PreCalculus **Key**

$\pi-\theta = r\angle$ Q2 | Q1 θ = ref angle

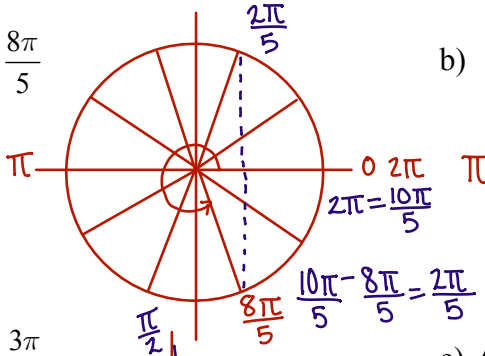
$180°-\theta = r\angle$ Q2 | Q1

$\theta-\pi = r\angle$ Q3 | Q4 $2\pi-\theta$

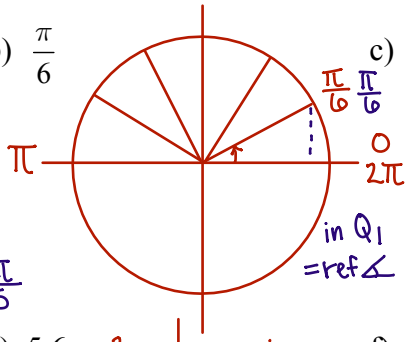
$\theta-180° = r\angle$ Q3 | Q4 $360°-\theta = r\angle$

1. The following angles are given to you in radian measure. Without converting to degrees, draw a sketch of each angle in standard position AND give the reference angle.

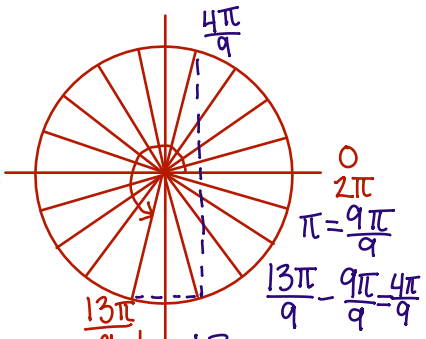
a) $\frac{8\pi}{5}$



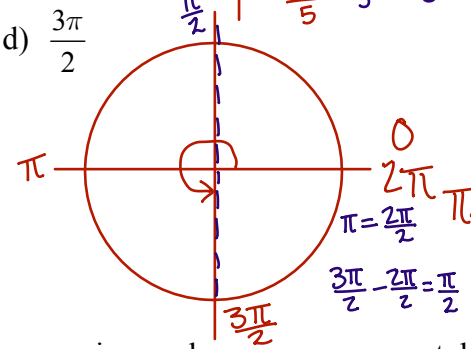
b) $\frac{\pi}{6}$



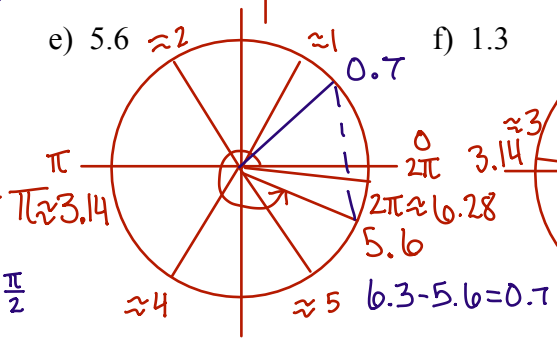
c) $\frac{13\pi}{9}$



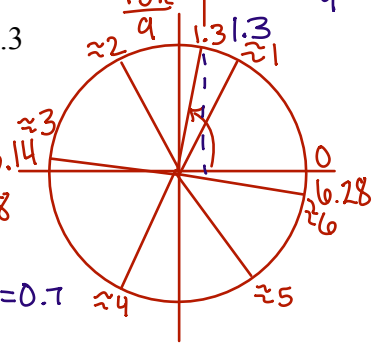
d) $\frac{3\pi}{2}$



e) 5.6



f) 1.3



2. If you are given a degree measurement, how do you convert it to radians?

multiply by $\frac{\pi}{180°}$

3. If you are given a radian measurement, how do you convert it to degrees?

multiply by $\frac{180°}{\pi}$

4. Convert the following angle measurements from degrees to radians (or vice-versa).

a) $\frac{2\pi}{3} \times \frac{180°}{\pi} = \frac{360°}{3} = 120°$

b) $24° \times \frac{\pi}{180°} = \frac{24\pi}{180} = \frac{2\pi}{15}$

c) $4.6 \times \frac{180°}{\pi} = \frac{828°}{\pi} \approx 263.5°$

d) $310° \times \frac{\pi}{180°} = \frac{310\pi}{180} = \frac{31\pi}{18}$

5. What is the formula for finding arc length? What does each letter represent?

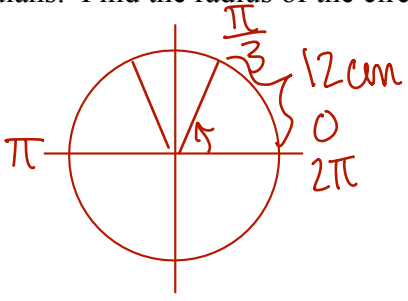
$S = r\theta$ sector arc length = radius times angle (theta)

6. A sector has an arc length 12 cm and a central angle of $\frac{\pi}{3}$ radians. Find the radius of the circle.

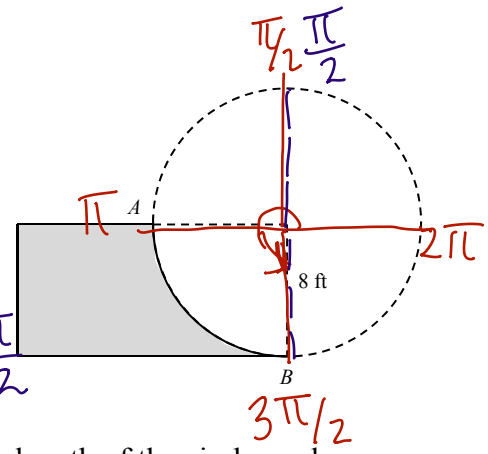
$S = r\theta$ $\left[12\text{ cm} = r \cdot \frac{\pi}{3}\right] \times \frac{3}{\pi}$

$\frac{36\text{cm}}{\pi} = \text{radius}$

$\approx 11.5\text{ cm}$



7. The skateboard ramp at the right is called a quarter pipe. The curved surface is determined by the radius of a circle. Find the length of the curved part of the ramp.

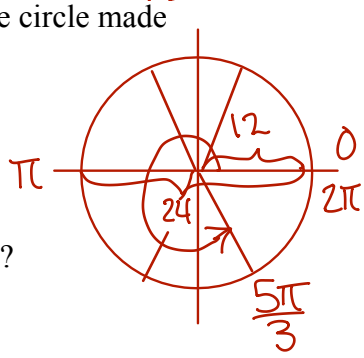


$S = r\theta$ $\theta = \frac{\pi}{2}$ $r = 8\text{ft}$ $\pi = \frac{2\pi}{2}$

$S = 8\text{ft} \times \frac{\pi}{2} = \frac{8\pi}{2}\text{ft}$ $\frac{3\pi}{2} - \frac{2\pi}{2} = \frac{\pi}{2}$

$= 4\pi\text{ft} \approx 12.5\text{ft}$

8. The paddlewheel of a riverboat has a diameter of 24 feet. Find the arc length of the circle made when the paddlewheel rotates 300°.



$d = 24\text{ft}$ $r = 12\text{ft}$

$S = r\theta$ $300° \times \frac{\pi}{180°} = \frac{5\pi}{3}$

$S = 12\text{ft} \times \frac{5\pi}{3} = \frac{60\pi}{3} = 20\pi\text{ft} \approx 62.8\text{ft}$

9. How many degrees are in one revolution? How many degrees in $\frac{1}{8}$ of a revolution?

$360°$ $\frac{360°}{8} = 45°$

10. How many radians are in one revolution? How many radians in $\frac{3}{4}$ of a revolution?

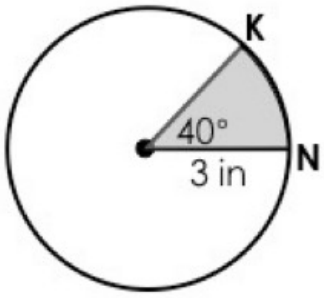
2π $\frac{6\pi}{4} = \frac{3\pi}{2}$ radians

11. The radius of a car wheel is 13 inches. How many revolutions per minute is the wheel making when the car is traveling at 40 mph.

$\frac{40\text{ miles}}{1\text{ hour}} \cdot \frac{1\text{ hour}}{60\text{ min}} \cdot \frac{5280\text{ ft}}{1\text{ mile}} \cdot \frac{12\text{ in}}{1\text{ ft}} = \frac{2{,}534{,}400\text{ in}}{60\text{ min}} = 42{,}240\frac{\text{in}}{\text{min}}$

$S = r\theta = 13 \cdot 2\pi = 26\pi\text{ in} \approx 82\text{in}$

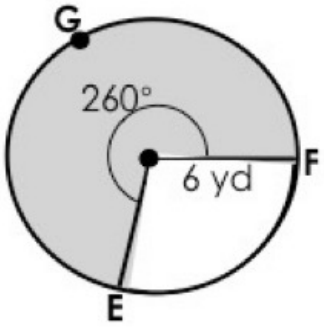
$\frac{21{,}120\pi}{41}\frac{\text{rev}}{\text{min}} \approx 517\frac{\text{rev}}{\text{min}}$



$S = r\theta$ $\theta = 40° \times \frac{\pi}{180°}$

$S = 3\text{in} \times \frac{2\pi}{9}$ $= \frac{40\pi}{180} = \frac{2\pi}{9}$

$= \frac{6\pi}{9}\text{in} = \frac{2\pi}{3}\text{in} \approx 2.1\text{in}$

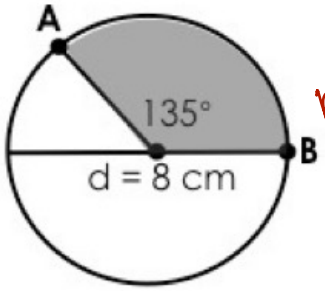


$S = r\theta$ $\theta = 260° \times \frac{\pi}{180°}$

$= \frac{260\pi}{180} = \frac{13\pi}{9}$

$S = 6\text{yd} \times \frac{13\pi}{9}$

$= \frac{26\pi}{3}\text{yd} \approx 27.2\text{yd}$



$r = 4\text{cm}$

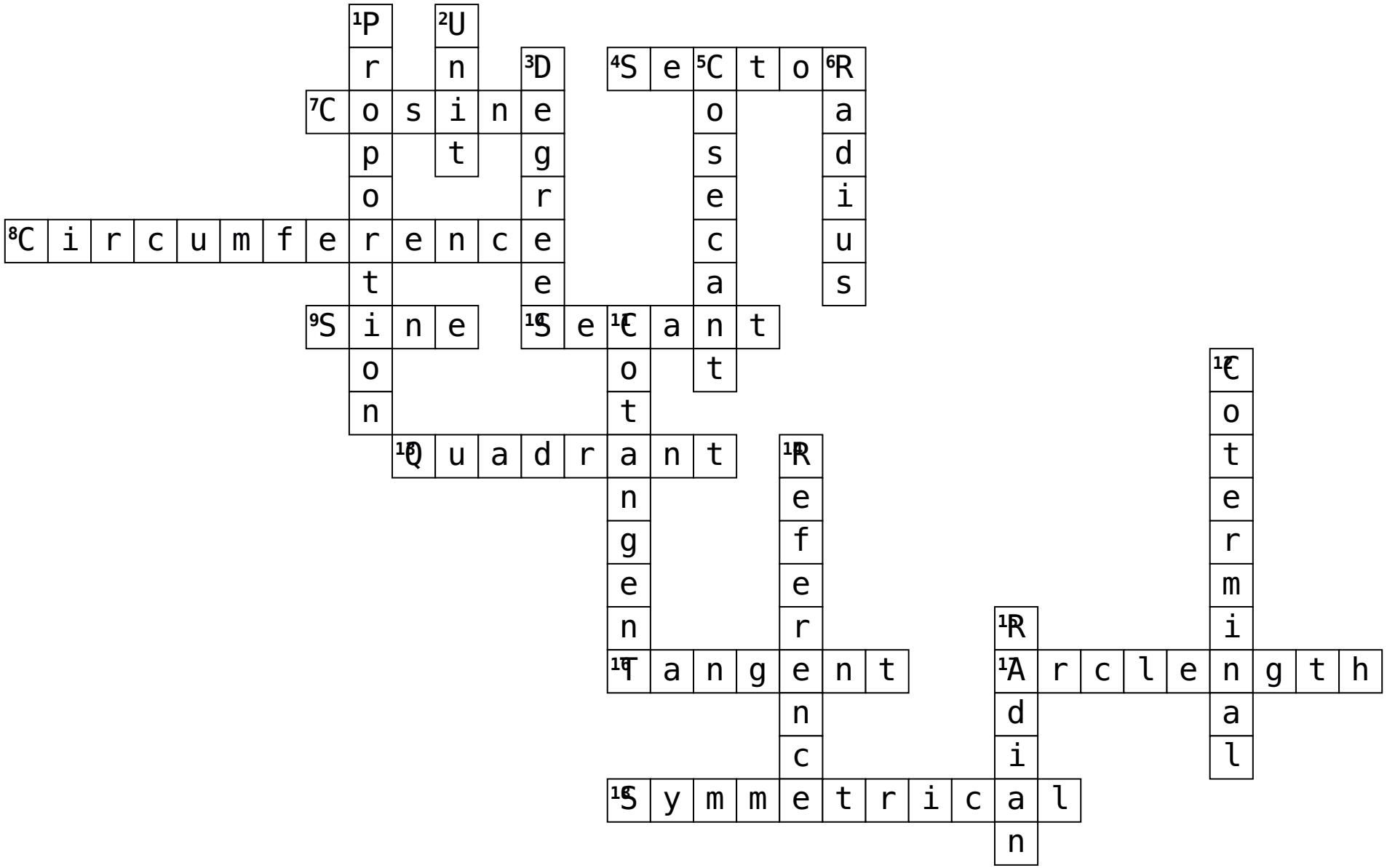
$S = r\theta$ $\theta = 135° \times \frac{\pi}{180°}$

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

$S = 4\text{cm} \times \frac{3\pi}{4}$

$= 3\pi\text{ cm}$

$\approx 9.4\text{ cm}$


1 P
2 U
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4 S e 5 C t o 6 R
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t e a s
9 S i n e 10 S e 11 C a n t
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13 Q u a d r a n t 14 R t
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15 T a n g e n t 16 A r c l e n g t h
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c i l
17 S y m m e t r i c a l
n