Geometry

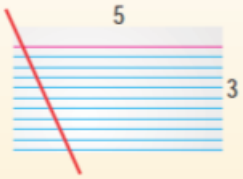
8.5: Area of Parallelograms and Rhombuses

Name:_____

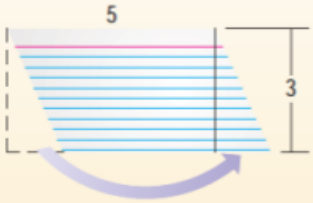
Students will find formulas for the areas of parallelograms and rhombuses and use them to find areas and missing side lengths.

Geo-Activity Exploring the Area of a Parallelogram

- Use a straightedge to draw a line through one of the vertices of an index card.



- Cut out the triangle. Tape the triangle to the opposite side to form a parallelogram.



- How does the area of the parallelogram compare to the area of the rectangular index card? How do their bases compare? How do their heights compare?

The area of a rectangle and parallelogram are exactly the same. The height and base lengths are also the same.

- Write a conjecture about the formula for the area of a parallelogram.

$A = bh$

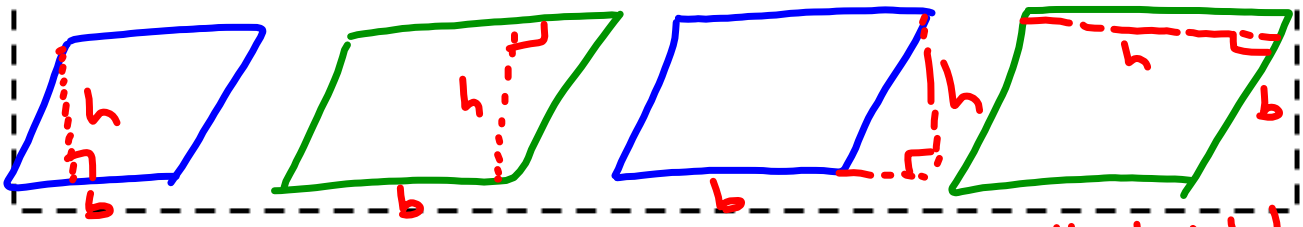
Bases of a parallelogram:

either pair of // sides

Height of a parallelogram:

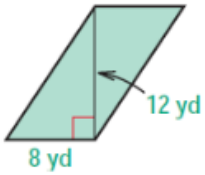
always ⊥ to base

Area of a Parallelogram



Try: Find the area of the parallelogram.

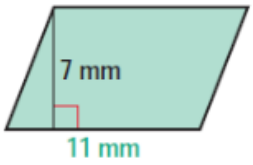
a)



$A = 8 \cdot 12$

$A = 96 yd^2$

b)



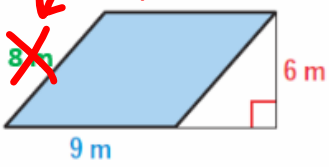
$A = 7 \cdot 11$

$A = 77 mm^2$

c)

NOT the height

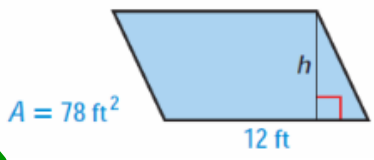
NOT ⊥



$A = 9 \cdot 6$

$A = 54 m^2$

Example 1: Find the height of the parallelogram given that its area is 78 square feet.



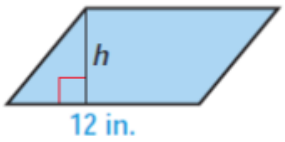
$A = bh$

$\frac{78}{12} = \frac{12h}{12}$

$h = 6.5$ ft

Try: Find the missing measurement.

a) $A = 72$ in.^{2}

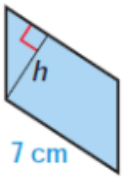


$A = bh$

$\frac{72}{12} = \frac{12h}{12}$

$h = 6$ in

b) $A = 28$ cm^2



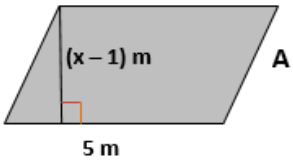
$A = bh$

$\frac{28}{7} = \frac{7h}{7}$

4 cm $= h$

Example 2: Solve for x using the given area.

a)



$A = bh$

$15 = 5(x-1)$

$15 = 5x - 5$

$+5 \quad +5$

$\frac{20}{5} = \frac{5x}{5}$

$x = 4$

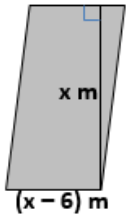
$\frac{15}{5} = \frac{5(x-1)}{5}$

$3 = x - 1$

$+1 \quad +1$

$4 = x$

b)



mult

-55

Add

-6

$A = bh$

$55 = x(x-6)$

$55 = x^2 - 6x$

$-55 \quad -55$

$0 = x^2 - 6x - 55$

$0 = (x-11)(x+5)$

$x - 11 = 0$

$+11 \quad +11$

$x = 11$

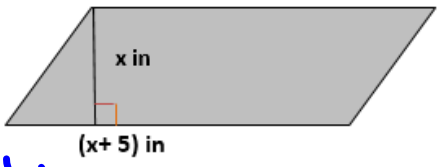
$x + 5 = 0$

$-5 \quad -5$

$x = -5$

1, 2, 3, 4, 6, 12, 24

TRY: Solve for x using the given area.



$A = bh$

$24 = x(x+5)$

$24 = x^2 + 5x$

$-24 \quad -24$

$0 = x^2 + 5x - 24$

$0 = (x-3)(x+8)$

$x - 3 = 0$

$+3 \quad +3$

$x = 3$

$x + 8 = 0$

$-8 \quad -8$

$x = -8$

mult

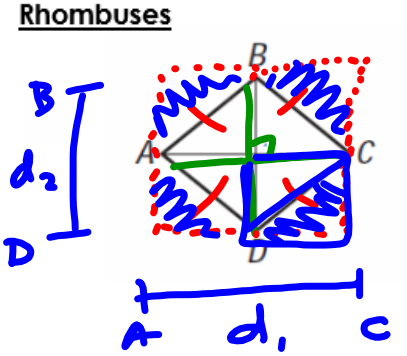
-24

Add

+5

-3, 8

Rhombuses

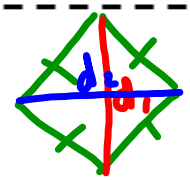


$A = \frac{d_1 \cdot d_2}{2}$

Area of Rhombuses

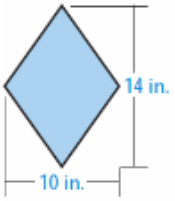
$\text{Area} = \frac{\text{diagonal}_1 \times \text{diagonal}_2}{2}$

$A = \frac{d_1 \cdot d_2}{2}$



Example 3: Find the area of each rhombus.

a)

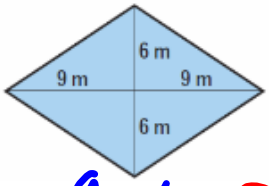


$A = \frac{d_1 \cdot d_2}{2}$

$A = \frac{14 \cdot 10}{2}$

$A = 70 \text{ in}^2$

b)

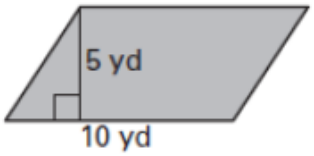


$A = \frac{9 \cdot 12}{2}$

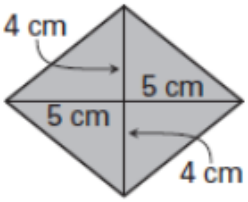
$A = 108 \text{ m}^2$

You Try: Find the area of the parallelogram or the rhombus.

a.



b.



HW: Worksheet 8.5