

1. Solve the following equation: $x + \frac{8}{x} = 9$

$$x \left(x + \frac{8}{x} \right) = 9x$$

$$x^2 + 8 = 9x$$

$$x^2 - 9x + 8 = 0$$

$$(x - 8)(x - 1) = 0$$

$$x = 8 \text{ or } x = 1$$

2. Look at the function $f(x) = 3(x - 10)^2 + 12$

(a) Which way does the parabola open?

Since $a = 3 > 0$ the parabola opens up.

(b) What is the vertex of the parabola?

$(10, 12)$

(c) What is the axis of symmetry of the parabola?

$x = 10$

(d) What is the y -intercept?

Plug in $x = 0$:

$$y = 3(0 - 10)^2 + 12 = 3(10^2) + 12 = 3(100) + 12 = 300 + 12 = 312$$

3. The total costs for a company are given by $C(x) = 2000 + 40x + x^2$ and the total revenues are given by $R(x) = 130x$. Find the break even point.

$$C(x) = R(x)$$

$$2000 + 40x + x^2 = 130x$$

$$x^2 - 90x + 2000 = 0$$

$$x = \frac{90 \pm \sqrt{(-90)^2 - 4(1)(2000)}}{2(1)}$$

$$= \frac{90 \pm \sqrt{8100 - 8000}}{2}$$

$$= \frac{90 \pm \sqrt{100}}{2}$$

$$= \frac{90 \pm 10}{2}$$

$$= 50 \text{ or } 40$$

There are two break even points - when you sell 40 items or 50 items.