Ch 6

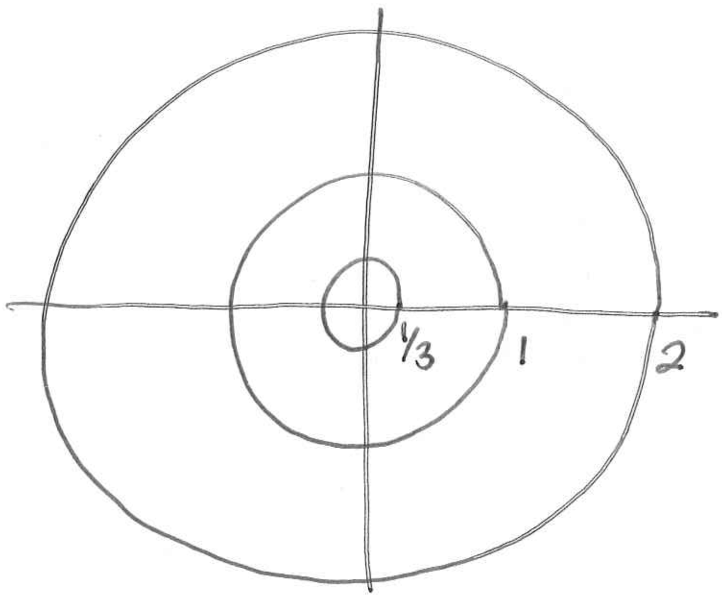
Test #3, Ch4 (Exp/logs), Ch5.

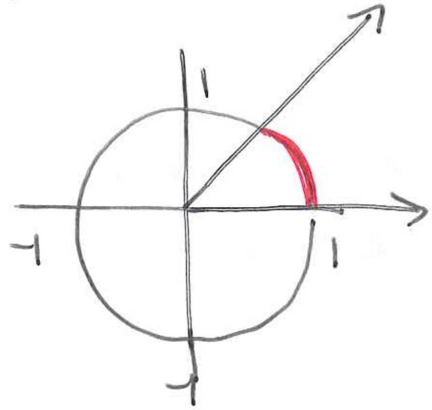
3/23/2011
Section 12

## 6.1 Angular measure:

What is radian measure?

It's just another way to measure angles.




1 full revolution

$= 360°$

$= 2\pi$ radians.

arclength on 1 unit circle

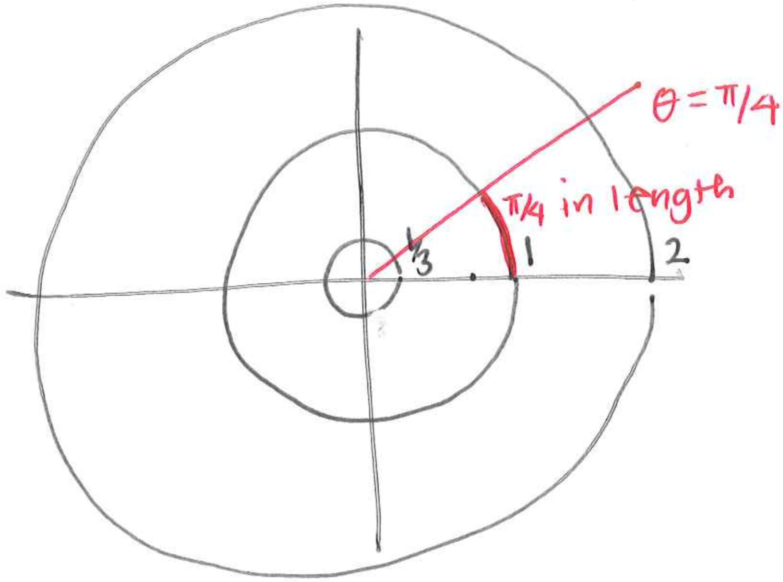
Degrees = 360° = 1 rev.

Radian = $2\pi$ = arclength on unit circle.

Conversion: $360° = 2\pi$ radian

deg → rad: $(\text{deg})\left(\frac{2\pi \text{ rad}}{360 \text{ deg}}\right) = (\text{deg})\left(\frac{\pi}{180}\right)$

rad → deg: $(\text{rad})\left(\frac{360 \text{ deg}}{2\pi \text{ rad}}\right) = (\text{deg})\left(\frac{180 \text{ deg}}{\pi \text{ rad}}\right)$




$\frac{\pi}{4} = \underline{\underline{\frac{1}{8}}}$ rev. (on ALL the circles)

$\Rightarrow$ on unit circle, arc length $S = \pi/4$

on circle rad 2, $S = \frac{1}{8}(2\pi(2)) = \pi/2 = \frac{\pi}{4}(2)$

circumf

on circle rad $1/3$, $S = \frac{1}{8}(2\pi(\frac{1}{3})) = \frac{\pi}{4}(\frac{1}{3})$

on circle rad r, $S = \frac{1}{8}(2\pi r) = \frac{\pi}{4} r.$

$\Rightarrow$ $\boxed{\text{arclength of } \theta \text{ on circle of radius } r \quad S = \theta r. \quad \theta \text{ measured in radians}}$

Ex: Find the arclength:

(a) $\theta = 45°$, $r = 2$

$= \pi/4$

$S = r\theta$

measured in rad!

$\Rightarrow s = 2(\pi/4) = \boxed{\pi/2}$

(b) $\theta = \frac{7\pi}{2}$ ; $r = \sqrt{2}$

$$s = \sqrt{2}\left(\frac{7\pi}{2}\right) = \boxed{\frac{7\pi}{\sqrt{2}}}$$

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In general, to see how many revs are in $\theta$, simply take

$$\frac{\theta\ (\text{rad})}{2\pi} = \frac{\theta\ (\text{deg})}{360} = \text{fraction of full revs in } \theta.$$

In Class ; Open notes ; groups 2-3 (10 minutes)

3/23/2011
In Class.
Sect 12

1.) Caffeine is metabolized in a typical person with a half life of about 3 hours.
A red bull contains 80.0 mg of caffiene.
How long until 15mg remains? (round to 0.01)

answer : 7.25 hours

2.) Suppose the population of a certain city increases by 3% per year. It's pop in 1990 is 1.5 million.

ⓐ Find a formula of the form $y = Cb^t$. (round to 0.01)

ⓑ Find a formula of the form $y = Ce^{kt}$ (round to 0.0001)

ⓒ What is the population projected to be in 2015? (Round to nearest million).

(NOTES→)

Warm up : ① Given that $180° = \pi$ radians
Complete the table of values exactly

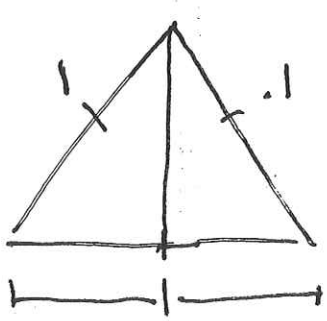
$\pi/4\,(180°/\pi)$

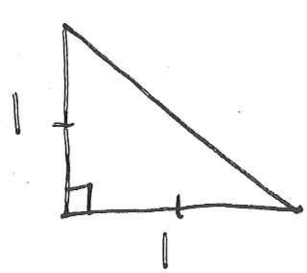
| $\theta(°)$ | 0 | 45° | 90° | 60 | 270 | 1 | $\frac{180}{\pi}$ | $\frac{180^2}{\pi}$ | $\pi$ |
|---|---|---|---|---|---|---|---|---|---|
| $\theta$(rad) | 0 | $\pi/4$ | $\pi/2$ | $\frac{\pi}{3}$ | $\frac{3}{2}\pi$ | $\frac{\pi}{180}$ | 1 | 180 | $\frac{\pi^2}{180}$ |

$60°\left(\frac{\pi}{180°}\right)$

② Determine angles (in °) and side lengths

triangle (angles sum to 180°)



3/23/2011
Section 10

Find formula: $y = Ce^{kt}$

$y = 80 \cdot e^{kt}$

To find $k$: $(3, 40)$

$40 = 80 e^{k(3)}$

$\frac{1}{2} = e^{3k}$

$\ln(\frac{1}{2}) = 3k$

$\frac{1}{3}\ln(1/2) = k \approx -0.231049$

$\Rightarrow y = 80 e^{-0.231049t}$

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$15 = 80 e^{-0.231049t}$

$\frac{\ln(\frac{15}{80})}{-0.231049} = t \approx \boxed{7.25 \text{ hours}}$

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(a) $y = Cb^t$ Set $t = 0 \rightsquigarrow 1990$.

$\Rightarrow C = 1.5$ mil.

$y = 1.5(b)^t$

$\boxed{y = 1.5(1.03)^t}$

growth rate.

$b = 1 + r$

growth factor

(b) $y = Ce^{kt}$ Set $t = 0 \leftrightsquigarrow 1990$

$\Rightarrow C = 1.5$

$y = 1.5e^{kt}$

To find $k$...

Easy route:

$e^k = 1.03 \Rightarrow k = \ln(1.03) \approx 0.0296$

other way: $(0, 1.5)$ ✓ $c = 1.5$ $(1, 1.5(1.03))$

$\uparrow$ plug in this pt to find $k$.

$$\cancel{1.5}(1.03) = \cancel{1.5}e^{k(1)}$$

$$1.03 = e^{k}$$

$$\ln(1.03) = k \approx 0.0296$$

(c) 2015 $\rightsquigarrow t = 25$ (25 years after 1990)

$$y = 1.5(1.03)^{25} = 3 \text{ million}$$

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We'll do Chapter 6 before Ch 5:

§6.1 Angular measure:

Big facts:

$$1 \text{ revolution} = 360°$$

$$= 2\pi$$

$\Longrightarrow$ conversion:

radian measure to degree: $\dfrac{360°}{2\pi \text{ rad}} = \boxed{\dfrac{180°}{\pi \text{ rad}}}$

degree to radian: $\boxed{\dfrac{\pi \text{ rad}}{180°}}$