Pre-Unit 12 Packet
Geometric Transformations & Piecewise Functions

Assigned: Wednesday, April 22

Due: Tuesday, April 28 by 2:30 PM

Requirements:

- Work on your packet at your **own pace** (not at the exact same pace as someone else).
- Watch a video for one section and complete the problem set for that section before going on to the next video.
- Correct each problem set before moving on. Answer keys will be on my website.
- **Be honest with yourself**.
- ***Don't procrastinate.***

Name: _____

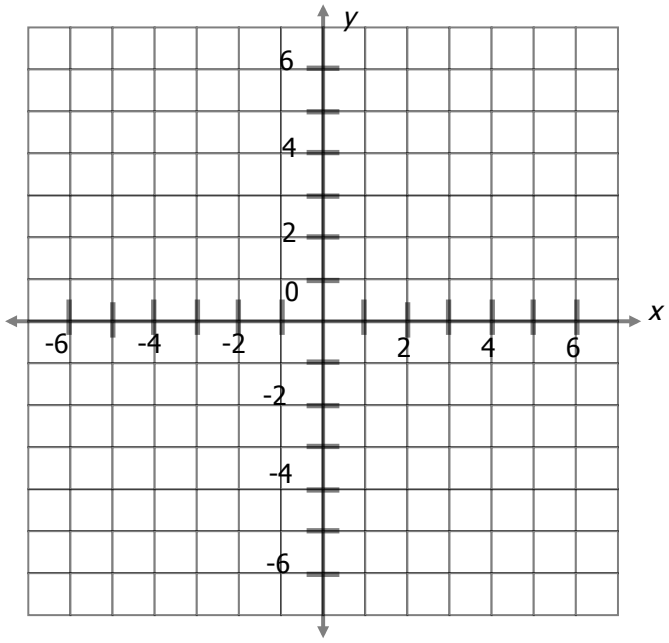
Section 1 - Reflections

Video Notes

Reflection:

1.) Graph point A(3,5) on the set of axes to the right.

2.) Graph the image of A after a reflection in the y-axis. State the coordinates of the image.



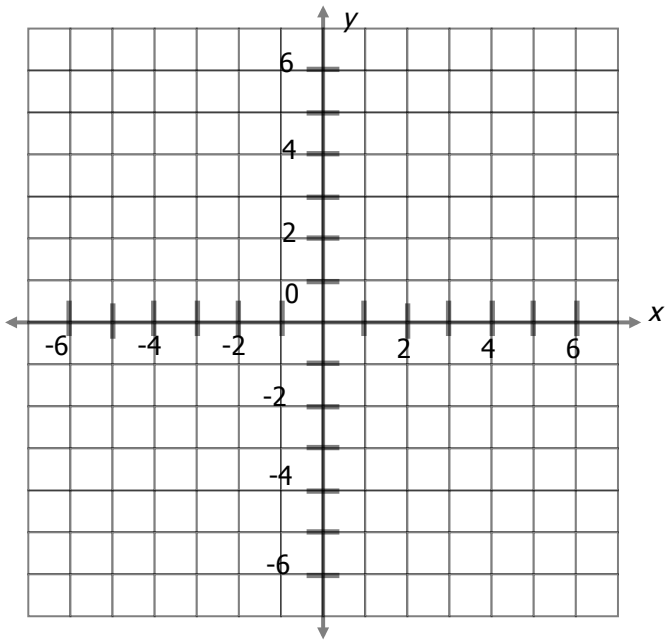
3.) Graph point B(6,2) on the set of axes to the right.

4.) Graph the image of B after a reflection in the x-axis. State the coordinates of the image.

What do you notice?

Before Reflection (x,y)	→	After Reflection in the x-axis:
		After Reflection in the y-axis:
		After Reflection in the line $y = x$

5.) Given triangle *ABC* with coordinates *A*(3,1), *B*(5,3), *C*(6,1). Reflect triangle *ABC* over the line $y = x$. State the new coordinates.



Properties of Reflections

a.) shape - preserved (stays same)

b.) size - preserved

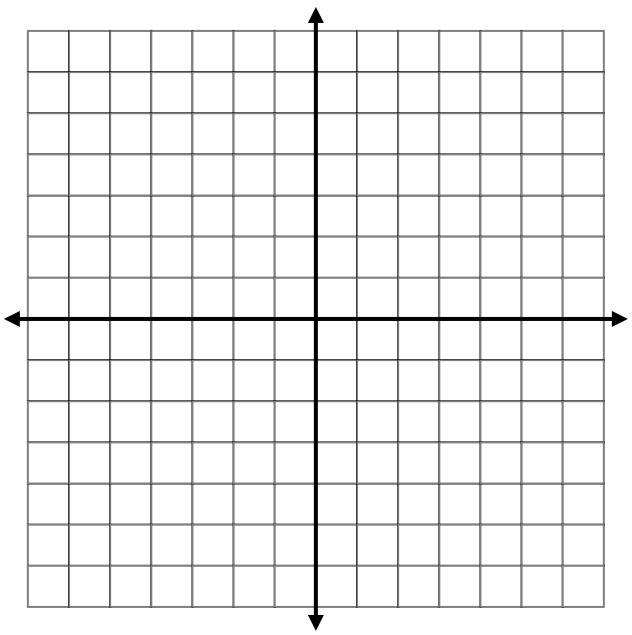
c.) orientation (direction) - not preserved

Section 1 Problem Set – Reflections

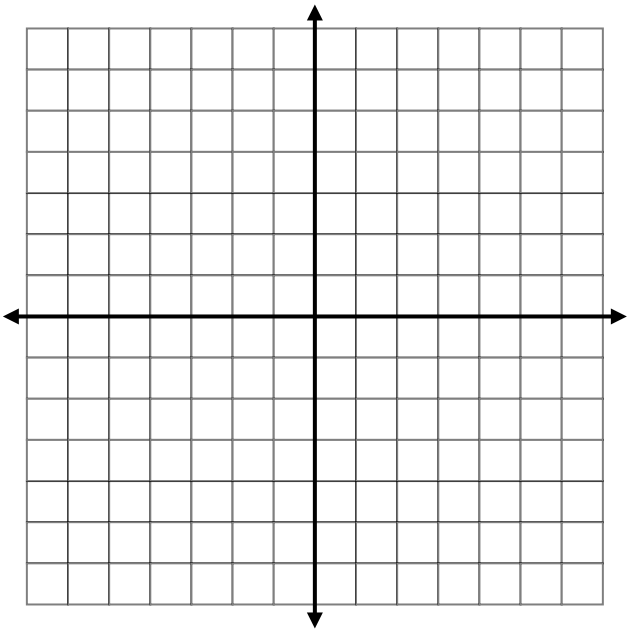
1.) Draw parallelogram *JACK* with coordinates *J*(1,-1), *A*(1,-5), *C*(5,-4), and *K*(5,0).

a.) Draw a reflection of *JACK* in the *x*-axis. Label the vertices of each image. What are the new coordinates?

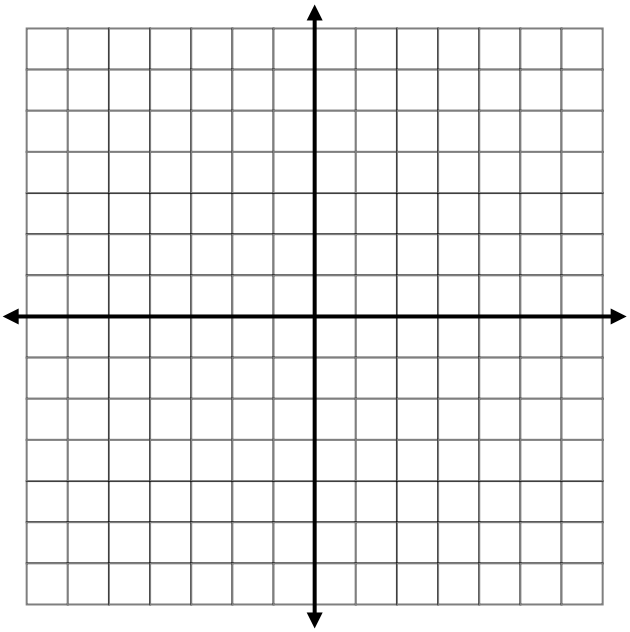
b.) Draw a reflection of *J'A'C'K'* in the *y*-axis. Label the vertices of each image. What are the new coordinates?



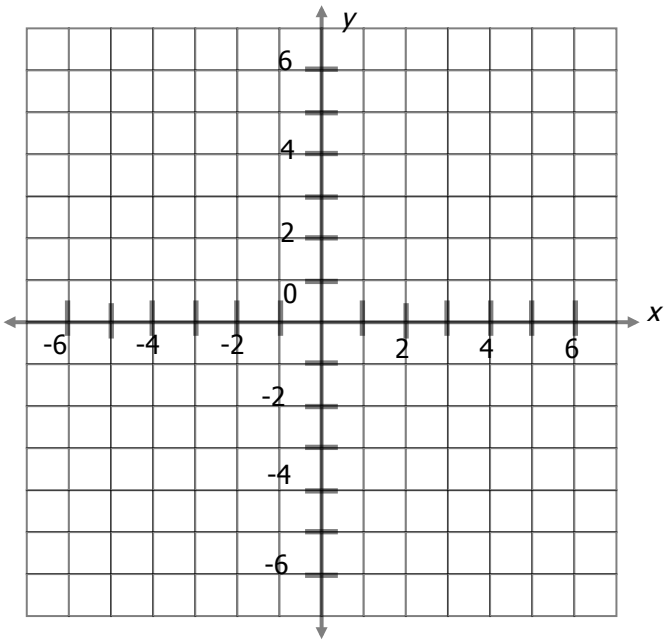
2.) Reflect rectangle *MIKE* with coordinates *M*(-3,1), *I*(-3,5), *K*(0,5), and *E*(0,1) over the line $x = 1$. State the coordinates of the image.



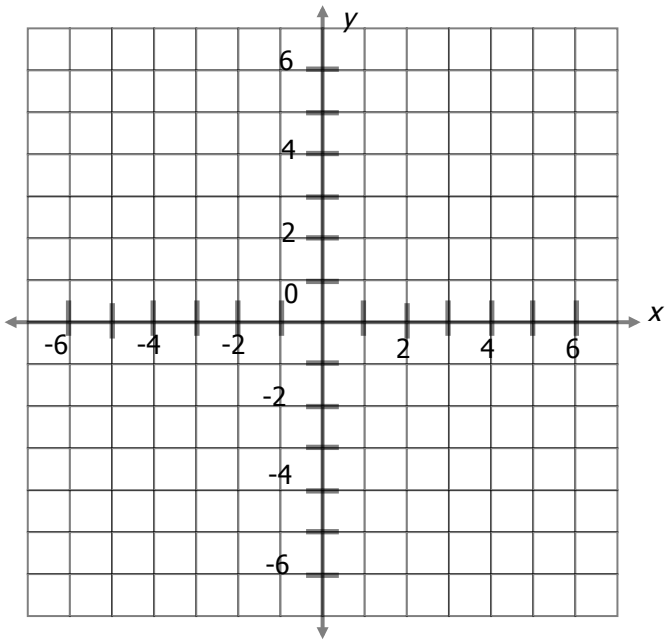
3.) Reflect Δ*JON* with coordinates *J*(1,1), *O*(-2,1), and *N*(-4,-3) over the line $y = 2$. State the coordinates of the image.



4.) Reflect pentagon *ERICA* with coordinates *E*(-1,3), *R*(2,5), *I*(4,4), *C*(4,1), *A*(2,1) over the line $x = -1$. State the coordinates of the image.



5.) Graph Δ*PAM* with coordinates *P*(-3,1), *A*(-7,-2), and *M*(-3,-2). Graph Δ*PAM* after a reflection in the line $y = -x$. State the coordinates of the image.



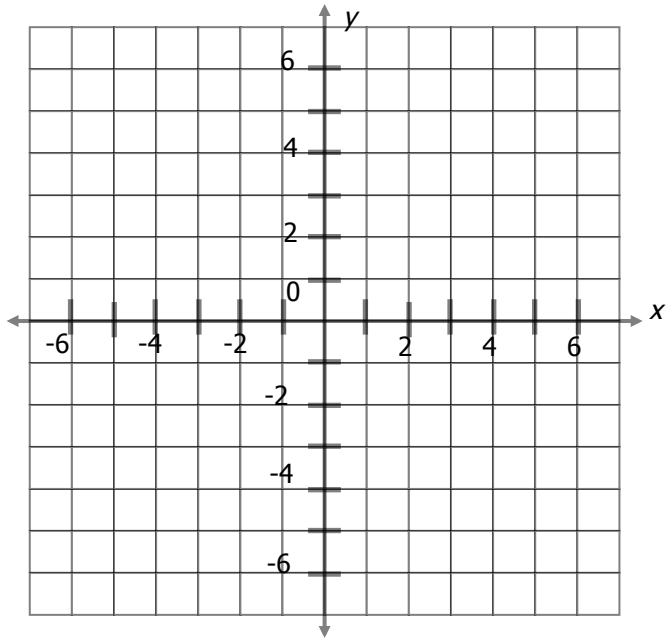
Section 2 – Dilations

Video Notes

What is a dilation?

How do you do a dilation?

1.) Graph rectangle *OLEG* *O*(-3,-3), *L*(-3,2), *E*(1,2), *G*(1,-3). Graph *O'L'E'G'* after a dilation with scale factor 2.



Properties of Dilations

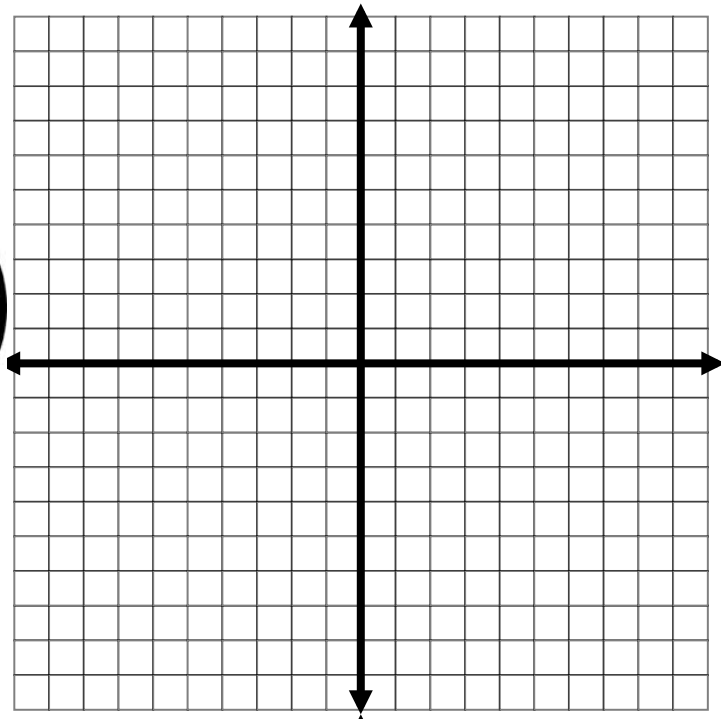
a.) _____

b.) _____

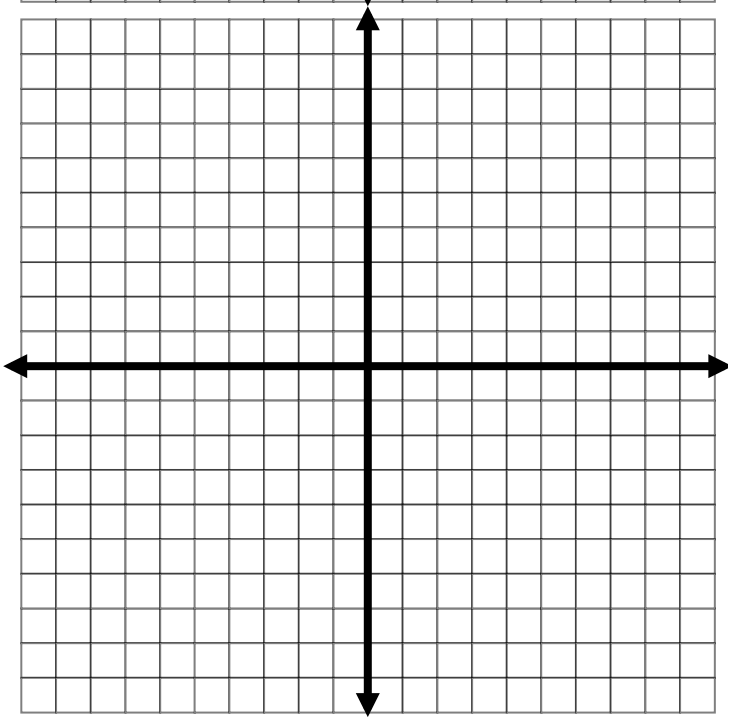
c.) _____

Section 2 Problem Set – Dilations

6.) Graph ΔCAM with coordinates C(1,1), A(3,1), and M(1,4). Then graph ΔC'A'M' after a dilation of scale factor 2. Write the coordinates of ΔC'A'M'.



7.) Graph pentagon RILEY with coordinates R(8,0), I(4,4), L(-8,4), E(-4,-4), and Y(4,-8). Then graph pentagon R'I'L'E'Y' after a dilation of scale factor ¼. Write the coordinates of pentagon R'I'L'E'Y'.



8.) What is the scale factor of a dilation that maps $(7,9) \rightarrow (56,72)$?

9.) If the perimeter of a rectangle is 12 and it is dilated with a scale factor of 3, what is the perimeter of the new rectangle? _____

10.) If the side of a triangle is 20 and it is dilated with a scale factor of $\frac{1}{5}$, what is the side of the new triangle? _____

Section 3 - Translations

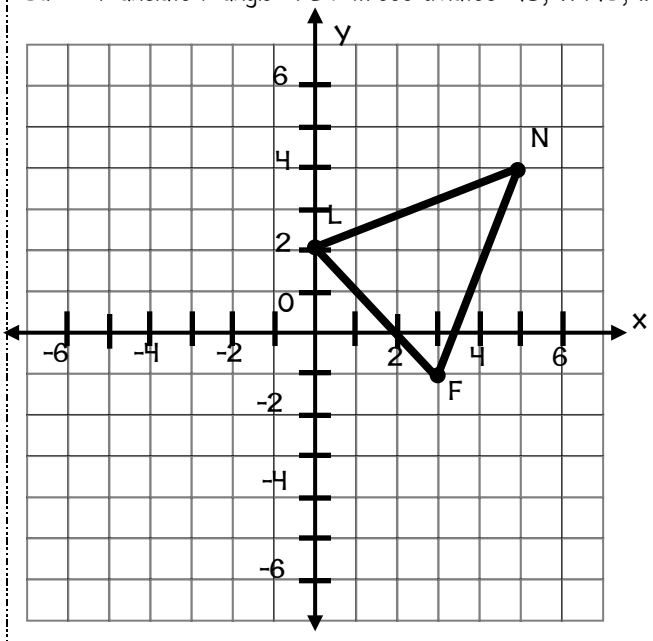
Video Notes

1.) **Translation:** A translation _____ the same figure in the same _____.

2.) How would the following translation affect a coordinate?

Translation	X-Coordinate	Y-Coordinate
Move to 8 units to the right		
Move 3 units to the left		
Move 9 units up		
Move 7 units down		

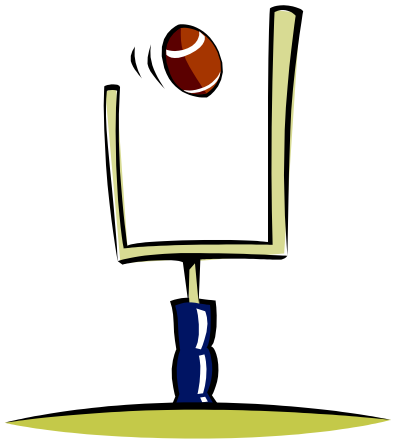
3.) Translate triangle NFL with coordinates N(5,4) F(3,-1) and L(0,2) 2 units to the right and 2 units down.



N' _____

F' _____

L' _____



4.) Two notations for left five, up six: _____ _____

5.) Two notations for right two, down eleven: _____ _____

6.) General form for a translation: _____ _____

Properties of Translations

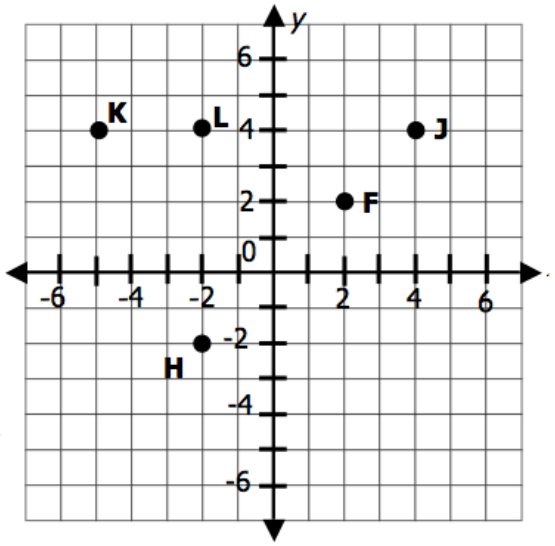
a.) _____

b.) _____

c.) _____

Section 3 Problem Set – Translations

Use the figure to the right to answer questions 11 – 14.



11.) Which point is the image of J after it is translated 9 units left?

(A) K (B) L (C) F (D) H

12.) Which point is the image of H after it is translated 6 units up?

(A) L (B) F (C) K (D) H

13.) Point J is translated using the following rule: $(x, y) \rightarrow (x-2, y-2)$. Which point is the image of J?

(A) L (B) F (C) K (D) H

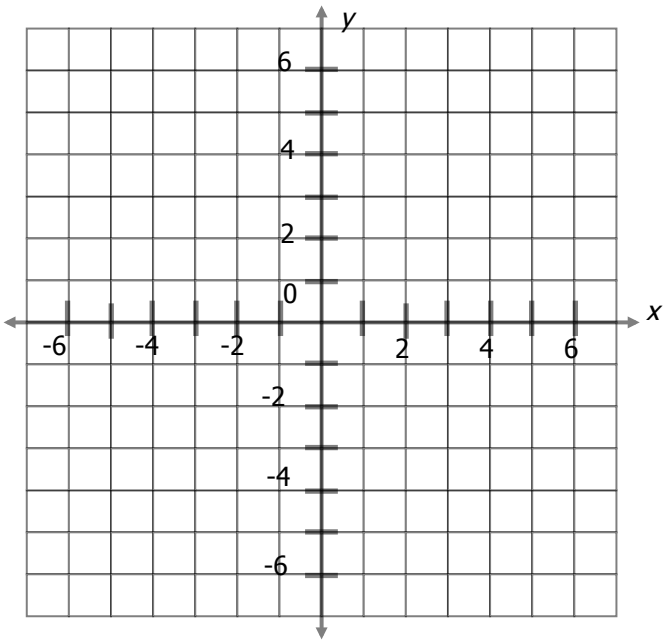
14.) Which describes how point K is translated to point F?

(A) 7 units right and 2 units down
(B) 7 units right and 2 units up
(C) 7 units left and 2 units down
(D) 7 units left and 2 units up

15.) Describe the translation $T_{5,-1}$ in words.

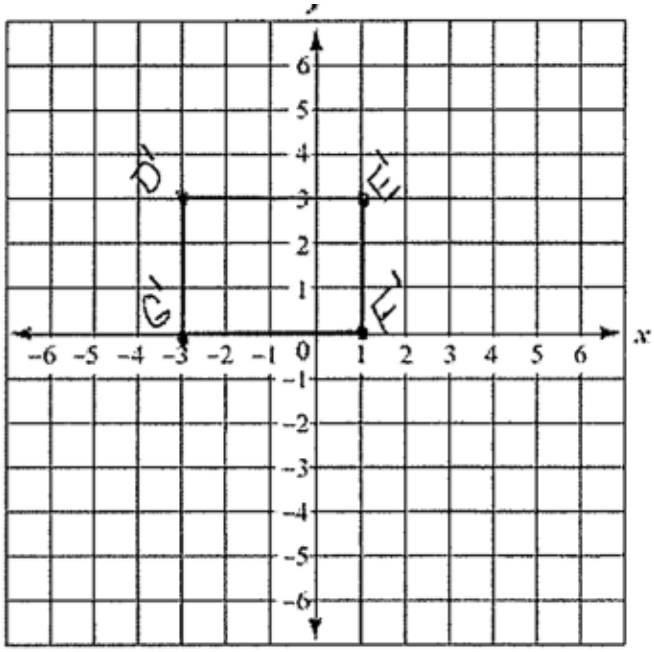
(A) 5 units right and 1 unit up
(B) 5 units right and 1 unit down
(C) 5 units left and 1 unit up
(D) 5 units left and 1 unit down

16.) Graph triangle ABC with coordinates A(-4,6), B(4,7), and C(0,3). Then, translate the figure six units down and two units to the right. Draw and label the translation of ΔABC in the coordinate plane. What are the coordinates of ΔA'B'C'?



17.) State the direction of the translation that maps $(x, y) \rightarrow (x + 4, y - 6)$.

18.) **Read me carefully!** Rectangle DEFG is graphed (not shown). This rectangle is translated right two and down three. The resulting image is shown. Find the coordinates of the pre-image.

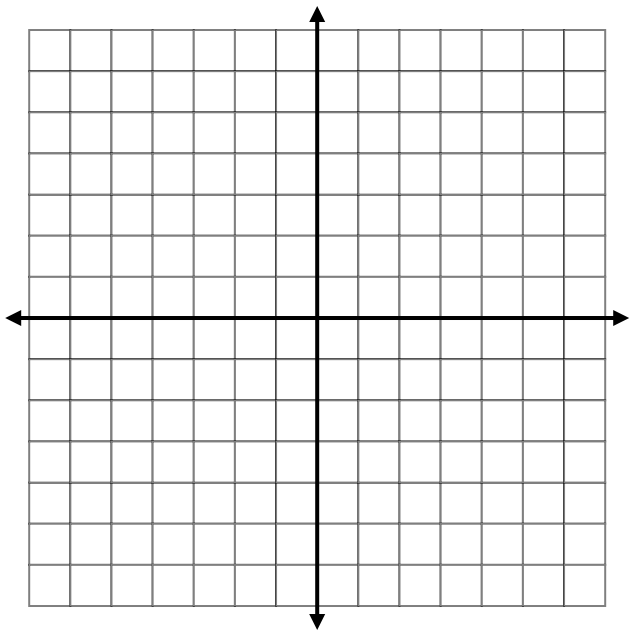


19.) The base of a box is at *ABCD*. It is moved by a translation to a new position *A'B'C'D'.* The table shows the position to which *A* was mapped. Find the new position of the other three vertices of the base in the table.

Original Point	A(4,1)	B(6,1)	C(6,-1)	D(4,-1)
Is Mapped to	A'(0,-2)	B'(,)	C'(,)	D'(,)

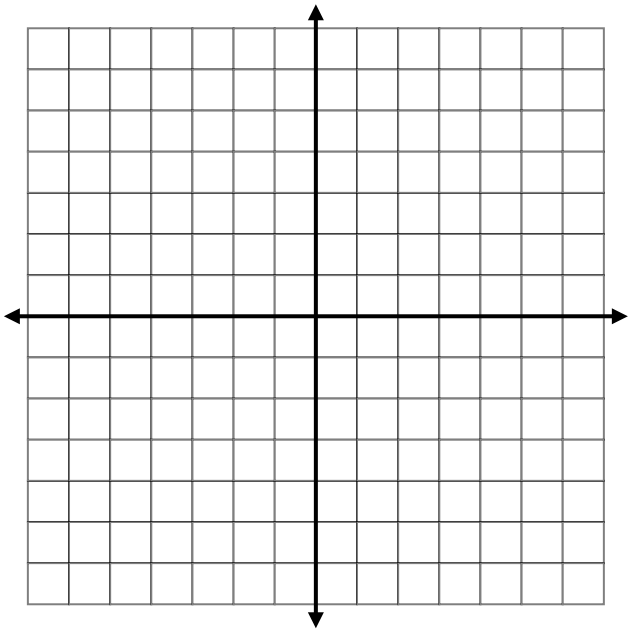
Write the notation for this translation: _____

20.) Graph pentagon MIRKA with coordinates M(1,1), I(4,5), R(7,5) K(7,0), A(4,0). Then graph pentagon M'I'R'K'A' after a translation of $T_{-8,2}$. What are the coordinates of the image?

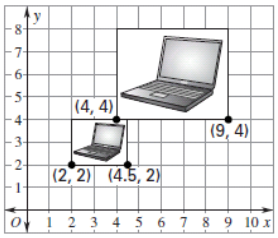


Mixed Problems From Sections 1 through 3

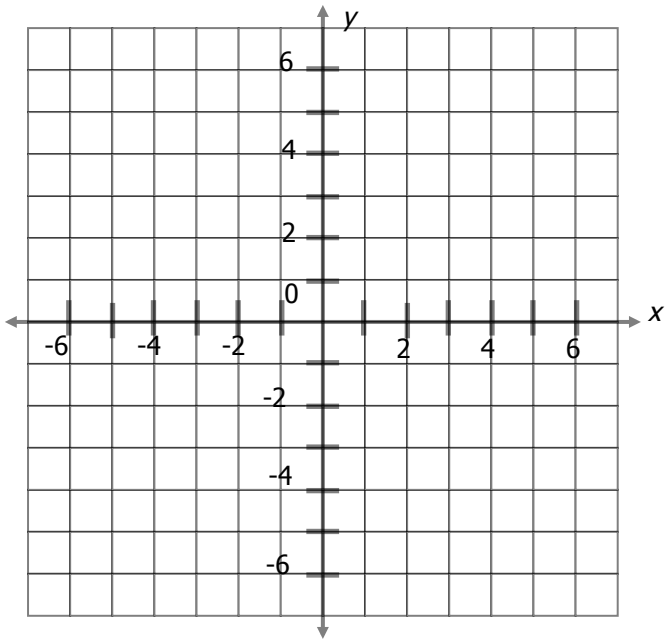
21.) Graph Δ*SAM* with coordinates *S*(0,3), *A*(2,5), and *M*(1,7) on the set of axes to the right. Reflect Δ*SAM* over the line $y = x$. What are the coordinates of the image?



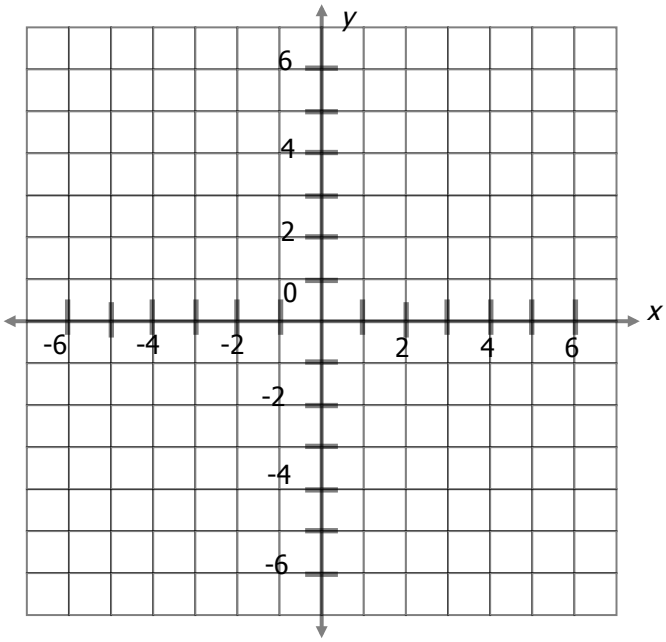
22.) Taylor uses a computer program to shrink a picture, as shown. What is the scale factor of dilation?



23.) Draw ΔABC with coordinates A(-2,1), B(-7,1), and C(-4,3). Then, draw the reflection of ΔABC in the line $y = -x$. Label the vertices of each image. What are the new coordinates?



24.) Graph trapezoid *RYAN* *R*(-6,6), *Y*(-3,-3), *A*(3,-3), *N*(6,6). Then graph it under a dilation with a scale factor of $\frac{2}{3}$.

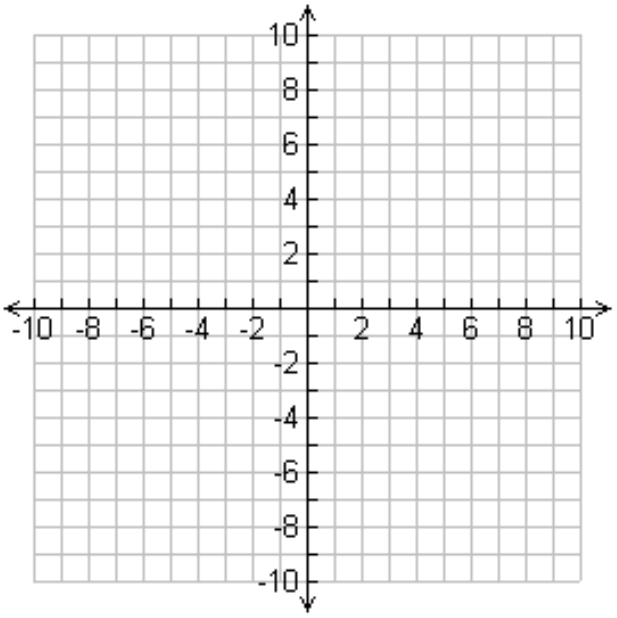


Section 4 – Parent Functions and Piecewise Functions

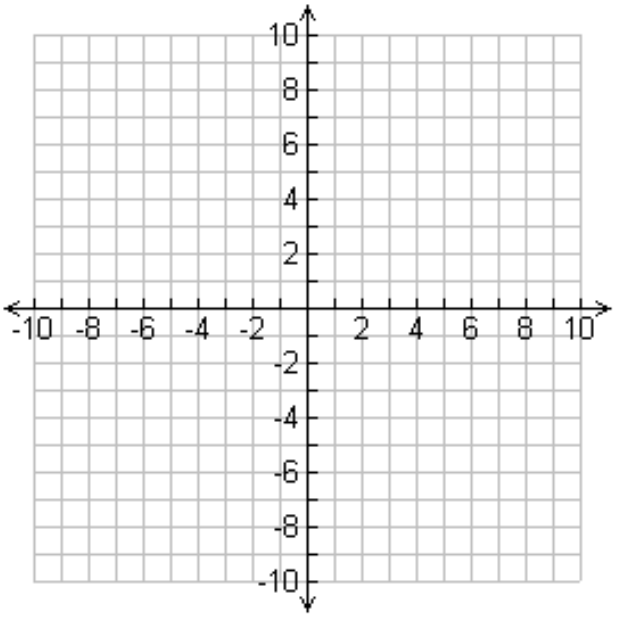
Video Notes

Graph the following parent functions:

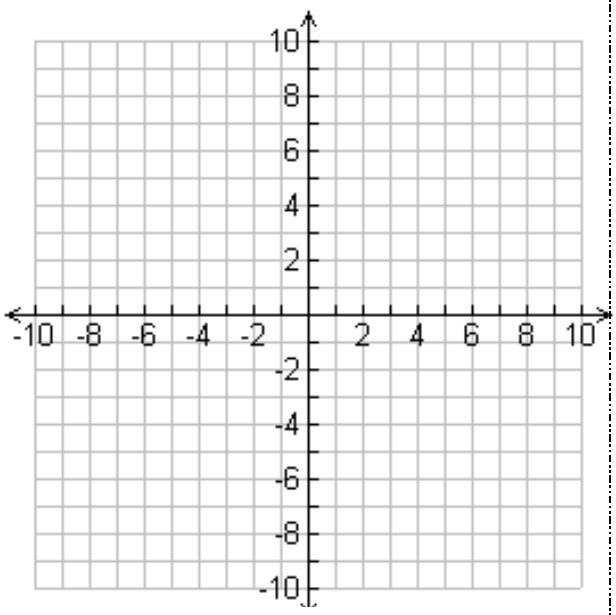
1.) $y = x$



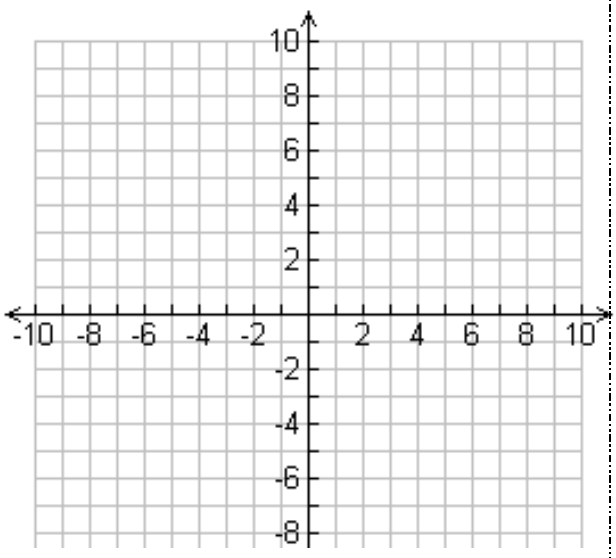
2.) $y = |x|$



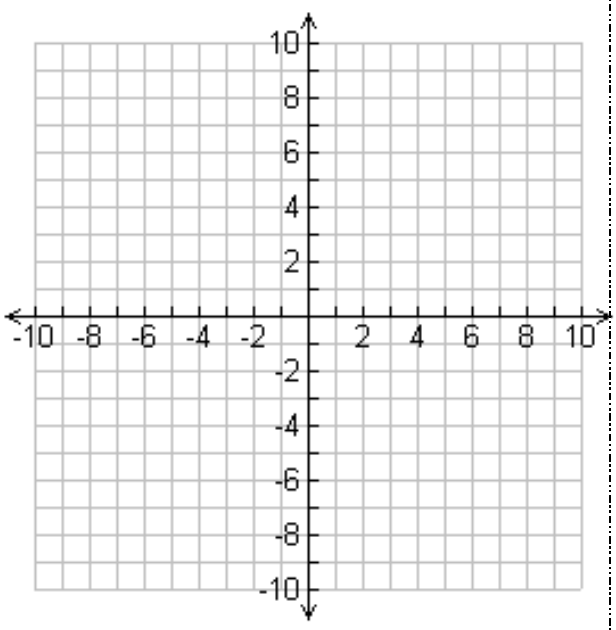
3.) $y = 2^x$



4.) $y = \sqrt{x}$

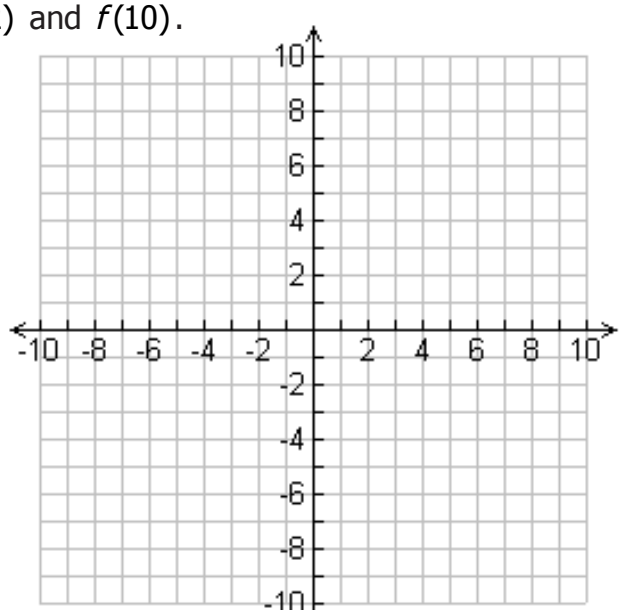


4.) $y = x^2$



Graph the following piecewise functions. Also, find $f(-2)$ and $f(10)$.

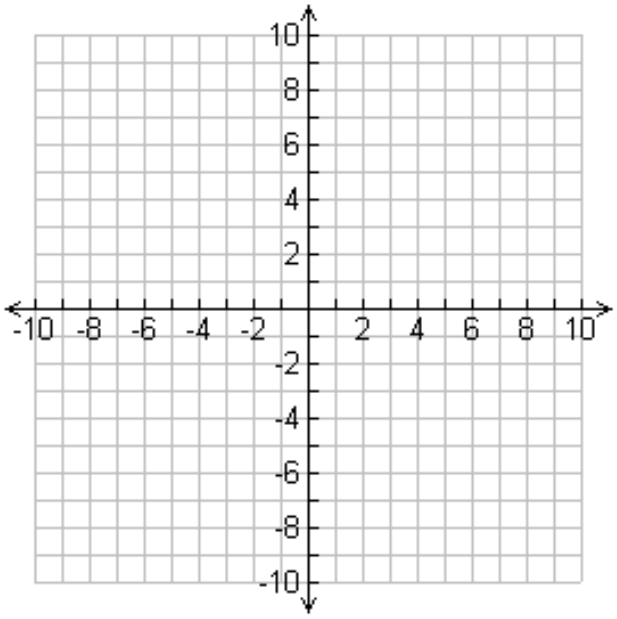
5.) $f(x) = \begin{cases} 3x+2, & x \le 2 \\ -4, & x > 2 \end{cases}$



$f(-2) =$ _____

$f(10) =$ _____

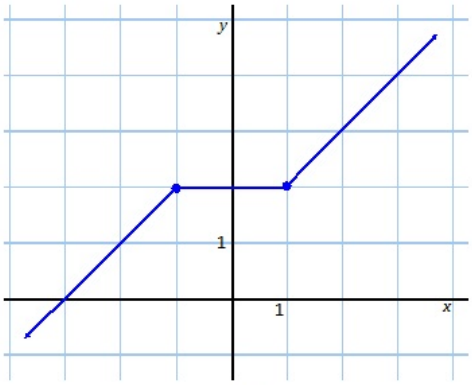
6.) $f(x) = \begin{cases} 3, & x \le -2 \\ -2-3x, & -2 < x < 3 \\ x^2-5, & x \ge 3 \end{cases}$



$f(-2) =$ _____

$f(10) =$ _____

7.) Write a piecewise function that matches the graph below.

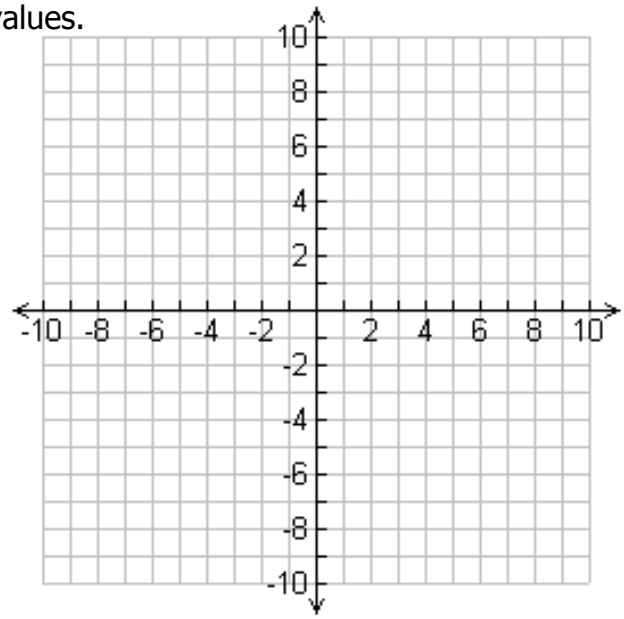


Graph of k

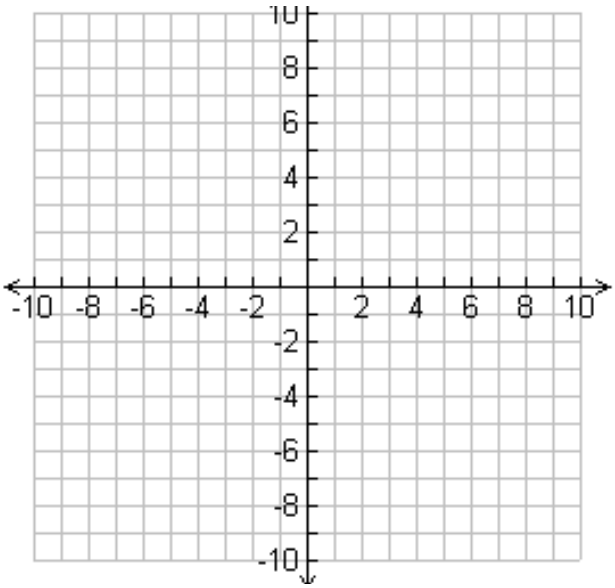
Section 4 Problem Set – Piecewise Functions

Graph each of the following functions. Include a table of values.

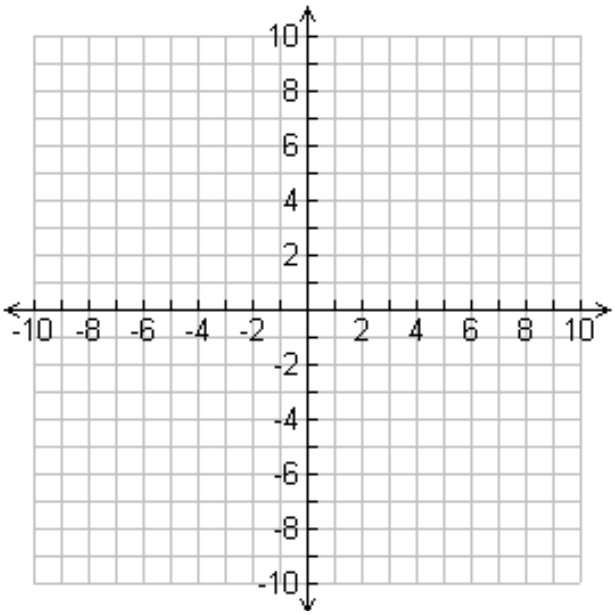
25.) $f(x) = x^3$, $-2 \le x \le 2$



26.) $f(x) = 3^x$, $-2 \le x \le 2$

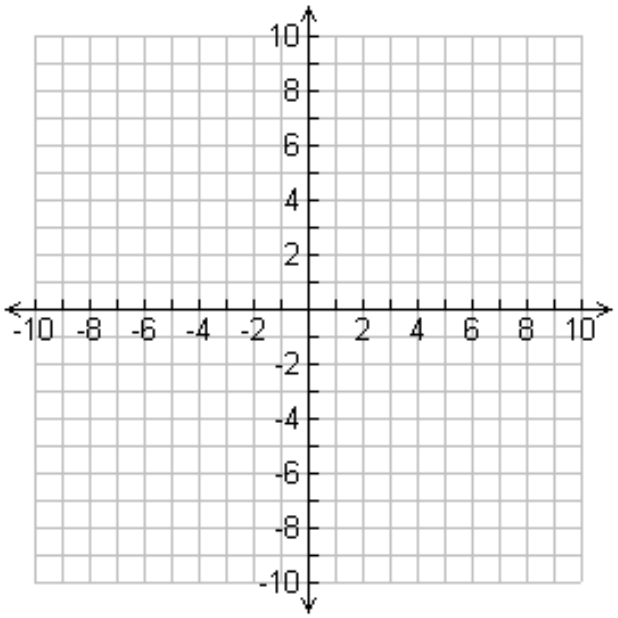


27.) $f(x) = \sqrt[3]{x}$, $-8 \le x \le 8$



Graph each of the following. Be sure to identify the endpoints. Also, find $f(-3)$ and $f(14)$.

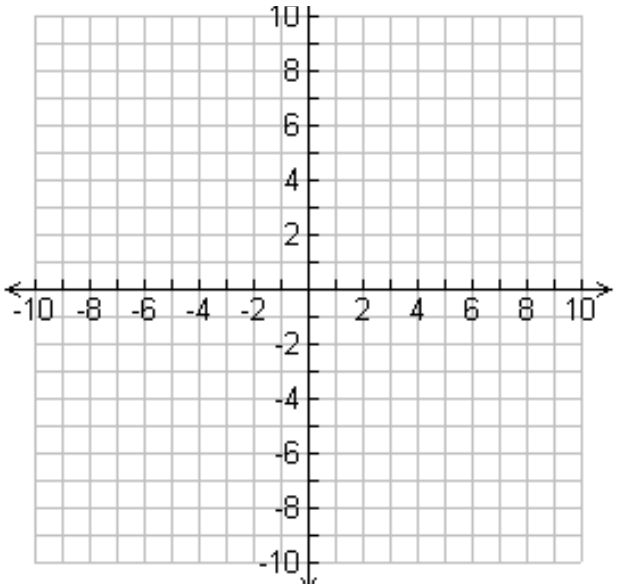
28.) $f(x) = \begin{cases} -2x - 4, & x \geq 1 \\ x + 4, & x < 1 \end{cases}$



$f(-3) =$ _____

$f(14) =$ _____

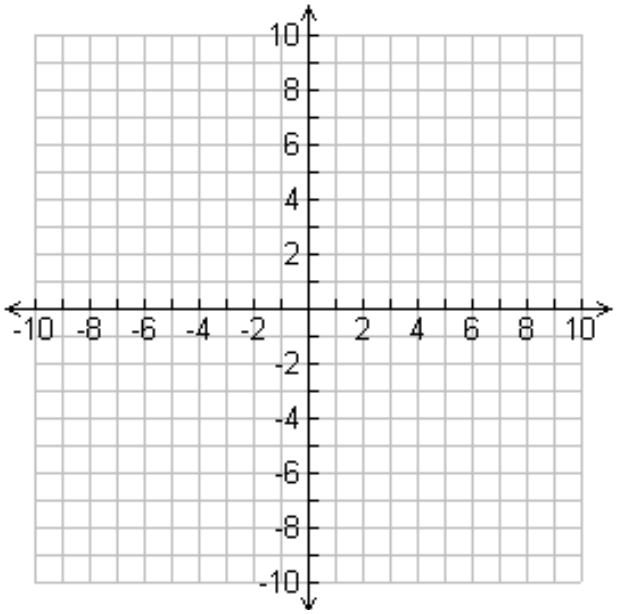
29.) $f(x) = \begin{cases} -2x - 5, & x \leq 2 \\ \frac{1}{2}x + 5, & x > 2 \end{cases}$



$f(-3) =$ _____

$f(14) =$ _____

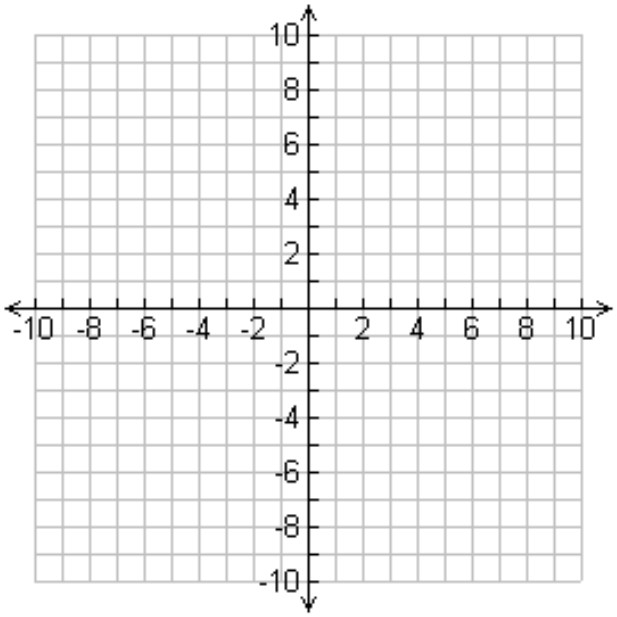
30.) $f(x) = \begin{cases} -x^2 - 2, & x \leq 0 \\ -1 & x > 0 \end{cases}$



$f(-3) =$ _____

$f(14) =$ _____

31.) $f(x) = \begin{cases} 3x-2, & x \le -2 \\ x^2+1, & -2 < x < 1 \\ 6, & x \ge 1 \end{cases}$

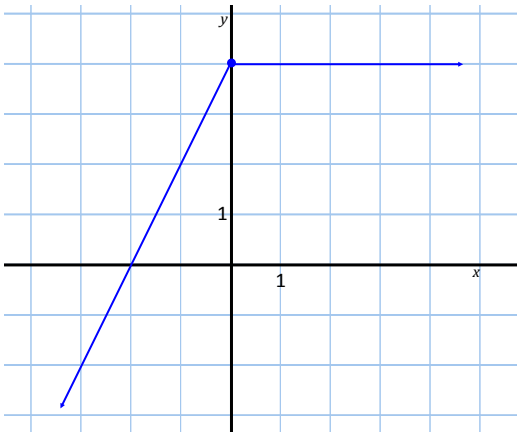


$f(-3) =$ _____

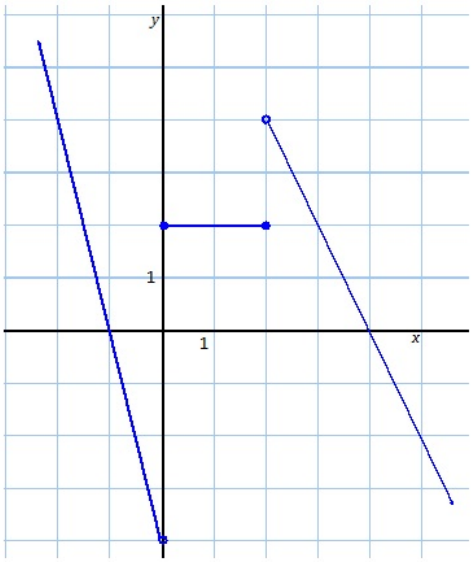
$f(14) =$ _____

Write a piecewise function for each graph below.

32.)

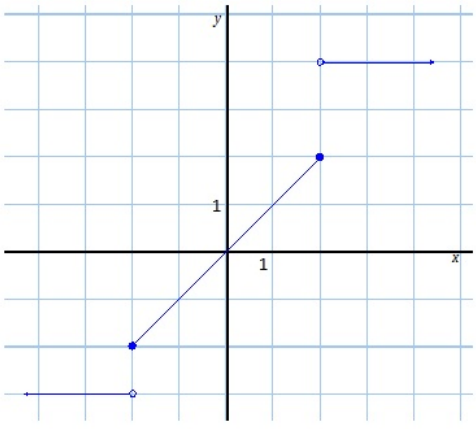


33.)



Graph of h

34.)



Graph of p