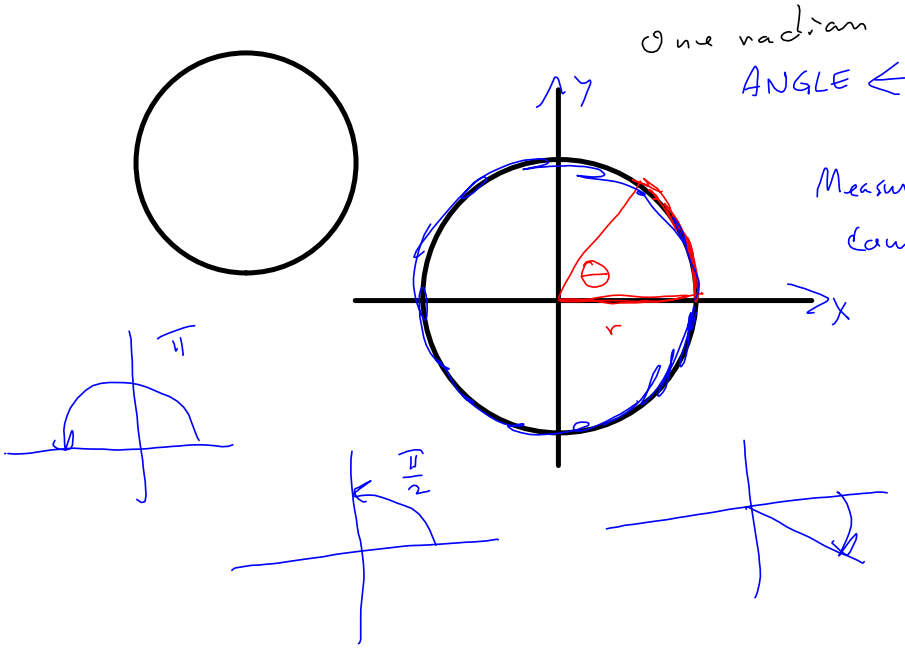
MAT 122 Trigonometry

https://harryzaims.com/122/videos/



$S = 2\pi r$ for full circle arc length

What's arc length of an angle $\theta = 270^\circ$ on a circle of radius 5?

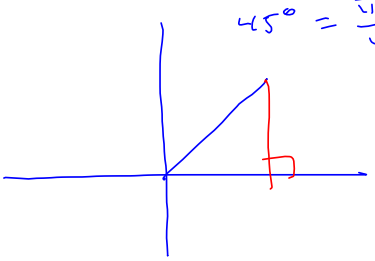
$$\left(\frac{2\pi \text{ radians}}{1 \text{ revolution}}\right) = \left(\frac{360^\circ}{1 \text{ revolution}}\right)$$

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

$$(270^\circ)\left(\frac{\pi}{180^\circ}\right) = \frac{3\pi}{2}$$

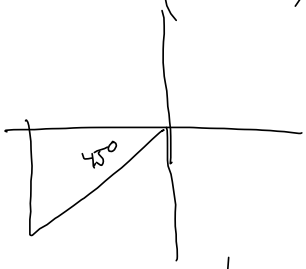
Building triangles from a given angle.

$45° = \frac{\pi}{4}$



Drop a perpendicular to the x-axis.

$(225^\circ)\left(\frac{\pi}{180^\circ}\right) = \frac{5\pi}{4}$

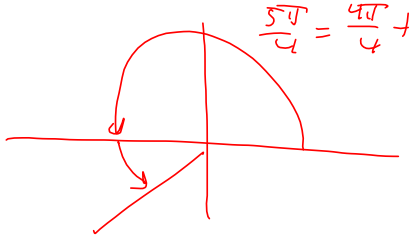


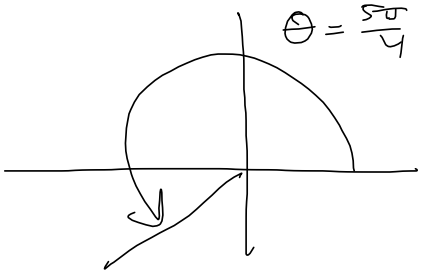
REFERENCE ANGLE θ'

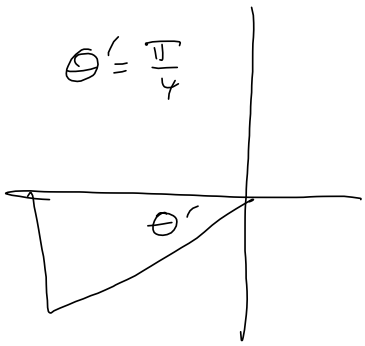
is the acute angle we get from the triangle we get by dropping a perpendicular to the x-axis

$225° - 180° = 45°$

$\frac{5\pi}{4} = \frac{4\pi}{4} + \frac{1\pi}{4}$







Logistics:

§1.2 is premature. will come back to it later

Lecture the first day or two.
Then more of a lab in class, with questions and people arguing about math.

Some warnings about early going:

Don't panic about eyeballing angles in radians. Distinguish between learning and busy work. Use your best judgement.

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§1.1_1.3 are on the long side.
Don't kill yourself if you get the idea.

Bicycle Problem 5.1.1 #58

$$\left(\frac{2 \text{ revolutions front}}{\text{sec}}\right)\left(\frac{4 \text{ revolutions back}}{2 \text{ revolutions front}}\right)$$

$$\left(\frac{2\pi \text{ radians}}{1 \text{ revolution back}}\right)\left(14\text{-inch radius}\right) =$$

$$\frac{\text{radians}}{\text{sec}}$$

$$\frac{\theta \cdot r}{\text{sec}}$$

$$\frac{(8\pi)(14) \text{ inch}}{\text{sec}}$$

$$= \left(\frac{112\pi \text{ in}}{\text{s}}\right)\left(\frac{1 \text{ ft}}{12 \text{ in}}\right) = \frac{28\pi}{3}\ \frac{\text{ft}}{\text{s}}$$

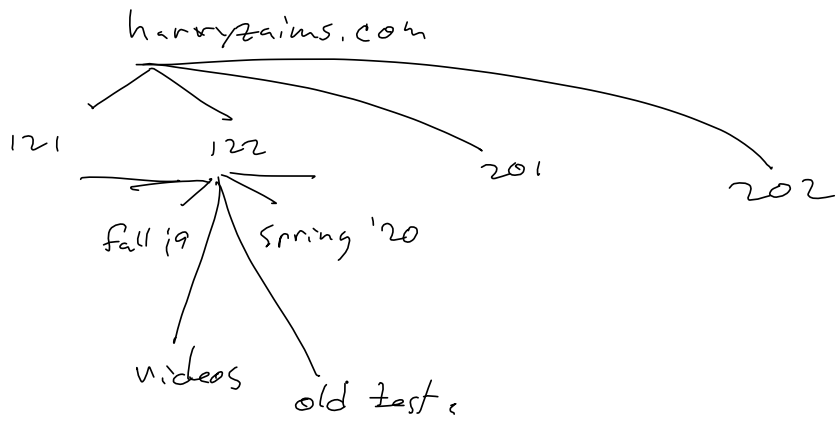
$$\frac{\text{ft}}{\text{s}} \rightarrow \frac{\text{mi}}{\text{hr}}$$

28
56
112
12
6
3

$$\left(\frac{28\pi}{3}\ \frac{\text{ft}}{\text{s}}\right)\left(\frac{60 \text{ miles/hr}}{88 \text{ ft/s}}\right)$$

Now in $\frac{\text{miles}}{\text{hr}}$

$$\frac{30}{44} = \frac{15}{22}$$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