

10-1

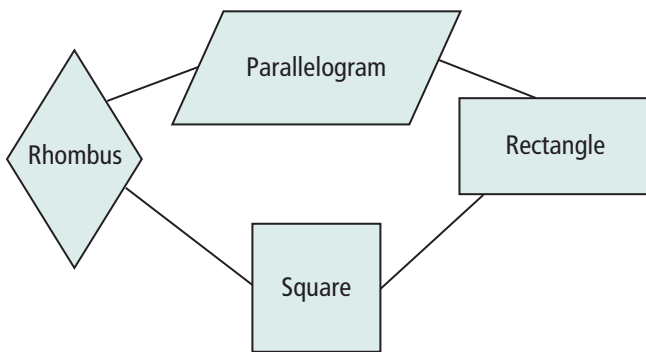
Areas of Parallelograms and Triangles



Vocabulary

Review

The diagram below shows the different types of *parallelograms*.



Underline the correct word to complete each sentence.

- All *parallelograms* are quadrilaterals / rectangles.
- All *parallelograms* have opposite sides parallel / perpendicular.
- Some *parallelograms* are trapezoids / rectangles.

Vocabulary Builder

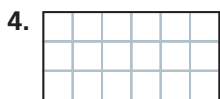
area (noun) EHR ee uh

Definition: Area is the number of square units needed to cover a given surface.

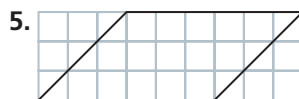
Main Idea: You can find the **area** of a parallelogram or a triangle when you know the length of its base and its height.

Use Your Vocabulary

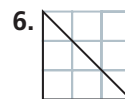
Find the area of each figure.



square units



square units



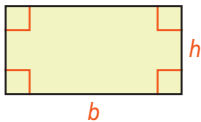
square units

Theorems 10-1 and 10-2 Area of a Rectangle and a Parallelogram

Theorem 10-1 Area of a Rectangle

The area of a rectangle is the product of its base and height.

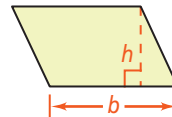
$$A = bh$$



Theorem 10-2 Area of a Parallelogram

The area of a parallelogram is the product of a base and the corresponding height.

$$A = bh$$



7. Explain how finding the area of a parallelogram and finding the area of a rectangle are alike.

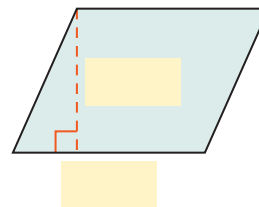


Problem 1 Finding the Area of a Parallelogram

Got It? What is the area of a parallelogram with base length 12 m and height 9 m?

8. Label the parallelogram at the right.
 9. Find the area.

$$\begin{aligned}
 A &= bh && \text{Write the formula.} \\
 &= 12(\quad) && \text{Substitute.} \\
 &= \quad && \text{Simplify.}
 \end{aligned}$$



10. The area of the parallelogram is m².

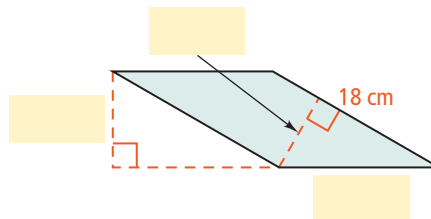


Problem 2 Finding a Missing Dimension

Got It? A parallelogram has sides 15 cm and 18 cm. The height corresponding to a 15-cm base is 9 cm. What is the height corresponding to an 18-cm base?

11. Label the parallelogram at the right.
 Let h represent the height corresponding to the 18-cm base.

12. Find the area.



13. The area of the parallelogram is cm².

14. Use the area of the parallelogram to find the height corresponding to an 18-cm base.

$$A = bh$$

Write the formula.

$$\square = (\square)h$$

Substitute.

$$\frac{135}{\square} = \frac{(\square)h}{\square}$$

Divide each side by the length of the base.

$$\square = h$$

Simplify.

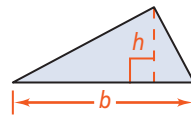
15. The height corresponding to an 18-cm base is \square cm.

Take note

Theorem 10-3 Area of a Triangle

The area of a triangle is half the product of a base and the corresponding height.

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



16. Explain how finding the area of a triangle is different from finding the area of a rectangle.



Problem 3 Finding the Area of a Triangle

Got It? What is the area of the triangle?

17. Circle the formula you can use to find the area of the triangle.

$$A = bh$$

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

18. Convert the lengths of the base and the hypotenuse to inches.

base

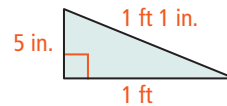
hypotenuse

$$1 \text{ ft} = \square \text{ in.}$$

$$1 \text{ ft } 1 \text{ in.} = \square \text{ in.}$$

19. Find the area of the triangle.

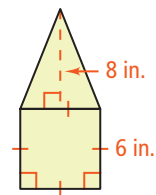
20. The area of the triangle is \square in.².





Problem 4 Finding the Area of an Irregular Figure

Got It? Reasoning Suppose the base lengths of the square and triangle in the figure are doubled to 12 in., but the height of each polygon remains the same. How is the area of the figure affected?



21. Complete to find the area of each irregular figure.

Area of Original Irregular Figure

$$\begin{aligned} A &= 6(6) + \frac{1}{2}(6)(8) \\ &= \square + 24 \\ &= \square \end{aligned}$$

Area of New Irregular Figure

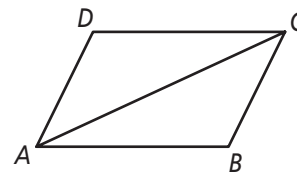
$$\begin{aligned} A &= (2)(6)(6) + \frac{1}{2}(2)(6)(8) \\ &= (2)(36) + (2)(\square) \\ &= (2)(\square + \square) = (2)(\square) = \square \end{aligned}$$

22. How is the area affected?



Lesson Check • Do you UNDERSTAND?

$\square ABCD$ is divided into two triangles along diagonal \overline{AC} . If you know the area of the parallelogram, how do you find the area of $\triangle ABC$?



Write T for *true* or F for *false*.

23. Since \overline{AC} is a diagonal of $\square ABCD$, $\triangle ABC$ is congruent to $\triangle CDA$.

24. The area of $\triangle ABC$ is greater than the area $\triangle CDA$.

25. The area of $\triangle ABC$ is half the area of $\square ABCD$.

26. If you know the area of the parallelogram, how do you find the area of $\triangle ABC$?



Math Success

Check off the vocabulary words that you understand.

- base of a parallelogram height of a parallelogram
 base of a triangle height of a triangle

Rate how well you can *find the area of parallelograms and triangles*.

