

Key

$$A = \frac{1}{2} r^2 \theta$$

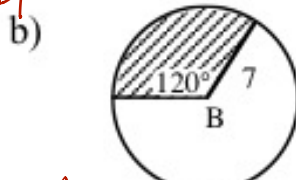
A - Area of a sector
r - radius
 θ - angle

1. Find the area of the shaded sector in each circle below. Points A, B and C are the centers.

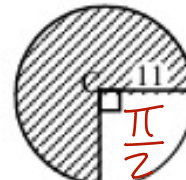
$$45^\circ \times \frac{\pi}{180^\circ} = \frac{\pi}{4}$$



$$120^\circ \times \frac{\pi}{180^\circ} = \frac{2\pi}{3}$$



$$\frac{4\pi}{2} - \frac{\pi}{2} = \frac{3\pi}{2}$$



$$A = \frac{1}{2} r^2 \theta$$

$$A = \frac{1}{2} r^2 \theta$$

$$S = \frac{1}{2} r^2 \theta$$

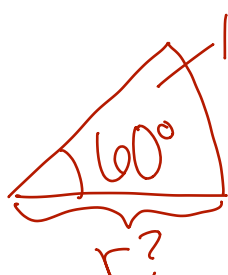
$$A = \frac{11^2}{2} \cdot \frac{3\pi}{2}$$

$$A = \frac{4^2}{2} \cdot \frac{\pi}{4} = 2\pi$$

$$A = \frac{7^2}{2} \cdot \frac{2\pi}{3} = \frac{49\pi}{3}$$

$$A = \frac{363\pi}{4}$$

2. The area of a 60° sector of a circle is $10\pi \text{ m}^2$. Find the radius of the circle.



$$A = \frac{1}{2} r^2 \theta$$

$$\left[10\pi \text{ m}^2 = \frac{1}{2} r^2 \cdot \frac{\pi}{3} \right] \frac{3}{\pi}$$

$$60^\circ \times \frac{\pi}{180^\circ} = \frac{\pi}{3}$$

$$\left[30 \text{ m}^2 = \frac{1}{2} r^2 \right] 2$$

$$60 \text{ m}^2 = r^2 \quad r = \sqrt{60} \text{ m}$$

3. The area of a sector of a circle with a radius of 5 mm is $10\pi \text{ mm}^2$. Find the measure of its central angle.



$$A = \frac{1}{2} r^2 \theta \quad \left[10\pi = \frac{1}{2} (5)^2 \theta \right] 2$$

$$20\pi = 25\theta$$

$$\frac{20\pi}{25} = \theta = \frac{4\pi}{5}$$

4. Find the area of a circular garden if the diameter of the garden is 30 feet.



$$\theta = 2\pi \quad r = 15 \text{ ft}$$

$$A = \frac{1}{2} r^2 \theta = \frac{15^2}{2} \cdot 2\pi = 225\pi$$

Linear and Angular Speed Worksheet

DJ L-Boogie has a turntable that has two settings, 33 rpm or 45 rpm (revolutions per minute).

1. When the turntable is set at 33 revolutions per minute (rpm), what is its angular speed in radians per minute?

$$\frac{\theta}{t} = \frac{33 \cdot 2\pi}{1 \text{ min}} = 66\pi \text{ rad/min}$$

$$V_A = \frac{\theta}{t}$$

2. When the turntable is set at 45 rpm, what is its angular speed in radians per minute?

$$\frac{\theta}{t} = \frac{45 \cdot 2\pi}{1 \text{ min}} = 90\pi \text{ rad/min}$$

While a record is spinning, a ladybug lands on the turntable 10 inches from the center.

3. What is the linear speed (in inches per minute) of the ladybug when the turntable is set to:

a) 33 rpm

$$10 \cdot 66\pi$$

$$2073.45 \text{ inches/min}$$

b) 45 rpm

$$10 \cdot 90\pi$$

$$2827.43 \text{ inches/min}$$

$$V_L = \frac{r\theta}{t}$$

4. The ladybug crawls towards the middle and is now 3 inches from the center, what is the linear speed (in inches per minute) of the ladybug when the turntable is set to:

a) 33 rpm

$$3 \cdot 66\pi$$

$$622.04 \text{ inches/min}$$

b) 45 rpm

$$3 \cdot 90\pi$$

$$848.23 \text{ inches/min}$$

5. A Ferris wheel with a diameter of 250 feet takes 20 minutes to make one full revolution. Find the angular velocity of the carnival ride.

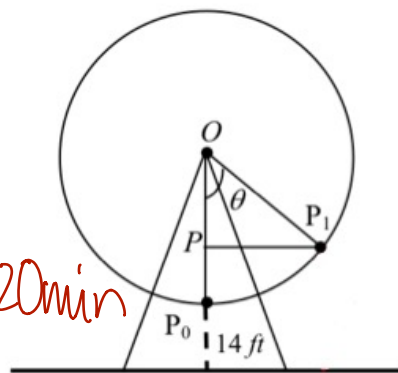
$$V_A = \frac{\theta}{t} \quad \theta = 2\pi \quad t = 20 \text{ min}$$

$$V_A = \frac{\pi}{10} \frac{\text{rad}}{\text{min}}$$

6. Find the linear speed of a person riding in one of the Ferris wheel's cars.

$$V_L = \frac{r\theta}{t} \quad r = 125 \text{ ft} \quad \theta = 2\pi \quad t = 20 \text{ min}$$

$$\frac{25\pi}{2} \frac{\text{rad}}{\text{min}}$$



7. A 16mm diameter shaft rotates at 1,500 rps (revolutions per second). Find the speed of a particle on its surface (to the nearest meter per second).

Linear Speed $r = 8 \text{ mm}$

$$\frac{r\theta}{t} = \frac{8 \cdot 1500 (2\pi) \text{ mm}}{1 \text{ sec}} \cdot \frac{1 \text{ meter}}{1000 \text{ mm}} = 75.4 \text{ meters/sec}$$