

Desmos Practice Task Solution

A business wants to manufacture bike bells for kids. Before they start production, they need to make sure they can make a profit with the materials and labor force they have. Their accountant has given them some approximate numbers. Fixed costs including salaries, insurance, rent, equipment, and so on for the year is approximately \$35,000. Each bell will cost \$0.85 and can be sold for \$1.55. How much profit would the company make if they produced 25,000 bells? 70,000 bells?

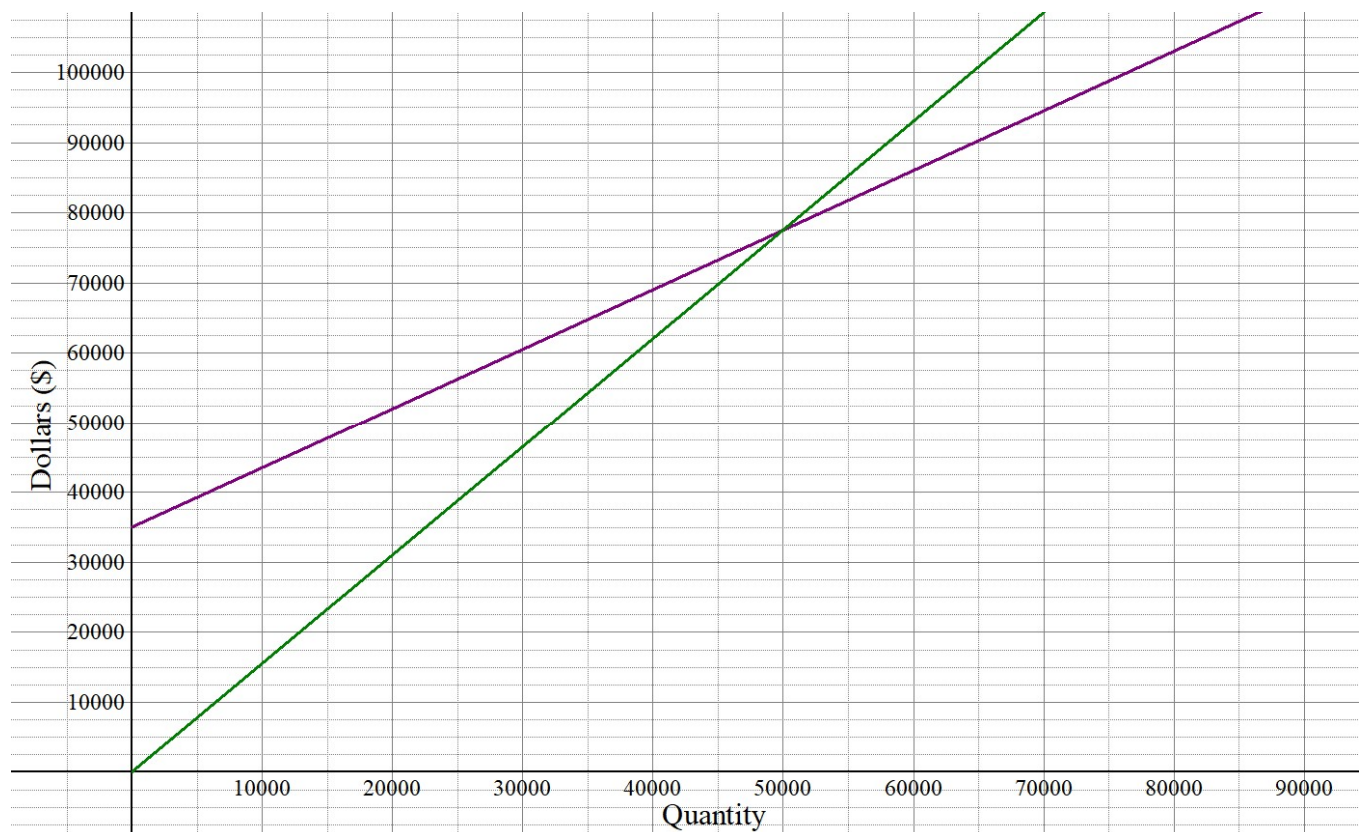
Let's start by creating a cost equation. If we assume that x represents the number of bells produced, then we know that the cost of producing bells is $0.85x$. The \$35,000 is a cost that we must pay regardless of how many frames we produce and must be added onto the end of the equation that we've created. So, our cost equation is $C(x) = 0.85x + 35000$. The $C(x)$ is a mathematical way of stating the cost of an unknown amount of bells.

The revenue will be \$1.55 per unit sold, so we know the revenue of producing bells is $1.55x$. Nothing is earned if nothing sells, so we will add nothing to the end of our revenue equation. So, our revenue equation is $R(x) = 1.55x$.

Let's graph our equations on a coordinate plane where the y -axis will represent dollars, and the x -axis will represent quantity of units.

$$C(x) = 0.85x + 35,000$$

$$R(x) = 1.55x$$



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The break-even point is where the cost of producing items is equal to the revenue. In our graph, that is the place where the graphs meet. If we look closely (or use Desmos), we can see that this happens when the quantity is 50,000 and the cost and revenue are both \$77,500.

All units produced after 50,000 units will produce a profit. If the company stopped production prior to 50,000 units, the result would be a loss.

We know that at 25,000 bells, the company would lose money. To determine the loss at any value, one would need to subtract the value of the revenue function from the value of the cost function at any number of units. For example, the loss at 25,000 units is $0.85(25000) + 35000 - 1.55(25000) = 17500$. So, the company would lose \$17,500 if they stopped production after 25,000 units according to the model.

We know that at 70,000 bells, the company will make a profit. To determine the profit at any value, one would need to subtract the value of the cost function from the value of the revenue function at any number of units. For example, the profit at 70,000 units is $1.55(70000) - (0.85(70000) + 35000) = 14,000$. So, the company would have profits of \$14,000 after selling 70,000 units.