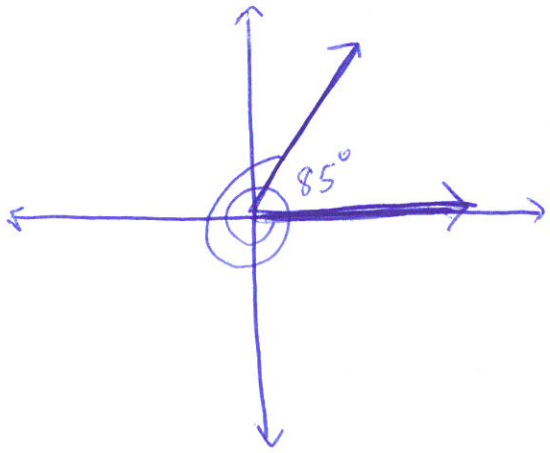
Name: AK Period: Date:

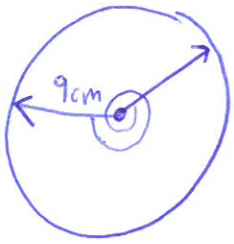
6.1 Practice Problems

1. For a -635° angle:
   a) Draw the angle in standard position.
   b) Convert the angle to radians.
   c) Find a positive and negative coterminal angle.
   d) Name the reference angle in radians and degrees.



b) $\frac{-127\pi}{36}$ c) $-275°$, $85°$ d) $85°$, $\frac{17\pi}{36}$

2. A minute hand on a clock is 9 inches. How far does a point on the tip of the minute hand travel from 5:20 pm to 6:45 pm?



$\frac{85}{60} = \frac{\theta}{2\pi}$

$\theta = \frac{17\pi}{6}$

$S = \frac{17\pi}{6} \cdot 9$

$S = \frac{51\pi}{2}$ in

3. A wheel with a diameter of 2 feet is rotating at 1400 rpms. For a point on the circumference of the wheel, find its angular speed in radians per second and its linear speed in miles per hour.

Angular: $\frac{1400 \text{ rev}}{1 \text{ min}} \cdot \frac{2\pi \text{ rad}}{1 \text{ rev}} \cdot \frac{1 \text{ min}}{60 \text{ sec}}$

$\frac{140\pi}{3}$ rads/sec

Linear: $S = r\theta$

$S = 1 \cdot \frac{140\pi}{3} \text{ ft} \cdot \frac{1 \text{ mile}}{5280 \text{ ft}} \cdot \frac{3600 \text{ sec}}{1 \text{ hr}}$

$\frac{350\pi}{11} \frac{\text{mile}}{\text{hr}} \approx 99.96 \frac{\text{miles}}{\text{hr}}$

4. Determine the angular velocity, in radians per second, of a wheel turning 124 revolutions per minute.

$124 \frac{\text{rev}}{\text{min}} \cdot \frac{2\pi \text{ rads}}{1 \text{ rev}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} = \frac{62\pi}{15} \frac{\text{rads}}{\text{sec}}$

5. Determine the angular speed of a point on the earth around the axis on which the earth rotates in radians per hour.

$\frac{2\pi \text{ rads}}{24 \text{ hrs}} = \frac{\pi}{12}$ rads/hr

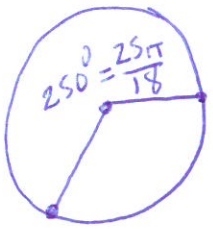
$C = 23\pi$ in

6. A car tire has a diameter of 23 inches. Find the number of revolutions the tire makes per minute when the car is traveling at 60 miles per hour.

$$\frac{60 \text{ miles}}{1 \text{ hr}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \cdot \frac{5280 \text{ ft}}{1 \text{ mile}} \cdot \frac{12 \text{ in}}{1 \text{ ft}} \cdot \frac{1 \text{ rev}}{23\pi \text{ in}} = \frac{63360}{23\pi} \frac{\text{rev}}{\text{min}}$$

$$\approx 876.9 \frac{\text{rev}}{\text{min}}$$

7. Determine the linear velocity, in centimeters per second, of a point on a circle 1.2m from the center that moves 250° in one minute.



$$s = r\theta$$

$$s = 1.2\left(\frac{25\pi}{18}\right) \text{ m}$$

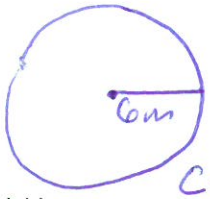
$$s = \frac{5\pi}{3} \text{ m}$$

$$\frac{5\pi}{3} \frac{\text{m}}{\text{min}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} \cdot \frac{100 \text{ cm}}{1 \text{ m}}$$

$$= \frac{500\pi}{180} \frac{\text{cm}}{\text{sec}} = \frac{25\pi}{9} \frac{\text{cm}}{\text{s}}$$

8. A skater is skating around the edge of a circular pond at a distance of 6 m from the center. Her linear velocity is 7.3 m/s.

(a) Determine her angular velocity in radians/second.



$C = 12\pi$ m

$$\frac{7.3 \text{ m}}{1 \text{ s}} \cdot \frac{1 \text{ rev}}{12\pi \text{ m}} \cdot \frac{2\pi \text{ rads}}{1 \text{ rev}} = \frac{14.6}{12} \frac{\text{rads}}{\text{sec}} \approx 1.21\overline{66} \frac{\text{rads}}{\text{sec}}$$

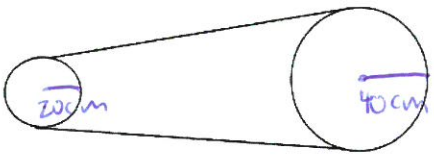
(b) How many revolutions per minute does she go around the pond?

$$\frac{7.3 \text{ m}}{1 \text{ s}} \cdot \frac{1 \text{ rev}}{12\pi \text{ m}} = \frac{7.3}{12\pi} \frac{\text{rev}}{\text{s}}$$

$$0.19 \frac{\text{rev}}{\text{s}}$$

9. A belt connects two pulleys. The larger has a radius 40 cm and the smaller has radius 20 cm. The smaller pulley revolves at a rate of 48 rpm. (a) Determine the linear velocity of the belt in cm/minute. (b) What is the angular velocity of the larger pulley in radians per minute?

a) $$\frac{48 \text{ rev}}{1 \text{ min}} \cdot \frac{40\pi \text{ cm}}{1 \text{ rev}} = 1920\pi \frac{\text{cm}}{\text{min}}$$



b) $$1920\pi \frac{\text{cm}}{\text{min}} \cdot \frac{1 \text{ rev}}{80\pi \text{ cm}} \cdot \frac{2\pi \text{ rads}}{1 \text{ rev}} = 48\pi \frac{\text{rads}}{\text{min}}$$