

Questions From Homework

8

x	p(x)
-3	-7
-1	-3
0	-1
1	3
3	4
5	<u>0</u>

x	q(x)
-4	8
-2	<u>5</u>
0	1
2	-4
4	-7
6	-11

a) $p(q(-2))$
 $p(5)$
0

Polynomial Functions

Polynomial - an algebraic expression consisting of two or more terms. A polynomial usually contains only one variable. Within each term the variable is raised to a non-negative integer power, and is multiplied by a constant. The simplest types of polynomials are binomials (two terms) and trinomials (three terms)

Degree of a Polynomial - the greatest power to which the variable is raised; for example, the degree of the trinomial

" " " " " $x^4 - 2x + 5$ is 4
 $x^3 + 3x^2 - x + 5$ is 3

A **polynomial** function with real coefficients can be represented by

$$y = f(x) = ax^n + bx^{n-1} + cx^{n-2} + \dots + \square x^0$$

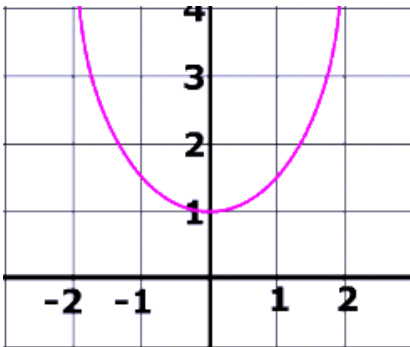
where $a, b, c, \text{ etc.}$ are real numbers. The shape of the graph of the function is affected by the value of n (**the Degree of the Polynomial**), the values of the coefficients, and whether the value of a is positive or negative.

Quadratics

2nd degree Polynomials.
(Parabolas)

$$y = ax^2 + bx + c$$

General Form



When given a quadratic function we can determine several important features to help us graph the function

- We already know how to find the **vertex**... Remember "**completing the square**?"
- x-int ($y=0$) **Roots**
- y-int ($x=0$)
- Check the stretch factor
↳ "a"

What are the **Roots** of a Function?

Remember Quadratic Functions will have

- (i) two different real roots,
- (ii) two equal real roots, or
- (iii) two complex roots.

Calculate the roots of the following Quadratic Functions...(**Factor**), then graph it.

$$y = x^2 + 8x + 12$$

$$\boxed{x \text{ int } (y=0)}$$

$$0 = x^2 + 8x + 12$$

$$0 = (x+6)(x+2)$$

$$x+6=0 \quad | \quad x+2=0$$

$$x=-6 \quad | \quad x=-2$$

$$\boxed{(-6, 0)}$$

$$\boxed{(-2, 0)}$$

$$\boxed{y \text{ int } (x=0)}$$

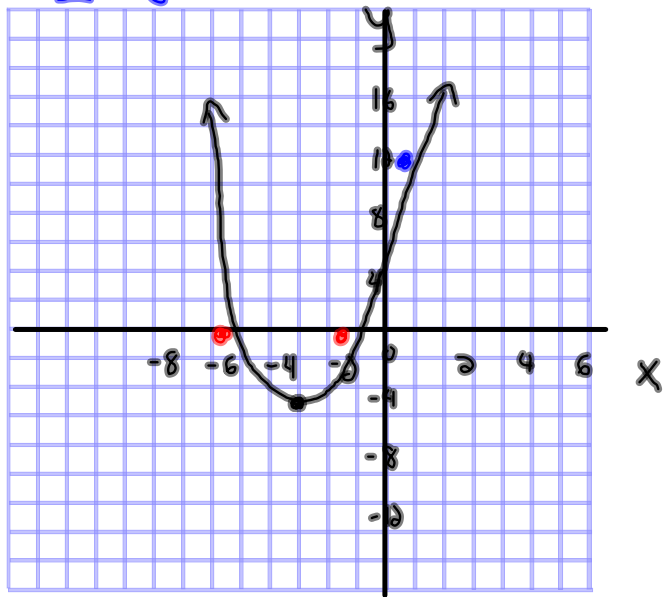
$$y = x^2 + 8x + 12$$

$$y = (0)^2 + 8(0) + 12$$

$$y = 12$$

$$\boxed{(0, 12)}$$

$$\begin{aligned} 2 \times 6 &= 12 \\ 2+6 &= 8 \end{aligned}$$



Vertex (Complete the Square)

$$y = x^2 + 8x + 12$$

$$y - 12 + 16 = (x^2 + 8x + 16)$$

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

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

$$\boxed{V: (-4, -4)}$$

Calculate the roots of the following Quadratic Functions...(Factor)

$$y = x^2 - 6x + 9$$

$$\boxed{x_{\text{int}} (y=0)}$$

$$0 = x^2 - \underline{6}x + \underline{9}$$

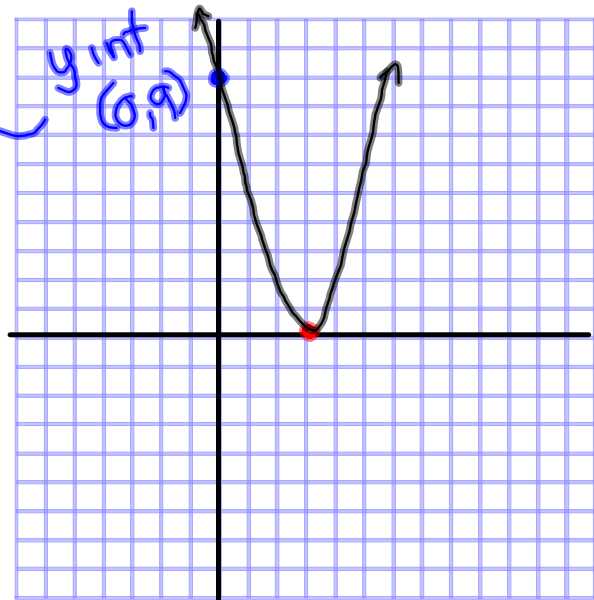
$$0 = (x-3)(x-3)$$

$$x-3=0 \quad | \quad x-3=0$$

$$x=3 \quad | \quad x=3$$

$$(3,0) \quad | \quad (3,0)$$

$$\begin{aligned} -3 \times -3 &= 9 \\ -3 + -3 &= -6 \end{aligned}$$



$$\begin{aligned} ?x? &= -9 \\ ?+? &= 5 \end{aligned}$$

$$y = x^2 + 5x - 9$$

$$\boxed{x \text{ int } (y=0)}$$

$$0 = x^2 + 5x - 9$$

$$a=1 \quad b=5 \quad c=-9$$

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

$$x = \frac{-(5) \pm \sqrt{(5)^2 - 4(1)(-9)}}{2(1)}$$

$$x = \frac{-5 \pm \sqrt{25 + 36}}{2}$$

$$x = \frac{-5 \pm \sqrt{61}}{2}$$

$$x = \frac{-5 \pm 7.8}{2}$$

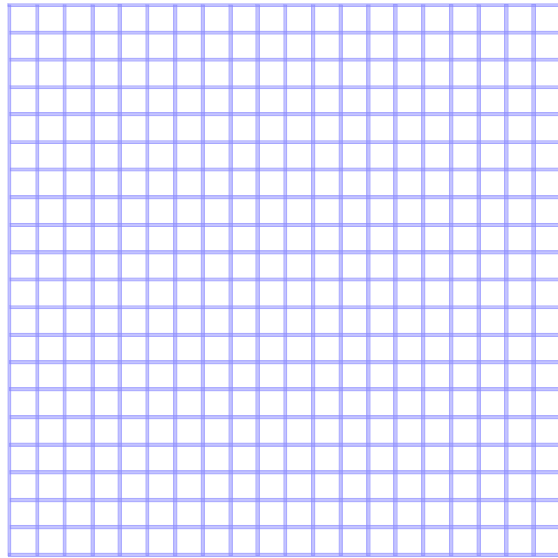
$$x = \frac{-5 + 7.8}{2} \quad \Bigg| \quad x = \frac{-5 - 7.8}{2}$$

$$x = 1.4$$

$$\boxed{(1.4, 0)}$$

$$x = -6.4$$

$$\boxed{(-6.4, 0)}$$



Homework

$$\textcircled{1} \text{ e) } y = 6x^2 - 7x + 2 \quad \begin{array}{l} -3 \times -4 = 12 \\ -3 + -4 = -7 \end{array}$$

$x \text{ int } (y=0)$

$$0 = 6x^2 - 7x + 2$$

$$0 = (6x^2 - 3x)(4x + 2)$$

$$0 = 3x(2x - 1) - 2(2x - 1)$$

$$0 = (2x - 1)(3x - 2)$$

$$2x - 1 = 0 \quad | \quad 3x - 2 = 0$$

$$2x = 1$$

$$3x = 2$$

$$x = \frac{1}{2}$$

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