in, cm, km, etc.)$

s = arc length or distance traveled along the circumference of a circle $(in, cm, km, etc.)$

θ = angle or amount of rotation $(deg, rad, revolutions, etc.)$

$$\boxed{s = r\theta}$$

1. $r = 5in$; $\theta = 45°$; $s = ?\, in$

$s = r\theta$

$s = (5in)(45°) \cdot \frac{\pi}{180°} = \boxed{\frac{5\pi}{4}\, in}$

$= \frac{5(45)\pi}{180}\, in$

$\frac{180}{20}$

4

2. $s = 16 yards$; $\theta = 5$; $r = ?\, yards$

$\frac{s}{\theta} = \frac{r\theta}{\theta}$ $r = \frac{s}{\theta}$

$r = \boxed{\frac{16\ yds}{5}} = \boxed{\frac{16}{5}\ yards}$

3. Find the measure of a rotation in radians when a point 2 meters from the center of rotation travels 4 meters.

$\theta = ?\ rad$; $r = 2m$; $s = 4m$

$\frac{s}{r} = \frac{r\theta}{r}$ $\quad \theta = \frac{s}{r}$

$\theta = \frac{4m}{2m} = 2$

Linear Speed

$v = \frac{s}{t}$

Angular Speed

$\omega = \frac{\theta}{t}$ ω "omega" Ω

Arc Length

$s = r\theta$ $\quad v = r\omega$

Relating Linear & Angular Speed

$v = \frac{s}{t} = \frac{r\theta}{t} = r \cdot \frac{\theta}{t} = r\omega$

r = radius or distance from the center of rotation $(in, cm, km, etc.)$

s = arc length or linear distance along the circumference of a circle $(in, cm, km, etc.)$

θ = angle or amount of rotation $(deg, rad, revolutions, etc.)$

t = time $(sec, min, hours, years, etc.)$

$v = \frac{\text{linear distance}}{\text{time}}$ = linear speed $\left(\frac{km}{s}, \frac{mi}{h}, etc.\right)$

$\omega = \frac{\text{amount of rotation}}{\text{time}}$ = angular speed $\left(\frac{rev}{min}, \frac{deg}{s}, etc.\right)$

1. A wheel with a 15 inch diameter rotates at a rate of 6 radians per second. What is the linear speed of a point on its rim in feet per minute?

$r = \frac{15\text{ in}}{2}$; $\omega = \frac{6\text{ rad}}{s}$; $V = ? \frac{ft}{min}$

$V = r\omega$

$V = \frac{15\text{ in}}{2} \cdot \frac{3}{\cancel{6}\ \cancel{\text{rad}}}{\cancel{s}} \cdot \frac{1\text{ ft}}{\cancel{12\text{ in}}} \cdot \frac{5}{\cancel{60}\ \cancel{s}}{1\text{ min}} = \boxed{225 \frac{ft}{min}}$