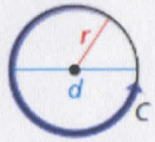
Lesson Title 11.1 Circumference & Arc Length of a Circle NOTES **HGEO** **Date** _____

OBJECTIVE 1: Circumference of a Circle

Reminder from previous math courses, circumference is the perimeter of a circle. The formula is either $C = \pi d$ or $C = 2\pi r$.

d = diameter
r = radius
π = pi (exact leave it in the answer & for approximate use the pi button on the calculator)



$C = \pi d = 2\pi r$

TASK 1: find the indicated measure(s). Give both the exact answer and the approximate answer to the thousandths. Be sure to include correct units.

a) circumference of a circle with a radius of 11 inches.

$C = 2\pi r = 2\pi(11) = 22\pi$ in ≈ 69.115 in

b) radius of a circle with a circumference of 4 millimeters.

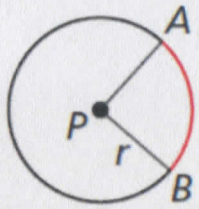
$C = 2\pi r \quad 4 = 2\pi r \quad = \frac{2}{\pi}$ mm $\quad \approx 0.637$ mm

c) circumference of a circle with a diameter of 6 centimeters.

$C = \pi d = \pi(6) \quad = 6\pi$ cm $\quad \approx 18.850$ cm

OBJECTIVE 2: Arc Length

Arc length is the ratio of the length of a given arc to the circumference, which is equal to the ratio of the measure of the arc to 360°



$$\frac{\text{Arc length of } \overset{\frown}{AB}}{2\pi r} = \frac{m\overset{\frown}{AB}}{360^\circ}, \text{ or}$$

$$\text{Arc length of } \overset{\frown}{AB} = \frac{m\overset{\frown}{AB}}{360^\circ} \cdot 2\pi r$$

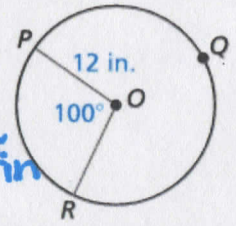
$21 = \left(\frac{x}{360}\right)(2\pi(14))$

$7560 = (28\pi)x$

$263.96\pi m$

TASK 2: Find each indicated measure. Be sure to include correct units.

a) arc length of $\overset{\frown}{PR}$



$\left(\frac{100}{360}\right)(2\pi(12))$

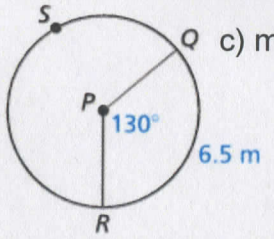
$\frac{5}{18}(24\pi) = \frac{20\pi}{3}$ in

b) circumference of $\odot P$

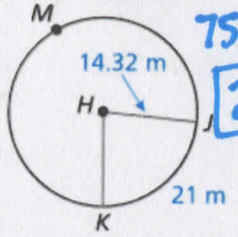
$6.5 = \left(\frac{130}{360}\right)C$

$2340 = 130C$

$18m = C$



c) $m\overset{\frown}{JK}$



OBJECTIVE 3: Revolutions

Distance traveled	=	Number of revolutions	•	Circumference

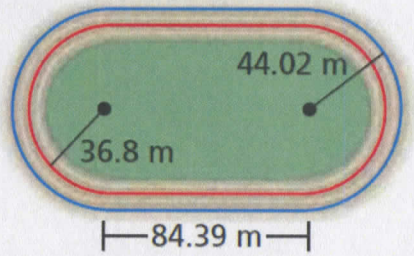
TASK 3: Real-World Application

a) The radius of a wheel on a toy truck is 4 inches. To the nearest foot, how far does the tire travel when it makes 7 revolutions?

$C = 4(2\pi) = 8\pi$ $\quad D = 7(8\pi) = 56\pi$ in $= \frac{56\pi}{12}$ ft ≈ 14.661

15 ft

b) The curves at the ends of the track shown are 180° arcs of circles. The radius of the arc for a runner on the red path (or inside path) shown is 36.8 meters. About how far does this runner travel to go once around the track? Round to the nearest tenth of a meter.



$= 2(84.39) + 2(2\pi(36.8))$

$= 168.78 + 147.2\pi$

≈ 631.222

631.2m

OBJECTIVE 4: Conversions

You will need to be able to convert between Degrees (DEG) and Radians (RAD)

- *Degrees uses the degree symbol as its unit*
- *Radians uses the word radians as its unit*

Degrees to radians	Radians to degrees
Multiply degree measure by $\frac{2\pi \text{ radians}}{360°}$, or $\frac{\pi \text{ radians}}{180°}$.	Multiply radian measure by $\frac{360°}{2\pi \text{ radians}}$, or $\frac{180°}{\pi \text{ radians}}$.

TASK 4: Converting between Degrees and Radians

a) 30° to radians

$\frac{30}{1} \cdot \frac{\pi r}{180} = \frac{\pi}{6}$ radians

b) $\frac{3\pi}{8}$ radians to degrees

$\frac{3\pi}{8} \cdot \frac{180}{\pi} = \frac{540}{8}$

67.5°

c) 15° to radians

$\frac{15}{1} \cdot \frac{\pi}{180} = \frac{15\pi}{180}$

$\frac{\pi}{12}$ radians

d) $\frac{4\pi}{3}$ radians to degrees

$\frac{4\pi}{3} \cdot \frac{180}{\pi} = 240°$

Still need help with: