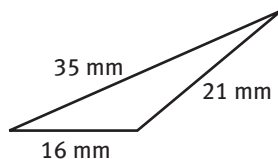


# Perimeter and Area

**Perimeter** is the measure of the distance around a closed plane figure. Perimeter is used to determine how much fencing is needed to enclose a play area or how much ribbon is needed to make a border around a picture. **Area** is the measure of the inside region of a closed plane figure. Area is used to determine how much wallpaper is needed to cover the wall of a room or how much paint is needed to cover the side of a house.

## EXAMPLE A

What is the perimeter of the triangle?



**Step 1:** Add the lengths of the sides.

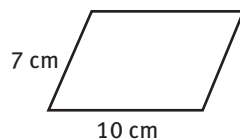
$$35 \text{ mm} + 21 \text{ mm} + 16 \text{ mm} = 72 \text{ mm}$$

**Solution:** The perimeter of the triangle is 72 millimeters.

To find the perimeter of a parallelogram, add the lengths of all four sides. Another way to find the perimeter is by multiplying the lengths of a pair of consecutive sides by 2 and then adding the results. You can use this method because opposite sides of a parallelogram have the same length.

## EXAMPLE B

What is the perimeter of the parallelogram?



**Step 1:** Multiply the lengths of consecutive sides, 7 cm and 10 cm, by 2.

$$10 \text{ cm} \times 2 = 20 \text{ cm}$$

$$7 \text{ cm} \times 2 = 14 \text{ cm}$$

**Step 2:** Add the products.

$$20 \text{ cm} + 14 \text{ cm} = 34 \text{ cm}$$

**Solution:** The perimeter of the parallelogram is 34 centimeters.

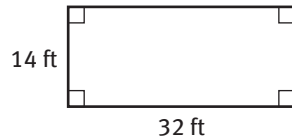
## Perimeter and Area (continued)

To find the perimeter of a rectangle, you can add the sides or you can use the following formula, where  $l$  represents the length and  $w$  represents the width.

$$P = 2l + 2w$$

### EXAMPLE C

The diagram shows the dimensions of Pearl's play park for her dog Rover. Pearl wants to enclose the play park with a fence. How much fencing does she need to buy?



**Step 1:** Substitute the values for the length and width into the formula.

$$\begin{aligned} P &= 2l + 2w \\ &= (2 \times 32 \text{ ft}) + (2 \times 14 \text{ ft}) \\ &= 64 \text{ ft} + 28 \text{ ft} \\ &= 92 \text{ ft} \end{aligned}$$

**Step 2:** Multiply inside each set of parentheses.

**Step 3:** Add.

**Solution:** Pearl needs to buy 92 feet of fencing.

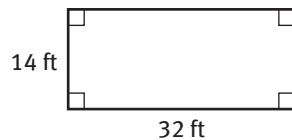
Area is measured in square units. A square unit is a square with a measure of 1 unit on all sides.

To find the area of a rectangle, use the following formula, where  $l$  represents the length of the rectangle and  $w$  represents the width of the rectangle.

$$A = lw$$

### EXAMPLE D

Pearl wants to determine in how much space Rover has to play. What is the area of the dog play park?



**Step 1:** Substitute the values for the length and width into the formula.

$$\begin{aligned} A &= lw \\ &= 32 \text{ ft} \times 14 \text{ ft} \\ &= 448 \text{ ft}^2 \end{aligned}$$

**Step 2:** Multiply.

**Solution:** The area of the dog play park is 448 square feet.

## Perimeter and Area (continued)

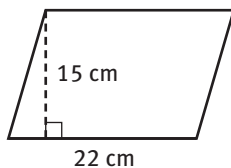
To find the area of a parallelogram, use the following formula, where  $b$  represents the base of the parallelogram and  $h$  represents the height of the parallelogram.

$$A = bh$$

The height is the perpendicular distance from the base to the opposite side.

### EXAMPLE E

What is the area of the parallelogram?



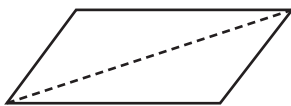
**Step 1:** Substitute the values for the base and height into the formula.

**Step 2:** Multiply.

**Solution:** The area of the parallelogram is 330 square centimeters.

$$\begin{aligned} A &= bh \\ &= 22 \text{ cm} \times 15 \text{ cm} \\ &= 330 \text{ cm}^2 \end{aligned}$$

In the diagram below, you can see how the area of a triangle is related to the area of a parallelogram. A parallelogram cut by a diagonal forms 2 congruent triangles.



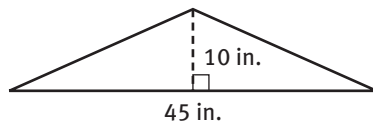
To find the area of a triangle, use the following formula, where  $b$  represents the base of the triangle and  $h$  represents the height of the triangle. The height of a triangle is the perpendicular distance from a vertex to the base opposite the vertex.

$$A = \frac{1}{2}bh$$

## Perimeter and Area (continued)

### EXAMPLE F

What is the area of the triangle?



**Step 1:** Substitute the values for the base and height into the formula.

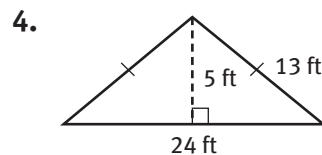
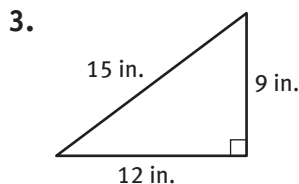
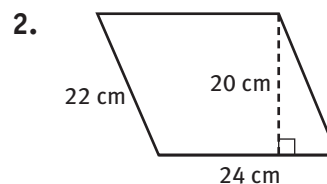
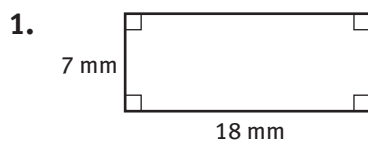
**Step 2:** Multiply.

**Solution:** The area of the triangle is 225 square inches.

$$\begin{aligned} A &= \frac{1}{2}bh \\ &= \frac{1}{2} \times 45 \text{ in.} \times 10 \text{ in.} \\ &= 225 \text{ in.}^2 \end{aligned}$$

### PRACTICE

Find the perimeter and area of each figure.



5. A parallelogram has a perimeter of 36 inches. The length of the parallelogram is 11 inches. What is the length of a side that is not opposite the 11-inch side?
6. Cindy has a rectangular bedroom floor that has an area of 240 square feet. One side of the floor is 12 feet long. What is the perimeter of Cindy's bedroom floor? Show your work.
7. Russell made the design at the right. What is the area of the part of the rectangle that is not shaded by the triangle? Explain how you found your answer.

