

Math 1060 ~ Trigonometry

9 Applications of Radian Measure

Learning Objectives

In this section you will:

- Determine arc length.
- Determine area of a sector of a circle.
- Solve problems involving linear and angular velocity.

$\sin^2 u + \cos^2 u = 1$

$\sin 2u = 2 \sin u \cos u$

$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

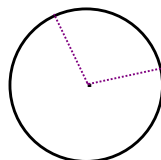
$c^2 = a^2 + b^2 - 2ab \cos C$

Vocabulary

Arc

Sector

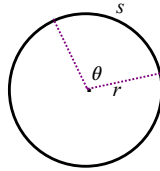
Length of a circular arc



Ex 1: Find the arc length along a circle of radius 10 cm subtended by an angle of 125° .

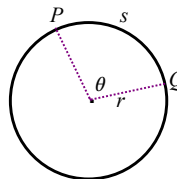
Ex 2: What is the radius of a circle for which $\frac{2}{3}$ of the circumference is 6π ft?

Area of a Sector



Ex 3: A lawn sprinkler sprays a distance of 15 feet out and rotates back and forth at a 120° angle. What is the area that the sprinkler waters?

Linear and Angular Velocity



$$\text{Velocity} = \bar{v} = \frac{\text{displacement}}{\text{time}}$$

$$\text{Average Angular Velocity} = \bar{\omega} = \frac{\text{change in angle}}{\text{time}}$$

$$\text{Speed} = |\bar{v}|$$

Velocity for Circular Motion

$$v = r \omega$$

Ex 4: The giant wheel in London, known as the Millennium Wheel has a radius of 60 meters. It completes one rotation in 30 minutes. What is the linear and angular velocity of a person riding in one of the cabins on the wheel? (It does not stop to pick up passengers, they hop on and off as it moves.)