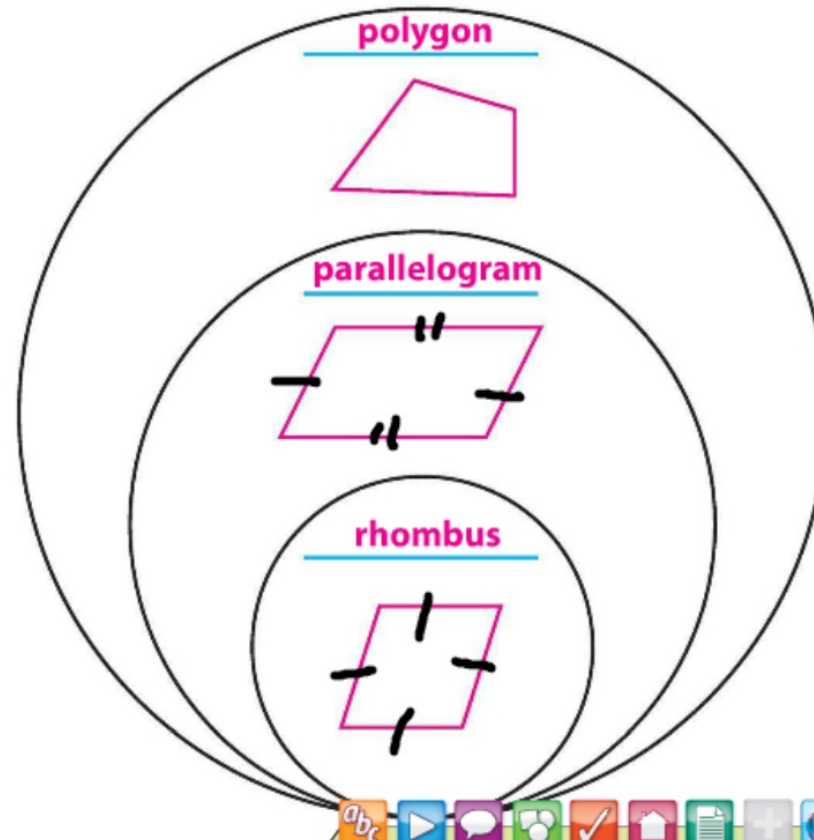


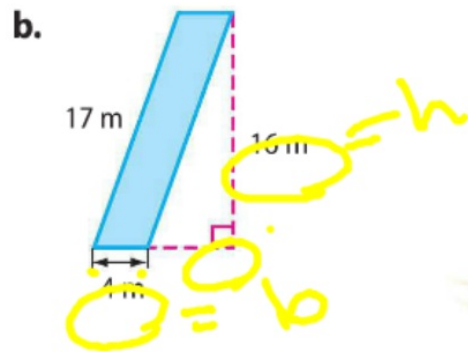
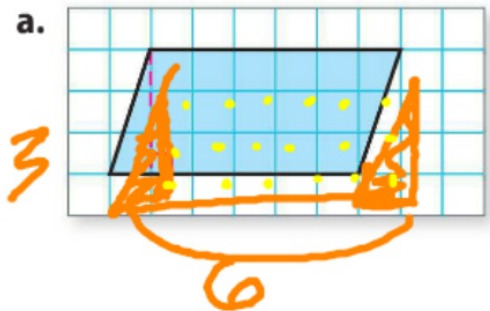
# vocabulary start-up



A **polygon** is a closed figure formed by 3 or more straight lines.  
A **parallelogram** is a quadrilateral with opposite sides parallel and opposite sides the same length. A **rhombus** is a parallelogram with four equal sides. Fill in the lines in the diagram with polygon, parallelogram, or rhombus and draw an example of each.



Got It? Do these problems to find out.

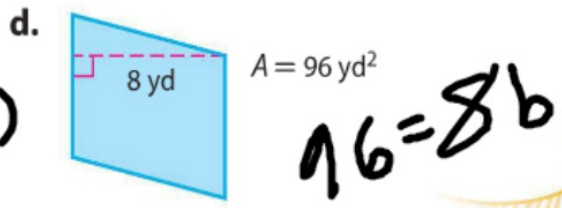
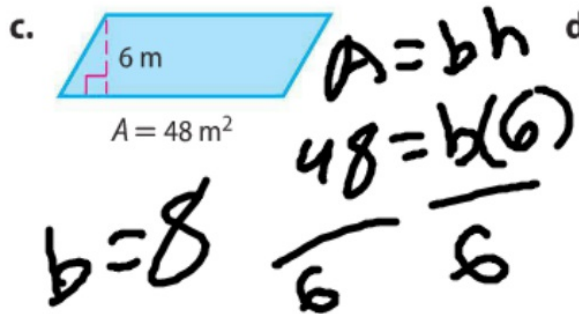


Show your work.

a. 18 units<sup>2</sup>

b. 64 m<sup>2</sup>

Got It? Do these problems to find out.



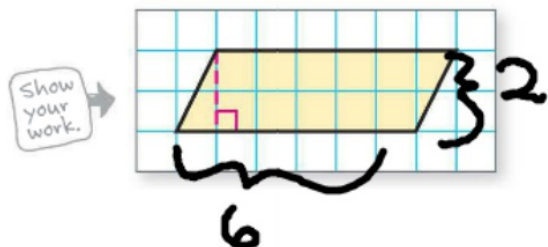
c. 8 m

d. 12 yd



Find the area of each parallelogram. (Examples 1 and 2)

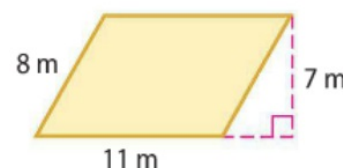
1. **12 units<sup>2</sup>**



2. **50 ft<sup>2</sup>**



3. **77 m<sup>2</sup>**

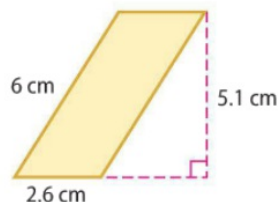


4. Find the height of a parallelogram if its base is 35 centimeters and its area is 700 square centimeters.

(Example 3) **20 cm**

5. The size of the parallelogram piece in a set of tangrams is shown at the right. Find the area of the piece. (Example 4)

**13.26 cm<sup>2</sup>**



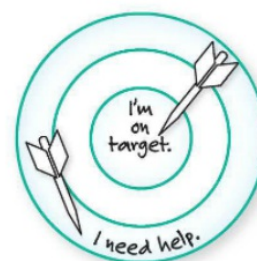
6. **e** **Building on the Essential Question** How are parallelograms related to triangles and rectangles?

**Sample answer: Parallelograms can be decomposed into triangles, or composed into rectangles. You can find the area of parallelograms using the relationship to triangles and rectangles.**



### Rate Yourself!

How confident are you about the area of parallelograms? Shade the ring on the target.



For more help, go online to access a Personal Tutor.



**FOLDABLES**

Time to update your Foldable!

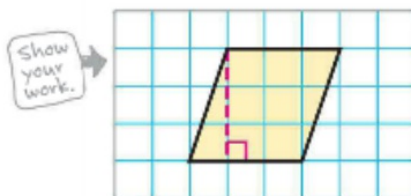


# Independent Practice

Go online for Step-by-Step Solutions

Find the area of each parallelogram. (Examples 1 and 2)

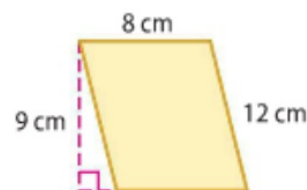
1.  $9 \text{ units}^2$



Show your work.

2. base, 6 millimeters;  
height, 4 millimeters  
 $24 \text{ mm}^2$

3.  $72 \text{ cm}^2$



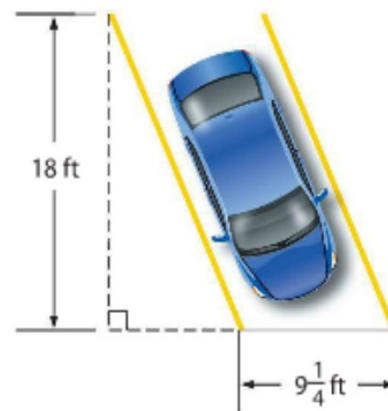
4. Find the base of a parallelogram with an area of 24 square feet and height 3 feet. (Example 3)  $8 \text{ ft}$

5. Find the area of the parking space shown to the right.

(Example 4)  $166\frac{1}{2} \text{ ft}^2$

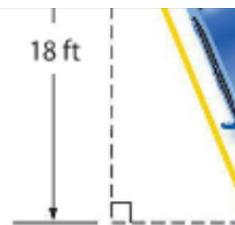
6. **STEM** An architect designed three different parallelogram-shaped brick patios. Write the missing dimensions in the table.

| Patio | Base (ft)       | Height (ft)    | Area (ft <sup>2</sup> ) |
|-------|-----------------|----------------|-------------------------|
| 1     | $15\frac{3}{4}$ | $9\frac{1}{3}$ | 147                     |
|       |                 |                |                         |



6. **STEM** An architect designed three different parallelogram-shaped brick patios. Write the missing dimensions in the table.

| Patio | Base (ft)       | Height (ft)     | Area (ft <sup>2</sup> ) |
|-------|-----------------|-----------------|-------------------------|
| 1     | $15\frac{3}{4}$ | $9\frac{1}{3}$  | 147                     |
| 2     | $12\frac{1}{2}$ | $11\frac{1}{4}$ | $140\frac{5}{8}$        |
| 3     | $10\frac{1}{4}$ | $14\frac{3}{4}$ | $151\frac{3}{16}$       |



7. The base of a building is shaped like a parallelogram. The first floor has an area of 20,000 square feet. If the base of this parallelogram is 250 feet, can its height be 70 feet? Explain.

**no; In order for the area of the first floor to be**

**$20,000 \text{ ft}^2$  and the base 250 feet, the height must be**

**$20,000 \div 250$  or 80 feet.**

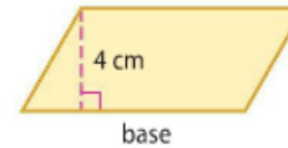
8. **CCSS Identify Structure** Draw and label a parallelogram with a base twice as long as the height and an area less than 60 square inches. Find the area. **Sample answer:**

**$50 \text{ in}^2$**





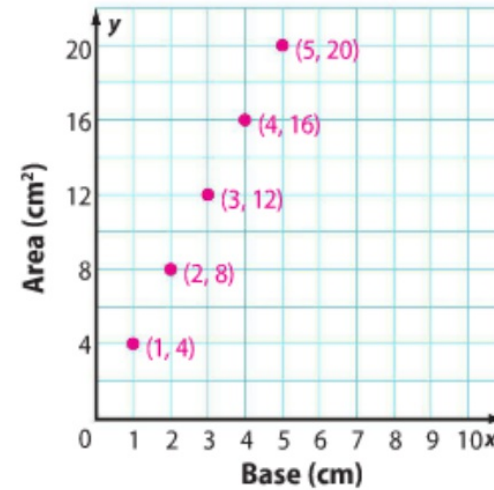
9. **CCSS Multiple Representations** Draw five parallelograms that each have a height of 4 centimeters and different base measurements on centimeter grid paper. **Sample answers are given.**



- a. **Table** Make a table with a column for base, height, and area.

| Base (cm) | Height (cm) | Area (cm <sup>2</sup> ) |
|-----------|-------------|-------------------------|
| 1         | 4           | 4                       |
| 2         | 4           | 8                       |
| 3         | 4           | 12                      |
| 4         | 4           | 16                      |
| 5         | 4           | 20                      |

- b. **Graph** Graph the ordered pairs (base, area).

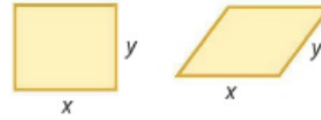


- c. **Words** Describe the graph. **It appears to form a line.**
-



## H.O.T. Problems Higher Order Thinking

10. **CCSS Persevere with Problems** If  $x = 5$  and  $y < x$ , which figure has the greater area? Explain your reasoning.



**the rectangle; The area of the rectangle is  $5y$  units<sup>2</sup>. The area of the parallelogram cannot be greater than  $5y$  units<sup>2</sup> since  $y$  is less than 5 and the height of the parallelogram is not greater than  $y$ .**

11. **CCSS Reason Inductively** Explain how the formula for the area of a parallelogram is related to the formula for the area of a rectangle.

**Sample answer: Both parallelograms and rectangles have bases and heights. So, the formula  $A = bh$  can be used for both figures. The height of a rectangle is the length of one of its sides while the height of a parallelogram is the length of the altitude.**

12. **CCSS Reason Inductively** Give an example of a triangle and a parallelogram that have the same area. Describe the bases and heights of each figure. Then state the area.

**Sample answer: A triangle with a base of 8 units and a height of 3 units has the same area as a parallelogram with a base of 4 units and a height of 3 units, 12 units<sup>2</sup>.**