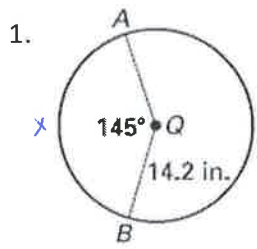
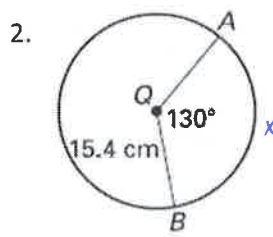


Find the length of \widehat{AB} .



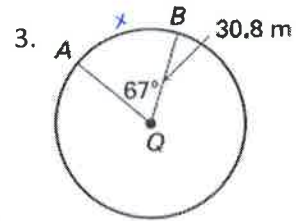
$$\frac{x}{2\pi(14.2)} = \frac{145}{360}$$

$$360x = 12937.07 \Rightarrow \widehat{AB} = 35.9 \text{ in}$$



$$\frac{x}{2\pi(15.4)} = \frac{130}{360}$$

$$360x = 12578.94 \Rightarrow \widehat{AB} = 34.9 \text{ cm}$$



$$\frac{x}{2\pi(30.8)} = \frac{67}{360}$$

$$360x = 12969.98 \Rightarrow \widehat{AB} = 36.0 \text{ m}$$

In $\odot D$ shown below, $\angle ADC \cong \angle BDC$. Find the indicated measure.

4. $m\widehat{ACB} = 269^\circ$

5. $m\widehat{CB} = 129.5^\circ$

6. Length of \widehat{ACB}

$$\frac{x}{2\pi(24.9)} = \frac{259}{360}$$

$$360x = 40620.89 \Rightarrow 112.6 \text{ m}$$

8. $m\widehat{ABC} = 230.5^\circ$

7. Length of \widehat{CB}

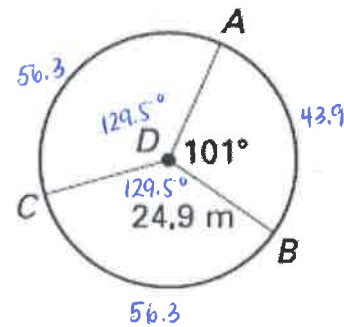
$$\frac{x}{2\pi(24.9)} = \frac{129.5}{360}$$

$$360x = 20260.4 \Rightarrow 56.3 \text{ m}$$

9. Length of \widehat{BAC}

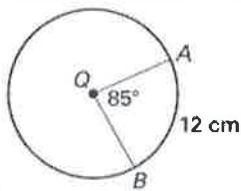
$$\frac{x}{2\pi(24.9)} = \frac{101}{360}$$

$$360x = 15801.58 \Rightarrow 43.9 \text{ m} + 56.3 = 100.2 \text{ m}$$



Find the indicated measure.

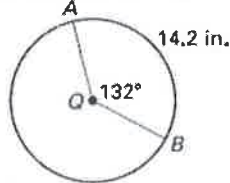
10. Circumference of $\odot Q$.



$$\frac{12}{c} = \frac{85}{360}$$

$$4320 = 85c \Rightarrow c = 50.8 \text{ cm}$$

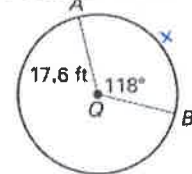
11. Radius of $\odot Q$



$$\frac{14.2}{2\pi r} = \frac{132}{360}$$

$$5112 = 829.38r \Rightarrow r = 6.2 \text{ in}$$

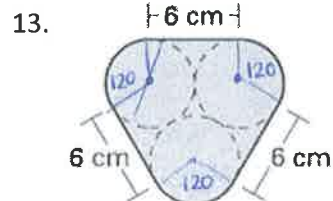
12. Length of \widehat{AB}



$$\frac{x}{2\pi(17.6)} = \frac{118}{360}$$

$$360x = 13048.92 \Rightarrow \widehat{AB} = 36.2 \text{ ft}$$

Find the perimeter of the region.



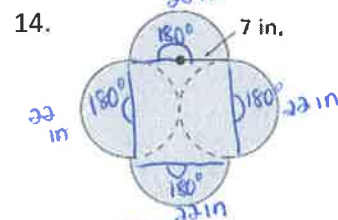
$$\frac{x}{2\pi(6)} = \frac{120}{360}$$

$$P = 3(6.28) + 18$$

$$= 36.84 \text{ cm}$$

$$360x = 2261.28$$

$$x = 6.28$$



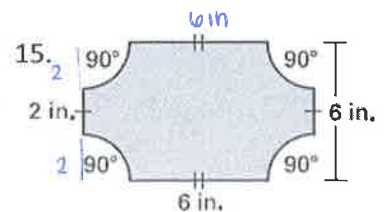
$$\frac{x}{2\pi(7)} = \frac{180}{360}$$

$$P = 2a \times 4 \text{ circles}$$

$$P = 88 \text{ in}$$

$$360x = 7416.81$$

$$x = 2a$$



$$\frac{x}{2\pi(6)} = \frac{90}{360}$$

$$P = 12 + 4 + 4(3.14)$$

$$P = 28.56 \text{ in}$$

$$360x = 1130.97$$

$$x = 3.14$$

16. A spool of thread contains 150 revolutions of thread. The diameter of the spool is 3 centimeters. Find the length of the thread to the nearest centimeter.

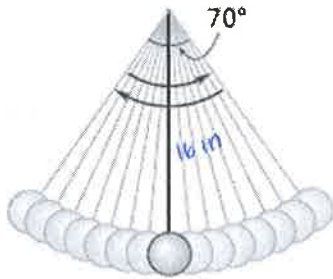


$$C = 2\pi r$$

$$C = 2\pi(1.5)$$

$$C \approx 9.42 \text{ cm} \times 150 \text{ rev} = 1413.7 \approx \boxed{1414 \text{ cm}}$$

18. Find the distance traveled in one back and forth swing by the weight of a 16 inch pendulum that swings through a 70° angle.



$$\frac{x}{2\pi(16)} = \frac{70}{360}$$

$$360x = 7037.17 \Rightarrow x = 19.5 \times 2 = \boxed{39.1 \text{ in}}$$

20. Robbie mentions to Krissy that he always gets confused which ratio he should use when converting degrees to radians, is it $\frac{\pi}{180^\circ}$ or $\frac{180^\circ}{\pi}$? Which one is the correct ratio? Explain a way to make sense of which one to use.

From deg \rightarrow rad, in radians you should always have a π in the numerator, so you would want to multiply by $\frac{\pi}{180}$.

21. Convert the degree measure into radians. Leave answers as exact values in reduced form.

a) $30^\circ \cdot \frac{\pi}{180} = \frac{30\pi}{180} = \boxed{\frac{\pi}{6}}$

b) $270^\circ \cdot \frac{\pi}{180} = \frac{270\pi}{180} = \boxed{\frac{3\pi}{2}}$

c) $300^\circ \cdot \frac{\pi}{180} = \frac{300\pi}{180} = \boxed{\frac{5\pi}{3}}$

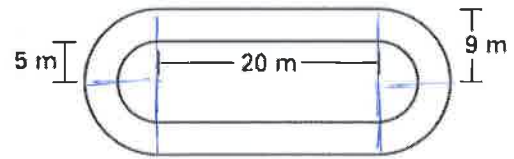
22. Convert the following radian measures into degrees.

a) $\frac{5\cancel{\pi}}{3} \cdot \frac{180}{\cancel{\pi}} = \frac{900}{3} = \boxed{300^\circ}$

b) $\frac{9\cancel{\pi}}{20} \cdot \frac{180}{\cancel{\pi}} = \frac{1620}{20} = \boxed{81^\circ}$

c) $\frac{7\cancel{\pi}}{6} \cdot \frac{180}{\cancel{\pi}} = \frac{1260}{6} = \boxed{210^\circ}$

17. Find the distance around the track on the inside lane and on the outside lane.



outside:

$$\frac{x}{2\pi(9)} = \frac{180}{360}$$

$$360x = 10178.76$$

$$x = 28.27 \text{ m}$$

inside:

$$\frac{x}{2\pi(5)} = \frac{180}{360}$$

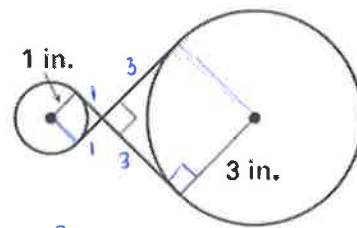
$$360x = 5654.87$$

$$x = 15.71 \text{ m}$$

$$\text{Total}_o = 96.54 \text{ m}$$

$$\text{Total}_i = 71.42 \text{ m}$$

19. Two belt-driven gears for a turntable are shown. What is the total length of the belt?



Small:

$$\frac{x}{2\pi(1)} = \frac{270}{360}$$

$$360x = 1696.46$$

$$x = 4.71$$

Big:

$$\frac{x}{2\pi(3)} = \frac{270}{360}$$

$$360x = 5089.38$$

$$x = 14.14$$

$$P = 4.71 + 2 + 6 + 14.14$$

$$P = \boxed{26.85 \text{ in}}$$

23. You are told that 15° is $\frac{\pi}{12}$ radians. How could you use that to determine the radian value for 45° ?

$$\text{Multiply } \frac{\pi}{12} \text{ radians by } 3 \Rightarrow \frac{3\pi}{12} = \boxed{\frac{\pi}{4}}$$

24. A value of $\frac{11\pi}{4}$ radians was the answer to a question on Selina's homework assignment. She looked at it and said "Wow, that angle is even bigger than 360° ." How could Selina identify that so quickly without calculating the actual value?

$$360^\circ \cdot \frac{\pi}{180} = \frac{360\pi}{180} = 2\pi \text{ compared to } \frac{11\pi}{4} : \frac{8\pi}{4} < \frac{11\pi}{4}$$

$$\text{The value of } 360^\circ < \frac{11\pi}{4}$$

25. Find the length of the arc associated with the given central angle and radius. $s = \theta r$

a) 120° ; radius 4

$$s = \frac{2\pi}{3} \cdot \frac{4}{1} = \frac{8\pi}{3}$$

$$\approx 8.4 \text{ units}$$

b) 135° ; radius 1.5

$$s = \frac{3\pi}{4} \cdot \frac{1.5}{1} = \frac{4.5\pi}{4} \approx$$

$$\approx 3.53 \text{ units}$$

c) 240° ; radius 3

$$s = \frac{4\pi}{3} \cdot \frac{3}{1} = 4\pi$$

$$\approx 12.57 \text{ units}$$

26. What is the measure of the central angle (measured in radians) of a circle whose arc is 3π inches and whose radius is 4 in.?

$$s = \theta r$$

$$3\pi = \theta \cdot 4$$

$$\theta = \frac{3\pi}{4}$$

Answer Key

1. about 35.94 in. ✓
2. about 34.94 cm ✓
3. about 36.02 m ✓
4. 259° ✓
5. 129.5° ✓
6. about 112.56 m ✓
7. about 56.28 m ✓
8. 230.5° ✓
9. about 100.17 m ✓
10. about 50.82 cm ✓
11. about 6.16 in. ✓
12. about 36.25 ft ✓
13. about 36.85 cm ✓
14. about 87.96 in. ✓
15. about 28.57 in. ✓

16. 1414 cm ✓
17. about 71.42 m; about 96.55 m ✓
18. about 39.10 in. ✓
19. about 26.85 in. ✓
20. $\frac{\pi}{180}$ is the correct ratio. The units you want in your final answer should be in the numerator. ✓
21. a) $\frac{\pi}{6}$ b) $\frac{3\pi}{2}$ c) $\frac{5\pi}{3}$ ✓
22. a) 300° b) 81° c) 210° ✓
23. Since $15^\circ \cdot 3 = 45^\circ$, $\frac{\pi}{12} \cdot 3 = \frac{\pi}{4}$ radians ✓
24. $\frac{11\pi}{4} = 2.75\pi$, anything bigger than 2π is bigger than 360° ✓