

- Perimeter
- Measures of a Circle

Power Up

facts

Power Up F

count aloud

Count by 6s from 6 to 60. Count by 60s from 60 to 360.

mental math

- Time:** The movie was 2 hours 15 minutes long. How many minutes is that?
- Money:** Vikas earned \$15.00 for raking leaves. He spent \$4.75 of his earnings on a comic book. How much money is left over?
- Measurement:** 1000 meters is one kilometer. How many meters is 25% of a kilometer?
- Number Sense:** $2\frac{1}{2} + 2\frac{1}{2}$
- Time:** How many minutes is $1\frac{1}{2}$ hours? ... $2\frac{1}{2}$ hours?
- Percent:** The sale price of the tennis racket is 50% of \$41. What is the sale price?
- Measurement:** The bicycle is 5 feet 4 inches long. How many inches is that?
- Calculation:** $\frac{1}{2}$ of 100, $\div 2$, $\div 5$, $\div 5$, $\times 10$, $\div 5$

problem solving

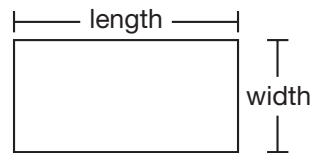
Choose an appropriate problem-solving strategy to solve this problem. Alvin finds that he can arrange objects into triangular patterns of 3, 6, and 10 objects, respectively. Alvin finds that he can also arrange objects into square patterns of 4, 9, 16, and 25 objects, respectively. Find the smallest number of objects greater than 1 that Alvin can arrange into either a triangular pattern or a square pattern.

New Concepts

Perimeter

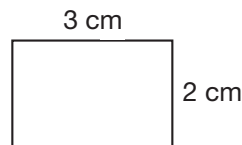
When line segments enclose an area, a polygon is formed. We can find the distance around a polygon by adding the lengths of all the segments that form the polygon. The distance around a polygon is called the **perimeter**.

We should note that the word *length* has more than one meaning. We have used length to mean the measure of a segment. But length may also mean the longer dimension of a rectangle. We use the word *width* to mean the shorter dimension of a rectangle.



Example 1

What is the perimeter of this rectangle?



The perimeter is the distance around the rectangle. This rectangle has a length of 3 cm and a width of 2 cm. The four sides measure 2 cm, 3 cm, 2 cm, and 3 cm.

$$2 \text{ cm} + 3 \text{ cm} + 2 \text{ cm} + 3 \text{ cm} = 10 \text{ cm}$$

We added the lengths of the sides and found that the perimeter is **10 cm**.

Notice that to find the perimeter, we added the length plus the width plus the length plus the width. In other words, we added two lengths plus two widths. Using l for length, w for width, and P for perimeter, we can express the formula for the perimeter of a rectangle this way:

$$P = 2l + 2w$$

Example 2

Use the formula on the next page to find the perimeter of the rectangle in Example 1.

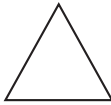
$$P = 2l + 2w$$

$$P = (2 \times 3) + (2 \times 2)$$

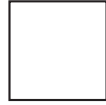
$$P = \mathbf{10 \text{ cm}}$$

A **regular polygon** has sides equal in length and angles equal in measure. For example, a square is a regular quadrilateral.

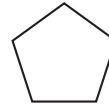
Below we show some regular polygons:



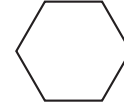
regular
triangle



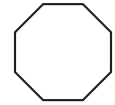
regular
quadrilateral



regular
pentagon



regular
hexagon



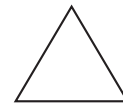
regular
octagon

If we know the length of one side of a regular polygon, we can find the perimeter of the polygon by multiplying the length of one side by the number of sides.

Generalize What formula could be used to find the perimeter of any regular polygon?

Example 3

What is the perimeter of this regular triangle?



12 in.

The perimeter is the total of the lengths of the three sides. We can find this by multiplying the length of one side of the regular triangle by 3.

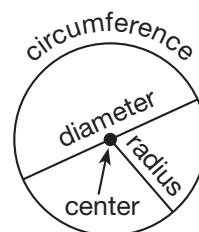
$$P = 3 \times \text{side length}$$

$$3 \times 12 \text{ inches} = \mathbf{36 \text{ inches}}$$

Analyze What is the perimeter of the triangle in yards?

Measures of a Circle

A **circle** is a smooth curve. The length of the curve is its **circumference**. So the circumference of a circle is the perimeter of the circle. The **center** of the circle is the “middle point” of the area enclosed by the circle. The **radius** is the distance from the center to the curve. The **diameter** is the distance across the circle through its center. Thus, the diameter of a circle is twice the radius.





Activity

Measuring Circles

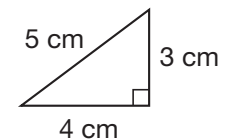
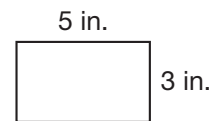
Materials needed:

- **Lesson Activity 34**
- various circular objects such as paper plates, cups, wheels, and plastic kitchenware lids
- ruler, cloth tape measure, string, or masking tape

Make a list of circular objects at school and home. Measure the diameter, radius, and circumference of each object. Record the results in the table on **Lesson Activity 34**.

Lesson Practice

- What is the length of this rectangle?
- What is the width of the rectangle?
- What is the perimeter of the rectangle?
- What is the perimeter of this right triangle?



- Generalize** Use a formula to find the perimeter of this square:




- What do we call the perimeter of a circle? Do we use units, square units, or cubic units to measure this perimeter?
- What do we call the distance across a circle through its middle?
- If the radius of a circle is 6 inches, what is the diameter of the circle?


Written Practice

Distributed and Integrated

- ⁽⁴⁹⁾ A baker used fifteen of three dozen eggs to make six spice cakes and five loaves of sourdough bread. How many eggs were not used?

- *2.**  **Analyze** There are 13 players on one team and 9 players on the other team. If some of the players from one team join the other team so that the same number of players are on each team, how many players will be on each team? Explain your reasoning.

- 3.** **Represent** If $\frac{1}{3}$ of the 30 students walked home, how many students walked home? What percent is this? Draw a diagram to illustrate and solve this problem.

- *4.**  **Analyze** If water is poured from glass to glass until the amount of water in each glass is the same, how many ounces of water will be in each glass? Explain your reasoning.



- 5. Multiple Choice** In the number 123,456,789,000, the 2 means which of the following?
- A** 2 billion **B** 20 billion **C** 200 billion **D** 2000 billion
- *6. List** Which factors of 8 are also factors of 12?
- 7.** How many decades were between the years 1820 to 1890?
- 8. Represent** Use digits to write nineteen million, four hundred ninety thousand.

9. $6 + \left(4\frac{2}{3} - 2\right)$

10. $4\frac{2}{3} - \left(2\frac{2}{3} + 2\right)$

11. 300×200

12. 800×70

13. $5t = 500$

14. $\begin{array}{r} \$5.64 \\ \times \quad 78 \\ \hline \end{array}$

15. $\begin{array}{r} 865 \\ \times \quad 74 \\ \hline \end{array}$

16. $\begin{array}{r} 983 \\ \times \quad 76 \\ \hline \end{array}$

17. $\begin{array}{r} \$63.14 \\ - \$42.87 \\ \hline \end{array}$

18. $\begin{array}{r} 3106 \\ - \quad 875 \\ \hline \end{array}$

19. $\begin{array}{r} \$68.09 \\ \$43.56 \\ \$27.18 \\ + \$14.97 \\ \hline \end{array}$

20. $\frac{\$31.65}{5}$
(26)

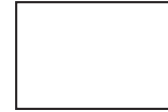
21. $\frac{4218}{6}$
(34)

22. $5361 \div 10$
(26)

*23. **Multiple Choice** When we count by tens, we find that 1236 is closest to which number?
(33)

- A 1230 B 1240 C 1200 D 1300

24. What is the length of this rectangle?
(53)



*25. **Generalize** Use a formula to find the perimeter of this rectangle.
(53)

26. To multiply 35 by 21, Nancee thought of 21 as $20 + 1$. Show two choices Nancee has for multiplying the numbers.
(51)

27. **Represent** Write 2,050,000 in expanded notation.
(52)

28. **Represent** Draw an equilateral triangle.
(36)

29. Alba found the circumference of the soup can to be $8\frac{5}{8}$ inches. Round $8\frac{5}{8}$ inches to the nearest inch.
(44)

*30. The highest elevation above sea level in each of four states is shown in the pictograph. The elevations have been rounded to the nearest hundred feet.
(Inv. 5)

	Highest Elevation (in feet)
Mississippi	
New Jersey	
Illinois	
Michigan	

Key: = 200 feet

- Analyze** Which state has a highest elevation of about 2000 feet?
- Write numbers to represent the elevations and order the numbers from greatest to least.
- Which elevation is nearest sea level?