2.3 Piecewise Word Problems key

Topics 5

Name: _____

Date: _____ Hour: _____

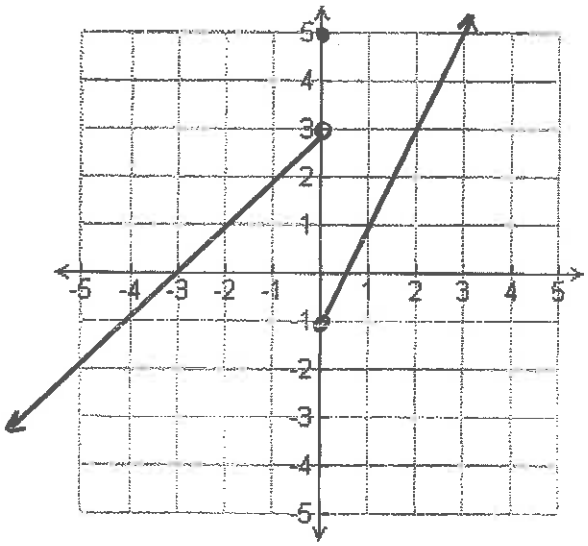
1. Graph the following function.

$$f(x) = \begin{cases} x+3 \text{ if } x < 0 \\ 5 \text{ if } x = 0 \\ 2x-1 \text{ if } x > 0 \end{cases}$$

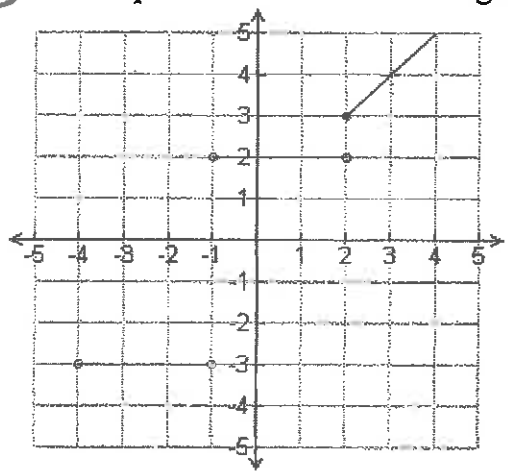
x	0	-1	-2
y	3	2	1

x	0
y	5

x	0	1	2
y	-1	1	3



2. Write a piecewise function for the graph.



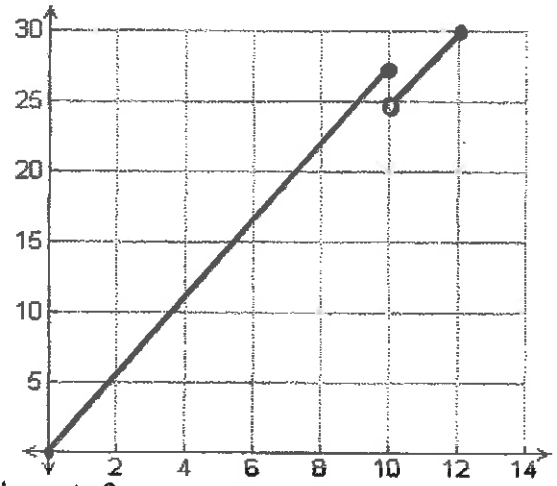
$$f(x) = \begin{cases} -3, \text{ if } x \leq -1 \\ 2, \text{ if } -1 < x < 2 \\ x+1, \text{ if } x \geq 2 \end{cases}$$

3. Erin buys gas at a self service station for $2.75 a gallon. The gas station has a promotion going on that anyone who buys more than 10 gallons of gas, only has to pay $2.50 per gallon. Erin's tank will hold 12 gallons of gas.

a. Write a rule for the total cost, C(g), as a function of g gallons of gas.

$$C(g) = \begin{cases} 2.75g, \text{ if } 0 \leq g \leq 10 \\ 2.50g, \text{ if } 10 < g \leq 12 \end{cases}$$

b. Graph the piecewise function.



c. What is the domain and range of the function in part a?

dom $[0, 12]$

range $[0, 30]$

4. A supermarket has a discount on "family packs" of meat. Chicken costs \$2.00/lb for packages over 5 lb. Smaller packages are \$2.50/lb. Express the cost as a function of weight.

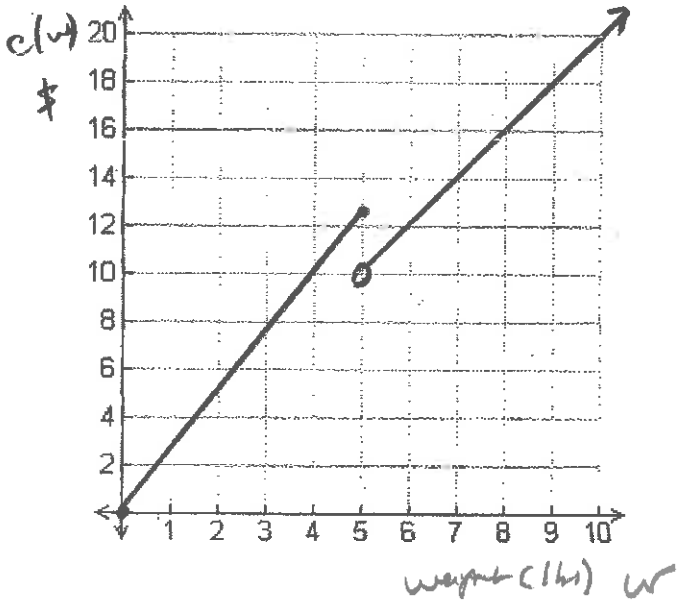
a. What are the dependent and control variables?

cost (\$) weight (lbs)

b. Write the piecewise function C(w).

$$C(w) = \begin{cases} 2.50w, & \text{if } 0 \le x \le 5 \\ 2.00w, & \text{if } x > 5 \end{cases}$$

c. Graph the function. Label your axis.



d. Find C(3.5) and C(6).

C(3.5) = \$8.75

C(6) = \$12

5. The amount of Social Security tax you pay, part of your Federal Insurance Contributions Act deductions, depends on your annual income. As of 1999 you pay 6.2% of your income if it is less than \$72,600. If your income is at least \$72,600, you pay a fixed amount of \$4501.20.

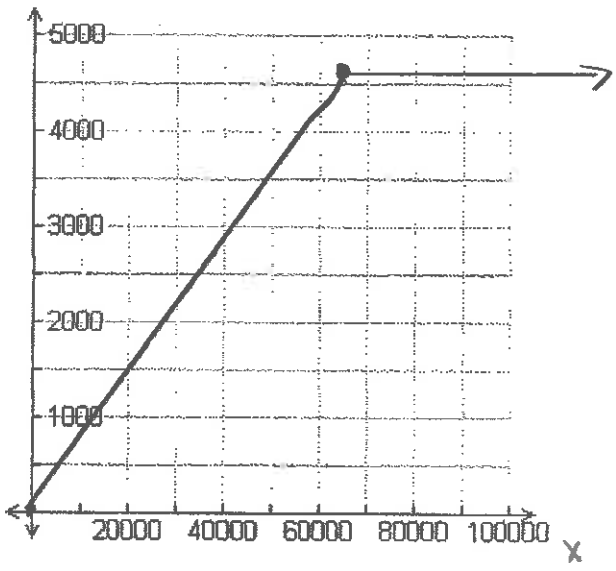
a. What are the control and dependent variables?

income \$ tax \$ f(x)

b. Write the piecewise function.

$$f(x) = \begin{cases} 0.062x, & \text{if } x < 72600 \\ 4501.20, & \text{if } x \ge 72600 \end{cases}$$

c. Graph the piecewise function. Label your axis.



d. If Ms. Howard, made \$33,000 last year, how much did she pay in social security?

f(33000) = \$2046

6. During a nine-hour snowstorm it snows at a rate of 1 inch per hour for the first two hours, at a rate of 2 inches per hour for the next six hours, and at a rate of 1 inch per hour for the final hour.

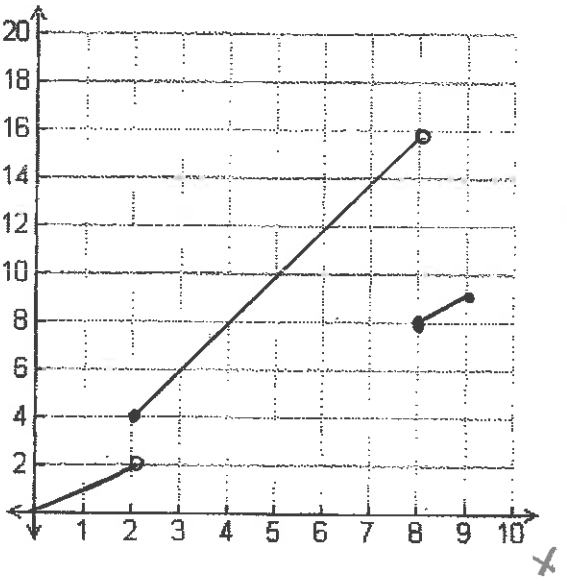
a. What are the dependent and control variables?

Snowfall (inches) t (hr)

b. Write the piecewise function.

$$f(x) = \begin{cases} x, & \text{if } 0 \le x < 2 \\ 2x, & \text{if } 2 \le x < 8 \\ x, & \text{if } 8 \le x \le 9 \end{cases}$$

c. Graph the piecewise function. Label your axis.



d. How much snow is there on the ground after 7 hours? Assume no snow at start

$f(2) + f(5) = 2 + 10 = 12$ inches

7. A cell phone company charges $49.99 a month for up to 500 minutes. If a family talks up to 600 minutes their bill jumps to $69.99 and if they talk up to 1000 minutes their bill is $99.99.

a. What are the dependent and control variables?

cost $ (per month) t (min)

b. Write a piecewise function.

$$f(x) = \begin{cases} 49.99, & \text{if } x \le 500 \\ 69.99, & \text{if } 500 < x \le 600 \\ 99.99, & \text{if } 600 < x \le 1000 \end{cases}$$

c. Graph the function. Label your axis.