

# X-treme Review



# Math 6

Test Preparation

Authors

**Celestine Marie Milanese and Carolyn Peck**

Editors

**Wayne Garnsey and Paul Stich**



**N&N Publishing Company, Inc.**

18 Montgomery Street, Middletown, New York 10940-5116



Ordering and Information

**1-800-NN 4 TEXT**

Internet: <http://www.nn4text.com>

email: [nn4text@nandnpublishing.com](mailto:nn4text@nandnpublishing.com)

## DEDICATION

This book is dedicated in loving memory of Michael J. Scoba Sr. and Carolina Gonzalez. We know you are both very proud of our accomplishments. We love you and miss you!

## ACKNOWLEDGEMENTS

The authors would like to thank the N&N production crew for their patience and talent in converting our "symbols," and Wayne Garnsey and Paul Stich for their unlimited support.

Thanks to Nana and "El Gitano Discreto" for your encouraging phone calls and e-mails, you are of our biggest fans! To our families thank you for all of your help and support.

And last but not definitely not least, many thanks to our proofreaders and problem solvers.

We thank all of you from the bottom of our hearts.

---

Front Cover: Photo courtesy of Image100 Ltd 2001©

CHELLIE SCOBA MILANESE & CAROLYN GONZALEZ PECK

Teachers: Wappingers Junior High School & Roy C. Ketcham High School  
Wappingers Falls, NY

No part of this book may be reproduced by any mechanical, photographic, or electronic process, nor may it be stored in a retrieval system, transmitted, shared, or otherwise copied for public or private use, without the prior written permission of the publisher.



© Copyright 2007, 3rd Edition Revised 2009

N&N Publishing Company, Inc.

Internet: [www.nn4text.com](http://www.nn4text.com) phone: 1-800-NN 4 TEXT email: [nn4text@nandnpublishing.com](mailto:nn4text@nandnpublishing.com)

SAN # - 216-4221

ISBN # - 0935487-84-0

3 4 5 6 7 8 9 10 BookMart Press 2013 2012 2011 2010 2009

NO PERMISSION HAS BEEN GRANTED BY N&N PUBLISHING COMPANY, INC TO REPRODUCE ANY PART OF THIS BOOK BY ANY MECHANICAL, PHOTOGRAPHIC, OR ELECTRONIC PROCESS.

# TABLE OF CONTENTS



Lesson	Topic	Page
	<i>To the Student</i> . . . . .	6
<b>One</b>	<b>Number Systems</b> . . . . .	<b>7</b>
	Vocabulary . . . . .	7
	Story: <i>The Native American Number System</i> . . . . .	7
1.1	Whole Numbers . . . . .	8
1.2	Properties for Addition and Multiplication . . . . .	9
1.3	Rational Numbers . . . . .	11
1.4	Rational Numbers on a Number Line . . . . .	8
	Test Prep . . . . .	15
<b>Two</b>	<b>Ratios, Rates, Proportions, and Percents</b> . . . . .	<b>17</b>
	Vocabulary . . . . .	17
	Story: <i>So, What is the Real Price?</i> . . . . .	17
2.1	Ratios and Rates . . . . .	18
2.2	Equivalent Ratios . . . . .	19
2.3	Proportions . . . . .	20
2.4	Similar Figures . . . . .	22
2.5	Percent . . . . .	27
2.6	Changing Percents to Fractions and Decimals . . . . .	28
2.7	Calculating Percents . . . . .	29
	Test Prep . . . . .	32
<b>Three</b>	<b>Operations</b> . . . . .	<b>35</b>
	Vocabulary . . . . .	35
	Story: <i>A New Art</i> . . . . .	35
3.1	Fractions and Mixed Numbers . . . . .	36
3.2	Add and Subtract Fractions and Mixed Numbers . . . . .	37
3.3	Multiply and Divide Fractions and Mixed Numbers . . . . .	40
3.4	Exponents . . . . .	42
3.5	Order of Operations . . . . .	43
	Test Prep . . . . .	44

<b>Four</b>	<b><i>Algebra</i></b>	<b>49</b>
	Vocabulary	49
	Story: <i>Learning to Speak a New Language</i>	49
4.1	Verbal Expressions into Algebraic Expressions	50
4.2	Evaluating Algebraic Expressions	51
4.3	Evaluating Formulas	52
4.4	Solving One-step Equations	53
	Test Prep	55
<b>Five</b>	<b><i>Coordinate Geometry</i></b>	<b>59</b>
	Vocabulary	59
	Story: <i>Plotting the Course of a Hurricane</i>	59
5.1	Coordinate Geometry	60
5.2	Polygons	62
5.3	Perimeter	63
	Test Prep	65
<b>Six</b>	<b><i>Area and Volume</i></b>	<b>69</b>
	Vocabulary	69
	Story: <i>What Makes a Strong Bridge?</i>	69
6.1	Area	70
6.2	Regular and Irregular Polygons	73
6.3	Volume	76
	Test Prep	77
<b>Seven</b>	<b><i>Circle Geometry</i></b>	<b>81</b>
	Vocabulary	81
	Story: <i>It's a Wonder</i>	81
7.1	Circles	82
7.2	Circumference and Area	84
7.3	Area of Sectors	85
	Test Prep	87
<b>Eight</b>	<b><i>Measurement</i></b>	<b>91</b>
	Vocabulary	91
	Story: <i>Don't Try This at Home</i>	91
8.1	Metric Units of Capacity	92
8.2	Customary Units of Capacity	93
8.3	Measurement and Precision of Capacity	95
8.4	Volume of a Rectangular Prism	95
	Test Prep	96

<b>Nine</b>	<b><i>Statistics and Probability</i></b> . . . . .	<b>99</b>
	Vocabulary . . . . .	99
	Story: <i>How Many People are Here?</i> . . . . .	99
9.1	Probability . . . . .	100
9.2	Mean, Median, Mode, and Range. . . . .	101
9.3	Reading and Interpreting Graphs. . . . .	103
9.4	Predictions Made from Data. . . . .	105
	Test Prep . . . . .	106
<b>Ten</b>	<b><i>Estimation</i></b> . . . . .	<b>111</b>
	Vocabulary . . . . .	111
	Story: <i>Are We There Yet?</i> . . . . .	111
10.1	Estimation Strategies . . . . .	112
10.2	Estimating Percents. . . . .	114
10.3	Measurement Estimation. . . . .	115
10.4	Estimate Volume, Area, and Circumference . . . . .	116
	Test Prep . . . . .	120
<b>Appendices</b>	. . . . .	<b>123</b>
	Math Symbols & References . . . . .	123-124
	Sample Test One . . . . .	125-136
	Sample Test Two . . . . .	137-146
<b>Glossary and Index</b>	. . . . .	<b>147-152</b>

# LESSON FIVE

# COORDINATE GEOMETRY



## Vocabulary

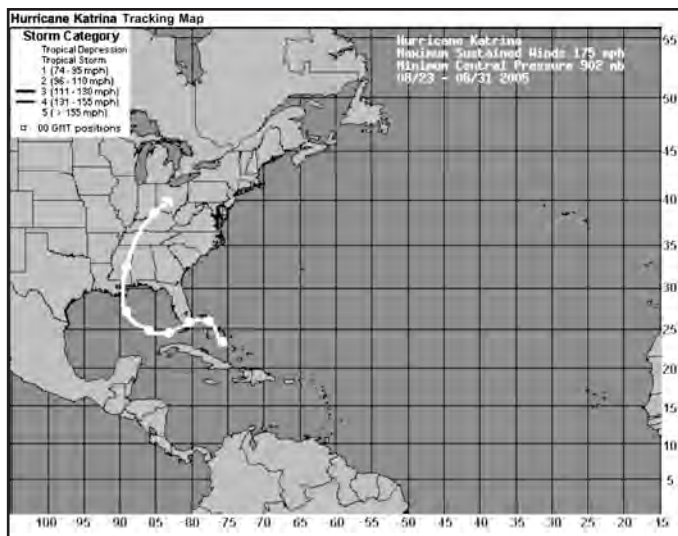
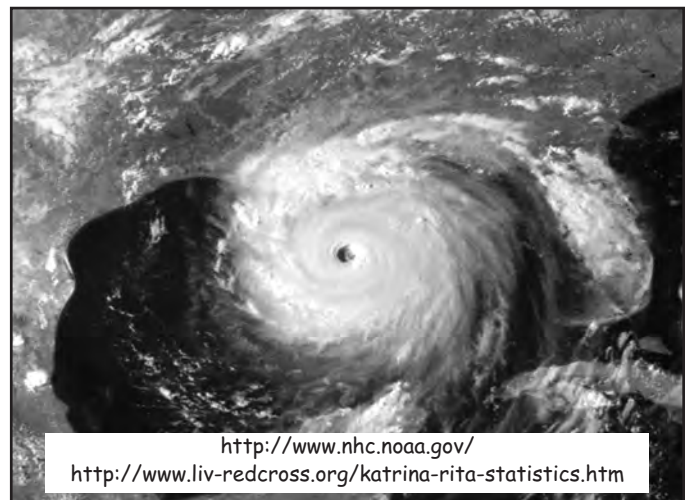
These words and phrases are associated with *Coordinate Geometry* and may be used when answering questions in this chapter. Definitions can be found in the *Glossary/Index* at the back of this *X-treme Review*.

coordinate geometry	plot	quadrilateral	triangle
coordinate plane	point	rectangle	vertex and vertices
ordered pair	parallelogram	rhombus	x-axis
origin	geometric shape	square	x-y coordinate plane
perimeter	quadrant	trapezoid	y-axis

## Plotting the Course of a Hurricane.

Hurricane Katrina (satellite photo) was one of the most costly, severe storms to hit the mainland of the United States, especially the Gulf Coast from Pensicola, FL to New Orleans, LA. Fortunately, using satellites, radar, and even reconnaissance aircraft, the National Hurricane Center can plot the course (track) of a hurricane. Also, scientists can predict when and where it will "hit" land, how strong it will be, and when it will get to that location.

This grid shows the track of Hurricane Katrina, using coordinate geometry.



In this lesson you will review working in Quadrant I of the coordinate system. You will also review using the coordinate plane to create and classify polygons, as well as to calculate their perimeter and area.

### American Red Cross Katrina Facts

- Red Cross relief exceeded \$2 billion in contributions.
- 1.2 million families needed financial assistance.
- More than 3.7 million victims survived Hurricane Katrina.
- More than 219,500 Red Cross disaster relief workers from all 50 states responded to their neighbors in need.
- More than 27.4 million hurricane survivors received hot meals and 25.2 million snacks.
- More than 3.42 million stayed overnight in nearly 1,100 shelters across 27 states and the District of Columbia.

# LESSON 5: COORDINATE GEOMETRY

## 5.1 COORDINATE GEOMETRY

(1) \_\_\_\_\_ is the study of geometry using a coordinate plane.

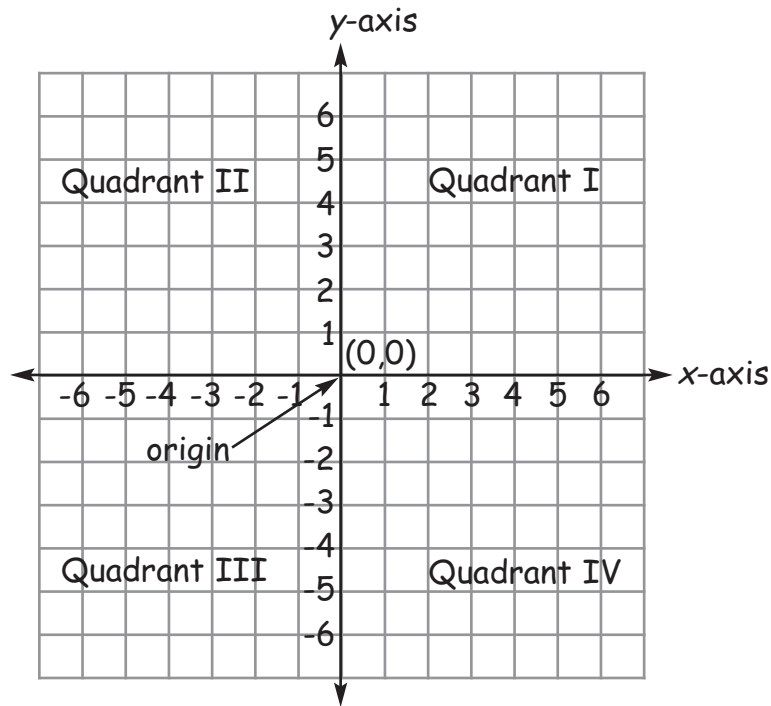
The (2) \_\_\_\_\_ is a plane containing a set of coordinate axes.

The (3) \_\_\_\_\_ is the horizontal number line. The

(4) \_\_\_\_\_ is the vertical number line.

The point at which both number lines intersect is called the (5) \_\_\_\_\_.

The intersection of the number lines divide the plane into four (6) \_\_\_\_\_.



An (7) \_\_\_\_\_ gives the coordinates and location of a point.



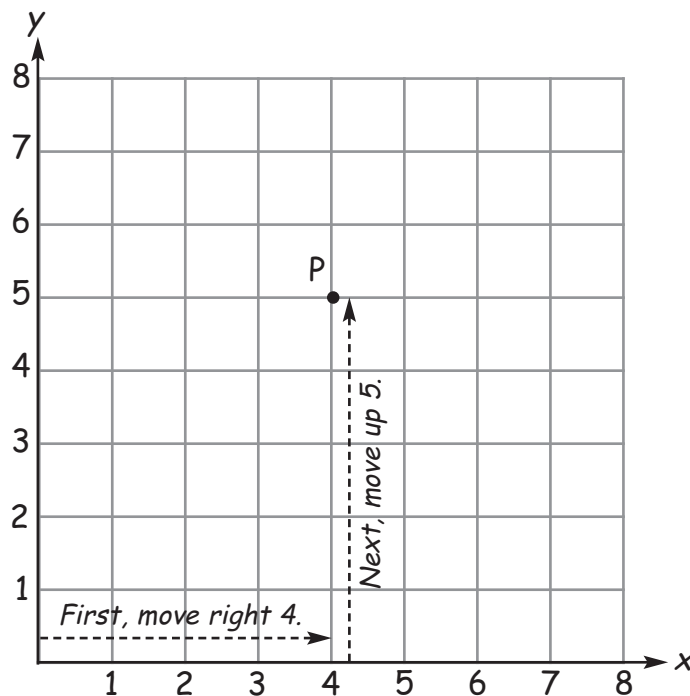
$(x, y)$

The  $x$ -coordinate tells how far to the left or right of the origin the point is located.

The  $y$ -coordinate tells how far up or down the point is located.

**Example:** Graph the point P(4,5)

- 1 Start at the origin.
- 2 Move 4 places to the right.
- 3 Move 5 places up the grid.



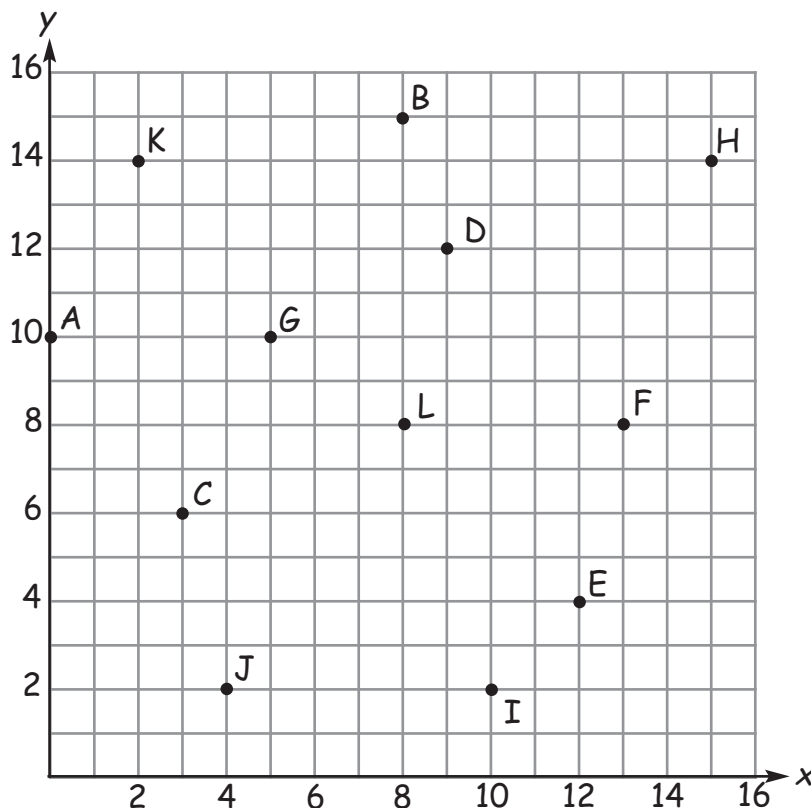
## PRACTICE

**Directions:** Use the graph of Quadrant I below to give the coordinates of each point.

- 1 A - (\_\_\_\_, \_\_\_\_)
- 2 B - (\_\_\_\_, \_\_\_\_)
- 3 C - (\_\_\_\_, \_\_\_\_)
- 4 D - (\_\_\_\_, \_\_\_\_)
- 5 E - (\_\_\_\_, \_\_\_\_)
- 6 F - (\_\_\_\_, \_\_\_\_)

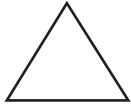
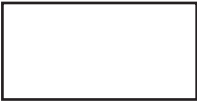
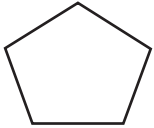
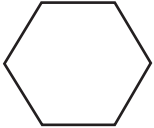
**Directions:** Name the point with the given coordinates using the same graph as used in 1 - 6.

- 7 (4, 2) \_\_\_\_\_
- 8 (15, 14) \_\_\_\_\_
- 9 (8, 8) \_\_\_\_\_
- 10 (5, 10) \_\_\_\_\_
- 11 (10, 2) \_\_\_\_\_
- 12 (2, 14) \_\_\_\_\_



## 5.2 POLYGONS

A (1) \_\_\_\_\_ is any regular or irregular polygon, circle, or combination of geometric figures. Polygons can be classified by their sides and angles.




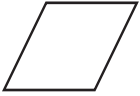

Name of Polygon	Picture	Number of Sides	Number of Angles
Triangle		3	3
Quadrilateral		4	4
Pentagon		5	5
Hexagon		6	6



**Remember:** Some quadrilaterals have specific classifications.

### PRACTICE

**Directions:** Using the definition and picture, name each quadrilateral.

Name of Quadrilateral	Definition	Picture
1 _____	It is a rectangle with two adjacent sides congruent (all four sides are congruent).	
2 _____	It is a quadrilateral with four right angles.	
3 _____	It is a quadrilateral with two pairs of parallel sides.	
4 _____	It is a parallelogram with two adjacent sides congruent (all four sides are congruent).	
5 _____	It is a quadrilateral with exactly one pair of parallel sides.	

**Example:** Classify the following Polygon in as many ways possible.



This polygon is a **quadrilateral**, because it has four sides. It is also called a **trapezoid**, because it has exactly one pair of parallel sides. It has 4 vertices (in this case, corners) where the sides meet.

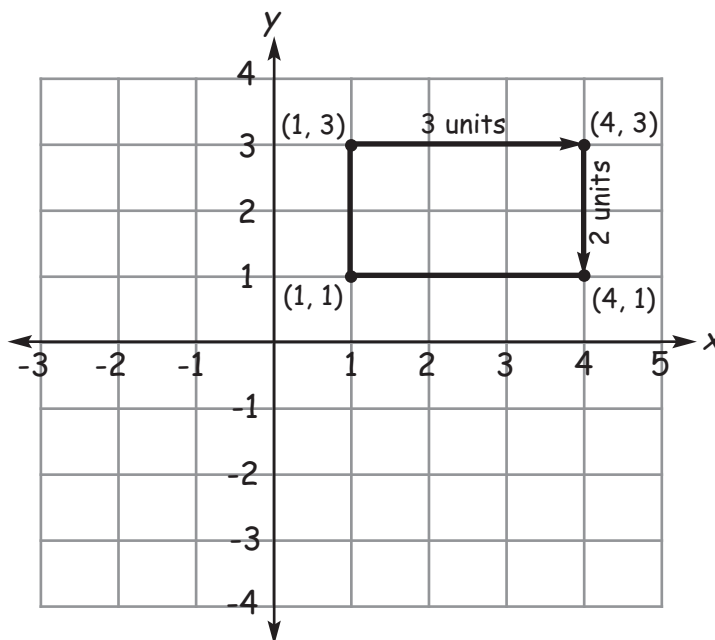
## 5.3 PERIMETER

(1) \_\_\_\_\_ is the distance around the outside of a polygon.



**Remember:** When looking for the perimeter of a polygon that is on a coordinate plane, count the number of units to find the lengths of each side.

**Example:** Graph the following points in Quadrant I of the coordinate plane: (1, 1), (4, 3), (4, 3), and (4, 1). Connect the points in order and connect the last point to the first point. Find the perimeter of the figure drawn.



**Problem:** To find the perimeter ( $P$ ) of the rectangle formed, you need to know the length ( $l$ ) and width ( $w$ ).

$$P = 2l + 2w$$

**Solution:** Since horizontal lines have the same  $y$ -coordinates, count the number of units between (1, 3) and (4, 3). There are 3 units in this case.

Since vertical lines have the same  $x$ -coordinates, count the number of units between  $(4, 3)$  and  $(4, 1)$ . In this case, there are 2 units.

So,  $P = 2l + 2w$        $\longrightarrow$       Write the formula.  
 $P = 2 \cdot 3 + 2 \cdot 2$        $\longrightarrow$       Substitute the values you determined.  
 $P = 6 + 4$        $\longrightarrow$       Simplify.  
 $P = 10$  units       $\longrightarrow$       Perimeter.

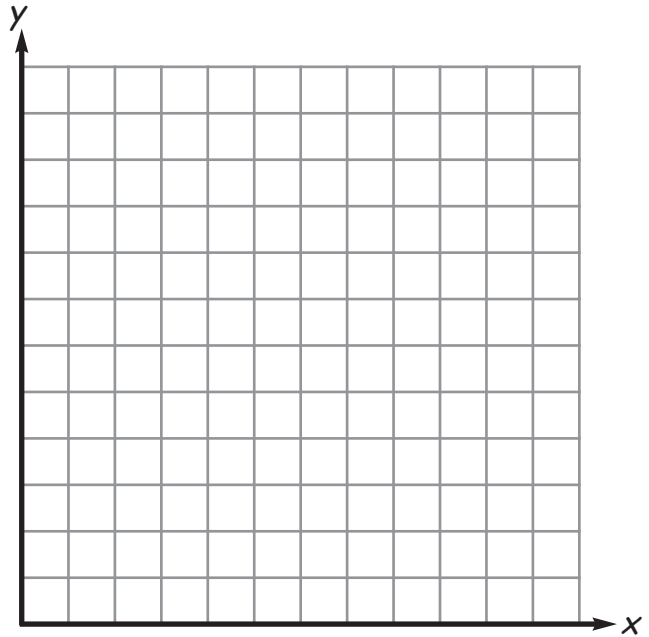
## PRACTICE

**Directions:** Graph the points and connect them with straight lines forming a polygon. Identify the polygon and find the perimeter.

1  $(5, 7), (5, 2), (11, 7), (11, 2)$

Polygon: \_\_\_\_\_

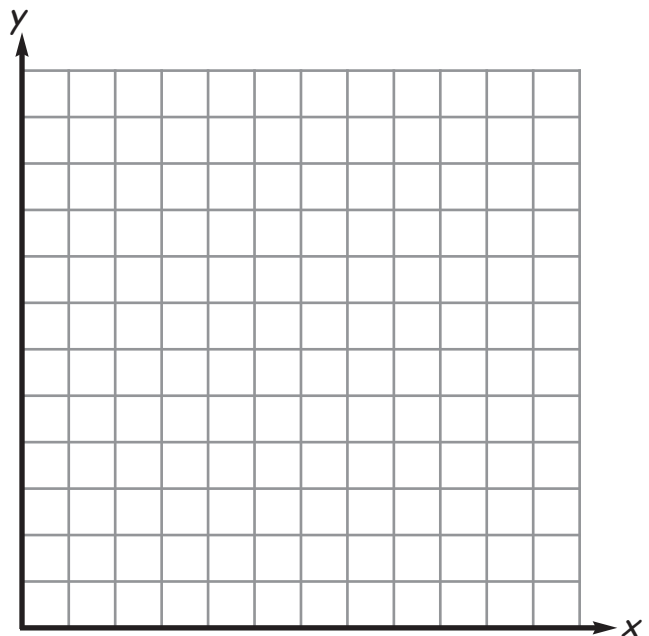
Perimeter: \_\_\_\_\_ units



2  $(8, 3), (2, 3), (2, 7), (8, 7)$

Polygon: \_\_\_\_\_

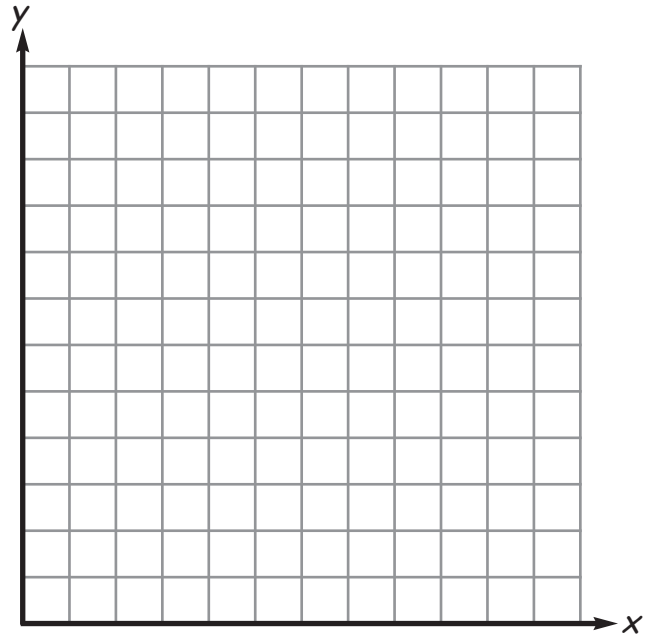
Perimeter: \_\_\_\_\_ units



3 (3, 3), (10, 3), (3, 10), (10, 10)

Polygon: \_\_\_\_\_

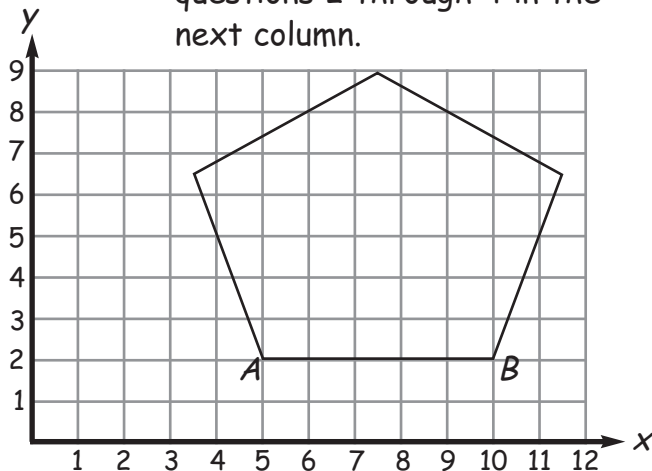
Perimeter: \_\_\_\_\_ units



## TEST PREP

- 1 What are the coordinates of a point in the coordinate plane that is 3 units to the right of the origin and 4 units up?
- A (4, 3)
  - B (3, 3)
  - C (3, 4)
  - D (4, 4)

Directions: Use the graph below to answer questions 2 through 4 in the next column.



- 2 Identify the polygon graphed above.
- A triangle
  - B quadrilateral
  - C pentagon
  - D hexagon
- 3 What are the coordinates for point *B*?
- A (2, 5)
  - B (2, 10)
  - C (5, 2)
  - D (10, 2)
- 4 What is the length of side *AB*.
- A 2 units
  - B 8 units
  - C 5 units
  - D 10 units
- 5 Anthony graphed these points: (4, 2), (4, 5), and (6, 2). Which point must be graphed to complete a rectangle
- A (4, 6)
  - B (4, 5)
  - C (6, 4)
  - D (6, 5)

6 What kind of polygon is formed when these points are graphed and connected in order?

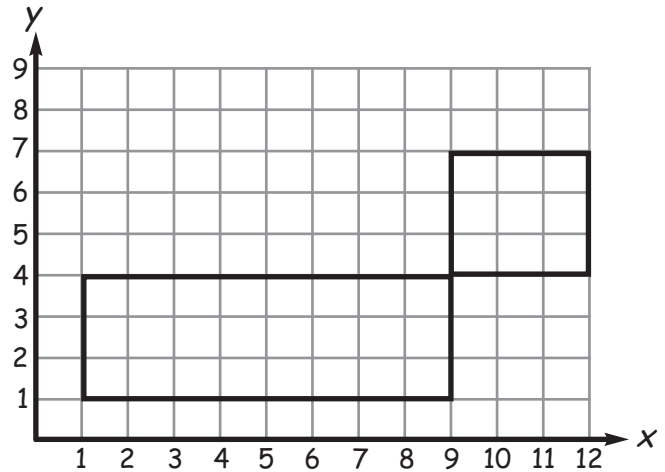
(2, 1), (7, 1), (5, 5)

- A triangle
- B quadrilateral
- C pentagon
- D hexagon

7 The  $x$  and  $y$ -axes divide the coordinate plane into \_\_\_\_\_

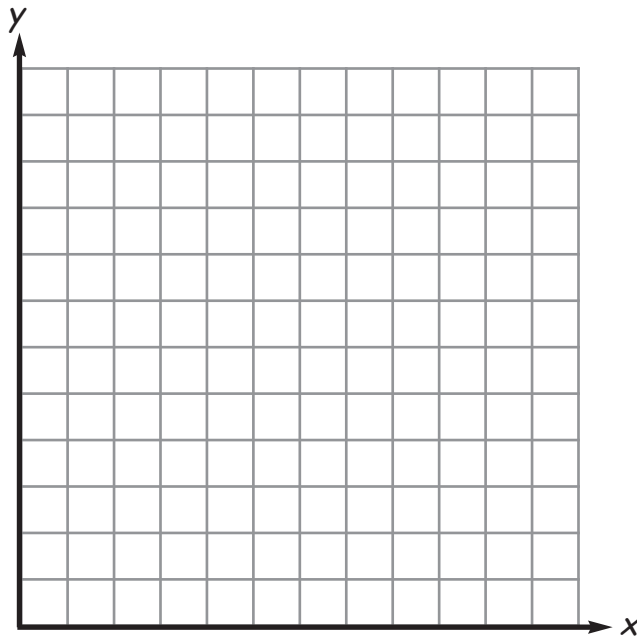
- A one quadrant
- B three quadrants
- C two quadrants
- D four quadrants

8 What is the total perimeter, of the two rectangles below? (in units)



- A 34 units
- B 22 units
- C 16 units
- D 12 units

9 Part A: Graph points A(4, 3), B(9, 3), C(9, 10), and D(4, 10).



Part B: What type of quadrilateral is formed? \_\_\_\_\_

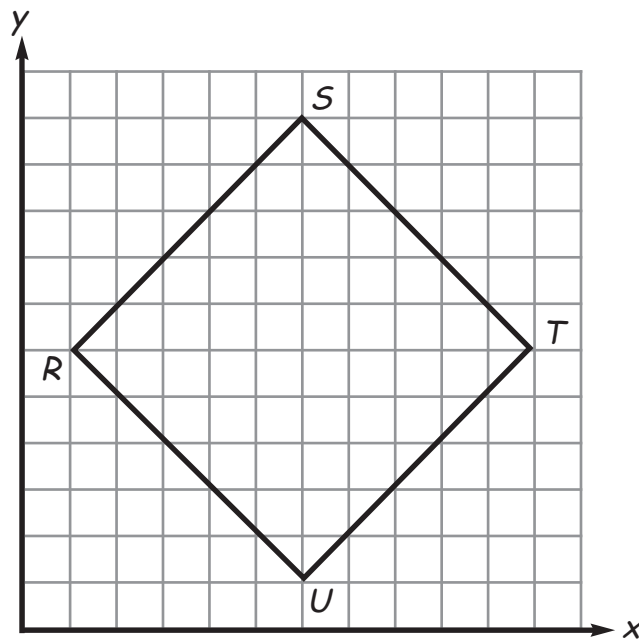
9 (continued)

Part C: Find the perimeter of ABCD.

Show your work.

Answer \_\_\_\_\_

10 Classify the polygon graphed below, and identify the coordinates of each the vertices.



Classification: \_\_\_\_\_

R coordinates: \_\_\_\_\_

S coordinates: \_\_\_\_\_

T coordinates: \_\_\_\_\_

U coordinates: \_\_\_\_\_