

Mathematics 10D

6.1 – Solving Quadratic Equations

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Solving Equation

$$3x - 4^{+4} = 5^{+4}$$

$$3x = 9$$

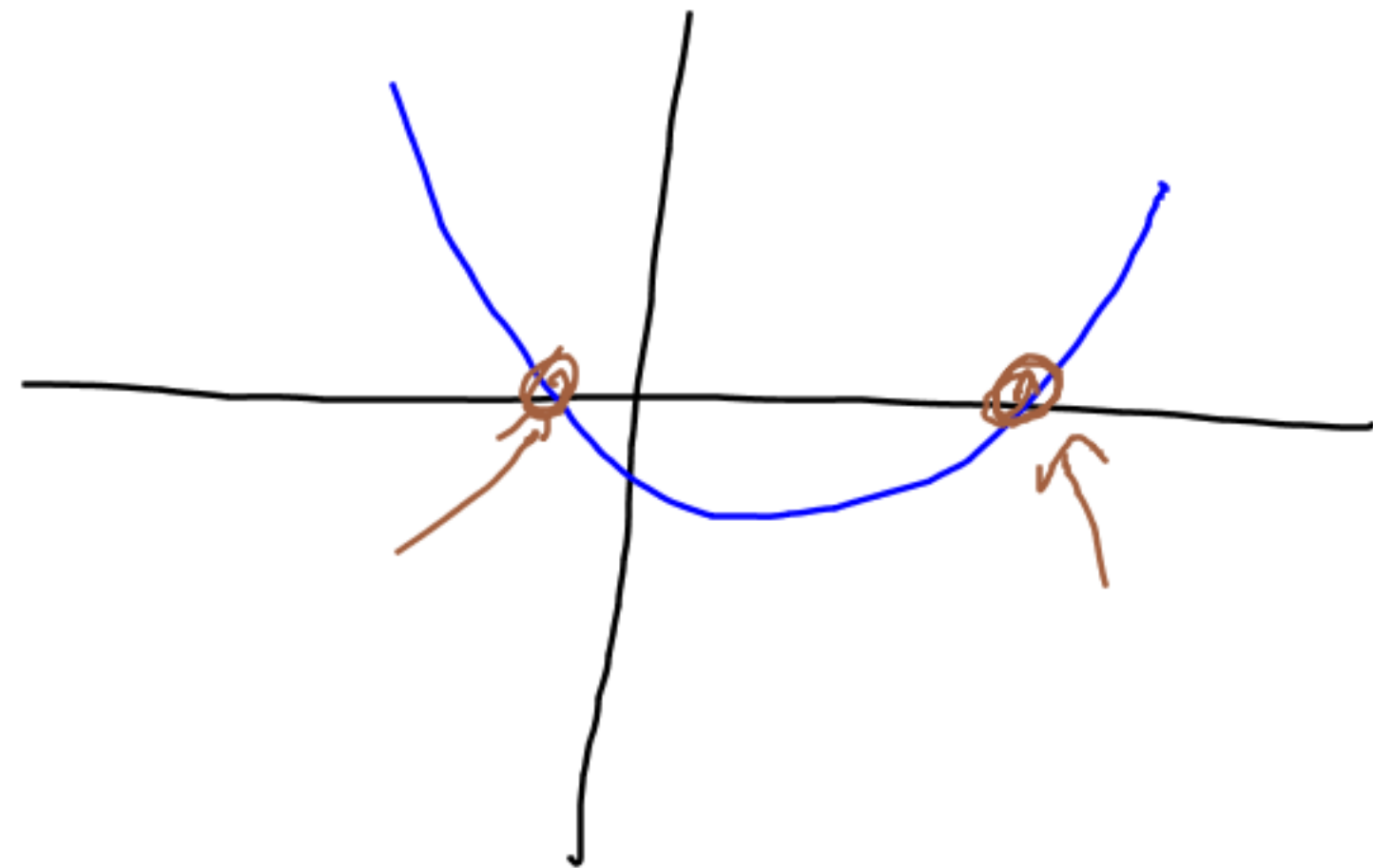
$$\therefore x = 3$$

Solve Quadratic Equations

means to solve for

the zeros

x-ints, $y = 0$



$$2x - 3 = 0^{+3}$$

$$2x = 3$$

$$x = \frac{3}{2} = 1.5$$

$$(2x - 3)(x + 5) = 0$$

Annotations: Red arrow from 2 to 3, red "0" below 3, blue arrow from 5 to x.

Zeros are

$$x = \frac{3}{2} \text{ and } x = -5$$

$$y = 2x^2 + 7x - 15$$

Solve for zeros $\therefore y = 0$

$$0 = 2x^2 + 7x - 15$$

Annotations: Purple circled "x" with "-30" next to it, purple circled "+" with "7" next to it, and "10, -3" below.

Factor!

$$0 = 2x^2 + 10x - 3x - 15$$

Annotations: Purple underline under "2x^2 + 10x" and blue underline under "-3x - 15".

$$0 = (2x - 3)(x + 5)$$

$$\therefore x = \frac{3}{2} \text{ and } x = -5$$

zeros
solutions
roots, x-int

Solve:

$$3x^2 + 11x - 4 = 0 \quad \begin{matrix} \textcircled{x} -12 \\ \textcircled{+} 11 \\ 12, -1 \end{matrix}$$

$$3x^2 - 1x + 12x - 4 = 0$$

$$(x + 4)(3x - 1) = 0$$

$$x + 4 = 0$$

$$\boxed{x = -4}$$

$$3x - 1 = 0$$

$$3x = 1$$

$$\boxed{x = \frac{1}{3}}$$

$$2x^2 + 3x = 16x + 7 \quad \begin{matrix} -16x \\ -7 \end{matrix}$$

$$2x^2 - 13x - 7 = 0 \quad \begin{matrix} \textcircled{x} -14 \\ \textcircled{+} -13 \\ = 14, 1 \end{matrix}$$

Standard

$$2x^2 + 1x - 14x - 7 = 0$$

$$(x - 7)(2x + 1) = 0$$

$$x = 7 \text{ and } x = -\frac{1}{2}$$

$$2(7)^2 + 3(7) = 16(7) + 7$$

$$98 + 21 = 112 + 7$$

$$119 = 119$$



A company has a profit function of

$y = -14x^2 + 133x - 63$, where x is number of items sold and y is the profit. Thousand

a) If they sold nothing, what is their profit?

$$x = 0 \quad \therefore y = -63$$

Lose \$63,000

$$Y = -14x^2 + 133x - 63$$

b) what are their break even points

$$0 = -7(2x^2 - 19x + 9) \quad \begin{matrix} \textcircled{x} 18 \\ \textcircled{1} 19 \end{matrix} \quad -18, -1$$

$$0 = -7(2x^2 - 1x - 18x + 9)$$

$$0 = -7(x - 9)(2x - 1)$$

$$\therefore x = 9, \frac{1}{2}$$

$\therefore$ 9000 or 500
need to be
sold.

c) What is their max profit?

axis of symmetry: $x = \frac{9 + \frac{1}{2}}{2} = \underline{4.75}$

$\therefore$ they need to
sell 4,750 to
maximize

$$y = -14(4.75)^2 + 133(4.75) - 63$$

$$y = 252.875$$

$\therefore$ the max profit is \$252,875