

Student Workbook

Angles

Name: _____

Date: _____

Period: _____

Learning Target: I can convert between degrees and radians, find coterminal and reference angles, and compute arc length and sector area.

Vocabulary

Term	Meaning
Radian	The angle where the arc length equals the radius; π radians = 180° .
Coterminal Angles	Angles that share the same terminal side, found by adding/subtracting 360° (or 2π).
Reference Angle	The acute angle between the terminal side and the x-axis.
Arc Length	$s = r\theta$ (θ in radians) — the distance along the circle's edge.

Key Concept: Degree-Radian Conversion

π radians = 180° Degrees $\rightarrow$ Radians: multiply by $\pi/180$. Radians $\rightarrow$ Degrees: multiply by $180/\pi$.

EXAMPLE 1
Convert 150° to radians.

$150 \times \pi/180 = \underline{\hspace{2cm}}$

Key Concept: Coterminal & Reference Angles

EXAMPLE 2
Find a positive and negative coterminal angle for 65° .

$65 + 360 = \underline{\hspace{2cm}}$ $65 - 360 = \underline{\hspace{2cm}}$

REFERENCE ANGLE BY QUADRANT

Quadrant	Reference Angle (degrees)
I	θ
II	$180^\circ - \theta$
III	$\theta - 180^\circ$
IV	$360^\circ - \theta$

EXAMPLE 3

Find the reference angle for 250° (Quadrant III).

$$250 - 180 = \underline{\hspace{2cm}}$$

COMMON MISTAKE

The arc length and sector area formulas ONLY work with θ in RADIANS! Always convert degrees to radians first.

Key Concept: Arc Length & Sector Area

EXAMPLE 4

Find the arc length for $r=8\text{cm}$, $\theta=2\pi/3$.

$$s = r\theta = 8 \times 2\pi/3 = \underline{\hspace{2cm}}$$

Guided Practice — Part A: Convert Degrees ↔ Radians

A1 Convert 120° to radians.

A2 Convert $5\pi/3$ radians to degrees.

Guided Practice — Part B: Coterminal Angles

- B1** Find a positive and negative coterminal angle for 40° .

- B2** Find a positive and negative coterminal angle for $5\pi/6$.

Guided Practice — Part C: Reference Angles

- C1** Find the reference angle for 200° .

- C2** Find the reference angle for $5\pi/4$.

Guided Practice — Part D: Arc Length & Sector Area

- D1** Find the arc length for $r=10\text{cm}$, $\theta=\pi/4$.

- D2** Find the area of a sector with $r=6\text{in}$, $\theta=2\pi/3$.

BEFORE YOU MOVE ON

Check with a partner: is your angle in radians before plugging into the arc length or sector area formula?