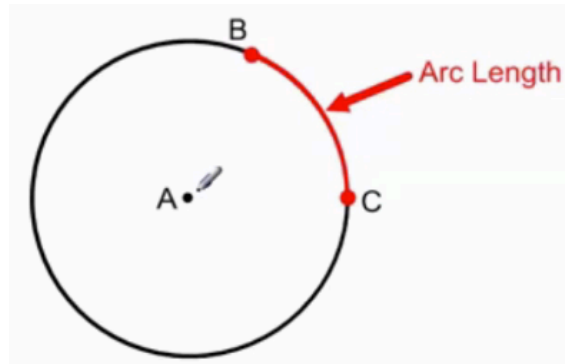


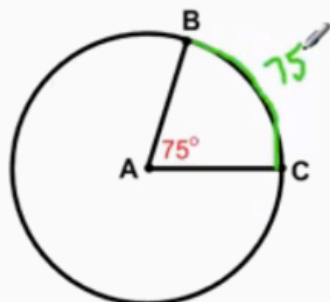
Arc Length

Arc Length - part of a circle defined by two points.
I think of it as 'part of the crust on a pizza'.



2 Kinds of Arc Length

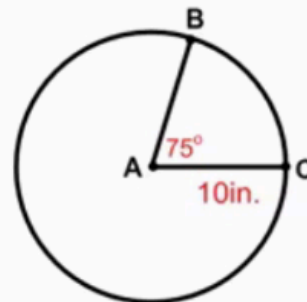
Degree



By central angle:
central angle = arc length
Ex. $m\widehat{BC} = 75^\circ$

Distance

(inches, feet, centimeters, etc.)

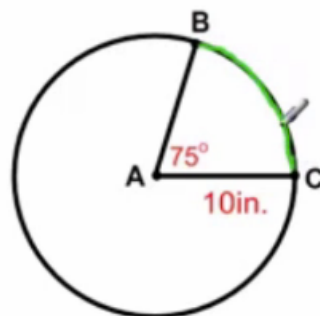


By proportion:
$$\frac{\text{central angle}}{360^\circ} = \frac{\text{arc length}}{2\pi r}$$

equation for circumference

Arc Length as Distance

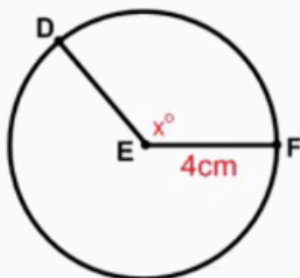
Ex. 1 Find the arc length of \widehat{BC} .



$$\frac{\text{central angle}}{360^\circ} = \frac{\text{arc length}}{2\pi r}$$

Arc Length as Distance

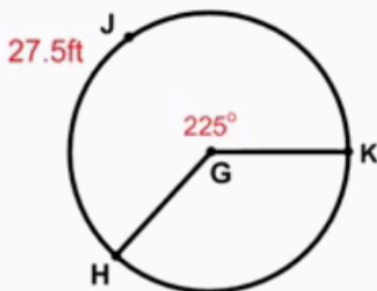
Ex. 2 Find the central angle to the nearest degree, if \widehat{DF} has an arc length of 9cm.



$$\frac{\text{central angle}}{360^\circ} = \frac{\text{arc length}}{2\pi r}$$

Arc Length as Distance

Ex. 3 Find the radius of circle G, if the \widehat{HJ} has an arc length of 27.5ft.

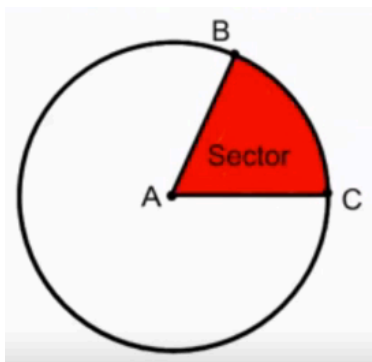


$$\frac{\text{central angle}}{360^\circ} = \frac{\text{arc length}}{2\pi r}$$

Sector of a Circle

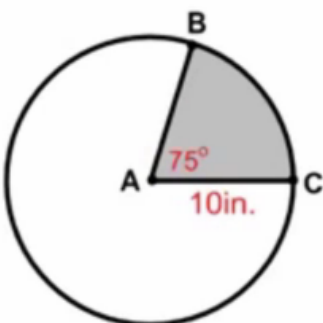
Sector - part of the area of a circle bound by the central angle and its intercepted arc.

I think of it as 'the area of a slice of pizza'.



Sector Area of a Circle

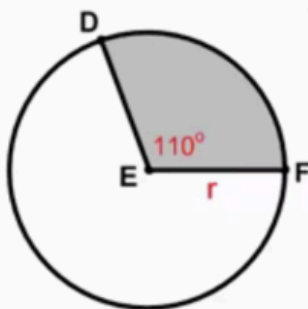
Ex. 1 Find the area of the shaded region.



$$\frac{\text{central angle}}{360^\circ} = \frac{\text{sector}}{\pi r^2}$$

Sector Area of a Circle

Ex. 2 Find the radius of the circle if the area of the shaded region is 50π .



$$\frac{\text{central angle}}{360^\circ} = \frac{\text{sector}}{\pi r^2}$$

Summary:

4.2 Problem Set

1. Fill out the table below - [Discover the formula for arc length through a real life example](#)

Wheel A

20 x 7 - 8

Outside Diameter x Width x Rim Diameter

A. 20"
Height of tire overall diameter

B. 7"
Width of tire from sidewall to sidewall

C. 8"
Diameter of rim



Wheel B

18 x 8.50 - 8

Outside Diameter x Width x Rim Diameter

A. 18"
Height of tire overall diameter

B. 8.5"
Width of tire from sidewall to sidewall

C. 8"
Diameter of rim

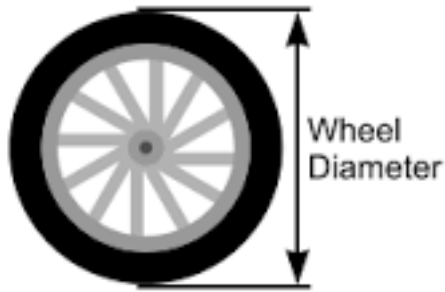


Degrees Rotated	How far would vehicle A travel, if it was rotated:	How far would vehicle B travel, if it was rotated:	How far would any sized vehicle travel, if it was rotated:
1 full rotation or _____ degrees			
1 half rotation or _____ degrees			
2 rotations or _____ degrees			
40 degrees			
120 degrees			
460 degrees			
x degrees			

2. What is the formula for finding the arc length of any circle?

Arc Length =

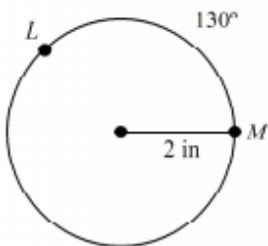
3. Using this formula, find the distance the car traveled if the wheel diameter 16 in and the when rotated four-and-a-half times around.



4. Approximately, how many degrees did the wheel turn if the car traveled 20 ft? Approximately how many rotations?
5. _____ The diameter of a wheel is 36 inches and each revolution of the wheel covers the distance of one circumference. To the nearest number of revolutions, how many revolutions of the wheel must be completed before the bike covers 1000 feet?
- A. 3
B. 9
C. 28
D. 106
E. 9420

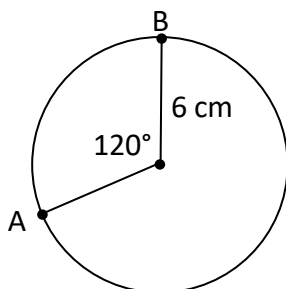
6. ACT QUESTION:

(1 point) Find the arc length of an arc with measure 130° in a circle with radius 2 in. Round to the nearest tenth.



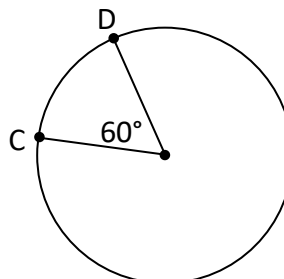
- a. 4.5 in
b. 2.3 in
c. 10.2 in
d. 0.5 in

7. Find the length of arc AB .



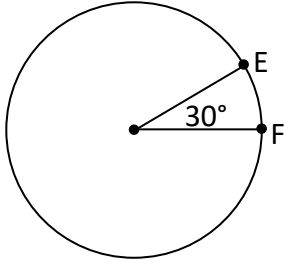
Arc: _____

8. The diameter is 24 cm.
Find the length of arc CD .



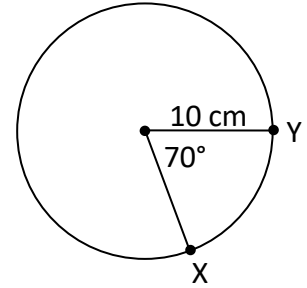
Arc: _____

9. The length of arc EF is 5π in.
Find the length of the radius.



Radius: _____

10. Find the length of arc XY .






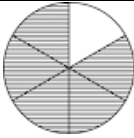
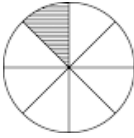
Arc: _____

11. A circle has an arc whose measure is 80° and whose length is 88π .

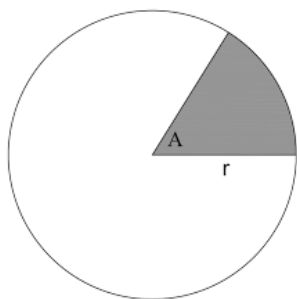
12. A circle has a circumference whose length is 25π . Find the length of an arc whose central angle is 90° .

13. Find the measure of the central angle of an arc if its length is 14π and the radius is 18.

14. Fill out the table below - [Discover the formula for the area of a sector](#)

Proportion of Circle Shaded	Image	Formula
		
		
		
		
		

15. What is the formula of the area of any sector?

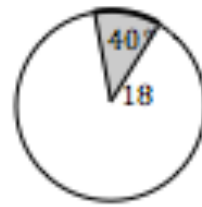
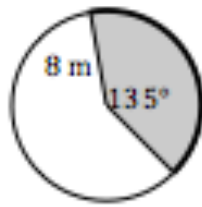
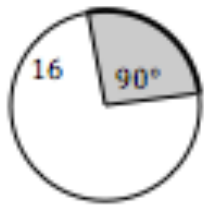


16. ACT QUESTION:

(1 point) Jenny's birthday cake is circular and has a 30 cm radius. Her slice creates an arc with a central angle of 120° . What is the area of Jenny's slice of cake? Give your answer in terms of π .

- a. $300\pi \text{ cm}^2$
- b. $10\pi \text{ cm}^2$
- c. $150\pi \text{ cm}^2$
- d. $3600\pi \text{ cm}^2$

17. Calculate each sector area below.



18. The area of a circle is 225π square inches. Find the area of the sector whose central angle is 45° .

19. The central angle of a sector is 60° and the area of the circle is 144π . What is the area of the sector?

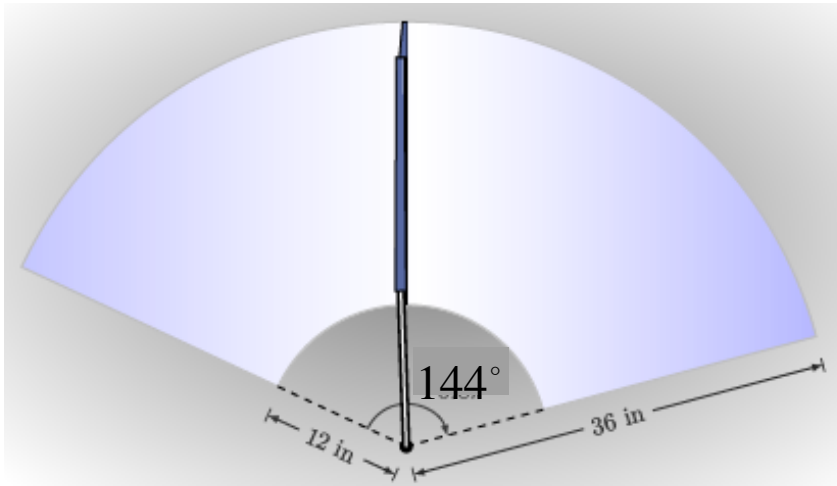
20. A circle has a radius of 12. Find the area of the sector whose central angle is 120° .

21. Find the radius of a circle which has a sector area of 9π whose central angle is 90° .

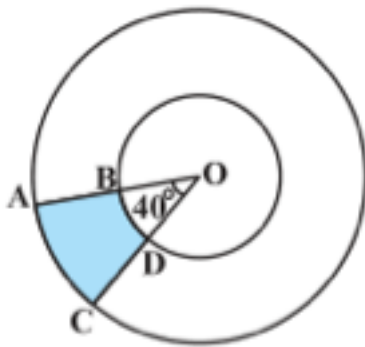
22. The central angle of a sector is 72° and the sector has an area of 5π . Find the radius.

23. Find the measure of the central angle of a sector if its area is 5π and the radius is 6.

24. Find the area that the windshield below covers in square inches.
(Hint: There are 2 sectors in the image below.)



25. Find the area of the blue shaded region. Given: $AO = 6$ inches and B is the midpoint of AO .

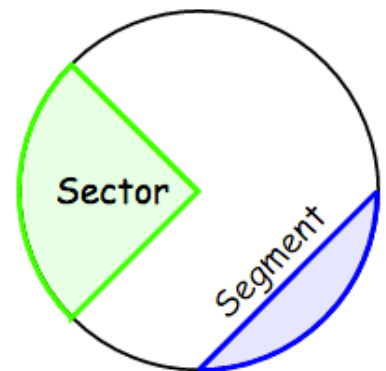
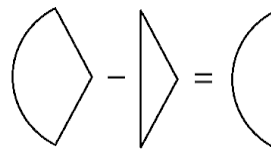


Circle Sector and Segment

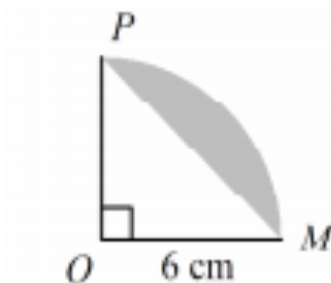
Slices

There are two main "slices" of a [circle](#) :

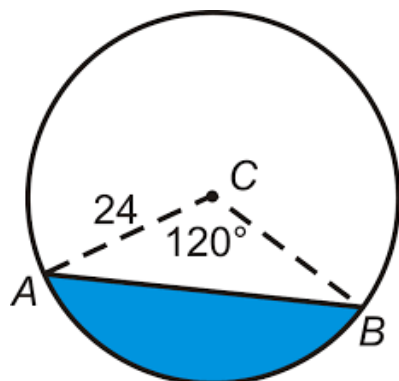
- The "pizza" slice is called a **Sector**.
- And the **Segment**, which is cut from the circle by a "chord" (a line between two points on the circle).



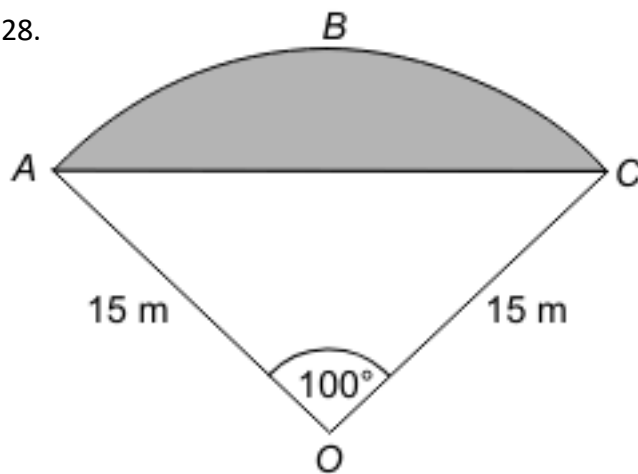
26. Find the area of segment PQM. Round to the nearest tenth.



27.

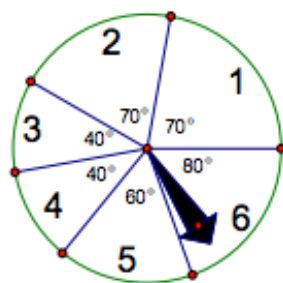


28.

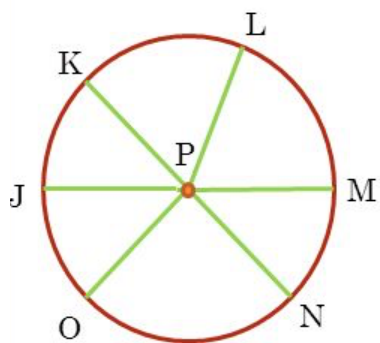


Skillz Review

1. Nuela has to spin a 3 or a 5 to stay in the game. What is the probability that she will spin either one of these two numbers?



Example 2: $m\angle NPM = 46$, \overline{PL} bisects $\angle KPM$,
 $\overline{OP} \perp \overline{KN}$, \overline{JM} & \overline{KN} are diameters. Find:



$$m\widehat{OK} =$$

$$m\widehat{LM} =$$

$$m\widehat{JKO} =$$

If the radius is 5 inches, find the arc length of

$$\widehat{OK} =$$

$$\widehat{LM} =$$

$$\widehat{JKO} =$$

Example 3:

Solve the following system of equations.

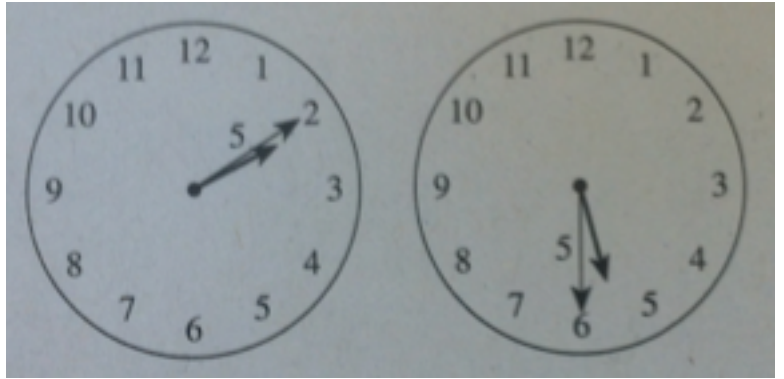
$$-5y + 4x = 49$$

$$7y + 2x = -23$$

4.2 Applications

_____ 1. As shown in the figure below, a clock has a minute hand that measures 5 cm from its tip to the center of the clock. To the nearest centimeter, what is the distance traveled by the tip of the minute hand between 2:10 pm and 5:30 pm?

- A. 31
- B. 68
- C. 101
- D. 105
- E. 173



2. Would you get more pizza if you doubled the area or if you doubled the radius? Explain.



3. 3 Act Math – Brita Pitchers

4. 3 Act Math – Conveyer Belt Application