CHAPTER

11 Circumference and Area of a Circle

Lesson 11.1   Radius, Diameter, and Circumference of a Circle

Add.

1. 2.486 + 0.75

2. 0.394 + 4.657

Subtract.

3. 6.04 − 1.39

4. 10.325 − 2.57

Multiply.

5. 2.64 × 7

6. 3.14 × 6

Divide.

7. 21.36 ÷ 6

8. 2.38 ÷ 7

Round to the nearest whole number.

9. 21.62 ≈ _____

10. 60.49 ≈ _____

Round to the nearest tenth.

11. 20.094 ≈ _____

12. 0.955 ≈ _____

Solve.

Example

In the figure, *O* is the center of the circle.
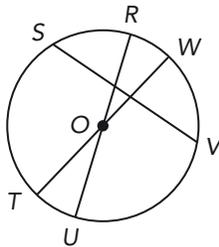
A **diameter** of a circle connects two points on the circle and passes through the center.

a) Name all the diameters that are drawn in the circle.

$\overline{RU}$ and $\overline{TW}$.

b) Which line segment that is not a radius is not a diameter? Explain why it is not a diameter.
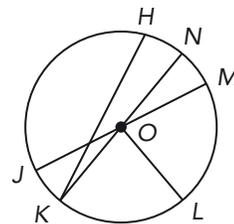
$\overline{SV}$. It does not pass through the center O.

A **radius** of a circle connects the center of the circle to any point on the circle. It is half the length of the diameter.

c) Name all the radii in the circle.

$\overline{OR}$, $\overline{OW}$, $\overline{OT}$, and $\overline{OU}$.

In the figure, *O* is the center of the circle.

13. Name all the diameters that are drawn in the circle.

14. Which line segment that is not a radius is not a diameter? Explain why it is not a diameter.

15. Name all the radii in the circle.

Name: _____ Date: _____

Find the diameter of each circle.

> *Example*
>
> The radius of a circle is 14 meters. What is the length of its diameter?
>
> Diameter = radius × 2
>
> = __14__ × 2
>
> = __28__ m
>
> The diameter of the circle is __28__ meters.

16. The radius of a circle is 13 feet. What is the length of its diameter?

Diameter = radius × _____

= _____ × _____

= _____ ft

The diameter of the circle is _____ feet.

17. The radius of a circle is 3.25 feet. What is the length of its diameter?

Find the radius of each circle.

> *Example*
>
> The diameter of a circle is 8 meters. What is the length of its radius?
>
> Radius = diameter ÷ __2__
>
> = __8__ ÷ __2__
>
> = __4__ m
>
> The radius of the circle is __8__ meters.

18. The diameter of a circle is 32 inches. What is the length of its radius?
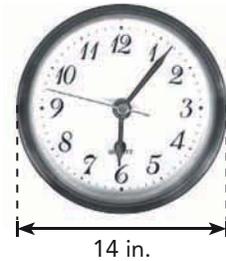
Radius = diameter ÷ _____

= _____ ÷ _____

= _____ in.

The radius of the circle is _____ inches.

19. The diameter of a circle is 24.6 centimeters. What is the length of its radius?

Solve. Show your work.

Example

The diameter of a clock face is 14 inches. Find the circumference of the clock face. Use $\frac{22}{7}$ as an approximation for π.

The **circumference** of a circle is the distance around the circle.

14 in.

The value of π is approximately $\frac{22}{7}$ or 3.14.

Circumference = πd

$\approx \underline{\quad\frac{22}{7}\quad} \cdot \underline{\quad 14 \quad}$

$= \underline{\quad 22 \quad} \cdot \underline{\quad 2 \quad}$

$= \underline{\quad 44 \quad}$ in.

The circumference of the face of the clock is approximately __44__ inches.

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20. The diameter of a bicycle wheel is 21 inches. Find the circumference of

the wheel. Use $\frac{22}{7}$ as an approximation for π.
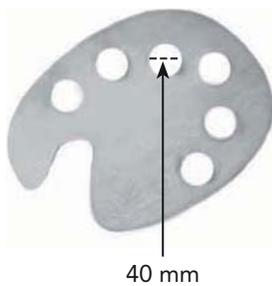

21 in.

Circumference = πd

$$\approx \underline{\hspace{2cm}} \cdot \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}} \cdot \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}} \text{ in.}$$

The circumference of the wheel is approximately _____ inches.

21. The diameter of each circular hole in a paint palette is 40 millimeters. Find the
circumference of each hole. Use 3.14 as an approximation for π.

40 mm

Name: _____   Date: _____

Solve. Show your work.

Example

A circular pie is cut into two semicircles. Find the length of the crust around each part.
Use $\dfrac{22}{7}$ as an approximation for π.

Circumference = πd

A **semicircle** is one half of a circle.

$$\approx \underline{\ \dfrac{22}{7}\ } \cdot \underline{\ 12\ }$$

$$= \underline{\ 37\dfrac{5}{7}\ }\ \text{in.}$$

Length of semicircular arc = $\dfrac{1}{2} \times$ circumference

$$= \dfrac{1}{2} \times \underline{\ 37\dfrac{5}{7}\ }$$

$$= \underline{\ 18\dfrac{6}{7}\ }\ \text{in.}$$

12 in.
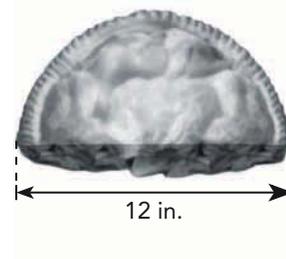
The length of the crust around each part is approximately $\underline{\ 18\dfrac{6}{7}\ }$ inches.

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22. A flexible ruler is bent into a semicircular arc. The length of $\overline{MN}$ is 15 inches.
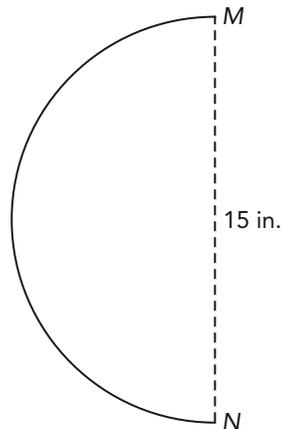Find the length of the ruler. Use 3.14 as an approximation for π.

Circumference = πd

$$\approx \underline{\hspace{2cm}} \cdot \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}\ \text{in.}$$

Length of semicircular arc = $\dfrac{1}{2} \times$ circumference

$$= \dfrac{1}{2} \times \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}\ \text{in.}$$

M

15 in.

N

The length of the ruler is approximately _____ inches.

23. A bag is in the shape of a semicircle. The length of $\overline{PQ}$ is 25 centimeters. A piece of lace is sewn along the semicircular part of the bag. Find the length of the lace. Use 3.14 as an approximation for π.

P Q

25 cm

Solve. Show your work.

> *Example*
>
> A **quadrant** is one quarter of a circle.
>
> A circle is cut into four quadrants. Find the length of each arc of the quadrant.
> Use 3.14 as an approximation for π.
>
> Since, diameter = 2 · radius, another formula for circumference is $C = 2\pi r$.
>
> Circumference = $2\pi r$
>
> $\approx 2 \cdot \underline{\quad 3.14 \quad} \cdot \underline{\quad 4 \quad}$
>
> $= \underline{\quad 25.12 \quad}$ ft
>
> Length arc of quadrant $= \dfrac{1}{4} \times$ circumference
>
> $= \dfrac{1}{4} \times \underline{\quad 25.12 \quad}$
>
> $= \underline{\quad 6.28 \quad}$ ft
>
> The length of each arc of the quadrant is approximately $\underline{\quad 6.28 \quad}$ feet.
>
> 4 ft
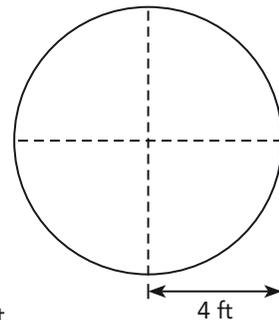
24. A quadrant is cut from a square. The side of the square is 25 inches. Find the length of the arc of the quadrant. Use 3.14 as an approximation for π.

Circumference $= 2\pi r$

$$\approx 2 \cdot \underline{\hspace{2cm}} \cdot \underline{\hspace{2cm}}$$
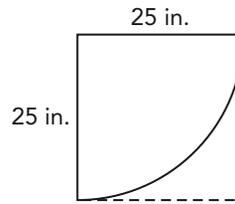
$$= \underline{\hspace{2cm}} \text{ in.}$$

25 in.

25 in.

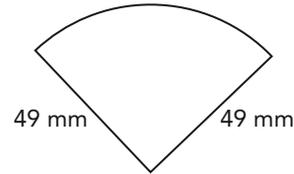Length of arc of quadrant $= \dfrac{1}{4} \times$ circumference

$$= \dfrac{1}{4} \times \underline{\hspace{2cm}}$$
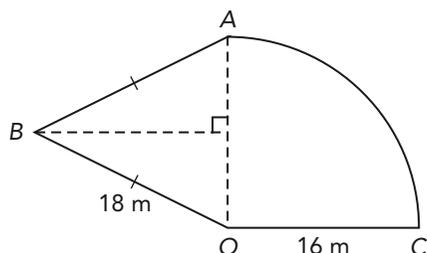
$$= \underline{\hspace{2cm}} \text{ in.}$$

The length of the arc of the quadrant is approximately _____ inches.

25. A refrigerator magnet is in the shape of a quadrant. Find the length of the arc of the quadrant. Use $\dfrac{22}{7}$ as an approximation for π.

49 mm   49 mm

Name: _____ Date: _____

Solve. Show your work.

> *Example*
>
> The figure below is made up of a quadrant and two triangles. Find the
> distance around the figure. Use 3.14 as an approximation for π.
>
>
>
> You can find the distance around the figure by finding the sum of the length of the arc of the quadrant, the radius, and the lengths of the two equal sides of the isosceles triangle.
>
> Circumference
>
> $= 2\pi r$
>
> $\approx 2 \cdot \underline{\ 3.14\ } \cdot \underline{\ 16\ }$
>
> $= \underline{\ 100.48\ }$ m
>
> Length of arc of quadrant
>
> $= \dfrac{1}{4} \times$ Circumference
>
> $= \dfrac{1}{4} \times \underline{\ 100.48\ }$
>
> $= \underline{\ 25.12\ }$ m
>
> Distance around the figure
>
> $=$ length of arc of quadrant $+ AB + BO + OC$
>
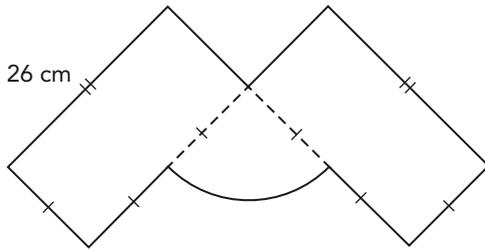> $= \underline{\ 25.12\ } + \underline{\ 18\ } + \underline{\ 18\ } + \underline{\ 16\ }$
>
> $= \underline{\ 77.12\ }$ m
>
> The distance around the figure is approximately $\underline{\ 77.12\ }$ meters.

26. The figure below is made up of a quadrant and two rectangles. Find the distance around the figure. Use 3.14 as an approximation for π.

26 cm

Circumference

$= \pi d$

$\approx$ _____ · _____

$=$ _____ cm

Length of arc of quadrant

$= \dfrac{1}{4} \times$ circumference

$= \dfrac{1}{4} \times$ _____

$=$ _____ cm

Distance around the figure

$=$ length of arc of quadrant $+ 6 \cdot$ _____ $+ 2 \cdot$ _____

$=$ _____ $+$ _____ $+$ _____

$=$ _____ cm

The distance around the figure is approximately _____ centimeters.

27. The figure below is made up of a semicircle and a square. Find the distance around the figure. Use $\frac{22}{7}$ as an approximation for π.

7 in.
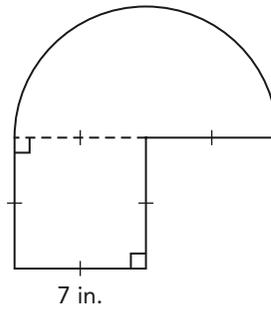
28. The figure below is made up of a semicircle, a square, and an isosceles triangle. The length of $\overline{CD}$ is 13.3 feet. Find the distance around the figure. Use $\frac{22}{7}$ as an approximation for π.

9.4 ft

C

D

Area of square $VWXY = \ell^2$

$\qquad = \underline{11} \cdot \underline{11}$

$\qquad = \underline{121}$ ft²

Area of trapezoid $STWX$

$\qquad$ = area of trapezoid $STVY$
$\qquad$ + area of square $VWXY$
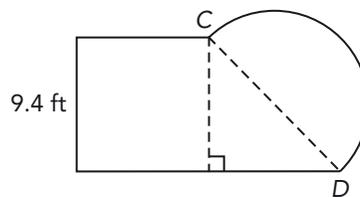
$\qquad = \underline{242} + \underline{121}$

$\qquad = \underline{363}$ ft²

The area of trapezoid $STWX$ is $\underline{363}$ square feet.

6. 65 square centimeters

7. 49.5 square feet

8. 495 square inches

Chapter 11

Lesson 11.1

1. 3.236   **2.** 5.051   **3.** 4.65

4. 7.755   **5.** 18.48   **6.** 18.84

7. 3.56   **8.** 0.34   **9.** 22

10. 60   **11.** 20.1   **12.** 1.0

13. $\overline{JM}$ and $\overline{KN}$.

14. $\overline{HK}$. It does not pass through the center O.

15. $\overline{OJ}$, $\overline{OK}$, $\overline{OL}$, $\overline{OM}$, and $\overline{ON}$.

16. Diameter = radius × $\underline{2}$

$\qquad = \underline{13} \times \underline{2}$

$\qquad = \underline{26}$ ft

The diameter of the circle is $\underline{26}$ feet.

17. 6.5 feet

18. Radius = diameter ÷ $\underline{2}$

$\qquad = \underline{32} \div \underline{2}$

$\qquad = \underline{16}$ in.

The radius of the circle is $\underline{16}$ inches.

19. 12.3 centimeters

20. Circumference = πd

$\qquad \approx \dfrac{\underline{22}}{\underline{7}} \cdot \underline{21}$

$\qquad = \underline{22} \cdot \underline{3}$

$\qquad = \underline{66}$ in.

The circumference of the wheel is approximately $\underline{66}$ inches.

21. 125.6 millimeters

22. Circumference = πd

$\qquad \approx \underline{3.14} \cdot \underline{15}$

$\qquad = \underline{47.1}$ in.

Length of semicircular arc

$= \dfrac{1}{2} \times$ circumference

$= \dfrac{1}{2} \times \underline{47.1}$

$= \underline{23.55}$ in.

The length of the ruler is approximately $\underline{23.55}$ inches.

23. 64.25 centimeters

24. Circumference = $2\pi r$

$\qquad \approx 2 \cdot \underline{3.14} \cdot \underline{25}$

$\qquad = \underline{157}$ in.

Length of arc of quadrant

$= \dfrac{1}{4} \times$ circumference

$= \dfrac{1}{4} \times \underline{157}$

$= \underline{39.25}$ in.

The length of the arc of the quadrant is approximately $\underline{39.25}$ inches.

25. 77 millimeters

26. Circumference = πd

$\qquad \approx \underline{3.14} \cdot \underline{26}$

$\qquad = \underline{81.64}$ cm

Length of arc of quadrant

$= \dfrac{1}{4} \times$ circumference

$= \dfrac{1}{4} \times \underline{81.64}$

$= \underline{20.41}$ cm

Distance around the figure

= length of arc of quadrant + $6 \cdot \dfrac{26}{2} + 2 \cdot \underline{26}$

$= 20.41 + \underline{78} + \underline{52}$

$= \underline{150.41}$ cm

The distance around the figure is approximately $\underline{150.41}$ centimeters.

27. 50 inches   **28.** 58.5 feet

Lesson 11.2

1. Area = πr^2

$\qquad \approx \underline{3.14} \cdot \underline{5} \cdot \underline{5}$

$\qquad = \underline{78.5}$ cm²

The area of the circle is approximately $\underline{78.5}$ square centimeters.

2. 12,474 square millimeters

3. Radius = diameter ÷ 2

$\qquad = \underline{56} \div 2$

$\qquad = \underline{28}$ ft

Area of circle = πr^2

$\qquad \approx \dfrac{22}{7} \times \underline{28} \times \underline{28}$

$\qquad = \underline{2,464}$ ft²

The area of the circle is approximately $\underline{2,464}$ square feet.

4. 34,650 square meters