

Quadratics in context: Leon scrubs up

Leon has a car grooming business.

His market research shows that he will get 200 cars per week to clean if he does it for free.

The number of cars he gets drops off by 25 for every \$5.00 he adds onto the price.



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Write an equation for Leon's demand curve and sketch the function. Use p to represent price and q to represent the number of cars.

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If Leon's total revenue, t , is the product of quantity and price, write the total revenue function and sketch the graph.

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Leon has fixed costs that total \$500 each week and variable costs that equal \$4.00 per car. Use these facts to work out his cost equation and his profit equation. Sketch the profit equation and work out what price Leon should charge.

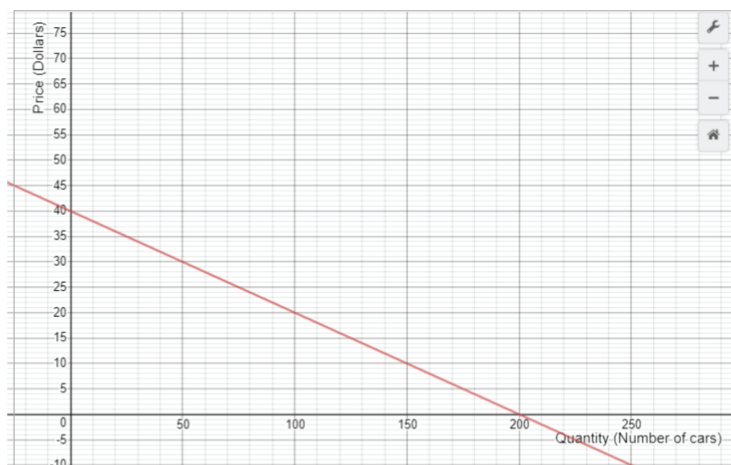
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Answers

Quantity in terms of price can be written as $q = 200 - 5p$

Price in terms of quantity can be written as $p = 40 - q/5$

The graph looks like this:



$t = p \times q$ so $t = p(200 - 5p)$

or

$$t = 200p - 5p^2$$

In terms of q you might write:

$$t = \left(40 - \frac{q}{5}\right)q \text{ or } t = 40q - \left(\frac{q^2}{5}\right)$$

The graph looks like this:



$c = 500 + 4q$. Combining the revenue and cost equations gives:

$$c = 40q - \left(\frac{q^2}{5}\right) - (500 + 4q)$$

or

$$c = 36q - \left(\frac{q^2}{5}\right) - 500$$

Profit maximises at $q = 90$

and $p = \$22$

