

2.4 Applications of Piecewise Functions

SWBAT write and graphing piecewise functions given a real-life situation.

Writing a Piecewise Function

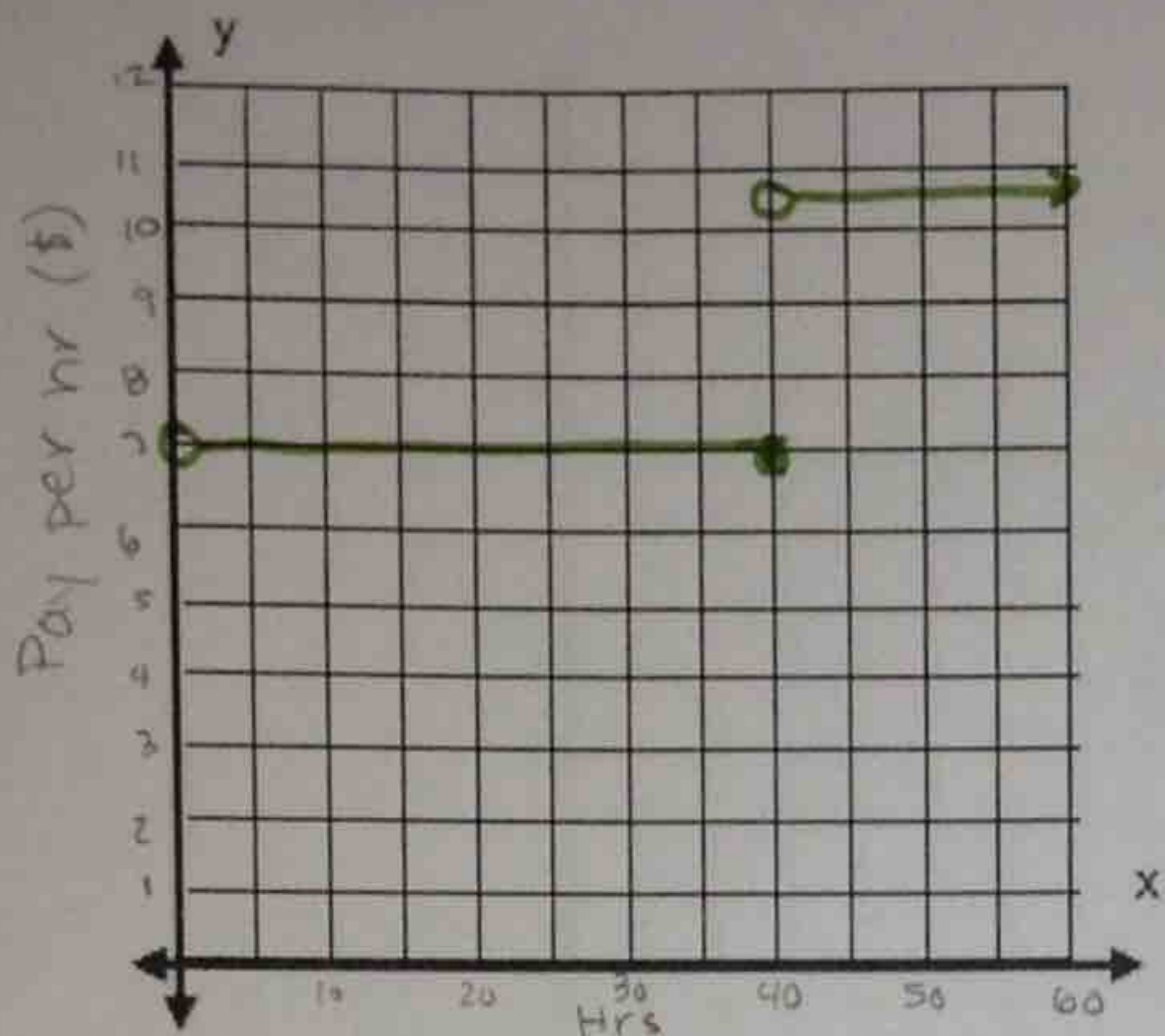
Write equations for the piecewise functions whose graph is shown.

Graph	Equation of Pieces	Domain for Pieces	Piecewise Function
	$y = mx + b$ $y = 1x + 2$ $y = 1x + 0$	$x < 0$ $x \geq 0$	$f(x) = \begin{cases} x + 2, & x < 0 \\ x, & x \geq 0 \end{cases}$
	$y = 4$ $y = x^2$ $y = 1x + 2$	$x < -2$ $-2 \leq x < 2$ $x \geq 2$	$f(x) = \begin{cases} 4, & \text{if } x < -2 \\ x^2, & \text{if } -2 \leq x < 2 \\ x + 2, & \text{if } x \geq 2 \end{cases}$
	$y = 1x + 2$ $y = 1$ $y = x^2$	$x < -1$ $-1 \leq x < 1$ $x \geq 1$	$f(x) = \begin{cases} x + 2, & \text{if } x < -1 \\ 1, & \text{if } -1 \leq x < 1 \\ x^2, & \text{if } x \geq 1 \end{cases}$
	$y = 1x + 2$ $y = 1x + 3$ $y = 1x + 1$	$x \leq 1$ $-1 < x < 1$ $x \geq 1$	$f(x) = \begin{cases} x + 2, & \text{if } x \leq 1 \\ x + 3, & \text{if } -1 < x < 1 \\ x + 1, & \text{if } x \geq 1 \end{cases}$

Using a Piecewise Function

You have a summer job that pays time and a half for overtime. That is, if you work more than 40 hours per week, your hourly wage for the extra hours is 1.5 times your normal hourly wage of \$7.

Write and graph a piecewise function that gives your weekly pay, P , in terms of the number, h hours you work.



0-40 hrs, \$7

40+ hrs, \$10.50

$$P(h) = \begin{cases} 7, & \text{if } 0 \leq h \leq 40 \\ 10.50, & \text{if } h > 40 \end{cases}$$

a. What is the domain?

$(0, \infty)$

b. What is the reasonable domain?

$(0, 84]$

84 hrs of work?

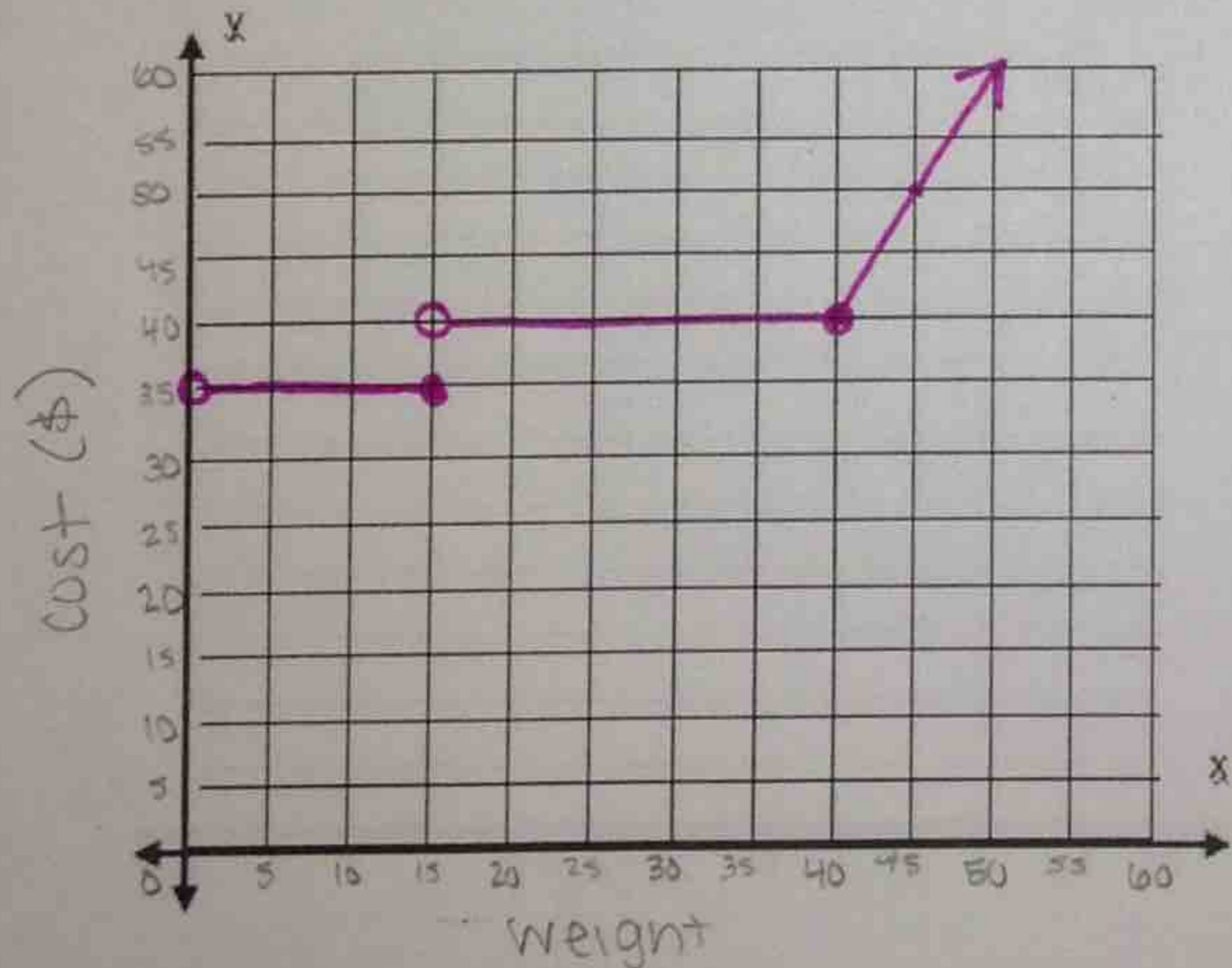
c. How much will you get paid if you work 45 hours?

$$40 \text{ hrs} \times \$7 = \$280$$

$$5 \text{ hrs} \times \$10.5 = \$52.50$$

$$45 \text{ hrs} = \$332.50$$

Your favorite dog groomer charges according to your dog's weight. If your dog is 15 pounds and under, the groomer charges \$35. If your dog is between 15 and 40 pounds, she charges \$40. If your dog is over 40 pounds, she charges \$40, plus an additional \$2 for each pound.



$$C(w) = \begin{cases} 35, & \text{if } 0 < w \leq 15 \\ 40, & \text{if } 15 < w \leq 40 \\ 2w - 40, & \text{if } w > 40 \end{cases}$$

$$\begin{aligned} \text{over 40 lbs} &= 40 + 2(w - 40) \\ &= 40 + 2w - 80 \\ &= 2w - 40 \end{aligned}$$

a. What is the domain?

$(0, \infty)$

b. What is the reasonable domain?

$(0, 200]$

200 lbs dog?

c. What would you be charged if your dog weighed 60 lbs?

$$2(60) - 40$$

$$= 120 - 40$$

$$= \$80$$

\$80