




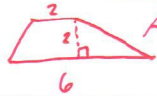
GEOMETRY

11

Name: Key Date: _____ Period: _____

SECTION 11.3 TWO-DIMENSIONAL FIGURES: QUADRILATERALS

VOCABULARY

DEFINITION	EXAMPLE
Regular polygon: A polygon with all side lengths equal and all angle measures equal.	
Area of a parallelogram: $A = b \cdot h$	 $b = 6, h = 4$ $A = 24$
Area of a triangle: $A = \frac{1}{2} b \cdot h$ or $A = \frac{b \cdot h}{2}$	 $b = 3, h = 2$ $A = \frac{3 \cdot 2}{2} = 3$
Area of a trapezoid: $A = \frac{1}{2} (b_1 + b_2) \cdot h$	 $A = \frac{1}{2} (2 + 6) \cdot 2$ $A = 8$

Big Idea: How do we calculate the area of triangles and quadrilaterals?

QUADRILATERALS

List a few examples where you see different quadrilaterals:

walls, tables, erasers, cards, etc.

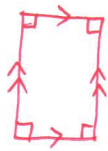
Types of Quadrilaterals

List the characteristics of each type of quadrilateral. What characteristics make each unique?

Rectangle	parallelogram with 4 right angles
Square	rectangle <u>AND</u> rhombus
Parallelogram	quadrilateral with opposite sides parallel both pairs of
Rhombus	parallelogram with 4 sides of equal length (congruent)
Trapezoid	quadrilateral with exactly 1 pair of parallel sides

CLASSIFYING QUADRILATERALS ACTIVITY (Justify your answers in words and draw a picture, if possible)

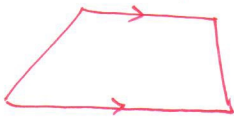
1. Is every rectangle a parallelogram? *Yes.*



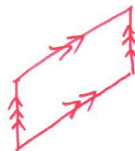
(see above)

2. Is a trapezoid a parallelogram? *Never.*

1 pair of sides parallel



2 pairs of sides parallel



3. Is every square a rectangle? *Yes.*



(see above.)

AREA OF POLYGONS

EXPLORATION 2

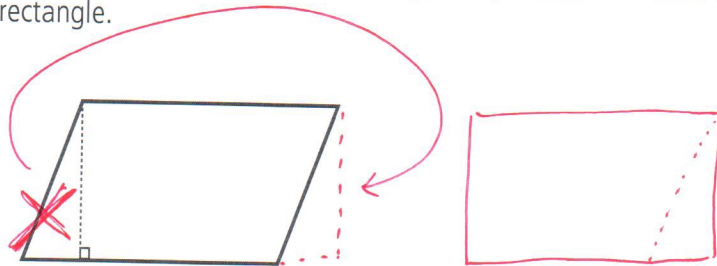
Draw four parallelograms using grid paper. For this exploration, make sure the longest side is on one of the grid lines.

- a. Measure the length of each of the sides and the measure of each angle. What do you observe?

\downarrow
opposite pairs are equal

\downarrow
opposite pairs are equal

- b. Find the area of one of the parallelograms by cutting the parallelogram apart, as illustrated below, and reassembling it to make a rectangle.



The dimensions of a rectangle are often called length and width, however, they are also referred to as the base and height. Base is typically represented using b and height is typically represented using h .

- a. Using b for length and h for width, write a rule for finding the perimeter of a rectangle.

$$b + b + h + h$$

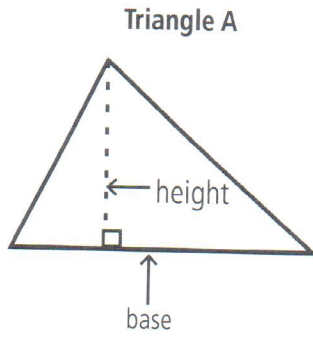
$$P = 2(b + h) \quad \text{or} \quad P = 2b + 2h$$

- b. Using b for length and h for width, write a rule for finding the area of a rectangle.

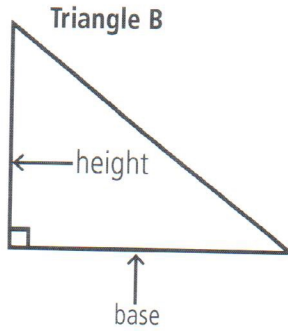
$$A = b \cdot h$$

Base and height are also used with triangles. The base of a triangle can be any one of the sides of the triangle. The height of a triangle is the perpendicular distance from the top vertex to the base.

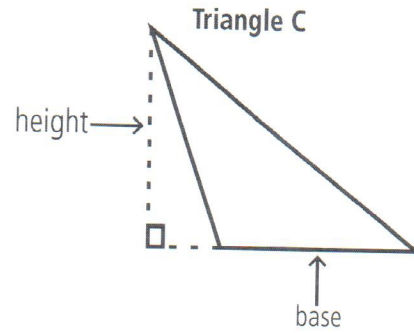
You can think of the height of a triangle as the distance a rock would fall if you dropped it from the top vertex of the triangle straight down to the line that the base is on.



Measure the height inside the triangle.



Measure the height along one of the triangle's sides.



Measure the height outside the triangle.

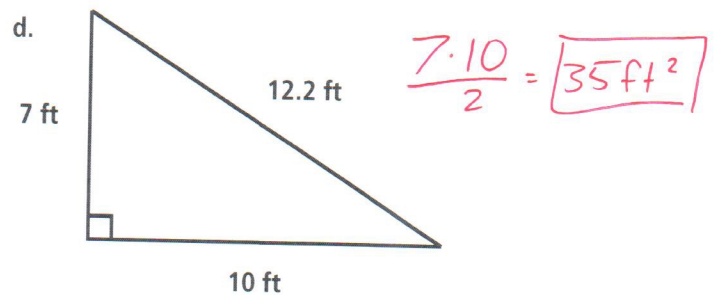
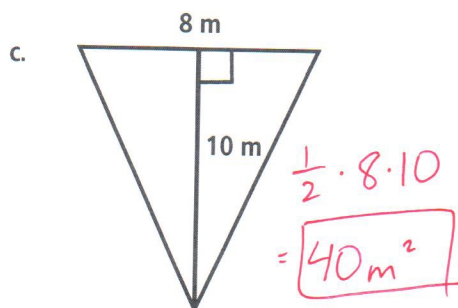
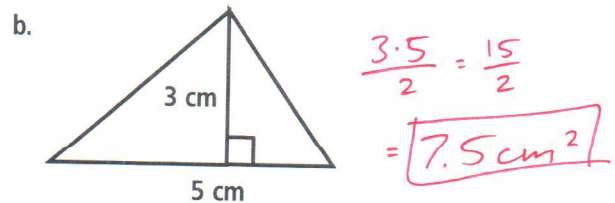
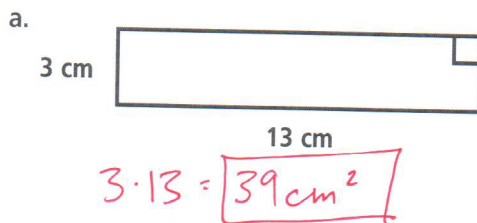
- a. Using b for base and h for height, write a formula for finding the area of the triangle.

$$A = \frac{1}{2} b \cdot h \quad \text{OR} \quad A = \frac{b \cdot h}{2}$$

- b. How do you find the perimeter of a triangle?

$$\text{Side 1} + \text{Side 2} + \text{Side 3}$$

4. Find the area of each figure. (They are not drawn to scale.)

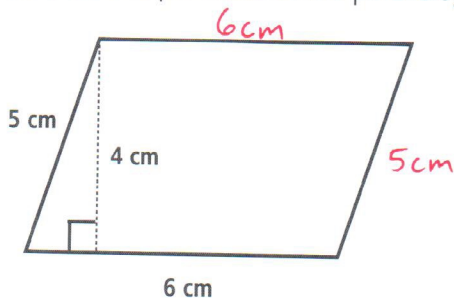


5. How do you find the perimeter and area of a parallelogram?

add side lengths

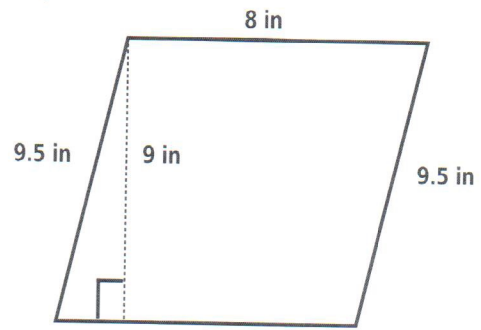
$A = b \cdot h$

6. Find the area and perimeter of the parallelograms below. Show your work



$$\text{Area} = 6 \cdot 4 = \boxed{24 \text{ cm}^2}$$

$$P = 2(5 + 6) = \boxed{22 \text{ cm}}$$



$$A = 9 \cdot 8 = \boxed{72 \text{ in}^2}$$

$$P = 2(9.5) + 2(8) = 19 + 16 = \boxed{35 \text{ in}}$$

7. Cut out two copies of each trapezoid handout and put them together to form a parallelogram.

a. Compute the area of each of the trapezoids. Show your work.

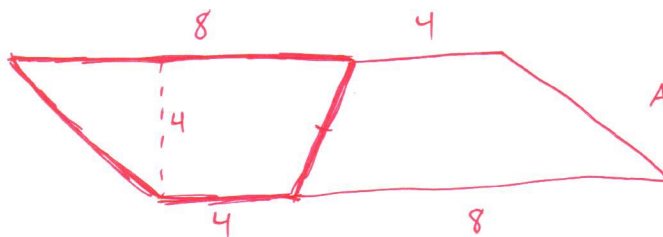
Area of A = 15 sq. units

Area of B = 37.5 sq. units

Area of C = 16 sq. units

b. How do you find the area and perimeter of a trapezoid?

$A = \frac{1}{2}(b_1 + b_2)h$ add all 4 side lengths

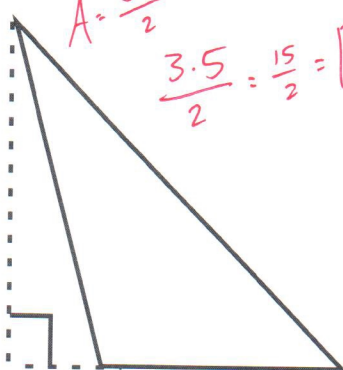


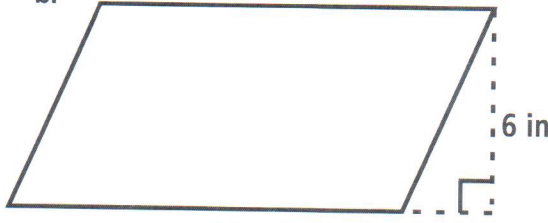
$A = (4)(12) = 48$ is the area of 2 trapezoids

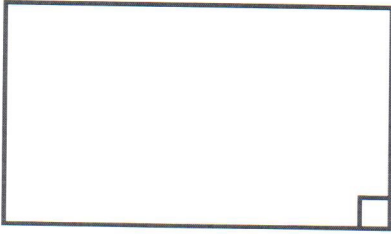
$$A = \frac{1}{2}(8+4)4 = 24 \text{ (area of one trapezoid)}$$

PRACTICE EXERCISES

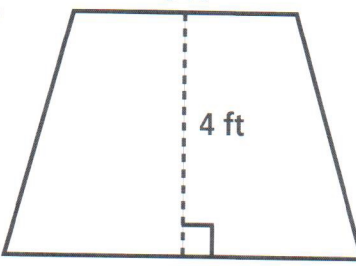
Find the area of the following polygons.

a.  $A = \frac{b \cdot h}{2} = \frac{3 \cdot 5}{2} = \frac{15}{2} = 7.5 \text{ cm}^2$

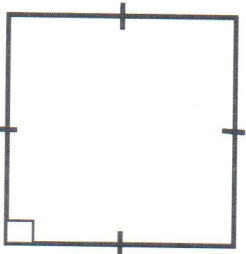
b.  $A = b \cdot h = 6 \cdot 8 = 48 \text{ in}^2$

c. 

$A = 7 \cdot 10 = 70 \text{ m}^2$

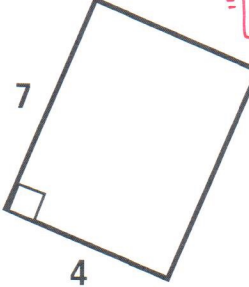
d. 

$A = \frac{1}{2}(b_1 + b_2)h = \frac{1}{2}(8 + 6)4 = 28 \text{ ft}^2$

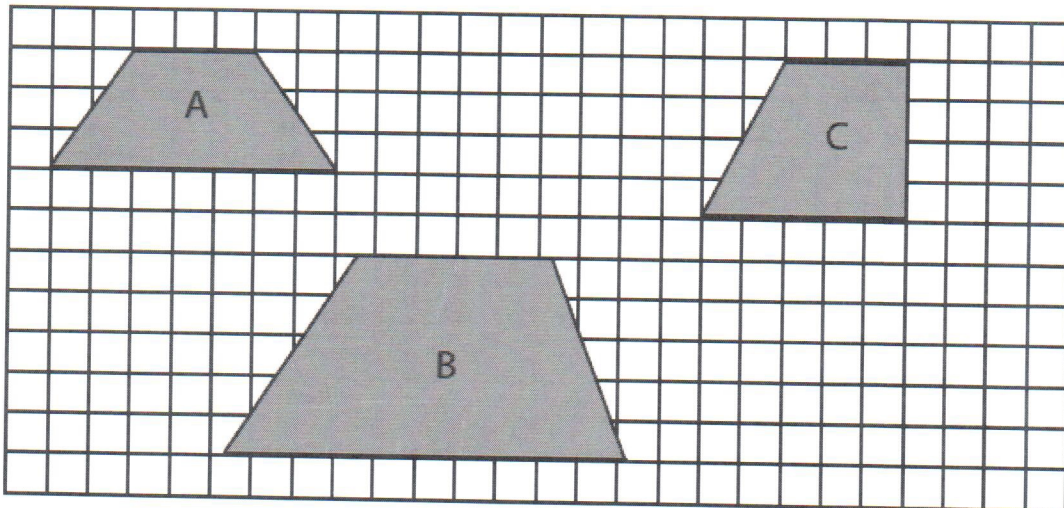
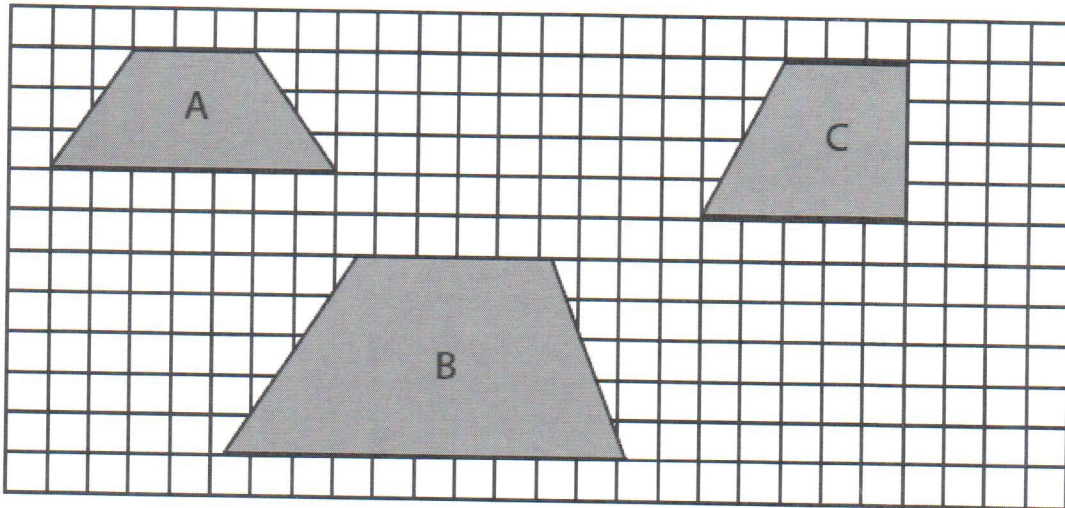
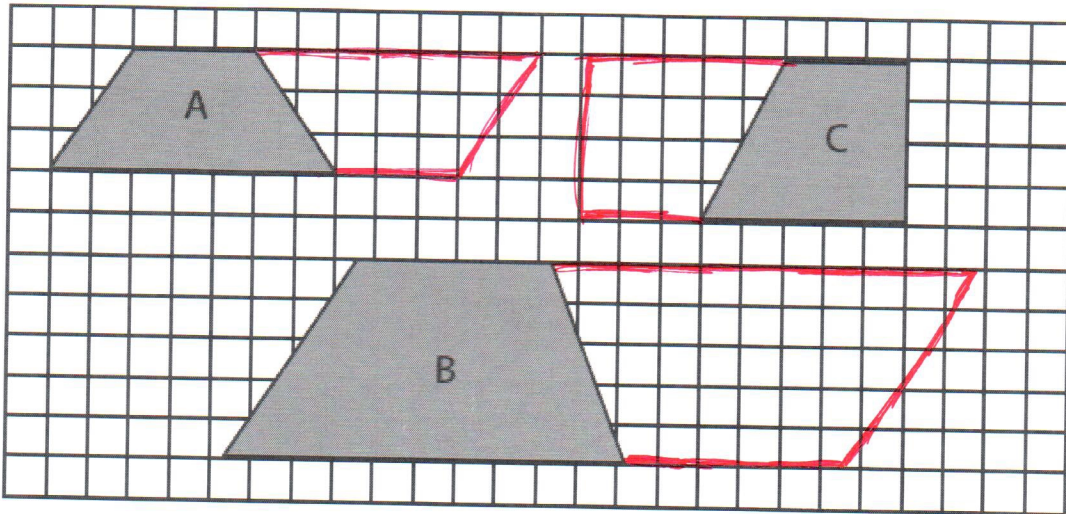
e. 

$A = s^2 = 6^2 = 36 \text{ yd}^2$

↑
because this is a square!

f. 

$A = b \cdot h = 7 \cdot 4 = 28 \text{ units}^2$



SUMMARY (What I learned today)
