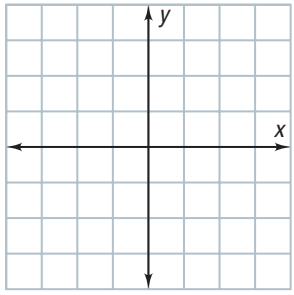
6-7 Polygons in the Coordinate Plane

Vocabulary

Review

1. Draw a line from each item in Column A to the corresponding part of the *coordinate plane* in Column B.

Column A	Column B
origin	
Quadrant I	
Quadrant II	
Quadrant III	
Quadrant IV	
x-axis	
y-axis	



Vocabulary Builder

classify (verb) KLAS uh fy

Definition: To **classify** is to organize by category or type.

Math Usage: You can **classify** figures by their properties.

Related Words: classification (noun), classified (adjective)

Example: Rectangles, squares, and rhombuses are **classified** as parallelograms.

Use Your Vocabulary

Complete each statement with the correct word from the list. Use each word only once.

classification classified classify

2. Trapezoids are _?_ as quadrilaterals. _____

3. Taxonomy is a system of _?_ in biology. _____

4. Schools _?_ children by age. _____

take note

Key Concept Formulas on the Coordinate Plane

	Distance Formula	Midpoint Formula	Slope Formula
Formula	$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$	$m = \frac{y_2 - y_1}{x_2 - x_1}$
When to Use It	To determine whether • sides are congruent • diagonals are congruent	To determine • the coordinates of the midpoint of a side • whether diagonals bisect each other	To determine whether • opposite sides are parallel • diagonals are perpendicular • sides are perpendicular

Decide when to use each formula. Write D for *Distance Formula*, M for *Midpoint Formula*, or S for *Slope Formula*.

____ **5.** You want to know whether diagonals bisect each other.

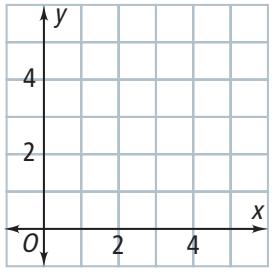
____ **6.** You want to find whether opposite sides of a quadrilateral are parallel.

____ **7.** You want to know whether sides of a polygon are congruent.

Problem 1 Classifying a Triangle

Got It? **$\triangle DEF$ has vertices $D(0, 0)$, $E(1, 4)$, and $F(5, 2)$. Is $\triangle DEF$ *scalene*, *isosceles*, or *equilateral*?**

8. Graph $\triangle DEF$ on the coordinate plane at the right.



Use the Distance Formula to find the length of each side.

9. $EF = \sqrt{\left(5 - \square\right)^2 + \left(2 - \square\right)^2}$

$= \sqrt{\square + \square}$

$= \sqrt{\square}$

10. $DE = \sqrt{\left(1 - \square\right)^2 + \left(4 - \square\right)^2}$

$= \sqrt{\square + \square}$

$= \sqrt{\square}$

11. $DF = \sqrt{\left(5 - \square\right)^2 + \left(2 - \square\right)^2}$

$= \sqrt{\square + \square}$

$= \sqrt{\square}$

12. What type of triangle is $\triangle DEF$? Explain.

_____

Problem 2 Classifying a Parallelogram

Got It? **$\square MNPQ$ has vertices $M(0, 1)$, $N(-1, 4)$, $P(2, 5)$, and $Q(3, 2)$. Is $\square MNPQ$ a rectangle? Explain.**

13. Find MP and NQ to determine whether the diagonals $\overline{MP}$ and $\overline{NQ}$ are congruent.

$$MP = \sqrt{\left(2 - \square\right)^2 + \left(5 - \square\right)^2}$$
$$= \sqrt{\square + \square}$$
$$= \sqrt{\square}$$

$$NQ = \sqrt{\left(3 - \square\right)^2 + \left(2 - \square\right)^2}$$
$$= \sqrt{\square + \square}$$
$$= \sqrt{\square}$$

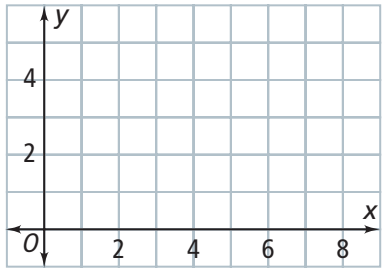
14. Is $\square MNPQ$ a rectangle? Explain.

_____

Problem 3 Classifying a Quadrilateral

Got It? **An isosceles trapezoid has vertices $A(0, 0)$, $B(2, 4)$, $C(6, 4)$, and $D(8, 0)$. What special quadrilateral is formed by connecting the midpoints of the sides of $ABCD$?**

15. Draw the trapezoid on the coordinate plane at the right.



16. Find the coordinates of the midpoints of each side.

$\overline{AB}$

$$\left(\frac{0 + \square}{2}, \frac{0 + \square}{2}\right) = (\square, \square)$$

$\overline{CD}$

$\overline{BC}$

$\overline{AD}$

17. Draw the midpoints on the trapezoid and connect them. Judging by appearance, what type of special quadrilateral did you draw? Circle the most precise answer.

kite parallelogram rhombus trapezoid

18. To verify your answer to Exercise 17, find the slopes of the segments.

connecting midpoints of $\overline{AB}$ and $\overline{BC}$: ____ connecting midpoints of $\overline{BC}$ and $\overline{CD}$: ____

connecting midpoints of $\overline{CD}$ and $\overline{AD}$: ____ connecting midpoints of $\overline{AD}$ and $\overline{AB}$: ____

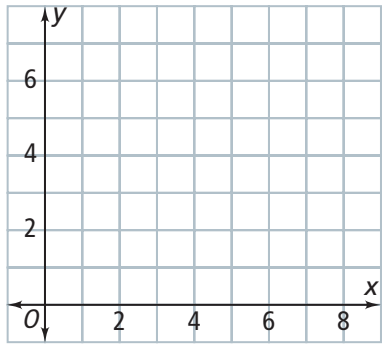
19. Are the slopes of opposite segments equal? Yes / No

20. Are consecutive segments perpendicular? Yes / No

21. The special quadrilateral is a _?_.

Lesson Check • Do you UNDERSTAND?

Error Analysis **A student says that the quadrilateral with vertices $D(1, 2)$, $E(0, 7)$, $F(5, 6)$, and $G(7, 0)$ is a rhombus because its diagonals are perpendicular. What is the student's error?**



22. Draw $DEFG$ on the coordinate plane at the right.

23. Underline the correct words to complete Theorem 6-16.

If the diagonals of a parallelogram / polygon are perpendicular, then the parallelogram / polygon is a rhombus.

24. Check whether $DEFG$ is a parallelogram.

slope of $\overline{DE}$: $\frac{7 - \square}{0 - \square} = \square$ slope of $\overline{FG}$: $\frac{0 - \square}{7 - \square} = \square$

slope of $\overline{DG}$: $\frac{0 - \square}{7 - \square} = \square$ slope of $\overline{EF}$: $\frac{6 - \square}{5 - \square} = \square$

25. Are both pairs of opposite sides parallel? Yes / No

26. Find the slope of diagonal $\overline{DF}$.

27. Find the slope of diagonal $\overline{EG}$.

28. Are the diagonals perpendicular? Yes / No

29. Explain the student's error.

_____

_____

Math Success

Check off the vocabulary words that you understand.

☐ distance ☐ midpoint ☐ slope

Rate how well you can *classify quadrilaterals in the coordinate plane.*

Need to review 0 2 4 6 8 10 Now I get it!