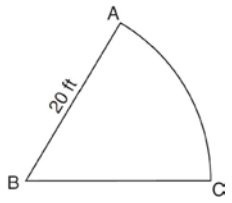
F.TF.A.1: Arc Length 1

1 A sprinkler system is set up to water the sector shown in the accompanying diagram, with angle ABC measuring 1 radian and radius $AB = 20$ feet.



What is the length of arc AC, in feet?
1) 63
2) 31
3) 20
4) 10

2 A circle has a radius of 4 inches. In inches, what is the length of the arc intercepted by a central angle of 2 radians?
1) 2π
2) 2
3) 8π
4) 8

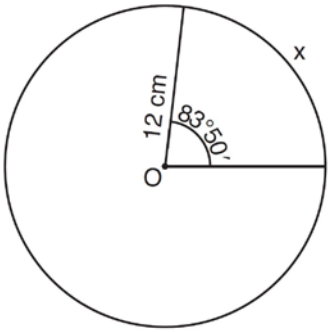
3 In a circle with a diameter of 24 cm, a central angle of $\frac{4\pi}{3}$ radians intercepts an arc. The length of the arc, in centimeters, is
1) 8π
2) 9π
3) 16π
4) 32π

4 A wheel has a radius of 18 inches. Which distance, to the *nearest inch*, does the wheel travel when it rotates through an angle of $\frac{2\pi}{5}$ radians?
1) 45
2) 23
3) 13
4) 11

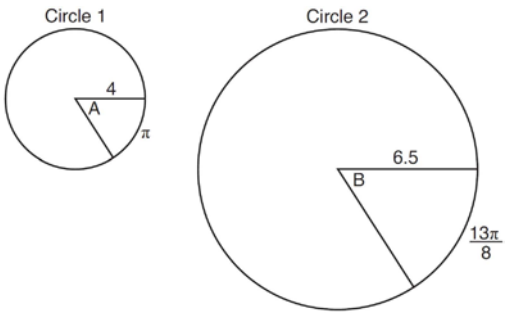
5 Jack wants to plant a border of flowers in the shape of an arc along the edge of a circular walkway. If the circle has a radius of 5 yards and the angle subtended by the arc measures $1\frac{1}{2}$ radians, what is the length, in yards, of the border?
1) 0.5
2) 2
3) 5
4) 7.5

6 A circle has a radius of 12 units. For this circle, which expression *incorrectly* states the length of the arc intercepted by the given central angle?
1) angle = 120°
   arc length = 8π
2) angle = 6°
   arc length = 72
3) angle = $\frac{2}{3}$ radian
   arc length = 8
4) angle = $\frac{\pi}{3}$ radians
   arc length = 4π

7 Circle *O* shown below has a radius of 12 centimeters. To the *nearest tenth of a centimeter*, determine the length of the arc, *x*, subtended by an angle of 83°50'.



8 In the diagram below, Circle 1 has radius 4, while Circle 2 has radius 6.5. Angle *A* intercepts an arc of length π, and angle *B* intercepts an arc of length $\frac{13\pi}{8}$.



Dominic thinks that angles *A* and *B* have the same radian measure. State whether Dominic is correct or not. Explain why.

9 In a circle whose radius is 10, what is the length of the arc intercepted by a central angle of 4 radians?

10 In a circle with a radius of 3 centimeters, find, in centimeters, the length of an arc intercepted by a central angle of 2 radians.

11 In a circle of radius 8, find the length of the arc intercepted by a central angle of 1.5 radians.

12 Circle *O* has a radius of 10. Find the length of an arc subtended by a central angle measuring 1.5 radians.

13 Express, in terms of π, the length of the arc intercepted by a central angle of $\frac{\pi}{6}$ radian in a circle with radius 30.

F.TF.A.1: Arc Length 1
Answer Section

1 ANS: 3
$s = \theta r = 1 \cdot 20 = 20$

REF: 060818b

2 ANS: 4
$s = \theta r = 2 \cdot 4 = 8$

REF: fall0922a2

3 ANS: 3
$s = \theta r = \frac{4\pi}{3} \cdot \frac{24}{2} = 16\pi$

REF: 011611a2

4 ANS: 2
$s = \theta r = \frac{2\pi}{5} \cdot 18 \approx 23$

REF: 011526a2

5 ANS: 4
$s = \theta r = 1\frac{1}{2} \cdot 5 = 7.5.$

REF: 010806b

6 ANS: 2
$\frac{72}{6 \cdot \frac{\pi}{180}} \neq 12$

REF: 011722a2

7 ANS:
$83°50' \cdot \frac{\pi}{180} \approx 1.463$ radians $s = \theta r = 1.463 \cdot 12 \approx 17.6$

REF: 011435a2

8 ANS:
$s = \theta \cdot r$ $s = \theta \cdot r$ Yes, both angles are equal.

$\pi = A \cdot 4$ $\frac{13\pi}{8} = B \cdot 6.5$

$\frac{\pi}{4} = A$ $\frac{\pi}{4} = B$

REF: 061629geo

9 ANS:
$s = \theta r = 4 \cdot 10 = 40$

REF: 010415siii

10 ANS:
$s = \theta r = 2 \cdot 3 = 6$

REF: 068514siii

11 ANS:
$s = \theta r = 1.5 \cdot 8 = 12$

REF: 068713siii

12 ANS:
$s = \theta r = 1.5 \cdot 10 = 15$

REF: 069714siii

13 ANS:
$s = \theta r = \frac{\pi}{6} \cdot 30 = 5\pi$

REF: 089313siii