# Bell Work: Convert from Degrees to Radians or Radians to Degrees

$380° =$

$\frac{15\pi}{9}\ \text{rad} =$

# Bell Work: Convert from Degrees to Radians or Radians to Degrees

$$380° = 380°\left(\frac{\pi \text{ rad}}{180°}\right) = \frac{19\pi}{9}$$

$$\frac{15\pi}{9} \text{ rad} = \left(\frac{15\pi}{9} \text{ rad}\right)\left(\frac{180°}{\pi \text{ rad}}\right) = 300°$$

# PRE-CALC TRIG

Day 30

# From last time and For Next Time:

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#17, 23-24, 27, 29, 31 ← Radian
#41, 45-46, 49, 51, 53 ← Degree

#57-58, 61-62, 65-66, 73-74 ← Convert

#89-90, 93-94, 98-99, 109-110,
112, 118-119 ←Applied

# “Practice Test” Level 2 Conversions

- Change 100° to radians
- Change $\frac{15\pi}{2} to\ degrees$
- Give a positive and negative coterminal angle of $\frac{6\pi}{5}\ and\ 20°$
- Find complement and supplement of $\frac{\pi}{5}$
- Sketch an angle that is $-\frac{4\pi}{7}$

# “Practice Test” Level 2 Applied

- The measure of a central angle in a circle of radius 30 cm is 80 degrees. Find the measure of its intercepted arc.
- Find the area of the sector in a circle of 8 inches, given a central angle of $\frac{\pi}{7}$.
- Find angular velocity of a wheel that rotates 12.5 rotations every 10 seconds
- Find the linear velocity, in inches per second, of a point on the edge of a wheel of radius 6 inches that is turning a an angular velocity of $\frac{\pi}{4}$ radians per second.

# “Practice Test” Level 3

- If an angle of measure $\frac{68\pi}{9}$ is drawn in standard position, in which quadrant is the terminal side?
- If you walk 2/7 the way around a circular lake with a radius of 500 yards, how far do you walk in terms of $\pi$ ?
- A wheel of radius 12 centimeters is rotating at an angular velocity of 4 radians per second. To the nearest hundredth of a centimeter per second, at what linear speed is a point on the edge of the wheel moving?
- A wheel of radius 8 centimeters is rotating so that a point on the edge of the wheel is moving with a linear velocity of 3 centimeters per second. To the nearest hundredth of a radian per second, at what angular speed is the wheel rotating?

# “Practice Test” Level 4

- At what angular velocity, in radians per second, should the wheels on a bike with 32-inch diameter wheels be turning so that the bike is traveling at 15 miles per hour? (to the nearest hundredth)

Note: (5280 feet =1 mile, 60 minutes=1 hour, 60 seconds=1 minute)

# "Practice Test" Level 2 Conversions SOLUTIONS

- Change 100° to radians = $\mathbf{\frac{5\pi}{9}}$
- Change $\frac{15\pi}{2} to\ degrees$ = **1350°**
- Give a positive and negative coterminal angle of $\frac{6\pi}{5}\ and\ 20°$
  - $\frac{6\pi}{5} \pm 2\pi = \mathbf{\frac{16\pi}{5}}$ **and** $\mathbf{\frac{-4\pi}{5}}$ $\qquad 20 \pm 360 = \mathbf{380\ and\ -340}$
- Find complement and supplement of $\frac{\pi}{5}$
  - $\frac{\pi}{2} - \frac{\pi}{5} = \mathbf{\frac{3\pi}{10}}$ $\qquad \pi - \frac{\pi}{5} = \mathbf{\frac{4\pi}{5}}$
- Sketch an angle that is $-\frac{4\pi}{7}$
  - It is equivalent to –102ish degrees… so estimate it in the 3rd quadrant accordingly

# “Practice Test” Level 2 Applied SOLUTION

- The measure of a central angle in a circle of radius 30 cm is 80 degrees. Find the measure of its intercepted arc.
  - $30\left(\frac{4\pi}{9}\right) = \mathbf{\frac{40\pi}{3}}$ **or about 41.88 cm**
- Find the area of the sector in a circle of 8 inches, given a central angle of $\frac{\pi}{7}$.
  - $A = \frac{1}{2}8^2\frac{\pi}{7} = \mathbf{\frac{32}{7}\pi = 14.36}$
- Find angular velocity of a wheel that rotates 12.5 rotations every 10 seconds
  - $\mathbf{\frac{central\ angle}{time} = \frac{12.5(2\pi)}{10\ sec} = \frac{25\pi}{10\ sec} = 7.854\ radians\ per\ sec}$
- Find the linear velocity, in inches per second, of a point on the edge of a wheel of radius 6 inches that is turning a an angular velocity of $\frac{\pi}{4}$ radians per second.
  - $\frac{s}{t} = \frac{r\theta}{t} = \frac{6*\frac{\pi}{4}}{1\ second} = \mathbf{4.712\ inches\ per\ second}$

# “Practice Test” Level 3 SOLUTIONS

- If an angle of measure $\frac{68\pi}{9}$ is drawn in standard position, in which quadrant is the terminal side?
  - $\frac{68\pi}{9} = 1360$ degrees (that is 3 full rotations plus $\mathbf{280}$)
    so it is just barely in the **4th quadrant**.

- If you walk 2/7 the way around a circular lake with a radius of 500 yards, how far do you walk in terms of $\pi$ ?
  - C = 2 $\pi$ ( 500 ) = $1000\pi$ would be all the way around… but you only went 2/7 → $\left(\frac{2}{7}\right) 1000\pi = \mathbf{897.598}\ \boldsymbol{yards}$

# “Practice Test” Level 3 SOLUTIONS

- A wheel of radius 12 centimeters is rotating at an angular velocity of 4 radians per second. To the nearest hundredth of a centimeter per second, at what linear speed is a point on the edge of the wheel moving?
  - $linear\ speed = \frac{s}{t} = \frac{r\theta}{t} = \frac{12*4\pi}{1\ sec} = \frac{48\pi}{1} = \mathbf{150.796\ cm\ per\ sec}$
- A wheel of radius 8 centimeters is rotating so that a point on the edge of the wheel is moving with a linear velocity of 3 centimeters per second. To the nearest hundredth of a radian per second, at what angular speed is the wheel rotating?
  - $angular\ speed = \frac{\theta}{t} = \frac{\left(\frac{3}{8}\right)\pi\ rad}{1\ sec} = \mathbf{1.178\ radians\ per\ sec}$

# “Practice Test” Level 4 SOLUTIONS

- At what angular velocity, in radians per second, should the wheels on a truck with 32-inch diameter wheels be turning so that the truck is traveling at 15 miles per hour? (to the nearest hundredth)

Note: (5280 feet =1 mile, 60 minutes=1 hour, 60 seconds=1 minute)

$$\frac{15\ miles * 5280\ feet * 12\ inch * 1\ hour * 1\ min}{1\ hour\ *\ 1\ mile\ *\ 1\ foot\ * 60\ \text{min}\ *\ 60\ sec} = \frac{950400\ inch}{3600\ sec} = 264\ inches\ per\ sec$$

$$linear\ speed = \frac{s}{t} = \frac{r\theta}{t} \rightarrow \frac{264\ inches}{1\ second} = \frac{32 *\ \theta}{1\ second} \rightarrow \theta = 8.25$$

$$angular\ speed = \frac{\theta}{t} = \frac{8.25\ rad}{1\ min} = \mathbf{8.25\ radians\ per\ min}$$