Name_____   Period _____   Date _____

8-4 ESSENTIAL SKILLS
NAME THAT SHAPE!

Graph each set of ordered pairs and connect them to form polygons.

1.   (2.5, 1), (2.5, 5),
        (6.5, 5), (6.5, 1)

        polygon: _____

        in quadrant _____

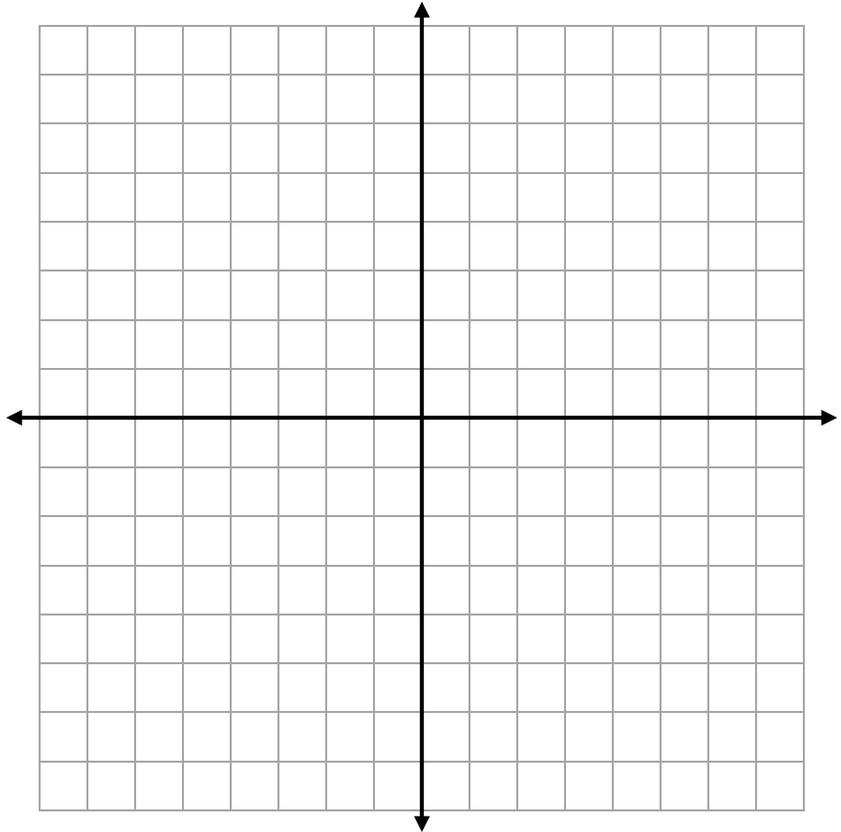2.   (-3, 3), (-7, 3), (-8, 6),
        (-5, 8), (-2, 6)

        polygon: _____

        in quadrant _____

3.   (-4, -3$\frac{1}{2}$), (-7, -7$\frac{1}{2}$), (-1, -7$\frac{1}{2}$)

        polygon: _____

        in quadrant _____

4. Construct a right trapezoid in quadrant IV.
    Draw points on the four vertices and list them as ordered pairs below.

Name_____   Period _____   Date _____

8-4 ESSENTIAL SKILLS
BATTLING SHIPS

The Setup:
Each player uses two coordinate grids. Label both axes from -5 to 5. One grid is labeled "my tries" and the other "my ships."

Each player decides where to place three rectangular ships on the Self grid: a **B**attleship (5 units × 1 unit), a **C**ruiser (3 units × 1 unit), and a **D**estroyer (2 units × 1 unit) so that edges and corners are on the grid lines. All ships must be placed either horizontally or vertically, and therefore all ordered pairs for vertices will have integer coordinates. Two ships may be adjacent to each other (may share part or all of a side), but they cannot overlap. Label the ships by the first letters of their names, B, C, and D.

The Game:
Players take turns calling out one ordered pair of integers at a time. If a player calls an ordered pair where an edge or corner of a ship is located, the opponent says "hit" and the player gets another turn. If no ship is located at the ordered pair, the opponent says "miss," and players change roles.

Players mark the "my ships" grid with shots taken by their opponent. Players should take care to record their hits and misses on their "my tries" grid so that they do not call an ordered pair more than once.

A ship is sunk when all of its corner and edge points have been hit. When this happens, the player whose ship was sunk says, "You sank my _____."

You win by sinking all of your opponent's ships. If time is called, the player who has sunk more of the opponent ships wins. If tied, the winner is the one who scored the most hits. Make sure to exchange grids afterwards to check that both players marked coordinates correctly.

my ships

my tries

Name_____ Period _____ Date _____
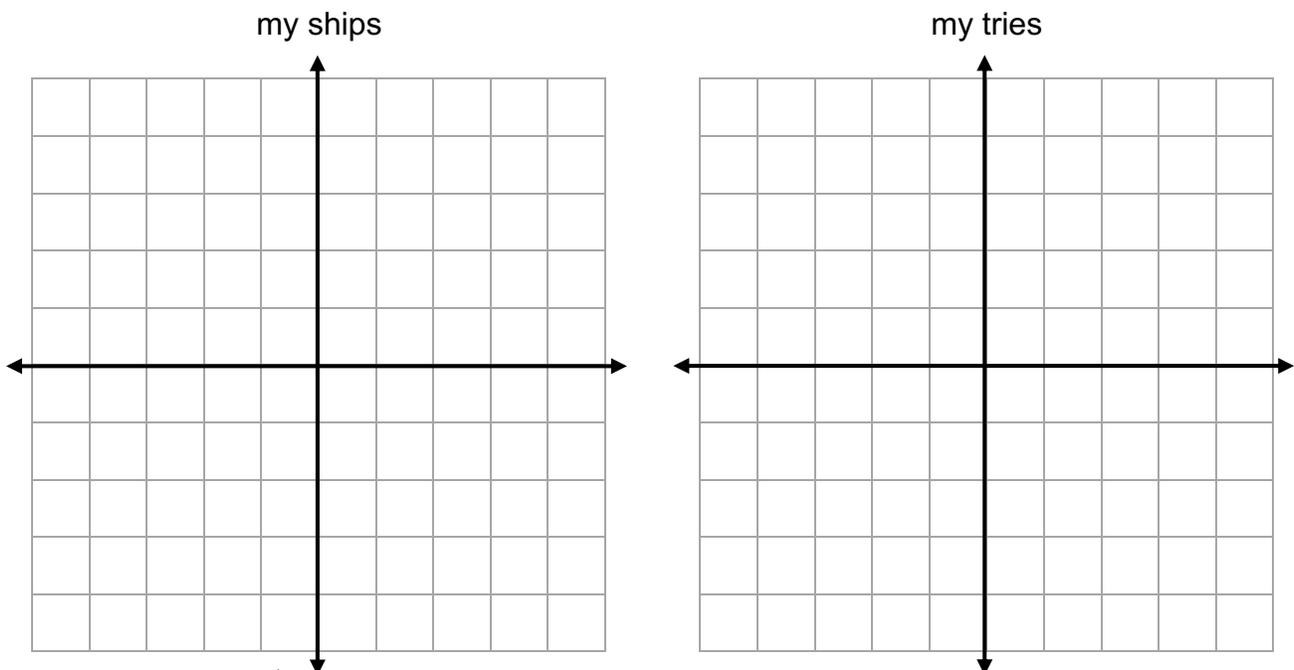
8-4 ESSENTIAL SKILLS
INPUT-OUTPUT TABLES

An input-output rule explains what operation(s) can be performed on an input value to arrive at the corresponding output value.

Study the arithmetic used in each step, complete steps 4 and 5, and explain each number pattern in words.

1. Number Pattern A

Step 1	Step 2	Step 3	Step 4	Step 5
1 + 4 = 5	2 + 4 = _____	3 + 4 = _____	_____ + 4 = _____	
Input-output rule: To get each result, add _____ to…				

2. Number Pattern B

Step 1	Step 2	Step 3	Step 4	Step 5
1 • 4 + 6 = _____	2 • 4 + 6 = _____	3 • 4 + 6 = _____	_____ + 6 = _____	
Input-output rule:				

3. Number Pattern C

Step 1	Step 2	Step 3	Step 4	Step 5
1 • 3 – 3 = _____	2 • 3 – 3 = _____	3 • 3 – 3 = _____		
Input-output rule:				

Name_____ Period _____ Date _____

8-4 ESSENTIAL SKILLS
TOOTHPICK PATTERNS

An input-output rule explains what operation(s) can be performed on an input value to arrive at the corresponding output value.

Continue each pattern and complete the table.

1. Step #	Step 1	Step 2	Step 3	Step 4 (build, then sketch below)
Pattern	◁|	◁|▯	◁|▯ ▯	
Number of toothpicks	———	———	———	———
Input-output rule:			
How many toothpicks are in Step 100?			

2. Step #	Step 1	Step 2	Step 3	Step 4 (build, then sketch below)
Pattern	|▯	|▯|▯	|▯|▯|▯	
Number of toothpicks	———	———	———	———
Input-output rule:			
How many toothpicks are in Step 100?			

3. Step #	Step 1	Step 2	Step 3	Step 4 (build, then sketch below)
Pattern			◁|	�><|	
Number of toothpicks	———	———	———	———
Input-output rule:			
How many toothpicks are in Step 100?			

Name_____   Period _____   Date _____

8-4 ESSENTIAL SKILLS
INPUT OUTPUT RULES

An input-output rule explains what operation(s) can be performed on an input value to arrive at the corresponding output value.

Each table has (*x*, *y*) values that follow a pattern. Determine missing input and output values based on the patterns you notice. Describe the pattern using an input-output rule with words or symbols.

Pattern A	
Input Value (*x*)	Output Value (*y*)
1	-4
2	-3
3	-2
4	-1
10	
	-7
Input-output rule:	

Pattern B	
Input Value (*x*)	Output Value (*y*)
0	1
1	3
2	5
3	7
-4	
	23
Input-output rule:	

Pattern C	
Input Value (*x*)	Output Value (*y*)
0	0
2	10
4	20
6	30
-6	
	-10
Input-output rule:	

Pattern D	
Input Value (*x*)	Output Value (*y*)
2	1
-4	-2
5	2.5
7	3.5
-9	
	-8
Input-output rule:	

Name_____ Period _____ Date _____

8-4 ESSENTIAL SKILLS
FOUR IN A ROW: EVALUATING EXPRESSIONS

Players: 2+

Objective: Be the first player to claim 4 spaces in a row, column, or diagonal to win the game.

Materials: Board game, 2 sets of colored counters (for the game board), 2 objects (e.g. cubes, paperclips, cut up paper) that will cover expressions in Box A and values in Box B.

Rules: Two players alternate evaluating expressions by choosing an expression from Box A and a quantity to substitute in for *x* from Box B. Players check the value and, if successful, place their colored counter on a space with the appropriate value.

BOX A: EXPRESSION		
$3x - 4$	$x^2 + 2$	$-2(x - 1)$
$x^3 - 2x$	$-5x + 4$	$2x^2 - 2$

BOX B: *x*-VALUE		
-4	2	-2
1	4	-3

GAME BOARD: EVALUATING EXPRESSIONS (SUBSTITUTE B INTO A)					
-6	-2	-1	8	6	-10
-13	19	11	-56	-1	16
30	-4	18	2	6	3
-16	6	0	-1	18	8
-6	-21	10	56	30	0
6	14	24	6	-16	4