

Day 3: Radians & Degrees

Date _____

1) What is a Radian?

A great resource can be found here: <http://www.mathsisfun.com/geometry/radians.html>

Let's look!!

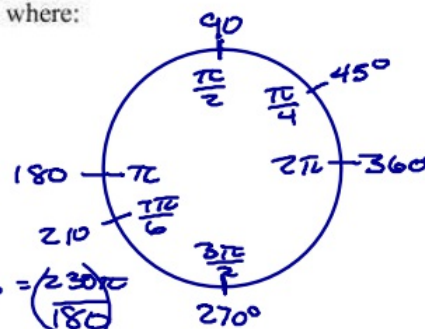
So how do we convert radians to degrees?

Another resource can be found here:

<http://www.mathwarehouse.com/trigonometry/radians/convert-degee-to-radians.php>

Since π radians = 180° then we can set up a proportion where:

$$2\pi = 360^\circ$$



Convert each degree measure into radians.

$$2) 210^\circ \cdot \frac{\pi}{180^\circ} = \frac{(210)\pi}{180}$$

$$= \frac{7\pi}{6}$$

$$3) 230^\circ \cdot \frac{\pi}{180^\circ} = \frac{(230)\pi}{180}$$

$$= \frac{23\pi}{18}$$

$$4) 120^\circ \cdot \frac{\pi}{180} = \frac{120\pi}{180}$$

$$= \frac{2\pi}{3}$$

$$\frac{12}{18} = \frac{6}{9} = \frac{2}{3}$$

$$5) 135^\circ \cdot \frac{\pi}{180} = \frac{135\pi}{180}$$

$$= \frac{3\pi}{8}$$

$$6) 225^\circ \cdot \frac{\pi}{180} = \frac{225\pi}{180}$$

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

$$7) 270^\circ$$

$$= \frac{3\pi}{2}$$

Convert each radian measure into degrees.

$$8) \frac{7\pi}{12} \cdot \frac{180}{\pi} = \frac{7(180)}{12}$$

$$= \frac{1260}{12}$$

$$= 105^\circ$$

$$9) \frac{11\pi}{9} = \frac{11(180)}{9}$$

$$= 220^\circ$$

$$10) \frac{31\pi}{18} = \frac{31(180)}{18}$$

$$= 310^\circ$$

$$11) \frac{17\pi}{12} = \frac{17(180)}{12}$$

$$= 255^\circ$$

$$12) \frac{5\pi}{12} = \frac{5(180)}{12}$$

$$= 75^\circ$$

$$13) \frac{\pi}{3} = \frac{180}{3}$$

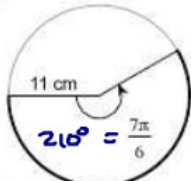
$$= 60^\circ$$

14) So now we can find Arc Length and Sector Area even if we are given the angle in radians.

How?

Convert the radians to degrees first, then solve like we did last class.

Find the length of each arc. Write solutions in exact and approximate forms.

15) 

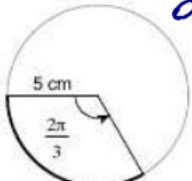
a) $C = 2\pi(11)$
 $= 22\pi$

b) $\frac{210}{360} = \frac{7}{12}$ ← Same

or $\frac{7\pi}{6} = \frac{7\pi}{6} \cdot \frac{1}{2\pi} = \frac{7}{6 \cdot 2} = \frac{7}{12}$

c) $C = \frac{7}{12} \cdot 22\pi = \frac{7 \cdot 22}{12} \pi = \frac{154}{12} \pi$

Exact = $\frac{77}{6} \pi$ cm
 Approx ≈ 40.3 cm

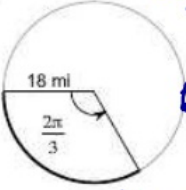
16) 

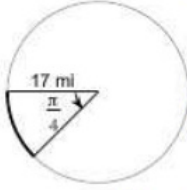
a) $C = 2\pi(5)$
 $= 10\pi$

b) $\frac{2\pi}{3} = \frac{2\pi}{3} \cdot \frac{1}{2\pi} = \frac{1}{3}$

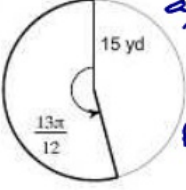
c) $C = \frac{1}{3} \cdot 10\pi$

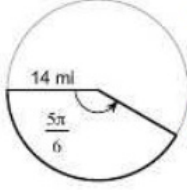
Exact = $\frac{10}{3} \pi$ cm
 Approx = 10.47 cm

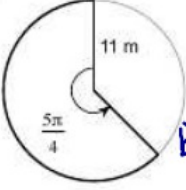
17)  a) $C = 2\pi(18) = 36\pi$
 b) $\frac{2\pi}{3} \div \frac{2\pi}{2\pi} = \frac{2}{6} = \frac{1}{3}$
 c) $C = \frac{1}{3} \cdot 36\pi = \frac{36\pi}{3}$
 Exact = 12π mi
 Approx. ≈ 37.68 mi

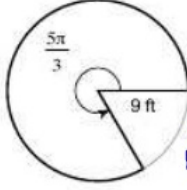
18)  a) $C = 2\pi(17) = 34\pi$
 b) $\frac{\pi}{4} \div \frac{2\pi}{2\pi} = \frac{1}{4 \cdot 2} = \frac{1}{8}$
 c) $C = \frac{1}{8} \cdot 34\pi = \frac{34\pi}{8}$
 $= \frac{17}{4}\pi$ mi
 ≈ 13.35 mi

Find the area of each sector. Write solutions in exact and approximate forms.

19)  a) $A = \pi(15)^2 = 225\pi$
 b) $\frac{13\pi}{12} \div \frac{2\pi}{2\pi} = \frac{13}{12 \cdot 2} = \frac{13}{24}$
 c) $A = \frac{13}{24} \cdot 225\pi = \frac{2925}{24}\pi$
 Exact = $\frac{975}{8}\pi$ yds²
 Approx ≈ 382.69 yd²

20)  a) $A = \pi(14)^2 = 196\pi$
 b) $\frac{5\pi}{6} \div \frac{2\pi}{2\pi} = \frac{5}{6 \cdot 2} = \frac{5}{12}$
 c) $A = \frac{5}{12} \cdot 196\pi = \frac{980}{12}\pi$
 $= \frac{245}{3}\pi$ mi²
 ≈ 256.43 mi²

21)  a) $A = \pi(11)^2 = 121\pi$
 b) $\frac{5\pi}{4} \div \frac{2\pi}{2\pi} = \frac{5}{4 \cdot 2} = \frac{5}{8}$
 c) $A = \frac{5}{8} \cdot 121\pi = \frac{605}{8}\pi$
 $= \frac{605}{8}\pi$ m²
 ≈ 237.46 m²

22)  a) $A = \pi(9)^2 = 81\pi$
 b) $\frac{5\pi}{3} \div \frac{2\pi}{2\pi} = \frac{5}{3 \cdot 2} = \frac{5}{6}$
 c) $A = \frac{5}{6} \cdot 81\pi = \frac{405}{6}\pi$
 $= \frac{135}{2}\pi$ ft²
 ≈ 211.95 ft²