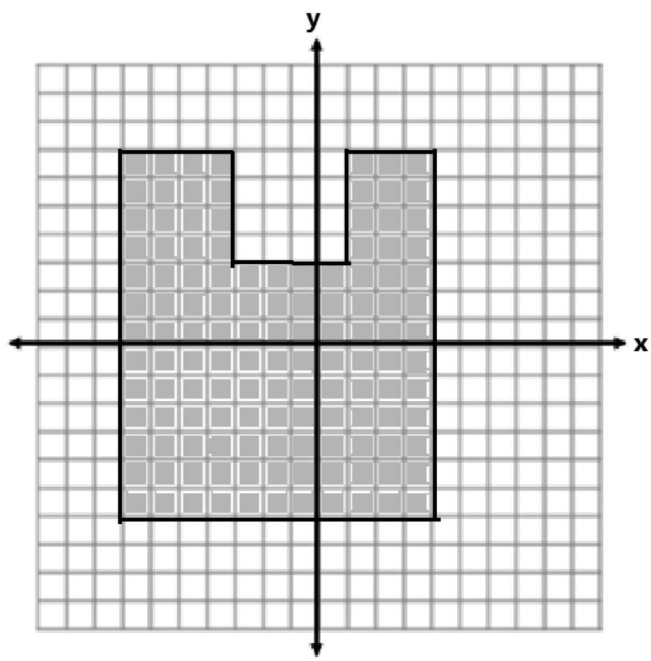
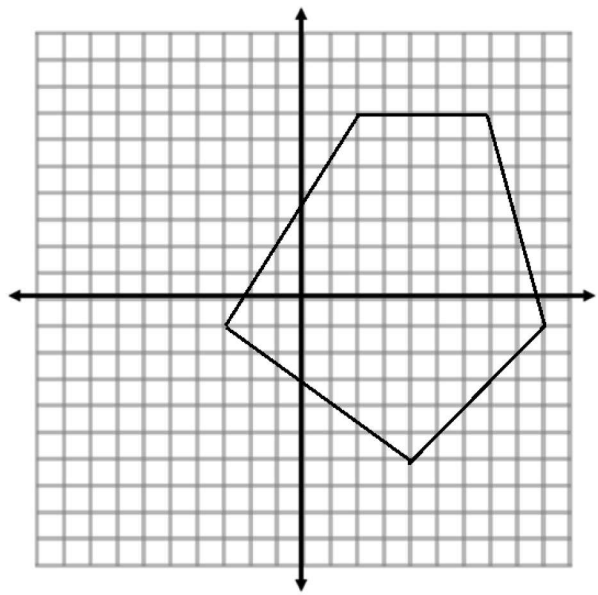
Name _____ Date _____

Determining Area and Perimeter of Polygons on the Coordinate Plane

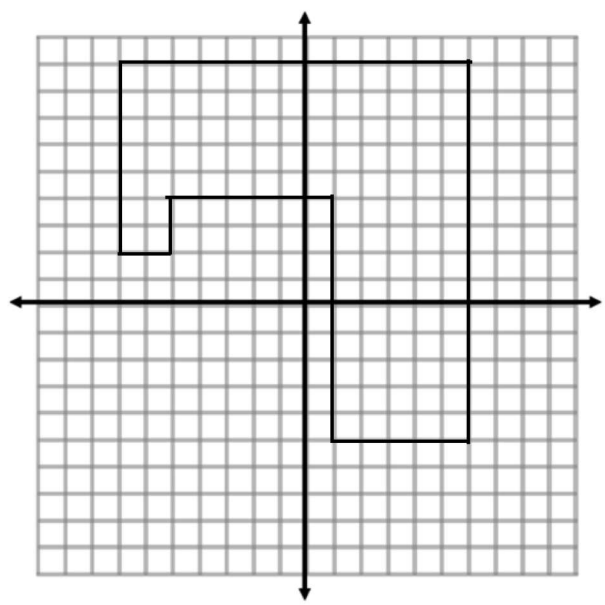
Determine the area and perimeter of the figure below. Note that each square unit is 1 unit in length.



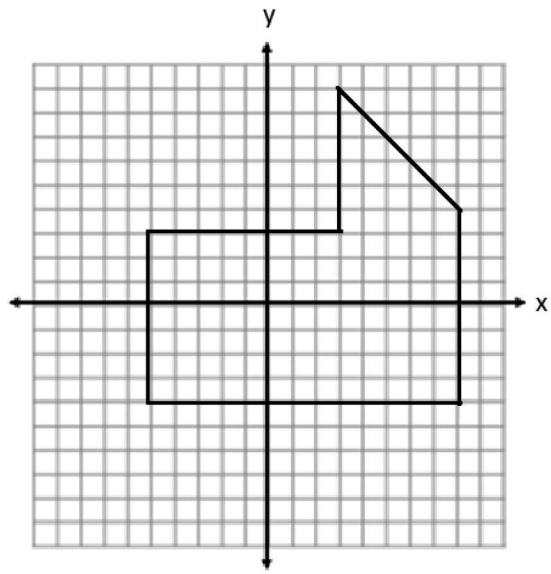
1. Determine the area of the polygon.



2. Determine the area and perimeter of the polygon.

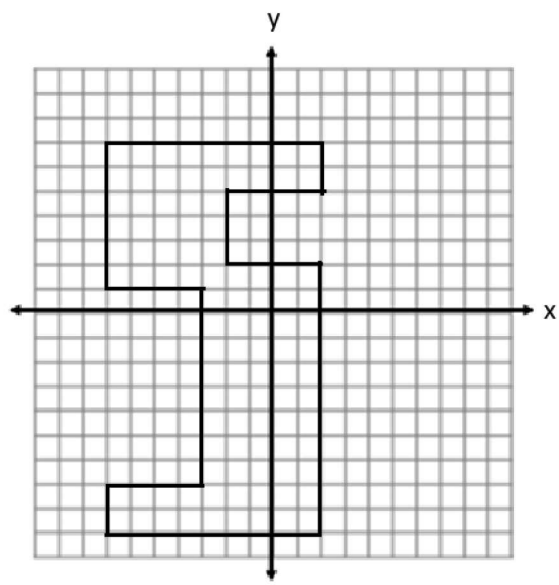


3. Determine the area of the polygon. Then, write an expression that could be used to determine the area.



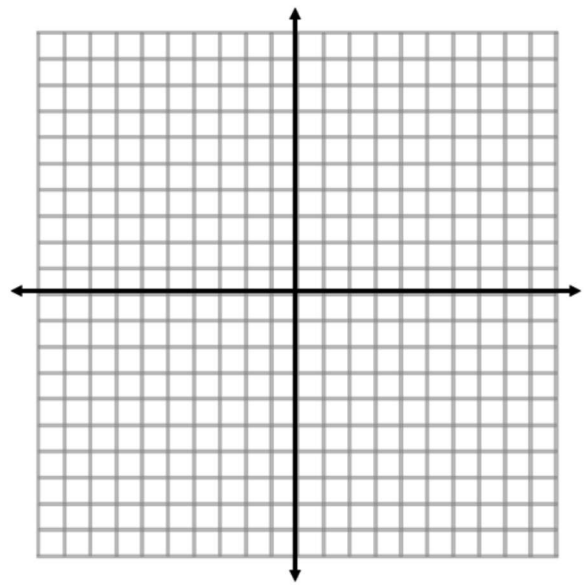
4. If the length of each square was worth 2 instead of 1, how would the area in Problem 3 change? How would your expression change to represent this area?

5. Determine the area of the polygon. Then, write an expression that represents the area.

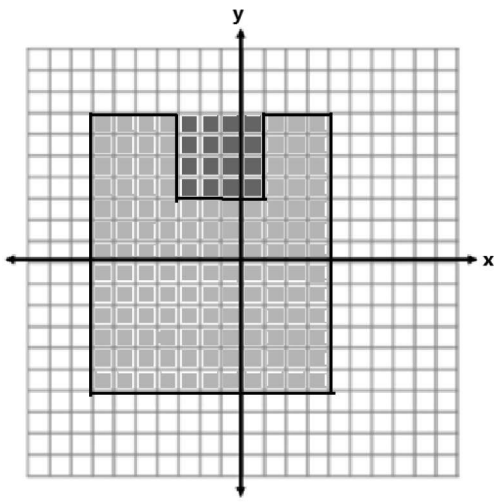


6. Describe another method you could use to find the area of the polygon in Problem 5. Then, state how the expression for the area would be different than the expression you wrote.

7. Write one of the letters from your name using rectangles on the coordinate plane. Then, determine the area and perimeter. (For help see Exercise 2(b). This irregular polygon looks sort of like a T.)



Determine the area and perimeter of the figure below. Note that each square unit is 1 unit in length.



Area

Area of Large Rectangle

$A = bh$

$A = (11 \text{ units})(13 \text{ units})$

$A = 143 \text{ units}^2$

Area of Small Square

$A = s^2$

$A = (4 \text{ units})^2$

$A = 16 \text{ units}^2$

Area of Irregular Shape

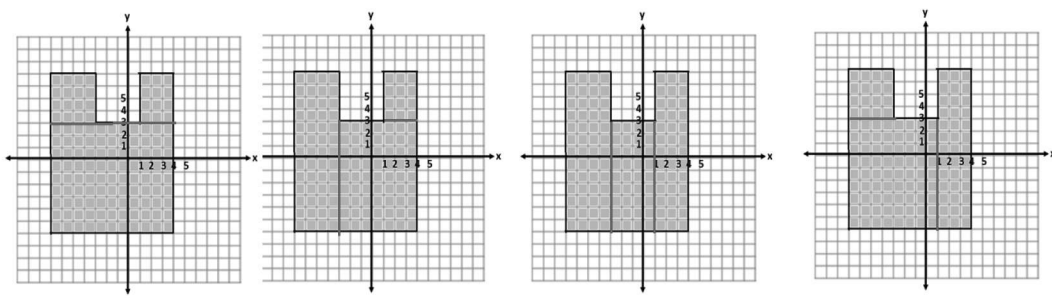
$A = 143 \text{ units}^2 - 16 \text{ units}^2$

$A = 127 \text{ units}^2$

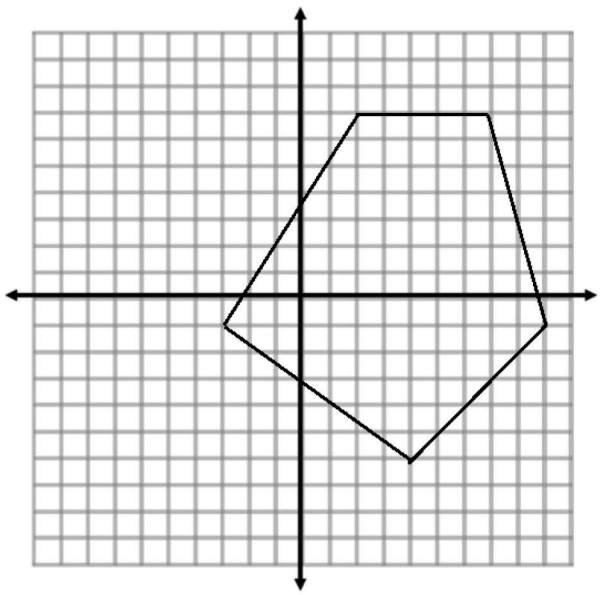
Perimeter $= 13 \text{ units} + 4 \text{ units} + 4 \text{ units} + 4 \text{ units} + 4 \text{ units} + 3 \text{ units} + 13 \text{ units} + 11 \text{ units}$

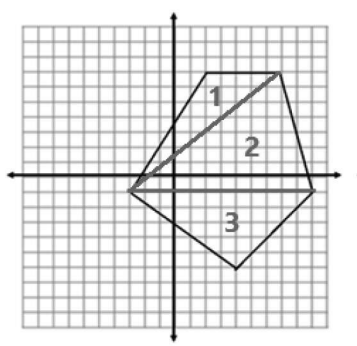
Perimeter $= 56 \text{ units}$

Other correct solutions might start with the following diagrams:



1. Determine the area of the polygon.





Area of Triangle 1

$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2}(5 \text{ units})(8 \text{ units})$$

$$A = \frac{1}{2}(40 \text{ units}^2)$$

$$A = 20 \text{ units}^2$$

Area of Triangle 2

$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2}(12 \text{ units})(8 \text{ units})$$

$$A = \frac{1}{2}(96 \text{ units}^2)$$

$$A = 48 \text{ units}^2$$

Area of Triangle 3

$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2}(12 \text{ units})(5 \text{ units})$$

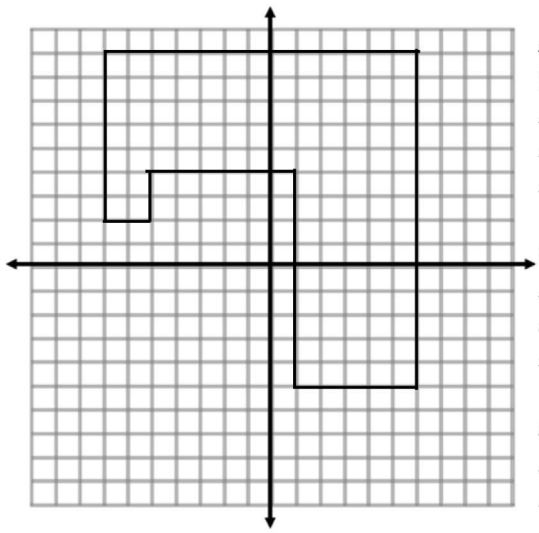
$$A = \frac{1}{2}(60 \text{ units}^2)$$

$$A = 30 \text{ units}^2$$

$$\textit{Total Area} = 20 \text{ units}^2 + 48 \text{ units}^2 + 30 \text{ units}^2$$

$$\textit{Total Area} = 98 \text{ units}^2$$

2. Determine the area and perimeter of the polygon.



Area

Horizontal Rectangle

$A = bh$

$A = (13 \text{ units})(5 \text{ units})$

$A = 65 \text{ units}^2$

Vertical Rectangle

$A = bh$

$A = (5 \text{ units})(9 \text{ units})$

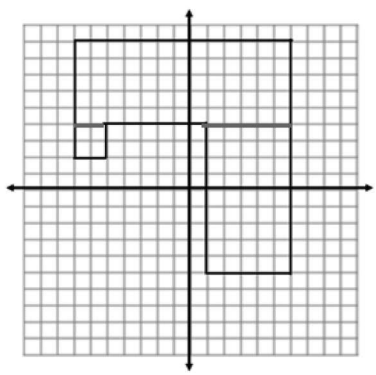
$A = 45 \text{ units}^2$

Square

$A = s^2$

$A = (2 \text{ units})^2$

$A = 4 \text{ units}^2$



Total Area $= 65 \text{ units}^2 + 45 \text{ units}^2 + 4 \text{ units}^2$

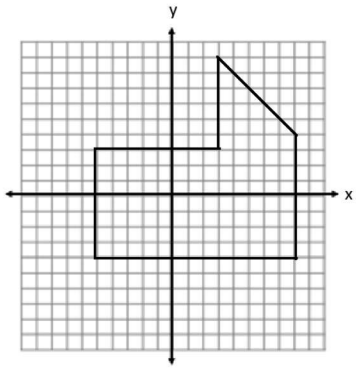
Total Area $= 114 \text{ units}^2$

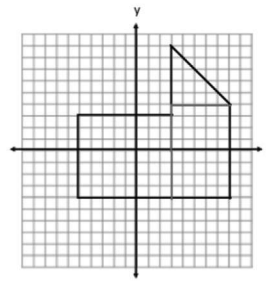
Perimeter

Perimeter $= 2 \text{ units} + 2 \text{ units} + 7 \text{ units} + 13 \text{ units} + 14 \text{ units} + 5 \text{ units} + 9 \text{ units} + 6 \text{ units}$

Perimeter $= 58 \text{ units}$

3. **Determine the area of the polygon. Then, write an expression that could be used to determine the area.**





Area of Rectangle on Left

$A = lw$

$A = (8 \text{ units})(7 \text{ units})$

$A = 56 \text{ units}^2$

Area of Rectangle on Right

$A = lw$

$A = (5 \text{ units})(8 \text{ units})$

$A = 40 \text{ units}^2$

Area of Triangle on Top

$A = \frac{1}{2}bh$

$A = \frac{1}{2}(5 \text{ units})(5 \text{ units})$

$A = 12.5 \text{ units}^2$

Total Area $= 56 \text{ units}^2 + 40 \text{ units}^2 + 12.5 \text{ units}^2 = 108.5 \text{ units}^2$

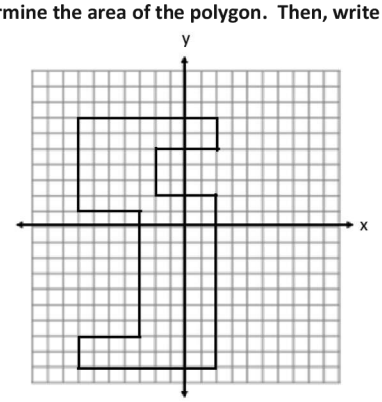
Expression $(8)(7) + (5)(8) + \frac{1}{2}(5)(5)$

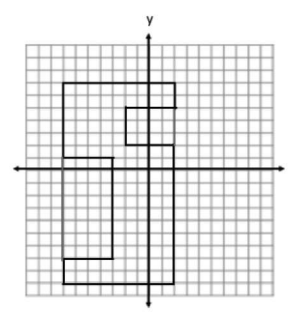
4. **If the length of each square was worth 2 instead of 1, how would the area in Problem 3 change? How would your expression change to represent this area?**

If each length is twice as long, when they are multiplied, $2l \times 2w = 4lw$. *Therefore, the area will be four times larger when the side lengths are doubled.*

I could multiply my entire expression by 4 to make it 4 times as big. $4\left[(8)(7) + (5)(8) + \frac{1}{2}(5)(5)\right]$

5. **Determine the area of the polygon. Then, write an expression that represents the area.**





Area of Outside Rectangle

$A = lw$

$A = (9 \text{ units})(16 \text{ units})$

$A = 144 \text{ units}^2$

Area of Rectangle on Left

$A = lw$

$A = (4 \text{ units})(8 \text{ units})$

$A = 32 \text{ units}^2$

Area of Rectangle on Right

$A = lw$

$A = (4 \text{ units})(3 \text{ units})$

$A = 12 \text{ units}^2$

Total Area $= 144 \text{ units}^2 - 32\text{units}^2 - 12\text{units}^2$

Total Area $= 100 \text{ units}^2$

Expression $(9)(16) - (4)(8) - (4)(3)$

6. **Describe another method you could use to find the area of the polygon in Problem 5. Then, state how the expression for the area would be different than the expression you wrote.**

   I could have broken up the large shape into many smaller rectangles. Then I would need to add all the areas of these rectangles together to determine the total area.

   My expression showed subtraction because I created a rectangle that was larger than the original polygon, and then I had to subtract the extra areas. If I break the shape into pieces, I would need to add the terms together instead of subtracting them to get the total area.

7. **Write one of the letters from your name using rectangles on the coordinate plane. Then, determine the area and perimeter. (For help see Exercise 2(b). This irregular polygon looks sort of like a T.)**

   Answers will vary.