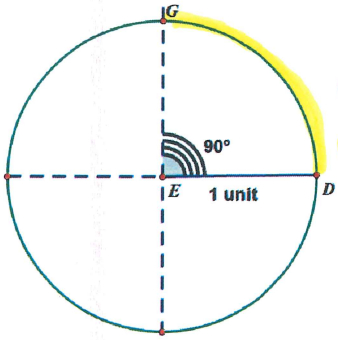
Converting Degrees to Radians Notes 2016-2017

1. Discovery: Find the exact ARC LENGTH of DG if $m\angle GED = 90°$.



$\ell = \frac{90}{360} C$ $\quad \ell = \frac{90}{360} 2\pi 1 \Rightarrow$ Length must be simplified and in terms of π.

$\ell = \frac{180\pi}{360}$

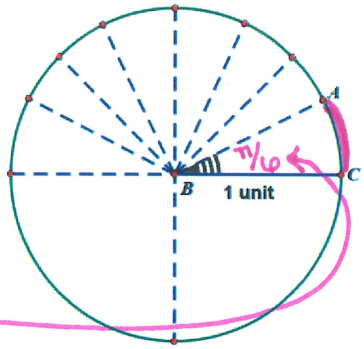
$\boxed{\ell = \frac{\pi}{2} \text{ units}}$

2. Discovery: Find the Arc Length of AC if $m\angle ABC = 30°$.

$\ell = \frac{30}{360} 2\pi 1$ or $\ell = \frac{30}{360} 2\pi$

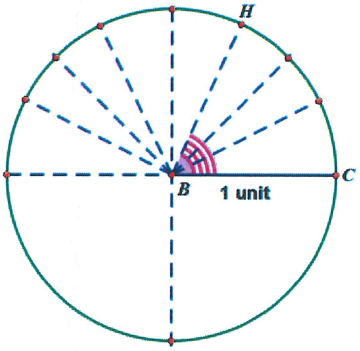
$\ell = \frac{60\pi}{360}$

$\boxed{\ell = \frac{\pi}{6} \text{ units}}$



With the unit circle having the radius of one unit, finding the arc length is converting the degrees to radian measure.

3. Convert to radians if $m\angle HBC = 60°$ by using the proportion.



θ

$\frac{\text{degree}}{\text{total } \odot} \left\{ \frac{60}{360} = \frac{b}{2\pi} \right\} \frac{\text{Radians}}{\text{total } \odot}$

$$\frac{\theta}{360} = \frac{b}{2\pi}$$

$2\pi \cdot 60 = 360b$

$120\pi = 360b$

$\frac{120\pi}{360} = b$

$\boxed{\frac{\pi}{3} = b}$ This is now the angle in radians

4. Convert the central angle with measure 150° to radians by using the proportion.

$$\frac{\theta}{360} = \frac{b}{2\pi}$$

$\frac{150}{360} = \frac{b}{2\pi}$ $\quad \frac{300\pi}{360} = b$ $\quad \frac{5\pi}{6} = b$

$\therefore \frac{5\pi}{6}$ is 150° converted into radians

5. Convert the central angle with measure 315° to radians by using the proportion.

$$\frac{\theta}{360} = \frac{b}{2\pi}$$

$\frac{315}{360} = \frac{b}{2\pi}$ $\quad \frac{630\pi}{360} = \frac{7\pi}{4}$

$\therefore 315°$ is $\frac{7\pi}{4}$ radians

Converting Radians to Degrees

6. Convert $\frac{3\pi}{4}$ radians to degrees by using the proportion.

$$\frac{\theta}{360} = \frac{b}{2\pi}$$

$\frac{3\pi}{4} = b$

We now need to find θ

Recall $\frac{3\pi}{4}$ is like $\frac{\frac{3\pi}{4}}{2\pi}$ $\frac{3\pi}{4} \cdot \frac{1}{2\pi} = \frac{3\pi}{8\pi}$

$$\frac{\theta}{360} = \frac{\frac{3\pi}{4}}{2\pi}$$

$$\frac{\theta}{360} = \frac{3}{8}$$

$\theta = \frac{1080}{8}$ simplify → 135°

$\frac{3\pi}{4}$ is 135° when converted

7. Convert $\frac{4\pi}{3}$ radians to degrees by using the proportion.

$$\frac{\theta}{360} = \frac{b}{2\pi}$$

$$\frac{\theta}{360} = \frac{\frac{4\pi}{3}}{2\pi}$$

Recall: Fractions $\frac{4\pi}{3} \cdot \frac{1}{2\pi} = \frac{4\pi}{6\pi} = \frac{2}{3}$

$$\frac{\theta}{360} = \frac{2}{3}$$

$\theta = \frac{720}{3}$ → simplify **240°**

We are really just multiplying the radian by $\frac{360}{2\pi}$. Let's take a look at #8.

8. Convert $\frac{5\pi}{4}$ radians to degrees.

$\frac{5\pi}{4} \cdot \frac{360}{2\pi} = \frac{1800\pi}{8\pi}$ simplify **225°**

9. Convert $\frac{3\pi}{2}$ radians to degrees.

$\frac{3\pi}{2} \cdot \frac{360}{2\pi} = \frac{1080\pi}{4\pi}$ → **270°**

10. The traditional method of converting degrees to radians is to multiply the degree by $\frac{\pi}{180}$. Explain Why this method works.

$2\pi \cdot \frac{\theta}{360} = \frac{b}{2\pi} \cdot 2\pi$ $\frac{\theta \times 2\pi}{360}$ → $\theta \cdot \frac{\pi}{180}$