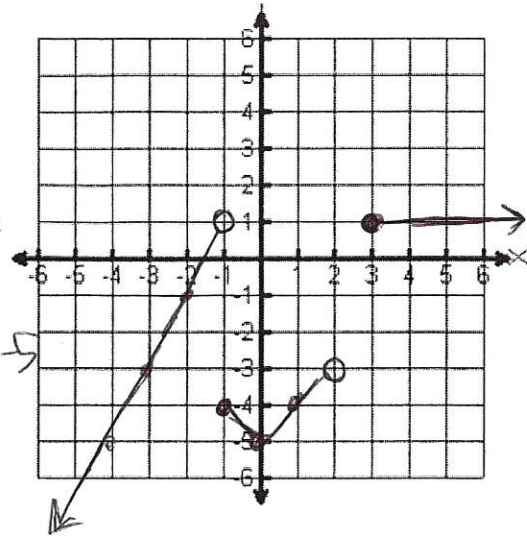


Name: Key Hr: _____

4.5 Graphing Piecewise Functions with Three Pieces

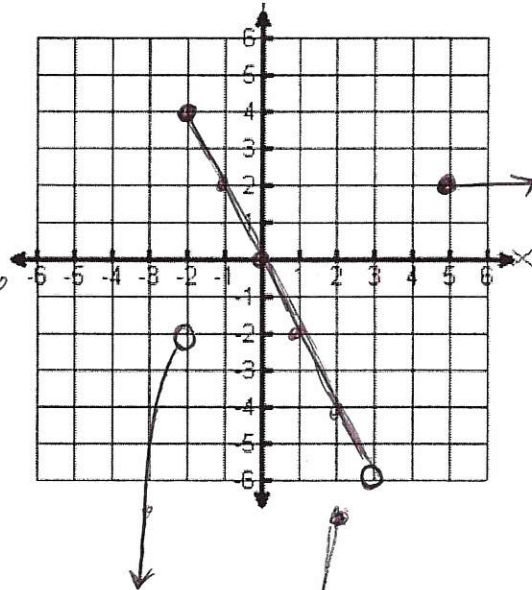
1. $f(x) = \begin{cases} 2x+3, & x < -1 \\ |x|-5, & -1 \leq x < 2 \\ 1, & x \geq 2 \end{cases}$

evaluate: $f(1) = \underline{-4}$ $||-5 = |-5| = -4$
 $f(6) = \underline{1}$
 $f(0) = \underline{-5}$ $||-5 = -5$



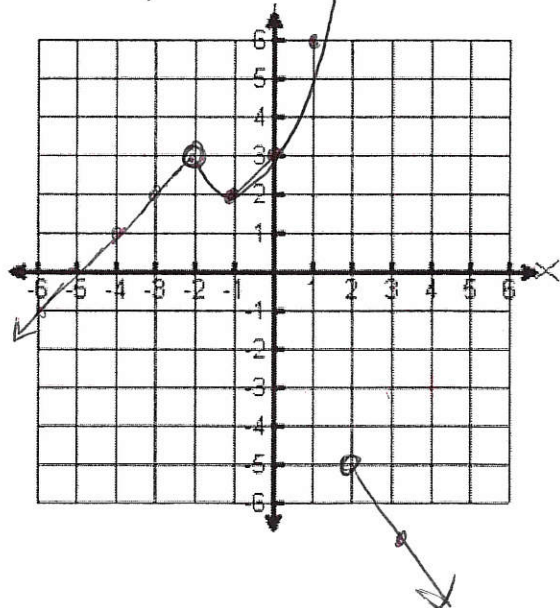
2. $f(x) = \begin{cases} 2, & x \geq 5 \\ -2x, & -2 \leq x < 3 \\ 2-x^2, & x < -2 \end{cases}$

evaluate: $f(-4) = \underline{-14}$ $2 - (-4)^2 = 2 - 16 = -14$
 $f(-2) = \underline{4}$ $-2(-2) = 4$
 $f(1) = \underline{-2}$ $-2(1) = -2$



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

evaluate: $f(3) = \underline{-7}$ $-2(3) - 1 = -6 - 1 = -7$
 $f(-4) = \underline{1}$ $-4 + 5 = 1$
 $f(-2) = \underline{3}$ $(-2+1)^2 + 2 = (-1)^2 + 2 = 1 + 2 = 3$



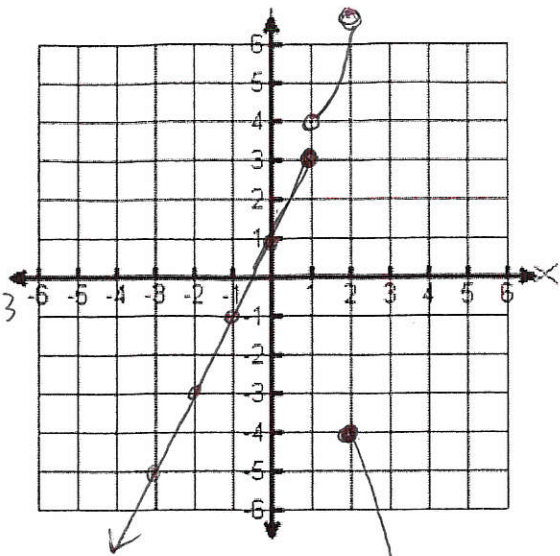
$$5. f(x) = \begin{cases} 2x+1, & x \leq 1 \\ x^2+3, & 1 < x < 2 \\ -x^2, & x \geq 2 \end{cases}$$

evaluate:

$$f(-2) = \boxed{-3} \quad 2(-2)+1 = -4+1 = -3$$

$$f(6) = - (6)^2 = \boxed{-36}$$

$$f(1) = \boxed{3} \quad 2(1)+1 = 2+1 = 3$$



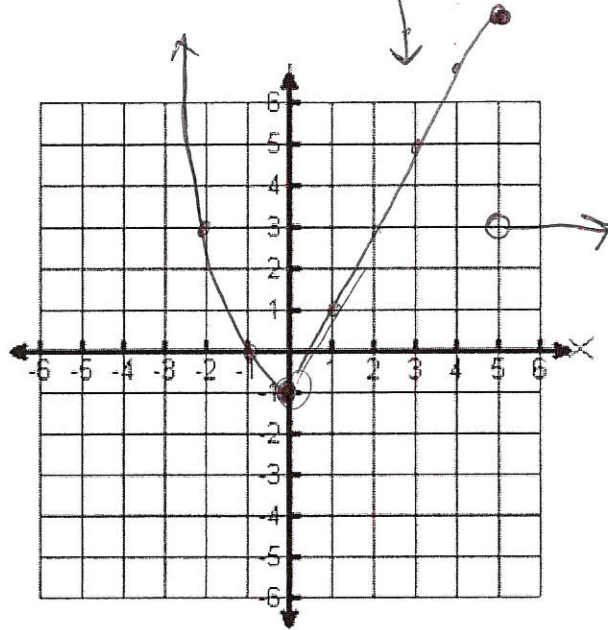
$$6. f(x) = \begin{cases} x^2-1, & x \leq 0 \\ 2x-1, & 0 < x \leq 5 \\ 3, & x > 5 \end{cases}$$

evaluate:

$$f(-2) = 3 \quad (-2)^2-1 = 4-1 = 3$$

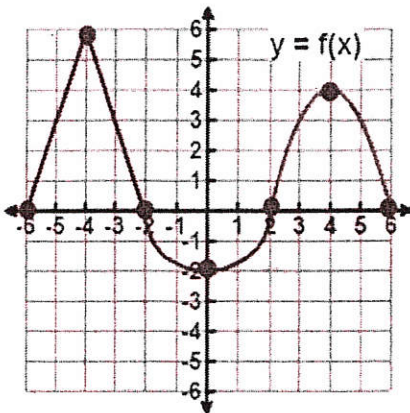
$$f(0) = -1 \quad 0^2-1 = -1$$

$$f(5) = 9 \quad 2(5)-1 = 10-1 = 9$$



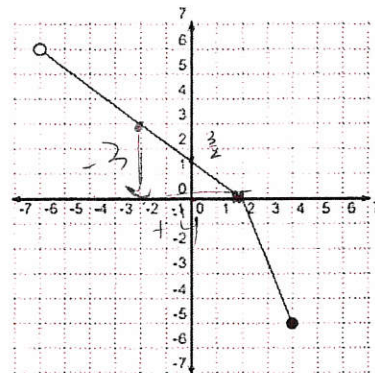
Part II. Write equations for the piecewise functions whose graphs are show below.

7.



$$f(x) = \begin{cases} -3|x+4|+6, & -6 \leq x \leq -2 \\ \frac{1}{2}x^2-2, & -2 < x < 2 \\ -(x-4)^2+4, & 2 \leq x \leq 6 \end{cases}$$

8.



$$f(x) = \begin{cases} -\frac{3}{4}x + \frac{3}{2} \\ -\frac{3}{4}x + \frac{3}{2} \\ -\frac{5}{2}x + 5 \end{cases}$$

$$f(x) = \begin{cases} -\frac{3}{4}x + \frac{3}{2} & -6 < x \leq 2 \\ -\frac{5}{2}x + 5 & 2 \leq x \leq 4 \end{cases}$$

9. You have a summer job that pays time and a half for overtime. (i.e. if you work more than 40 hours). After that it is 1.5 times your hourly rate of \$7.00/hr.

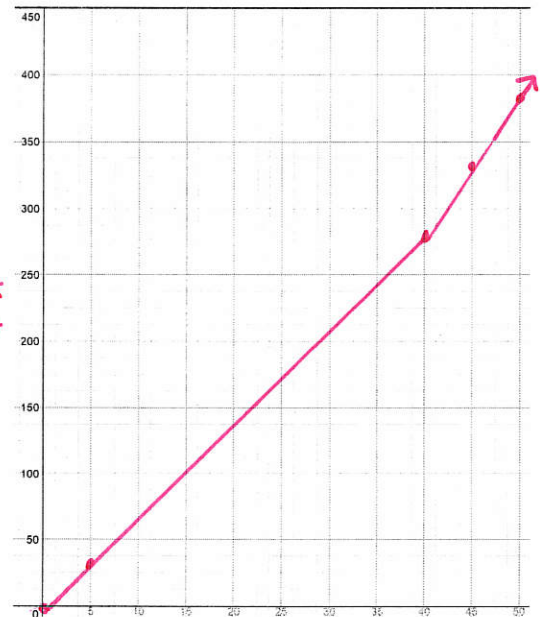
- a. Write a piecewise function that gives your weekly pay P in terms of the number of hours you worked h .

$$P(h) = \begin{cases} 7h & 0 \leq h \leq 40 \\ 280 + 10.5(h-40) & 40 < h \leq 168 \end{cases}$$

10.5h or -140

- b. Graph your piecewise function.

hrs
in 1 week



- c. How much will you make if you work 45 hours?

$$P(45) = 10.5(45) - 140 = \$332.50$$

or

$$7(40) + 10.5(5) = \$332.50$$

10. Write a piecewise function to represent the following internet providers' service charges.

Monthly Service charge: \$18.00
 First 50 hours of usage: Free
 Next 50 hours of usage: \$0.25/hour
 Over 100 hours of usage: \$1.00/hour

$$C(h) = \begin{cases} 18, & 0 \leq h \leq 50 \\ 18 + 0.25(h-50) & 50 < h \leq 100 \\ 0.25h + 5.5 & \\ 18 + 0.25(50) + 1(h-100) & h > 100 \\ h - 69.5 & \end{cases}$$

Eqn 2: $18 + 0.25(h-50) = 18 + 0.25h - 12.5 = 0.25h + 5.5$

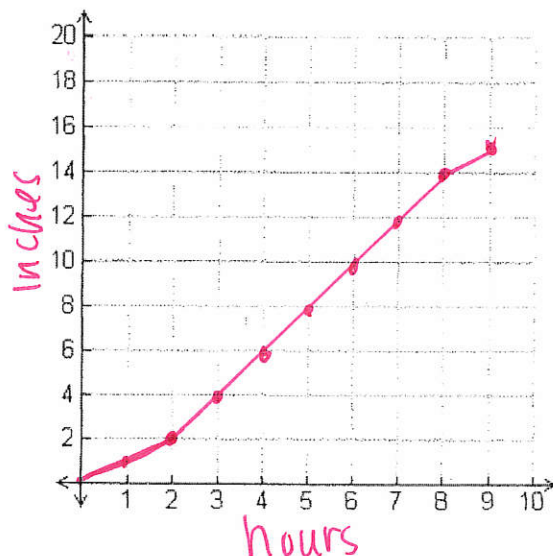
Eqn 3: $18 + 0.25(50) + 1(h-100) = 18 + 12.5 + h - 100 = h - 69.5$

11. During a nine hour snow storm it snows at a rate of one inch per hour for the first two hours, at a rate of two inches per hour for the next six hours, and at a rate of one inch per hour for the final hour.

- a. Write the piecewise function.

$$f(h) = \begin{cases} h, & 0 < h \leq 2 \\ 2h - 2, & 2 < h \leq 8 \\ h + 6, & 8 < h \leq 9 \end{cases}$$

- b. Graph the piecewise function. Label your axes.



Eqn 2: $2 + 2(h-2) = 2 + 2h - 4 = 2h - 2$

Eqn 3: $1(2) + 2(6) + 1(h-8) = 2 + 12 + h - 8 = 14 + h - 8 = h + 6$

- c. How much snow is there on the ground after seven hours?

$$f(7) = 2(7) - 2 = 14 - 2 = 12 \text{ inches}$$

