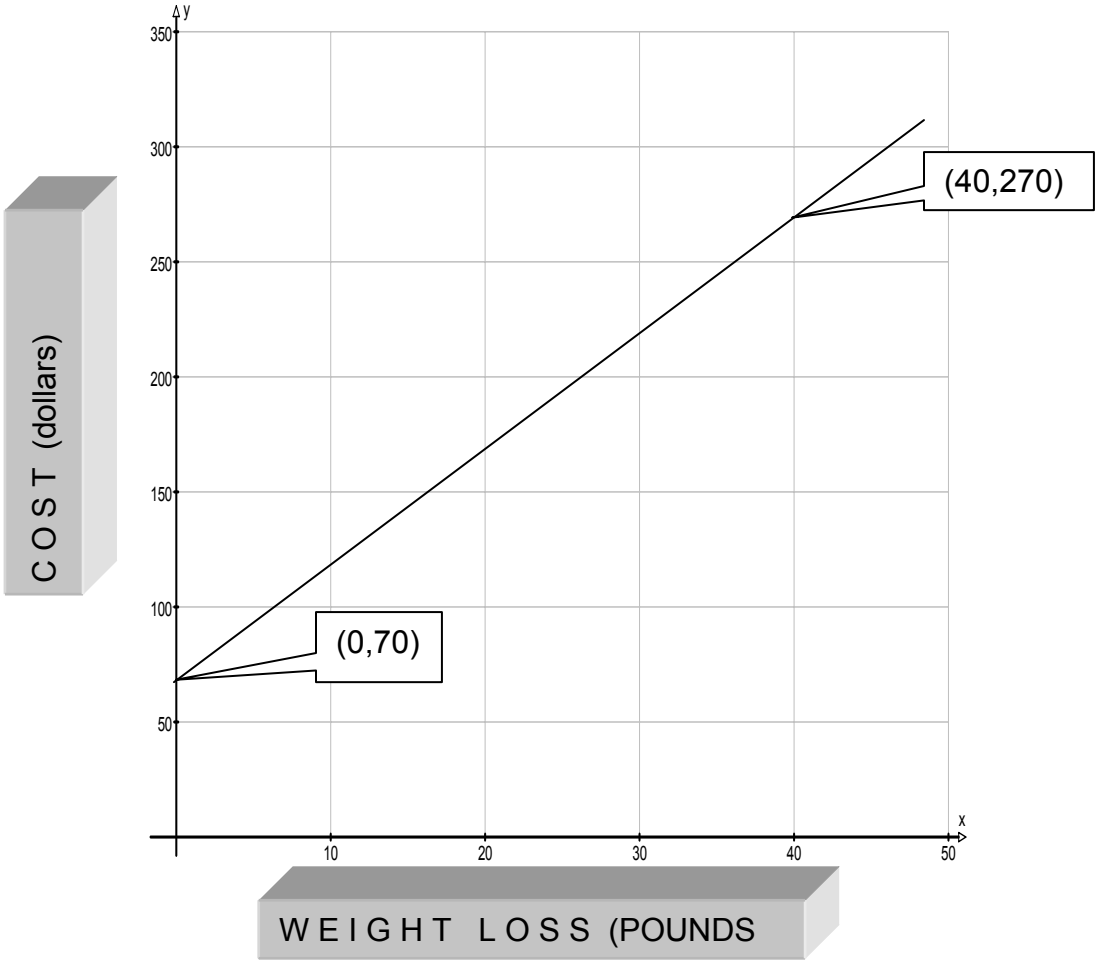
An Application of the Point – Slope Form

At a weight-loss clinic clients are charged a one-time membership fee and also by the amount of weight lost. The graph below shows a client's cost of losing weight.



a. Find the equation that represents the cost for a client who loses x pounds.

b. Use the equation to determine the cost of losing 35 pounds.

c. If a person has $150 dollars to spend, how much weight might be lost?

d. What is the meaning of the y-intercept?

e. What is the meaning of the slope in this problem?

Answer

a. Find the equation that represents the cost for a client who loses x pounds.

To find the equation we will use the point-slope form of a straight line.

$y - y_1 = m(x - x_1)$ Let's think of (0, 70) as point #1 and (40, 270) as point #2.

So, $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{270 - 70}{40 - 0} = \frac{200}{40} = \frac{5}{1} = 5$

So, $y - y_1 = m(x - x_1)$ becomes

$y - 70 = 5(x - 0)$ or $y = 5x + 70$

We could also write $C(x) = 5x + 70$ ← Answer

b. Use the equation to determine the cost of losing 35 pounds.

Here, x = 35, so we get $C(35) = 5 \bullet 35 + 70 = \$245$ ← Answer

c. If a person has $150 dollars to spend, how much weight might be lost? Here the value of y or C(x) is 150, so $C(x) = 5x + 70$ becomes

150 = 5x + 70 and solving for x gives 5x = 80 or x = 16 pounds.

d. What is the meaning of the y-intercept?

The y-intercept is 70 and this is the cost for losing 0 pounds – that is, it is the one-time membership fee.

e. What is the meaning of the slope in this problem?

The slope is 5 = $\frac{5}{1} = \frac{5 \text{ (dollars)}}{1 \text{ (pound)}}$. In other words, it costs $5 to lose 1 pound.