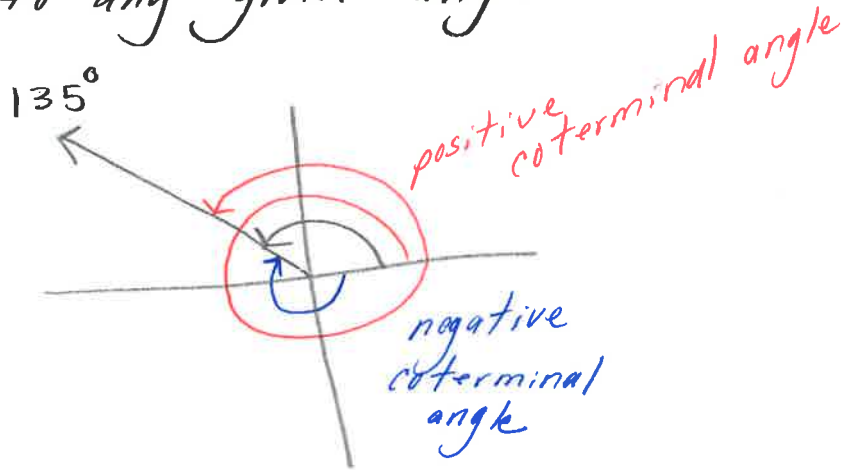


# Coterminal Angles

- Angles with the same initial and terminal sides
- Found by adding or subtracting rotations
- There are an infinite # of coterminal angles to any given angle.



Examples: Find one positive and one negative coterminal angle.

① 45°

Pos

$$45^\circ + 360^\circ$$

$$\boxed{405^\circ}$$

Neg

$$45^\circ - 360^\circ$$

$$\boxed{-315^\circ}$$

② -150°

Pos

$$-150^\circ + 360^\circ$$

$$\boxed{210^\circ}$$

neg

$$-150^\circ - 360^\circ$$

$$\boxed{-510^\circ}$$

③  $\frac{\pi}{6}$

pos

$$\frac{\pi}{6} + 2\pi$$

$$\frac{\pi}{6} + \frac{12\pi}{6}$$

$$\boxed{\frac{13\pi}{6}}$$

neg

$$\frac{\pi}{6} - 2\pi$$

$$\frac{\pi}{6} - \frac{12\pi}{6}$$

$$\boxed{-\frac{11\pi}{6}}$$

④  $\frac{15\pi}{7}$

pos

$$\frac{15\pi}{7} + 2\pi$$

$$\frac{15\pi}{7} + \frac{14\pi}{7}$$

$$\boxed{\frac{29\pi}{7}}$$

neg

$$\frac{15\pi}{7} - \frac{14\pi}{7}$$

$\frac{\pi}{7}$  → still positive subtract again

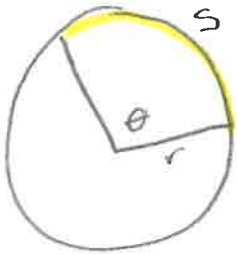
$$\frac{\pi}{7} - \frac{14\pi}{7} = \boxed{-\frac{13\pi}{7}}$$

# Arc Length

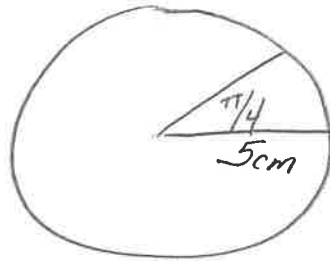
Arc: Part of the circumference of a circle

To find the length of an arc intercepted by an angle,  $\theta$ . use  $s = r\theta$  ( $\theta$  in radians)

Examples:



①



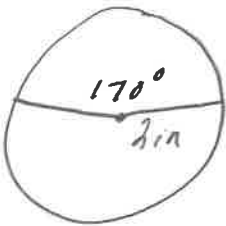
$$s = r\theta$$

$$s = 5\left(\frac{\pi}{4}\right)$$

$$s = \frac{5\pi}{4}$$

$$s = 3.93 \text{ cm}$$

②



$$\frac{170^\circ}{1} \cdot \frac{\pi}{180} = \frac{17\pi}{18}$$

$$s = r\theta$$

$$s = 2\left(\frac{17\pi}{18}\right)$$

$$s = \frac{34\pi}{18}$$

$$s = 5.93 \text{ in}$$

# Sector Area

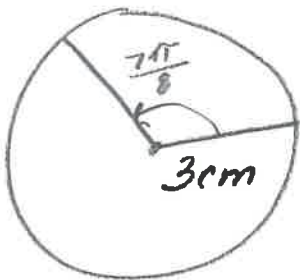
Sector: a region of a circle bounded by a central angle.



$$\frac{\text{area of sector}}{\text{area of circle}} = \frac{\text{arc length}}{\text{circumference of the circle}}$$

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

Ex: Find the area of the sector



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

$$A = \frac{1}{2} (3)^2 \left( \frac{7\pi}{8} \right)$$

$$A = \frac{1}{2} \left( \frac{63\pi}{8} \right)$$

$$A = 12.37 \text{ cm}^2$$

