

Name: \_\_\_\_\_

Class: \_\_\_\_\_

Date: \_\_\_\_\_

## 5.5 Properties of Parallelogram

### True/False

Indicate whether the statement is true or false.

\_\_\_\_\_ 1. In a parallelogram, the consecutive angles are congruent.

### Multiple Choice

Identify the choice that best completes the statement or answers the question.

*Choose whether each statement is always true, sometimes true, or never true.*

- \_\_\_\_\_ 1. The consecutive angles of a parallelogram are supplementary.
- Always true
  - Sometimes true
  - Never true

### Completion

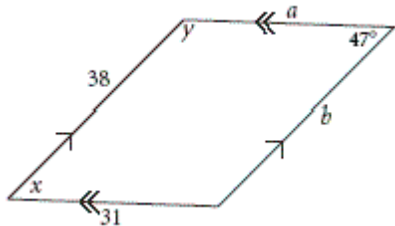
Complete each statement.

- The opposite angles of a parallelogram are \_\_\_\_\_.
- The diagonals of a parallelogram \_\_\_\_\_ each other.

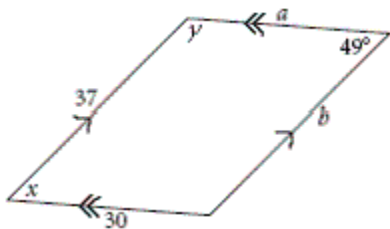
*Name the most general polygon that fits each set of conditions.*

- A quadrilateral with opposite angles congruent: \_\_\_\_\_

4.  $x =$  \_\_\_\_\_<sup>o</sup>  
 $y =$  \_\_\_\_\_<sup>o</sup>  
 $a =$  \_\_\_\_\_  
 $b =$  \_\_\_\_\_



5.  $x =$  \_\_\_\_\_<sup>o</sup>  
 $y =$  \_\_\_\_\_<sup>o</sup>  
 $a =$  \_\_\_\_\_  
 $b =$  \_\_\_\_\_



**An Extra Credit Essay Question (\*to be done on separate piece of paper)**

1. Consider these points:  $A(1, 4)$ ,  $B(2, 12)$ ,  $C(9, 8)$ .
  - a. **On a graph paper**, graph the points. Add a fourth point  $D$  so that points  $A$ ,  $B$ ,  $C$ , and  $D$  are the vertices of a particular type of quadrilateral (can be a kite, trapezoid or parallelogram). Name the quadrilateral and use algebra to verify one of the properties of that type of quadrilateral. Show all your work.
  - b. Find the coordinates of the point where the diagonals of quadrilateral  $ABCD$  intersect. Show all your work.

***For Every Quadrilateral you solve/ show you will get a 100 pts extra credit***

## 5.5 Properties of Parallelogram

### Answer Section

#### TRUE/FALSE

1. ANS: F                      PTS: 1                      DIF: Easy                      REF: Lesson 5.5  
 OBJ: Discover properties of parallelograms                      NAT: G.CO.11  
 TOP: Properties of Parallelograms  
 KEY: parallelogram | definition | consecutive angles | congruent

#### MULTIPLE CHOICE

1. ANS: A                      PTS: 1                      DIF: Easy                      REF: Lesson 5.5  
 OBJ: Discover properties of parallelograms                      NAT: G.CO.11  
 TOP: Properties of Parallelograms                      KEY: parallelogram | consecutive angles

#### COMPLETION

1. ANS: congruent

PTS: 1                      DIF: Easy                      REF: Lesson 5.5  
 OBJ: Discover properties of parallelograms                      NAT: G.CO.11  
 TOP: Properties of Parallelograms                      KEY: parallelogram | opposite angles

2. ANS: bisect

PTS: 1                      DIF: Easy                      REF: Lesson 5.5  
 OBJ: Discover properties of parallelograms                      NAT: G.CO.11  
 TOP: Properties of Parallelograms                      KEY: parallelogram | diagonals

3. ANS: Parallelogram

PTS: 1                      DIF: Moderate                      REF: Lesson 5.5  
 OBJ: Discover properties of parallelograms                      NAT: G.CO.11  
 TOP: Properties of Parallelograms  
 KEY: parallelogram | properties | congruent | opposite angles

4. ANS: 47, 133, 31, 38

PTS: 1            DIF: Moderate    REF: Lesson 5.5

OBJ: Discover properties of parallelograms            NAT: G.CO.11

TOP: Properties of Parallelograms    KEY: parallelograms

5. ANS: 49, 131, 30, 37

PTS: 1            DIF: Moderate    REF: Lesson 5.5

OBJ: Discover properties of parallelograms            NAT: G.CO.11

TOP: Properties of Parallelograms    KEY: parallelograms

## ESSAY

1. ANS:

**5 Points**

a. Point  $D$ , along with  $A$ ,  $B$ , and  $C$ , forms a kite, trapezoid, or rhombus, and the quadrilateral is correctly identified. (Student may refer to the rhombus as a parallelogram.) To form a rhombus, point  $D$  must be  $(8, 0)$ . For a kite, the point should satisfy  $y = -2x + 16$ . For a trapezoid, the point should satisfy either  $y = -\frac{4}{7}x + \frac{32}{7}$  or  $y = 8x - 64$ . Student correctly verifies one of the following properties.

$\Sigma$  For a kite, student verifies that the diagonals are perpendicular or (if he or she remembers the distance formula from algebra) that the quadrilateral has two distinct pairs of congruent consecutive sides.

$\Sigma$  For a rhombus, student verifies one of the following properties: Both pairs of opposite sides are parallel, the diagonals are perpendicular, all four sides are congruent, or the diagonals bisect each other. (Verifying the last two properties requires using the distance formula.)

$\Sigma$  For a trapezoid, student verifies that exactly one pair of opposite sides are parallel.

b. Intersection point is correct. Work shows that student found equations for the two diagonals and then solved the system of equations. Here is the answer for the rhombus:

$$\text{Equation of diagonal } \overline{AC}: y = 0.5x + 3.5$$

$$\text{Equation of diagonal } \overline{BD}: y = -2x + 16$$

To find  $x$ , set equations equal to each other:

$$-2x + 16 = 0.5x + 3.5$$

$$12.5 = 2.5x$$

$$x = 5$$

To find  $y$ , substitute 5 for  $x$  in one of the original equations:

$$y = -2(5) + 16$$

$$y = 6$$

The diagonals intersect at point  $(5, 6)$ .

**3 Points**

- a. Point  $D$ , along with  $A$ ,  $B$ , and  $C$ , forms a kite, trapezoid, or rhombus, and the quadrilateral is correctly identified. (Students may refer to the rhombus as a parallelogram.) Work shows that the method for verifying the chosen property is correct but includes algebraic errors.
- b. Work shows that student attempted to find the equations of the diagonals and solve the resulting system of equations, but answer is incorrect due to algebraic errors.

**1 Point**

Answers are attempted but work includes significant errors.

PTS: 5

DIF: Challenging

REF: Lesson 5.3 | Lesson 5.5 | Lesson 5.6

OBJ: Discover properties of kites and trapezoids | Discover properties of parallelograms | Discover properties of rectangles, rhombuses, and squares

NAT: G.CO.11

TOP: Properties of Kites, Trapezoids, Parallelograms, and Special Parallelograms

KEY: quadrilateral | properties