

## Applications of Quadratic Functions: Part 2

Mr. Ryan sells a new text messaging unit that also completes homework. This device is called the iStudent. The total profit  $y$  depends on the selling price  $x$  and is modeled by the following equation:

$$y = -100(x - 50)(x - 150)$$

where

- $y$  is the profit in dollars.
  - $x$  is the selling price of each unit.
- a) How much profit will Mr. Ryan make if he sells the units for \$75?
  - b) What are the  $x$ -intercepts?
  - c) Expand the equation to express it in standard form.
  - d) What is the  $y$ -intercept?
  - e) Determine the vertex of the above function.
  - f) Use the above information to sketch a graph of Profit vs. Price.
  - g) At what price will Mr. Ryan make the most profit and what will that profit be?
  - h) What are the breakeven prices; the price where Mr. Ryan makes zero profit?

## Homework

1. Pythagorean Inc. develops a new calculator with voice recognition. The total profit  $y$  depends on the selling price  $x$  and is modeled by the equation:

$$y = -25(x - 100)(x - 200)$$

- How much profit will Pythagorean Inc. make if they sell the units for 175\$ each?
- What are the  $x$ -intercepts?
- Expand the equation to express it in standard form.
- What is the  $y$ -intercept?
- Determine the vertex of the above function.
- Use the above information to sketch a graph of Profit vs. Price.
- At what price will Pythagorean Inc. make the most profit and what will that profit be?
- What are the breakeven prices; the price where Pythagorean Inc. make zero profit?

2. A landscaping business is given 200m of fencing to create a rectangular enclosure around a garden to protect the vegetables from livestock. The area of the enclosure that can be made with 200 m fencing is given by the equation:

$$A = -(x - 0)(x - 100)$$

where

- $A$  is the area of the enclosure in  $m^2$
  - $x$  is the width of the enclosure
  - $x - 100$  is the length of the enclosure
- Does the parabola defined by the equation above open up or down?
  - Is the vertex a minimum or a maximum?
  - What is the area of the rectangular enclosure if the width is 25 m?
  - What are the  $x$ -intercepts?
  - Determine the vertex of the above function.
  - Use the above information to sketch a graph of Area vs. Width.
  - What was the largest area of the rectangular enclosure that can be made with the 200m of fencing? What shape does this make?