

Final Exam Study Guide 2017-2018

The best way to prepare for a mathematics exam is to do lots of practice problems. This study guide is designed to provide practice on various topics we have learned throughout the year.

The following questions ARE NOT exactly like the final exam. The final exam is in a multiple choice format. Go through your notes, homework assignments, and look over the topics you missed on each test.

1) Solve the following problem for the variable. Show that your answer checks.

a)  $\frac{x+5}{17} = \frac{9}{11}$        $11(x+5) = 9 \cdot 17$        $x \approx 8.91$       a)  $x = \frac{98}{11} \approx 8.91$

$11x + 55 = 153$   
 $\quad \quad -55 \quad -55$   
 $\hline 11x = 98$   
 $\frac{11x}{11} = \frac{98}{11}$

check:  
 $\frac{98}{11} + 5 = \frac{9}{11}$

b)  $14 - 5(2x - 1) = 7x - 1$       check  
 $14 - 10x + 5 = 7x - 1$        $14 - 5(2 \cdot 1.18 - 1) \approx 7(1.18) - 1$   
 $19 - 10x = 7x - 1$        $14 - 5(2.36 - 1) \approx 8.26 - 1$   
 $\frac{22}{17} = \frac{17x}{17}$        $14 - 5(1.36) \approx 7.26$   
 $x \approx 1.18$        $14 - 6.8 \approx 7.26$   
 $7.2 \approx 7.26$

$\frac{153}{17} \Rightarrow \frac{9}{11} \cdot \frac{1}{1} = \frac{9}{11} = \frac{9}{11}$

b)  $x = \frac{20}{17} \approx 1.18$

2) Fill in the missing dimensions and areas. Then write the entire area as a product equivalent to the area as a sum.

a) 

$4X$	$-7$
$5X$	$20X^2$
$-9$	$-35X$
	$-36X$
	$+63$

b) 

$2Y$	$-7$
$5Y$	$10Y^2$
$-2$	$-35y$
	$-4y$
	$+14$

A)  $(4x-7)(5x-9) = 20x^2 - 71x + 63$

B)  $(2y-7)(5y-2) = 10y^2 - 39y + 14$

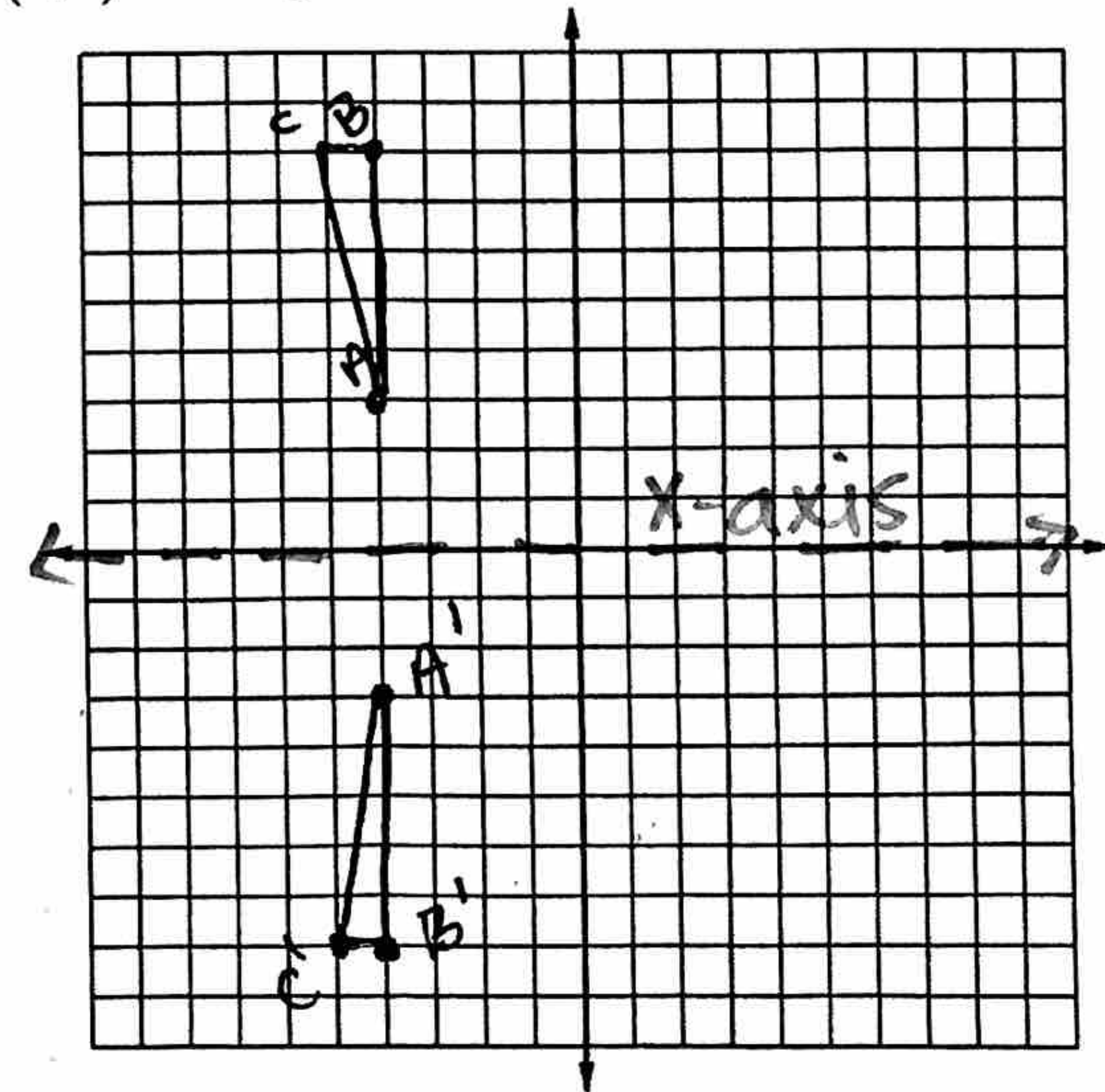
3) a) Draw the triangle with vertices  $A(-4,3)$ ,  $B(-4,8)$ , and  $C(5,8)$  on the grid below. LABEL ALL POINTS!!!!

b) What kind of triangle is this? Justify your answer.  
 $\Delta ABC$  is a right  $\Delta$  b/c  $\angle B$  is a right  $\angle$ . Also, scalene.

c) Reflect  $\Delta ABC$  over the x-axis.

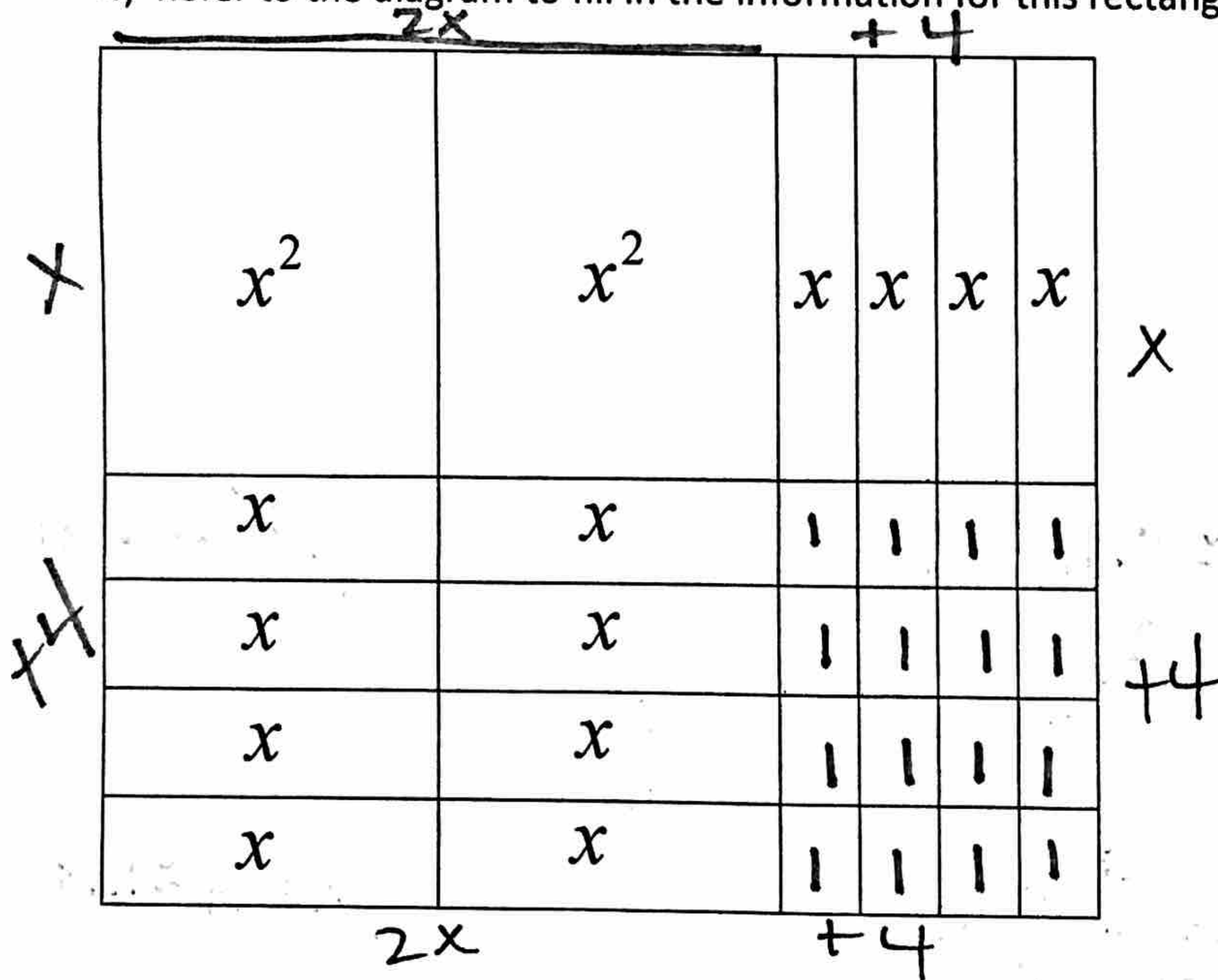
d) What are the coordinates of your new vertices?  
 Write your answers in prime notation.

$A'(-4, -3)$      $B'(-4, -8)$      $C'(-5, -8)$





4) Refer to the diagram to fill in the information for this rectangle.



Dimensions of Rectangle:

$(2x + 4)$  by  $(x + 4)$

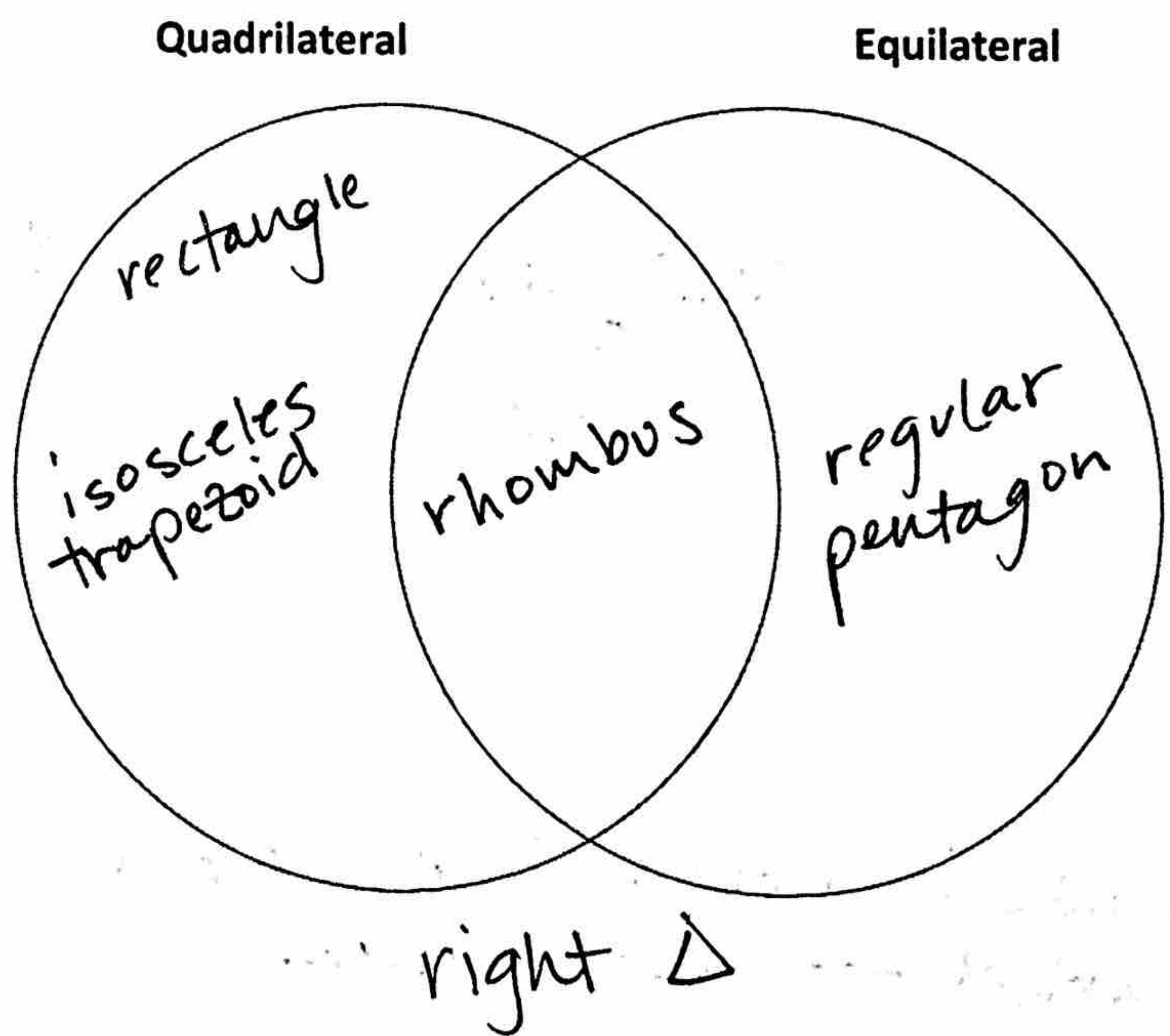
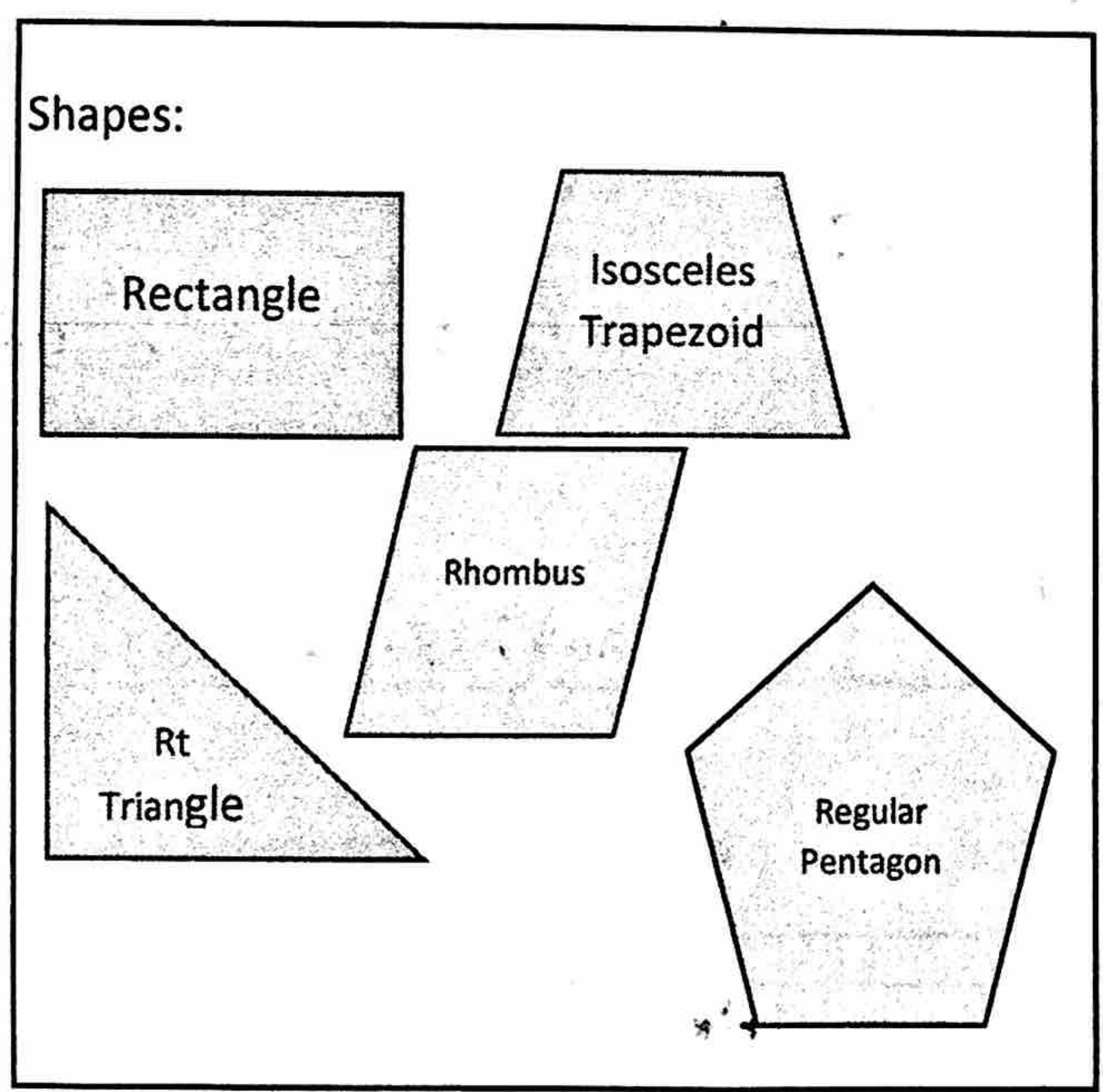
Area as a Product:  $(2x + 4)(x + 4)$

Area as a sum:  $2x^2 + 12x + 16$

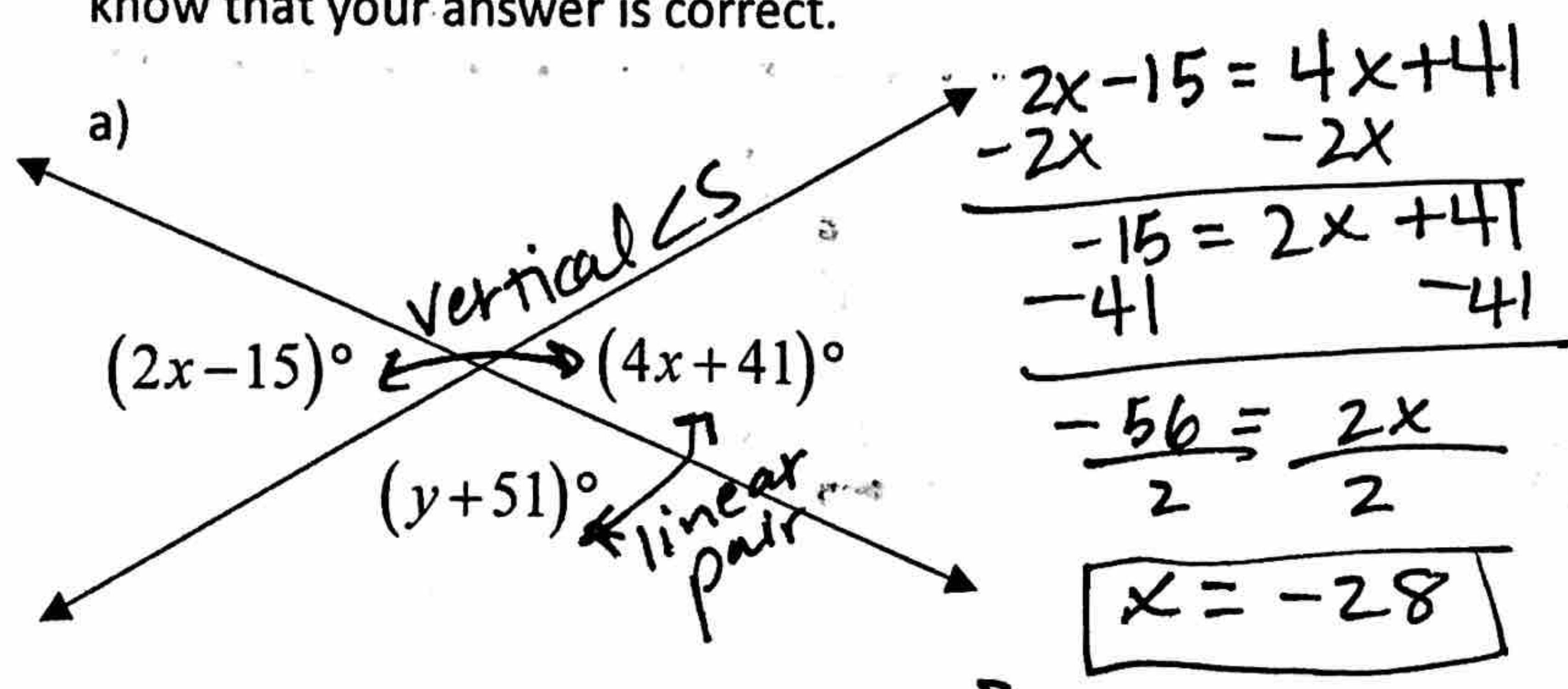
Perimeter:  $6x + 16$

(add up the 4 sides to find distance all the way around)

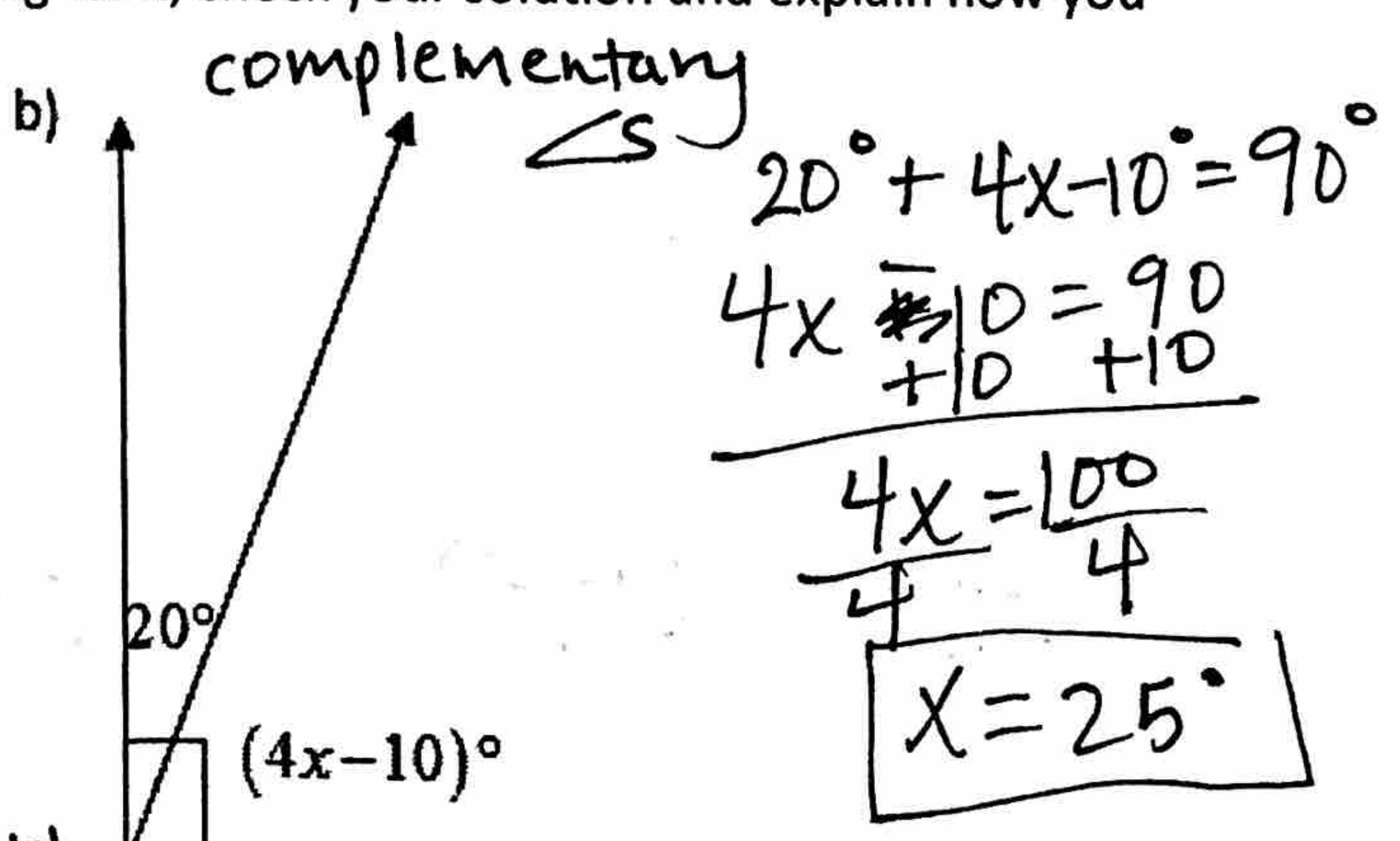
5) Fill in the Venn Diagram with the shapes for the categories.



6) Identify the angle pair relationship. Solve for x (&y). After solving for x, check your solution and explain how you know that your answer is correct.

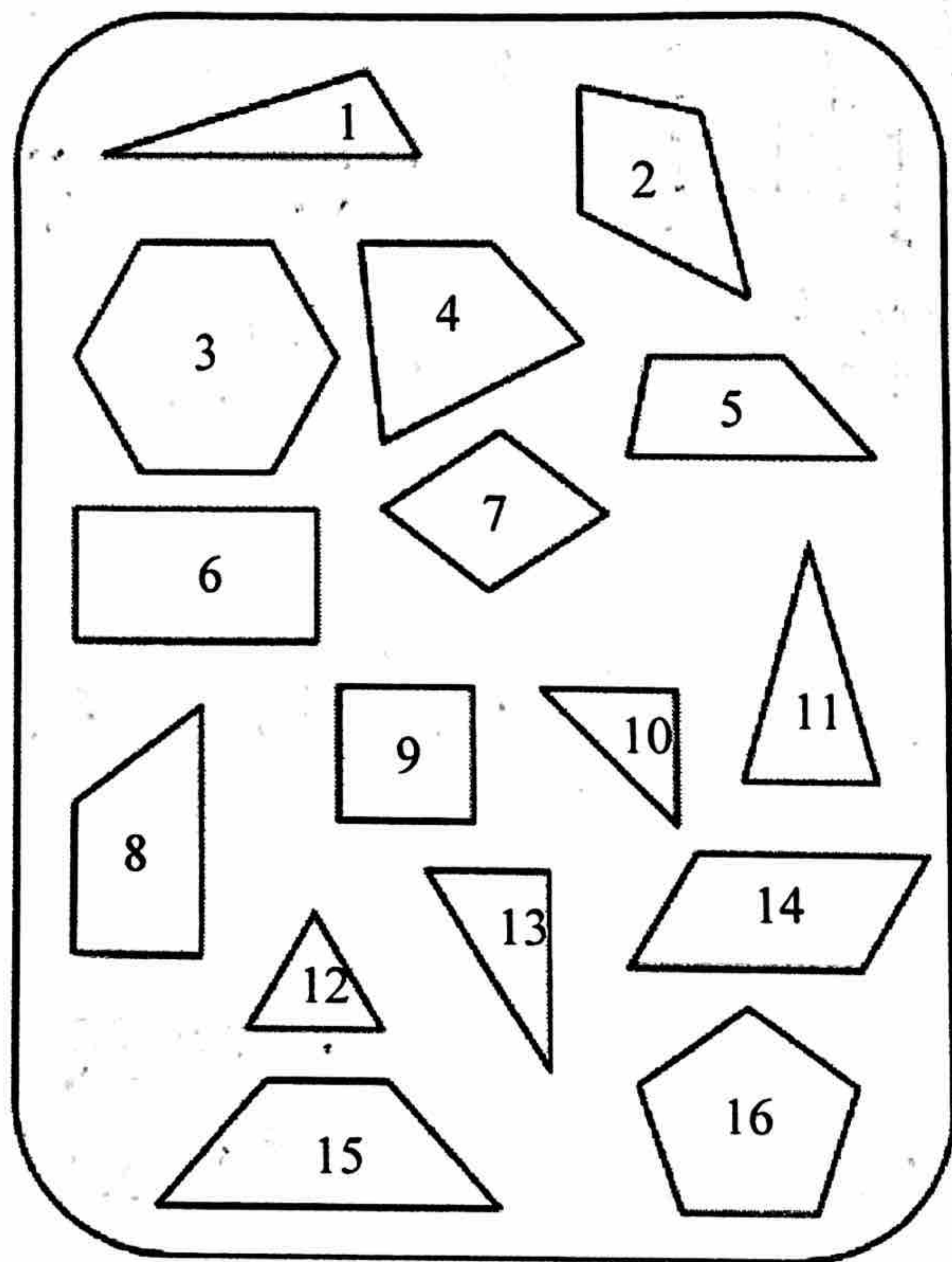


$2(-28) - 15 = -71$  cannot get neg.  $x$ . not possible.





7) Early in this chapter, we did a number of activities with these shapes. For each, identify the shape. Then classify the shape by its sides, angles, and symmetry (reflection, rotation, or translation symmetry)



- ① scalene, obtuse  $\Delta$ . no symmetry
- ② Kite. Quadrilateral. reflection symmetry.
- ③ regular hexagon. reflection & rotation symmetry. equilateral. equiangular.
- ④ Quadrilateral.
- ⑤ trapezoid.
- ⑥ rectangle. equiangular. ~~no~~ reflection symmetry.
- ⑦ rhombus. equilateral. rotation & reflection symmetry.
- ⑧ right trapezoid.
- ⑨ square. equiangular. equilateral. reflection & rotation symm.
- ⑩ right/isosceles  $\Delta$ . reflection symmetry.
- ⑪ isosceles  $\Delta$ . reflection symm.
- ⑫ equilateral/equiangular  $\Delta$ . reflection & rotational symmetry.
- ⑬ right  $\Delta$ .
- ⑭ Parallelogram. rotation symmetry.
- ⑮ isosceles trapezoid. reflection symmetry.
- ⑯ regular pentagon. equilateral. equiangular. reflection & rotation symmetry.



8) We also looked at patterns. (King, rug problem? Remember?) Here is a new design.

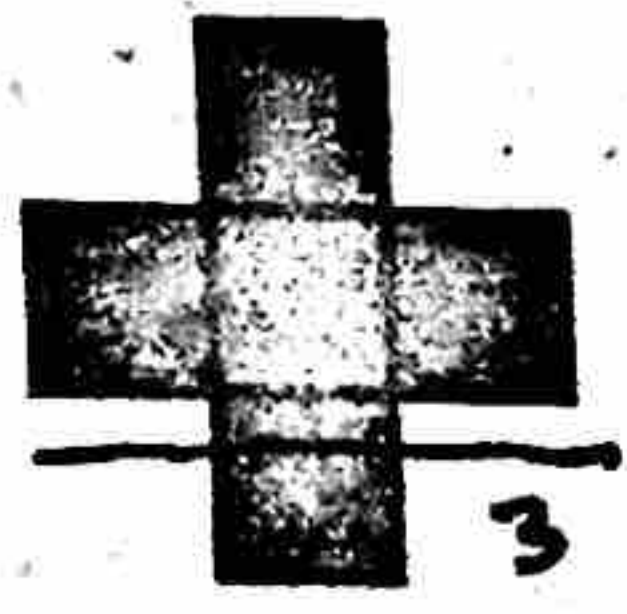


Figure 1

$1 \times 3 + 2$

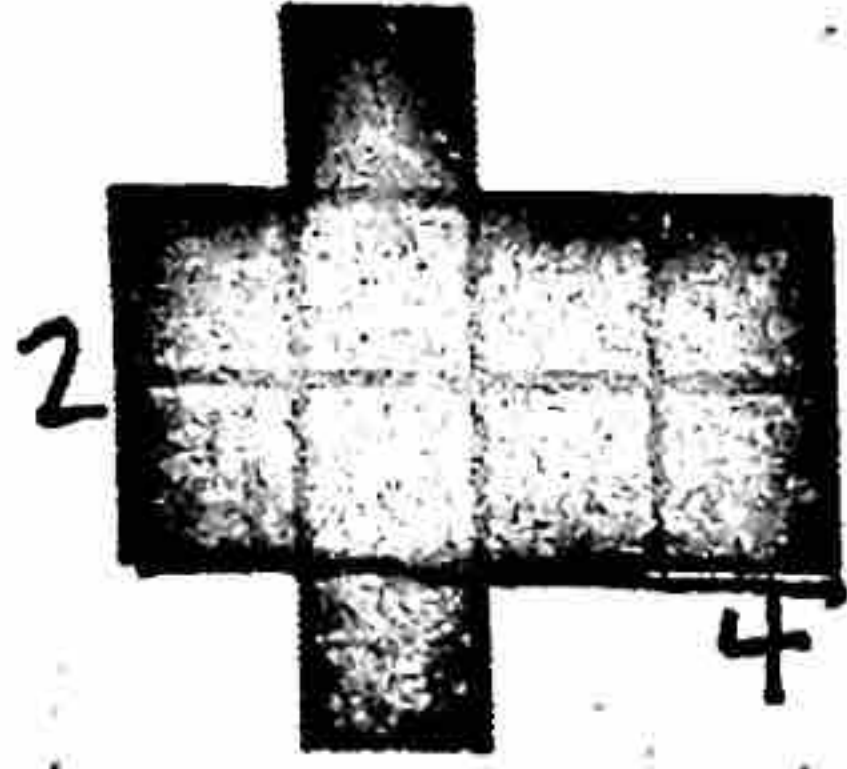


Figure 2

$2 \times 4 + 2$

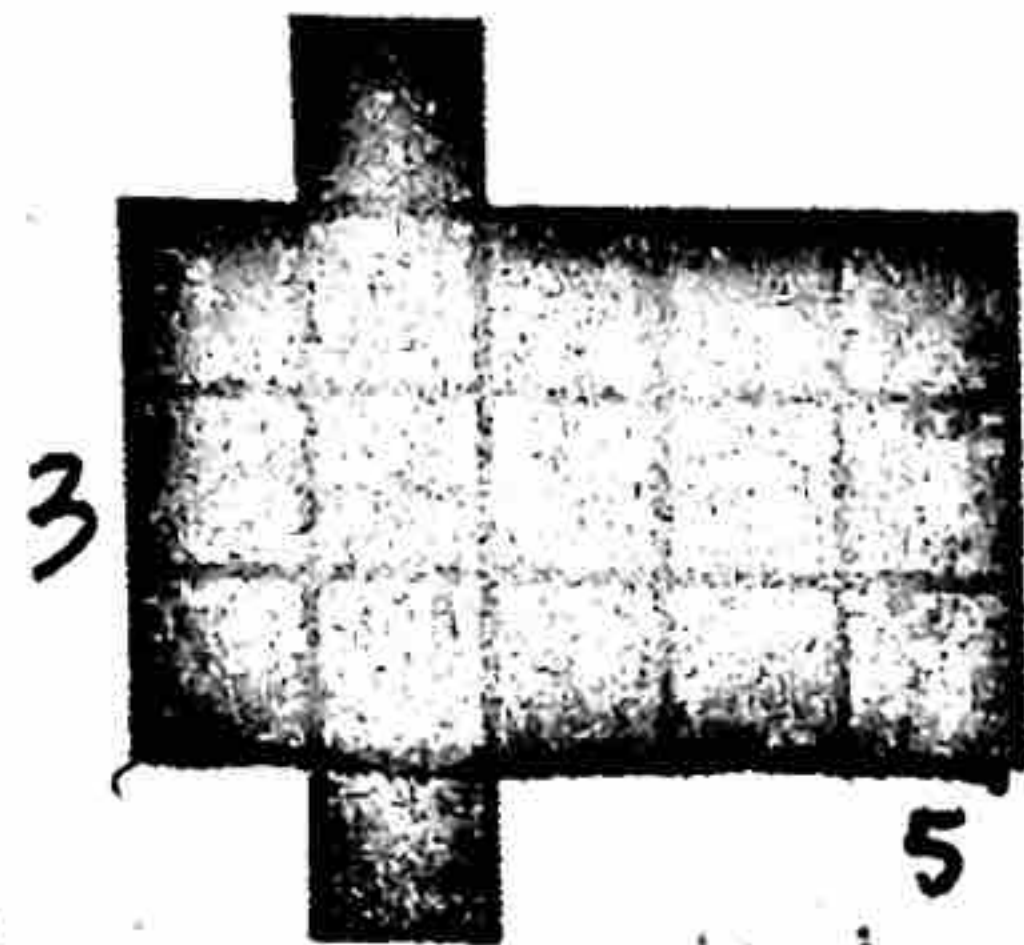


Figure 3

$3 \times 5 + 2$

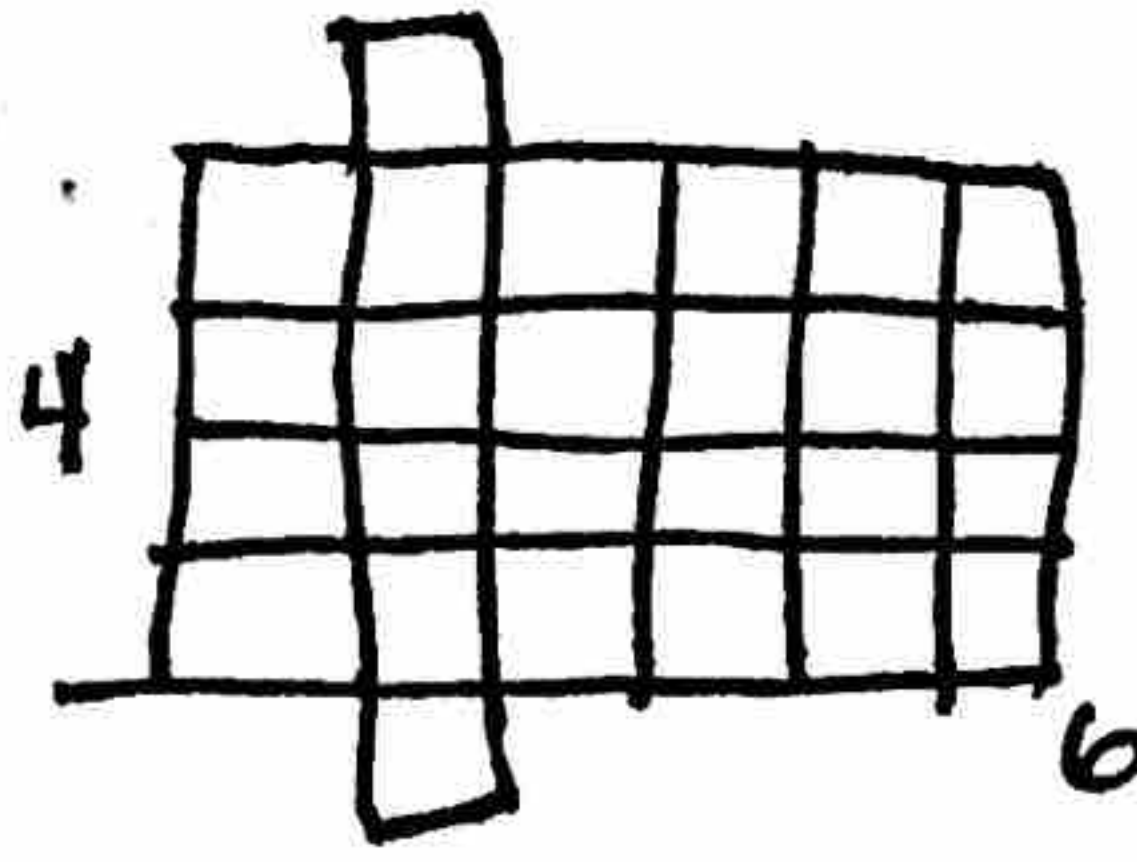


Figure 4

$4 \times 6 + 2$

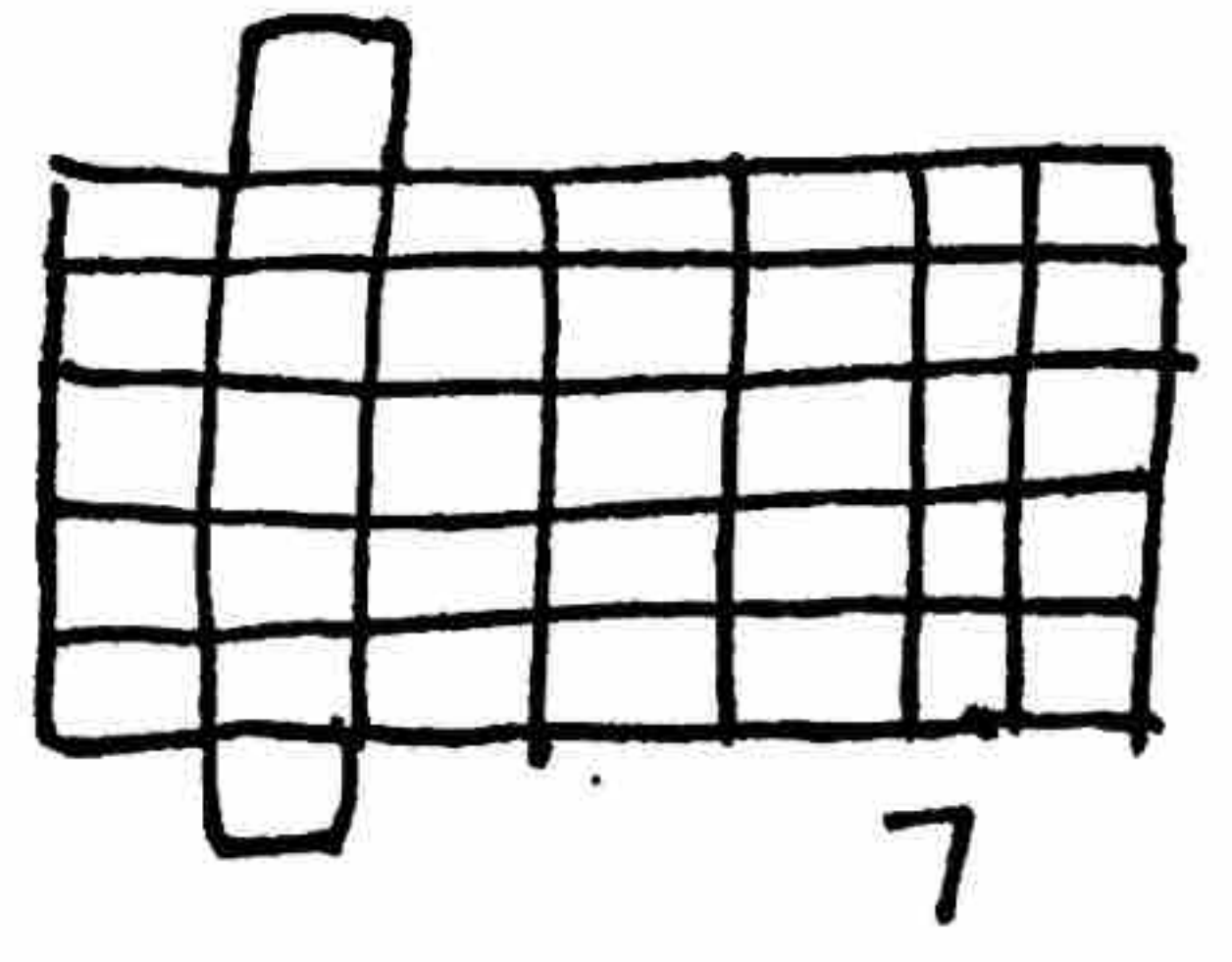


Figure 5

$5 \times 7 + 2$

First analyze the rug design your team has been assigned, and draw diagrams of Figures 4 and 5 for your rug design on graph paper.

Describe Figure 20 of your design. Provide as much information as you can. What will it look like? How will the squares be arranged?

rectangle grows. flaps stay same +2 in fig 4. 4x6 in fig 4. 5x7 in figure 5. +2

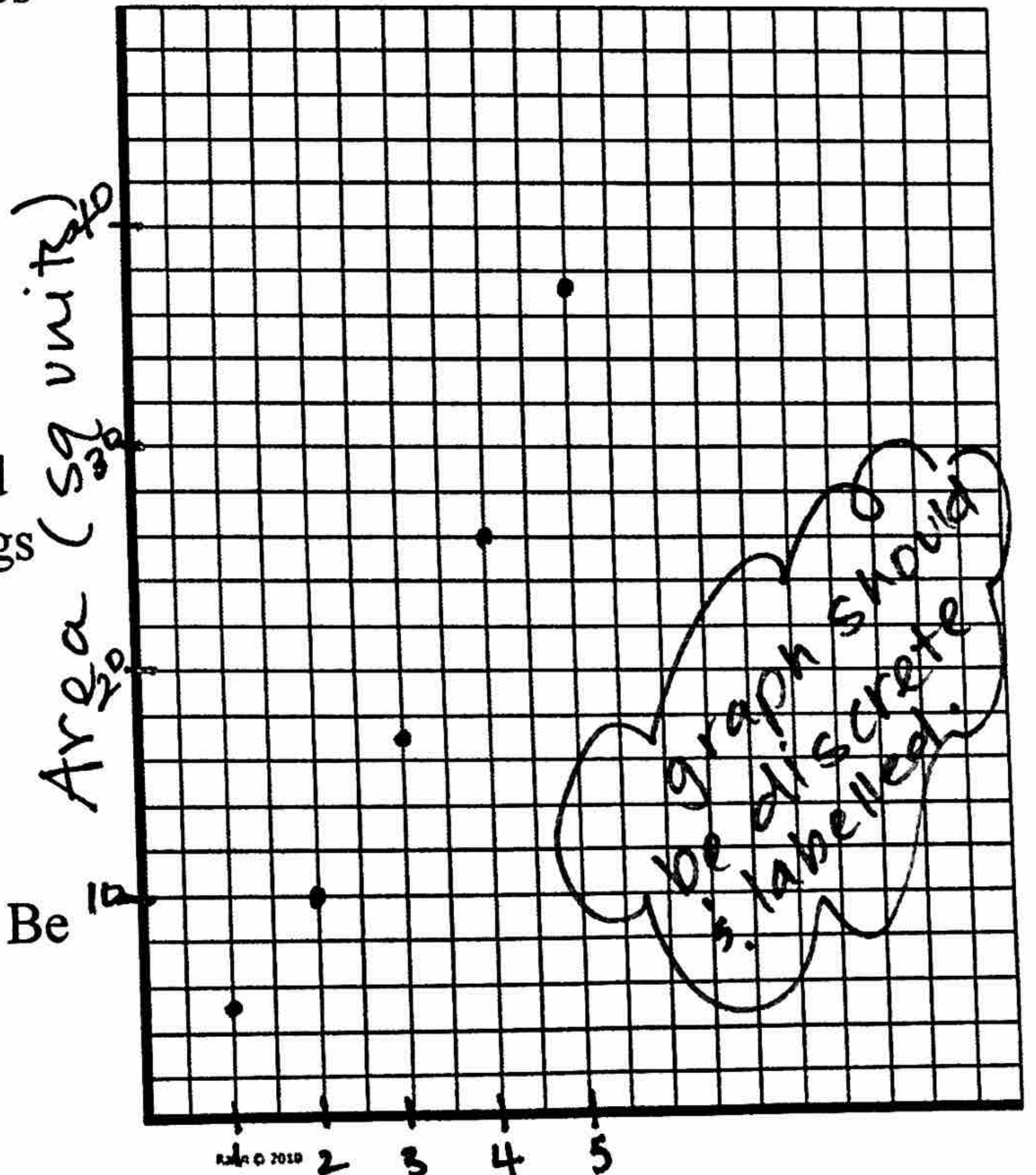
A table can help you learn more about how the area changes as the rugs get bigger.

a. Fill in the table below to organize information about the area of each rug in your design.

Figure number	1	2	3	4	5	20
Area (in square units)	5	10	17	26	37	442

→  $20 \cdot 22 + 2$   
 $20 \times 22 + 2 \text{ flaps}$

b. On a new set of axes, graph the area data for Figures 1 through 5. (You do not need to include Figure 20.) What is the shape of the graph?



c. How does the area grow? Examine your table and graph and describe how the area changes as the rugs get bigger.

\* answers will vary \*  
 up 5, up 7, up 9, up 11, etc.  
 The pattern is not linear.

d. Write an equation that calculates the area of Figure  $n$ . How did you figure out your equation? Be ready to defend your strategy.

\* answers will vary \*

figure  $n$ .  
 $n(n+2) + 2$

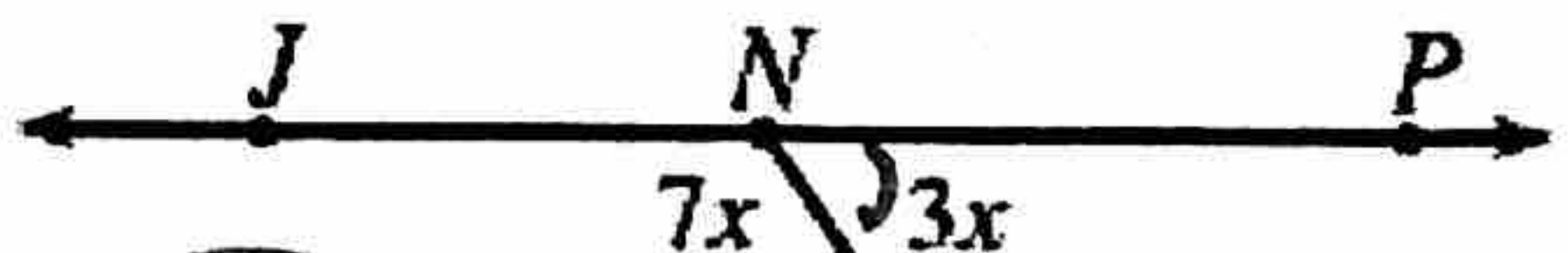
I saw it as rectangles growing w/ 2 flaps. So height of rectangle is same as figure #, the base is figure # plus 2. plus 2 again for 2 flaps.

figure #



9) Angle Pair Relationships. Solve for x and y and find the measure of the given angle.

a. What is  $m\angle MNP$ ?



$$3x + 7x = 180$$

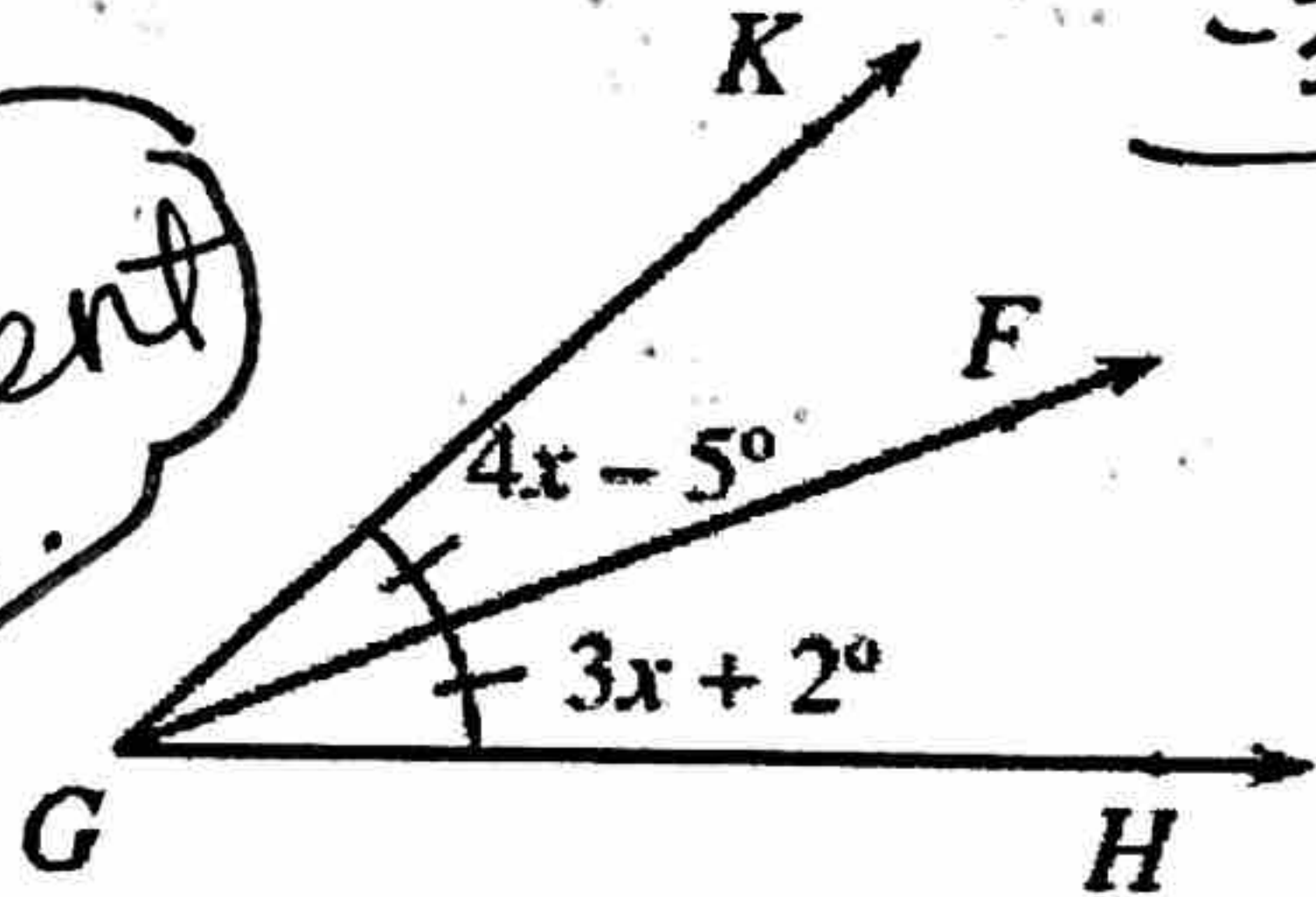
$$\frac{10x}{10} = \frac{180}{10}$$

$$x = 18$$

$$m\angle MNP = 3(18) = \boxed{54^\circ}$$

\*linear pair. Supplementary.

b. What is  $m\angle FGH$ ?



$$4x - 5 = 3x + 2$$

$$\begin{array}{r} 4x - 5 = 3x + 2 \\ -3x \quad -3x \\ \hline x - 5 = 2 \\ +5 \quad +5 \\ \hline x = 7 \end{array}$$

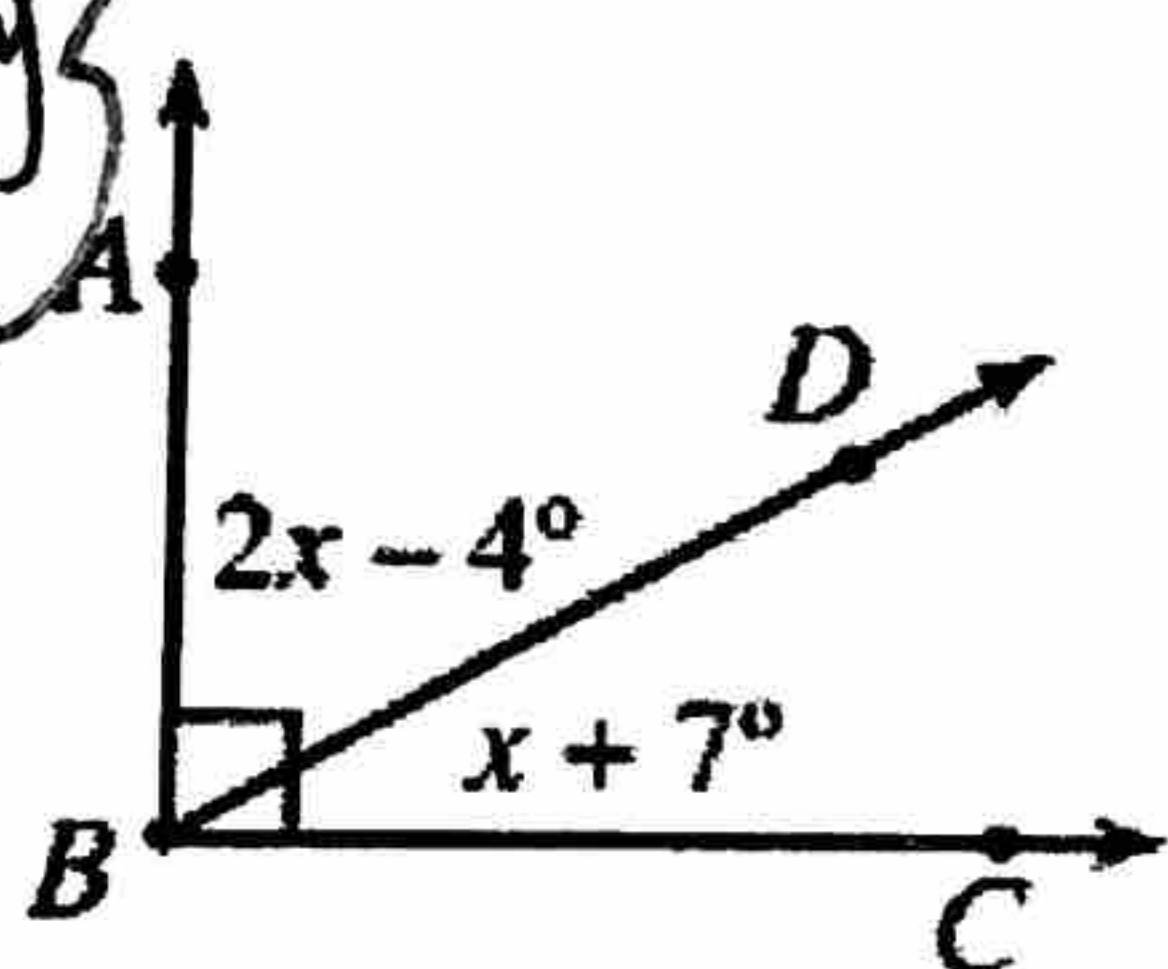
$$m\angle FGH = 3(7) + 2$$

$$= 21 + 2$$

$$= \boxed{23^\circ}$$

congruent angles.

c. What is  $m\angle DBC$ ?



$$2x - 4 + x + 7 = 90$$

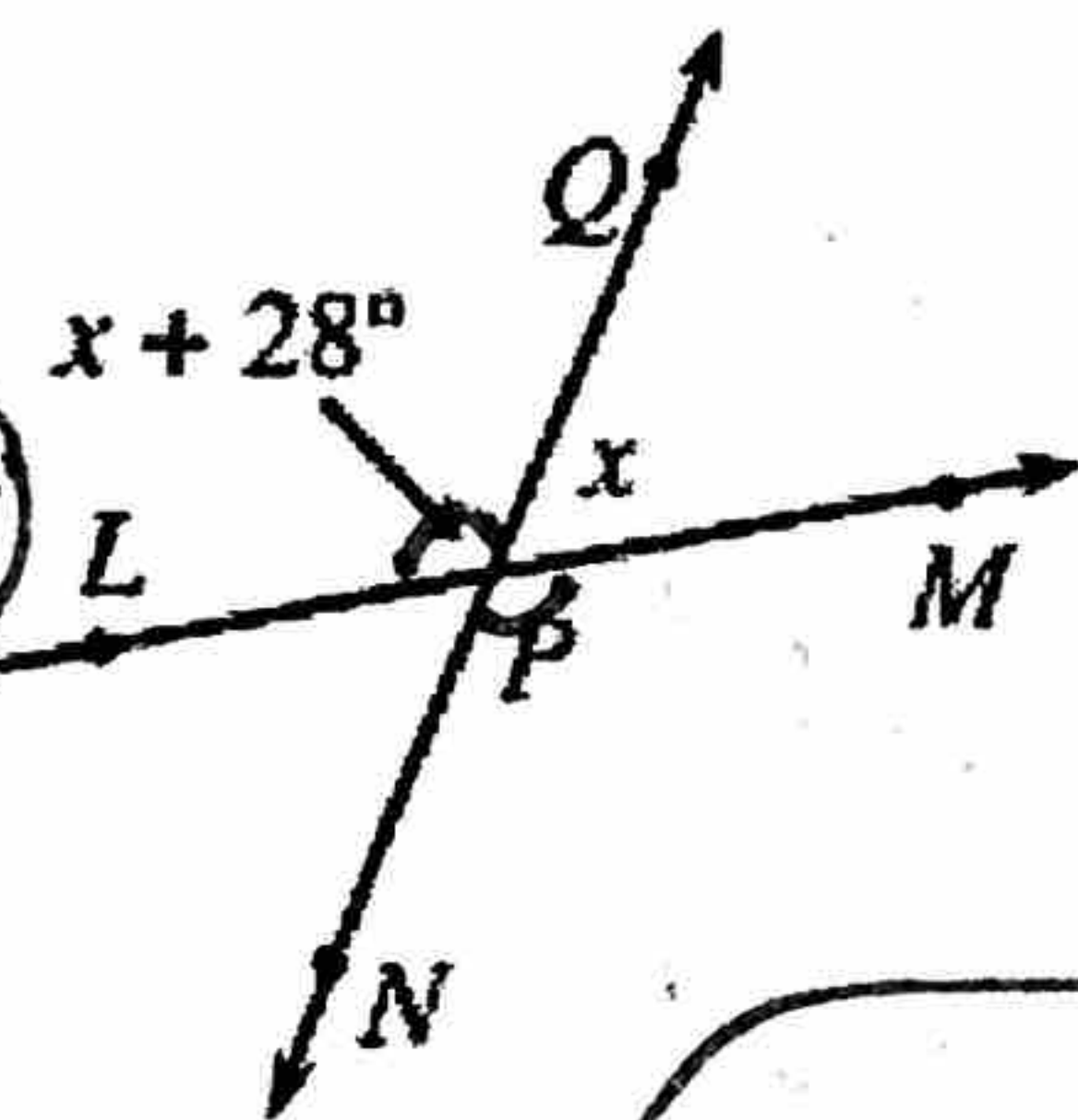
$$3x + 3 = 90$$

$$\begin{array}{r} 3x + 3 = 90 \\ -3 \quad -3 \\ \hline 3x = 87 \\ \frac{3x}{3} = \frac{87}{3} \\ x = 29 \end{array}$$

$$m\angle DBC = 29 + 7 = \boxed{36^\circ}$$

complementary angles. add up to 90 degrees.

d. What is  $m\angle NPM$ ?



$$x + 28 + x = 180$$

$$2x + 28 = 180$$

$$\begin{array}{r} 2x + 28 = 180 \\ -28 \quad -28 \\ \hline 2x = 152 \\ \frac{2x}{2} = \frac{152}{2} \\ x = 76 \end{array}$$

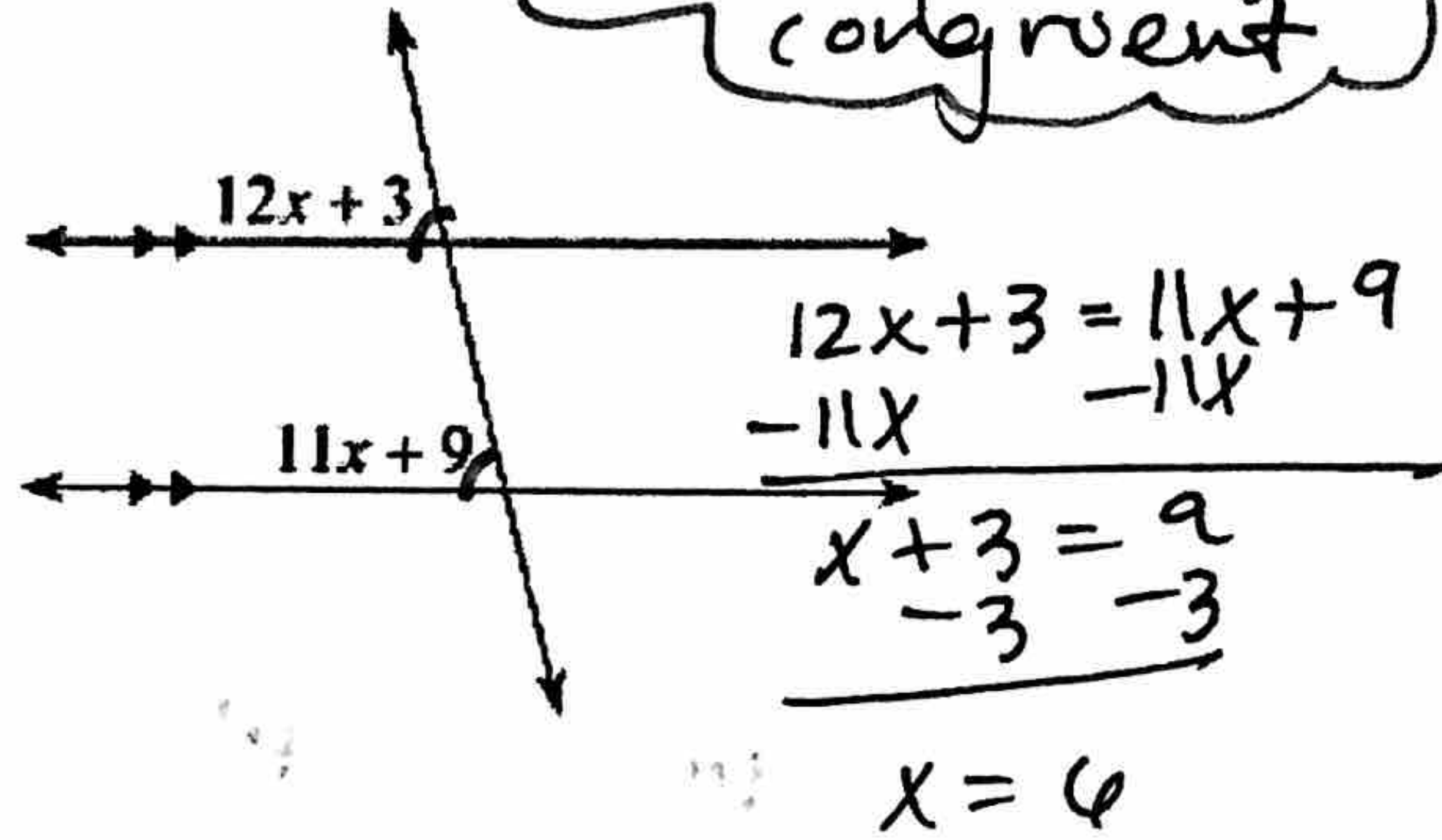
$$x = 76$$

$m\angle NPM \cong m\angle LPQ$   
b/c they are vertical angles

$$m\angle NPM = 76 + 28 = \boxed{104^\circ}$$

linear pair. Supplementary.

e.



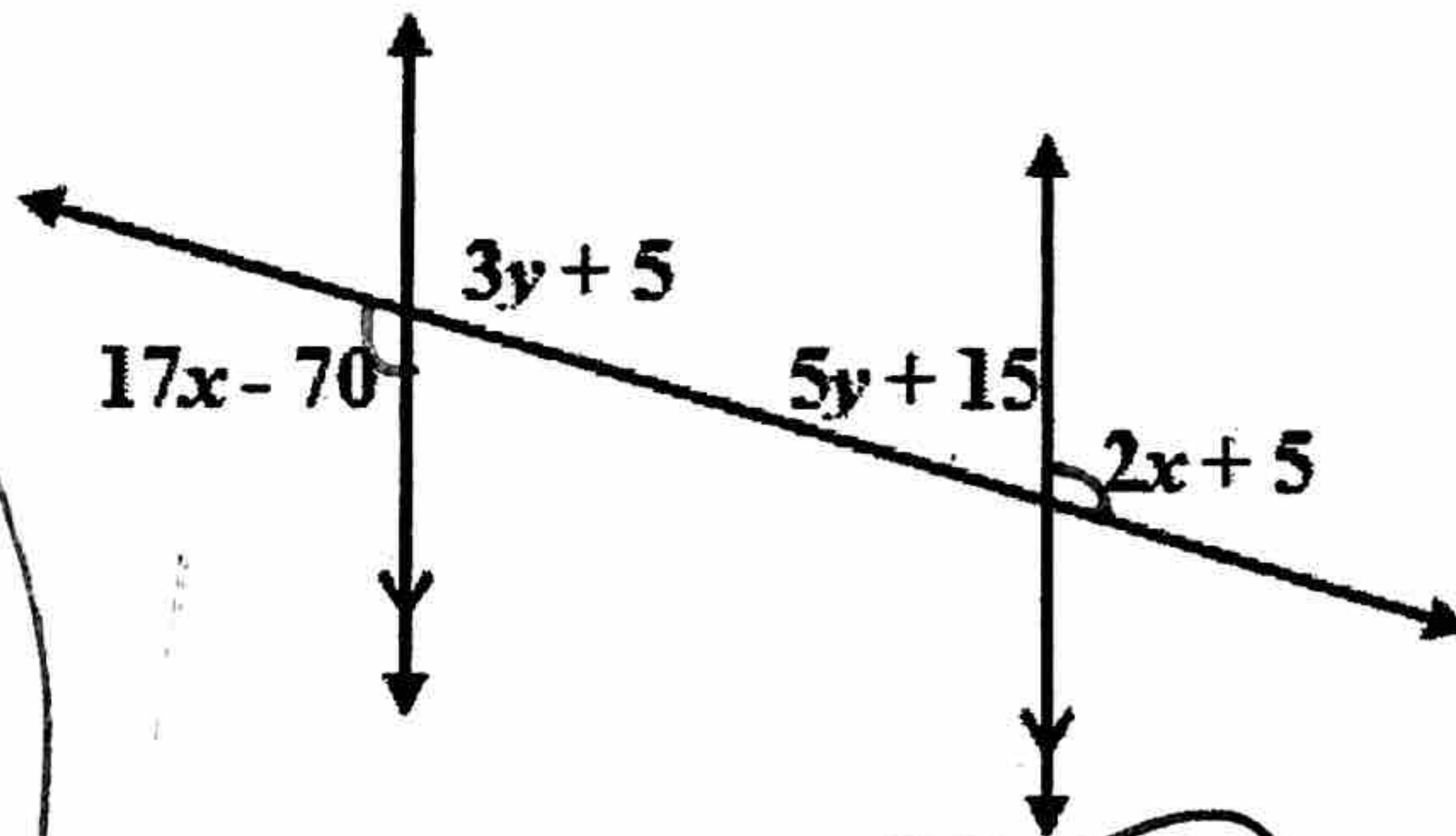
Corresponding angles congruent

$$12x + 3 = 11x + 9$$

$$\begin{array}{r} 12x + 3 = 11x + 9 \\ -11x \quad -11x \\ \hline x + 3 = 9 \\ -3 \quad -3 \\ \hline x = 6 \end{array}$$

$$x = 6$$

f.



X alt. ext. angles

$$17x - 70 = 2x + 5$$

$$\begin{array}{r} 17x - 70 = 2x + 5 \\ -2x \quad -2x \\ \hline 15x - 70 = 5 \\ +70 \quad +70 \\ \hline 15x = 75 \\ \frac{15x}{15} = \frac{75}{15} \\ x = 5 \end{array}$$

$$x = 5$$

Y same-side int. angles. supp.

$$3y + 5 + 5y + 15 = 180$$

$$8y + 20 = 180$$

$$\begin{array}{r} 8y + 20 = 180 \\ -20 \quad -20 \\ \hline 8y = 160 \\ \frac{8y}{8} = \frac{160}{8} \\ y = 20 \end{array}$$

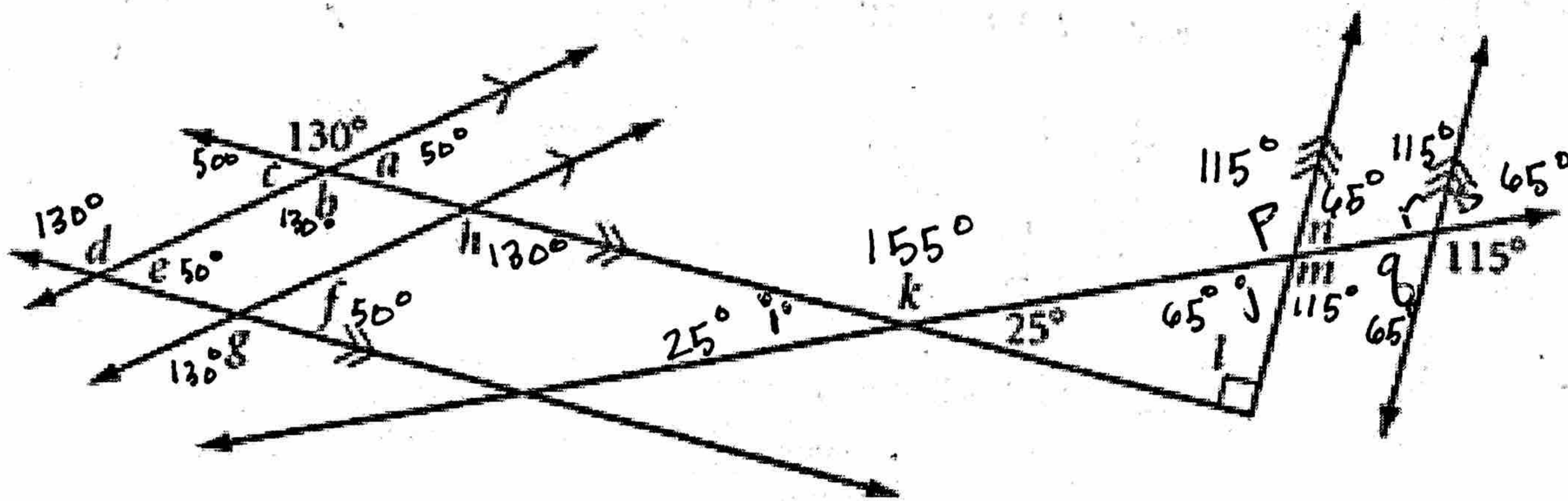
$$y = 20$$

$$y = 20$$

$$y = 20$$



10) Find all the missing angles.



- a 50°
- b 130°
- c 50°
- d 130°
- e 50°
- f 50°
- g 130°

- h 130°
- i 25°
- j ~~155°~~ 65°
- k 155°
- l 90°
- m 115°
- n 65°
- p 115°

- q 65°
- r 115°
- s 65°