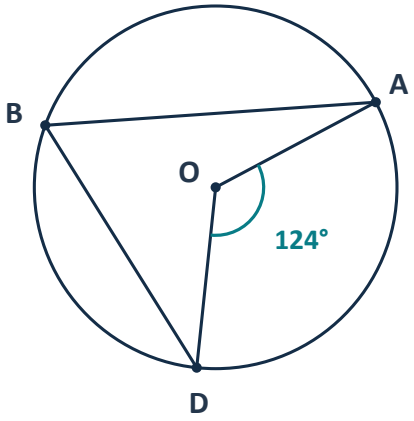
# Read the circle first

Identify the intercepted arc before calculating an angle.

Central angle = intercepted arc measure.
Inscribed angle = ½ × its intercepted arc. A triangle's angles total 180°.
An inscribed angle intercepts the arc that does not contain its vertex.

## 1 | Model: central and inscribed angles

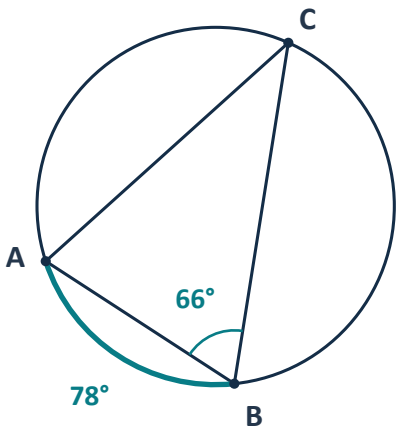



O is the center and angle AOD = 124°.

**a)** Find angle ABD.
**b)** Find the measure of minor arc AD.

Name the intercepted arc and explain the relationship you used.

## 2 | Together: connect angles and arcs




Minor arc AB = 78° and angle ABC = 66°.

**a)** Find angle BAC.
**b)** Find the measure of minor arc BC.

Show the intermediate angle or arc that helps you finish.

# Conversions with a process

Keep intermediate values; round only the final answer.

Decimal degrees → DMS: fractional degree × 60, then fractional minute × 60.
DMS → decimal degrees: d + m/60 + s/3600.
Degrees → radians: multiply by π/180. Check the calculator's display mode.

**Model 1** Convert 38.726145° to degrees, minutes, and seconds.

Round to the nearest second.

**Model 2** Convert 101°18′24.7″ to decimal degrees.

Round to four decimal places.

**Model 3** Convert 137.6° to radians.

Round to three decimal places.

**Your turn 1** Convert 58.417862° to degrees, minutes, and seconds.

Round to the nearest second.

**Your turn 2** Convert 112°36′18.5″ to decimal degrees.

Round to four decimal places.

# Arc length and sector area

Choose the formula, isolate the unknown, then substitute.

Use radians: $s = r\theta$  $A = \frac{1}{2}r^2\theta$  $r = s/\theta$  $\theta = 2A/r^2$.
Degrees → radians: $\times \pi/180$. Radians → degrees: $\times 180/\pi$.
Arc length uses linear units; sector area uses square units.

## 1 | Model: one angle, two measurements

A circle has $r = 6$ units and $\theta = 1.4$ rad. Find arc length $s$ and sector area $A$.

## 2 | Model: work backward to the radius

An arc is 24 units long and its central angle is 80°. Find the radius. Give an exact value or round to two decimal places.

## 3 | Your turn: find the radius

An arc is 21 units long and its central angle is 105°. Find the radius. Give an exact value or round to two decimal places.

## 4 | Together: work backward to the angle

A sector has area 35.4 square units and radius 4 units. Find $\theta$ in radians and degrees. Round the degree answer to two decimal places.

# From rotations to distance

Convert the rate and use the radius of the circle.

Angular speed: rpm × 360/60 gives °/s; rpm × 2π/60 gives rad/s.
Radius = diameter/2. Linear speed v = rω requires ω in radians per second.
Keep units through the calculation. Exact multiples of π are welcome.

## 1 | Model: diameter 12 ft, rate 24 rpm

Find **a)** angular speed in degrees per second and **b)** linear speed at the outer edge in feet per second.

## 2 | Your turn: diameter 8 ft, rate 30 rpm

Find **a)** angular speed in degrees per second and **b)** linear speed at the outer edge in feet per second.

## Independent exit check | 3 minutes

**1.** An arc is 8π ft long and its central angle is 120°. Find the radius.
Show the angle conversion and your setup.

**2.** A wheel has diameter 6 ft and rotates at 20 rpm. Find its angular speed in degrees per second and its edge speed in feet per second.