

## Math II - Quadratic Equations

So far we have solved by:

- (1) Completing the square
- (2) Factoring

Today: Solve by Graphing

Ex #1  $x^2 + 2x - 3 = 0$  is an EQUATION

$x^2 + 2x - 3 = y$  is a function

⇒ Graph the function and where  $y = 0$  (or the x-intercept) are the solutions (if any)

To Graph  $x^2 + 2x - 3 = y$  first complete the square:

$$(x^2 + 2x + 1) - 1 - 3 = y$$

$$(x+1)^2 - 4 = y$$

Vertex  $(-1, -4)$   
Open UP

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

$x = 1$   
or  $x = -3$

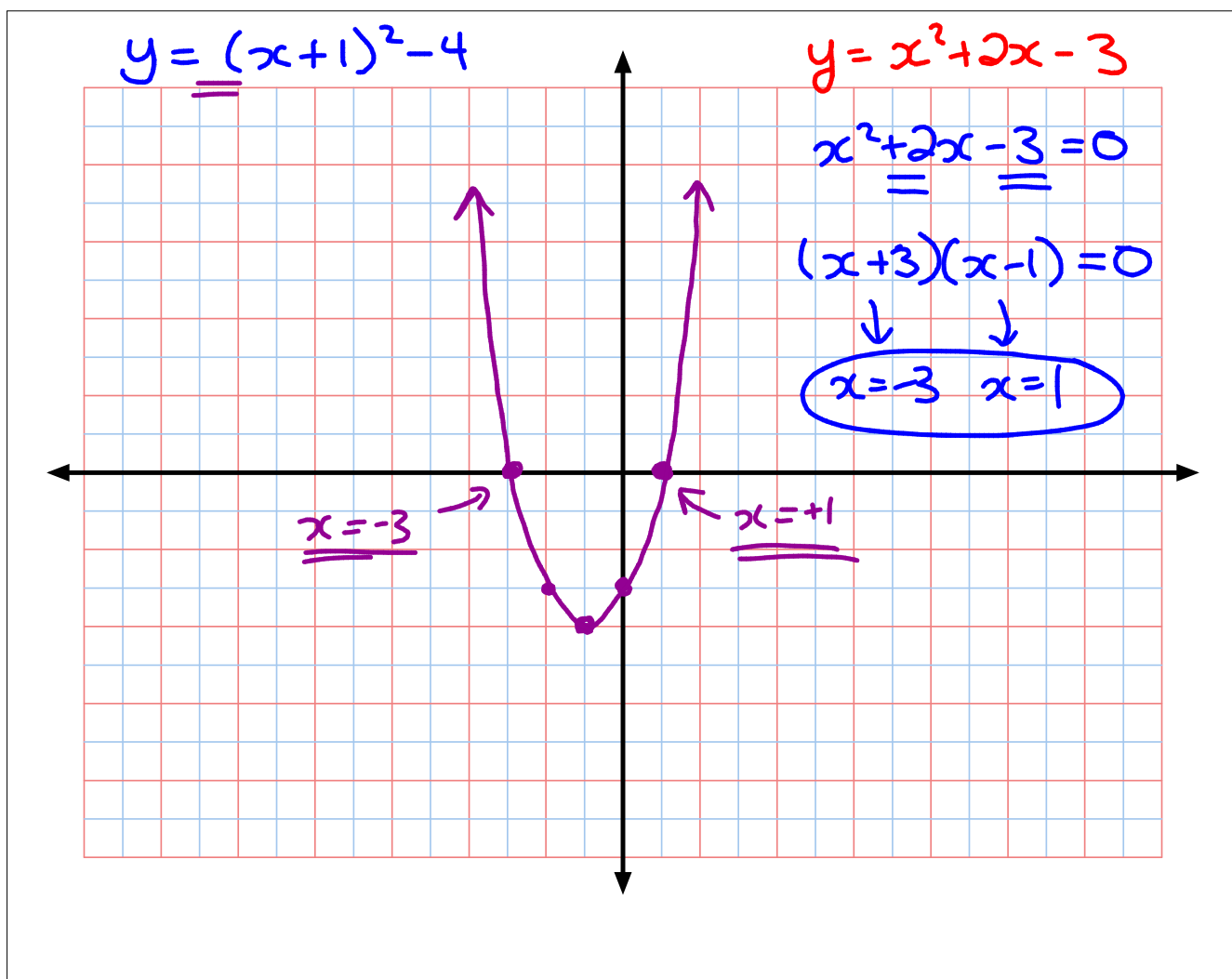
$$(1)^2 + 2(1) - 3 \stackrel{?}{=} 0$$

$$1 + 2 - 3 \stackrel{?}{=} 0$$

$$(-3)^2 + 2(-3) - 3 \stackrel{?}{=} 0$$

$$9 - 6 - 3 \stackrel{?}{=} 0$$

(compare to factoring!)

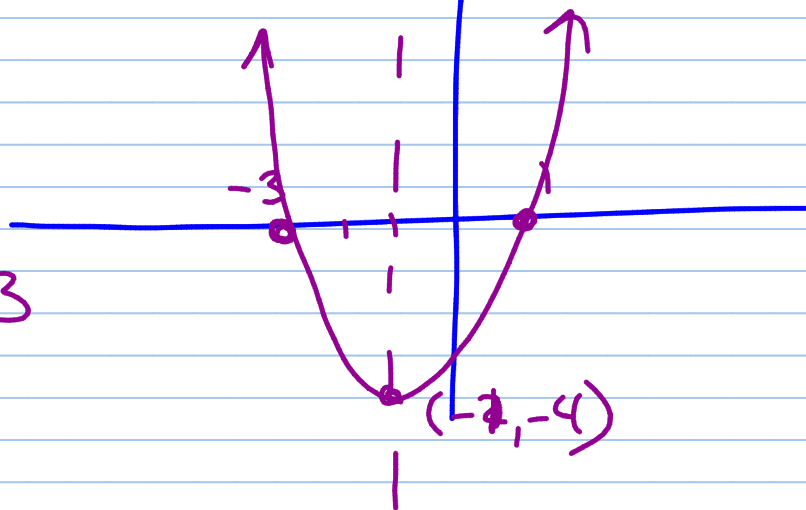


$$x^2 + 2x - 3 = 0$$

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

$$x = -3 \quad x = 1$$

$$y = x^2 + 2x - 3$$



$$\underline{\underline{x = -1}}$$

$$(-1)^2 + 2(-1) - 3 = y$$

$$1 - 2 - 3$$

$$-4 = y$$

## Solve by Graphing

First → graph by hand & state the solutions / roots / zeroes / answers.

Then Check on your GC

①  $0 = x^2 + 6x - 2$

②  $0 = 3x^2 - 12x + 1$

③  $0 = -2x^2 + 8x - 3$

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As a group :

Answer (on your board / table)  
Pg. 215 #1 & 2

#4 ace ⇒ use your calculators!!

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→ sketch the graph from your calculator  
↓ put answers exact to 3 dec.

THE X-INTERCEPTS ARE

THE ANSWERS

ROOTS

SOLUTIONS

ZEROES

$$\Rightarrow (ax^2 + bx) + c = 0$$

$$\underline{a} \left( x^2 + \frac{b}{a}x + \frac{b^2}{4a^2} \right) - \frac{b^2}{4a^2} + c = 0$$

$(\because = \left(\frac{b}{2a}\right)^2)$

$$a \left( x + \frac{b}{2a} \right)^2 - \frac{b^2}{4a} + c = 0$$

$$\frac{+b^2}{4a} - c \quad \frac{+b^2}{4a} - c$$

$$\frac{a \left( x + \frac{b}{2a} \right)^2}{a} = \frac{\frac{b^2}{4a} - c}{\frac{1}{a}}$$

$$\sqrt{\left( x + \frac{b}{2a} \right)^2} = \sqrt{\frac{b^2}{4a^2} - \frac{c \cdot 4a}{a \cdot 4a}}$$

$$x + \frac{b}{2a} = \pm \sqrt{\frac{b^2 - 4ac}{4a^2}}$$

$$-\frac{b}{2a} \quad -\frac{b}{2a}$$

$$x = \frac{-b}{2a} \pm \frac{\sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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

$$a=1 \quad x = \frac{-2 \pm \sqrt{(2)^2 - 4(1)(-3)}}{2(1)}$$

$$b=2$$

$$c=-3$$

$$x = \frac{-2 \pm \sqrt{4+12}}{2}$$

$$= \frac{-2 \pm \sqrt{16}}{2}$$

$$= \frac{-2 \pm 4}{2}$$

$$\frac{-2+4}{2} \quad \text{or} \quad \frac{-2-4}{2} = \frac{-6}{2}$$

$$\frac{2}{2} = 1 \quad \text{or} \quad -3$$

$$\sqrt{3^2 + 5^2} \stackrel{?}{=} 3 + 5$$

$$\sqrt{9 + 25} \stackrel{?}{=} 8$$

$$\sqrt{34} \not\stackrel{?}{=} 8$$

$$\sqrt{(3+5)^2} = 8$$

