

Brushing up on Essential Algebra Skills to get you ready for Pre-Calculus

Students entering Pre-Calculus 40/41 should complete the problems in this packet before returning to school. **Students will be held responsible for reviewing these concepts by their Pre-Calculus teacher.** The first full day of school questions will be answered on the packet. The second class period an assessment on the packet will be administered.

Answers to all problems are included on the last page of this packet.

Need help on some of the topics? For each section a link to an instructional video has been provided!

Pre-Requisite Expectations from Algebra-1

- Graph quadratic functions and show intercepts, maxima, and minima (F-IF.7a)
- Use the process of factoring in a quadratic function to show zeros, extreme values, and symmetry of the graph (F-IF.8)
- Solve quadratic equations in one variable using factoring and quadratic formula (A-REI.4)
- Understand that if f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input of x (F-IF.1)

Algebra-1 tutorials

- [Solving-quadratic-equations-by-square-roots](#)
- [Factoring-quadratic-expressions](#)
- [Using-the-quadratic-formula](#)
- [Features-of-quadratic-functions](#)
- [Graphing-a-quadratic-function](#)

Graphing Quadratic Functions

1) Graph the following functions. On the graph, illustrate the x & y-intercepts and vertex.

a. $f(x) = x^2 + 4x - 5$

d. $i(x) = (2x + 1)(x - 4)$

b. $g(x) = -2x^2 - 4x + 6$

e. $j(x) = (x - 2)^2 - 4$

c. $h(x) = (x + 1)(x + 5)$

f. $k(x) = -3(x + 4)^2 + 3$

Solving Quadratic Functions

2) Factor each expression below.

a. $x^2 - 4x + 3$

c. $3x^2 + x - 4$

b. $x^2 + 8x - 33$

d. $5x^2 - 3x - 2$

3) Solve each quadratic equation below by using square roots.

a. $(x - 2)^2 = 9$

b. $3(x + 1)^2 = 12$

4) Solve each quadratic equation by factoring/zero product property.

a. $(x + 5)(x - 3) = 0$

c. $7x^2 = 18x - 11$

b. $x^2 - 12x + 35 = 0$

d. $32 = x^2 - 4x$

5) Solve each quadratic equation by using the quadratic formula.

a. $3x^2 + 4x - 5 = 0$

b. $2x^2 - 2x = 1$

Pre-Requisite Expectations from Algebra-2

- Add, subtract, and multiply polynomials (A-APR.1)
- Use the relation $i^2 = -1$, and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers (N.CN2)
- Solve quadratic equations with real coefficients that have complex solutions (N-CN.7)

Algebra-2 tutorials

Polynomial Operations

[Adding, subtracting, and multiplying-polynomials](#)

Imaginary and Complex Numbers

- [Introduction-to-i-and-imaginary-numbers](#)
- [Introduction-to-complex-numbers](#)

Polynomial Operations

6) Simplify the following expressions

a. $(3x^3 - 3x + 1) + (5x - 8x^2 + 4x^3 + 3)$

b. $(7x^3 + 4x^2 - 5x - 4) - (3x^3 + 5x^2 - 10)$

c. $(9x - 4)(2x^3 - 6x + 3)$

d. $(4x^2 - 3x + 1)(2x^2 - 3x + 4)$

Complex Numbers

- 7) Determine an equivalent value for i^8 given that $i^2 = -1$.
- 8) Write the following expression $1 + i^2 + i^3 + i^4$ into $a + bi$ form, where $\sqrt{-1} = i$ and a and b are real numbers.
- 9) Simplify the following complex expressions given the following:

$$A = 2 + 3i$$

$$B = 3 - 4i$$

$$C = -3 - 5i$$

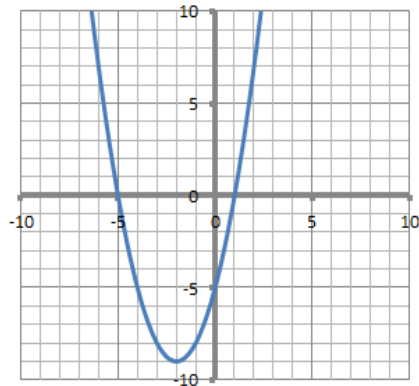
$$D = 2 - 3i$$

- a. $A + C$
- b. $C - B + D$
- c. $7A - 2B$
- d. AB
- e. BC
- f. $AD - C$
- g. ABC
- 10) Solve each quadratic function using the quadratic formula:
- a. $2x^2 - x + 5 = 0$
- b. $3x^2 + 2x + 4 = 0$
- c. $4x = 7 + 3x^2$

Solutions:

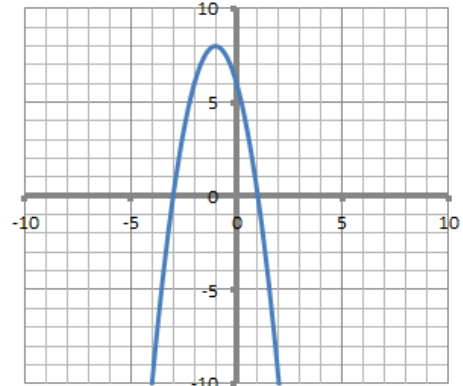
1) –

a.



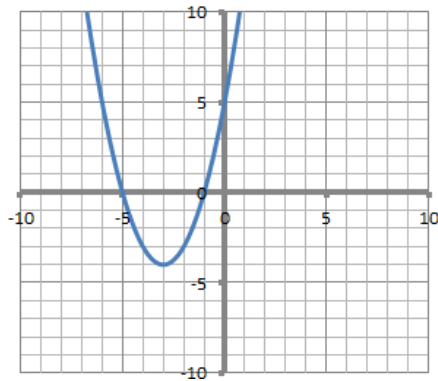
x-intercepts: $(-5, 0)$ and $(1, 0)$
y-intercepts: $(0, -5)$
Vertex: $(-2, -9)$

b.



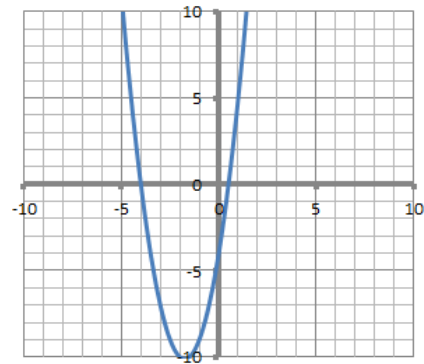
x-intercepts: $(-3, 0)$ and $(1, 0)$
y-intercepts: $(0, 5)$
Vertex: $(-1, 8)$

c.



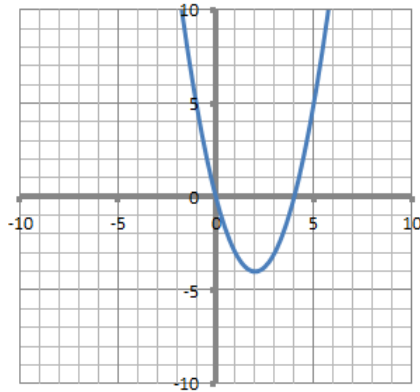
x-intercepts: $(-5, 0)$ and $(-1, 0)$
y-intercepts: $(0, 5)$
Vertex: $(-3, -4)$

d.



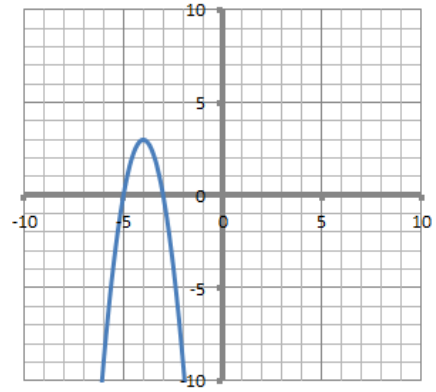
x-intercepts: $(-4, 0)$ and $(\frac{1}{2}, 0)$
y-intercepts: $(0, -4)$
Vertex: $(-1.75, -10.125)$

e.



x-intercepts: $(0, 0)$ and $(4, 0)$
 y-intercepts: $(0, 0)$
 Vertex: $(3, 4)$

f.



x-intercepts: $(-5, 0)$ and $(-3, 0)$
 y-intercepts: $(0, -45)$
 Vertex: $(-4, 3)$

2) -

- a. $(x - 3)(x - 1)$
 b. $(x + 11)(x - 3)$

- c. $(3x + 4)(x - 1)$
 d. $(5x + 2)(x - 1)$

3) -

- a. $x = 5$ and $x = -1$

- b. $x = 1$ and $x = -3$

4) -

- a. $x = -5$ and $x = -3$
 b. $x = 7$ and $x = 5$

- c. $x = \frac{11}{7}$ and $x = 1$
 d. $x = 8$ and $x = 4$

5) -

a. $x = \frac{-4 \pm \sqrt{86}}{6}$

b. $x = \frac{2 \pm 2\sqrt{3}}{4} = \frac{1 \pm \sqrt{3}}{2}$

6) -

- a. $7x^3 - 8x^2 + 2x + 4$
 b. $4x^3 - x^2 - 5x + 6$

- c. $18x^4 - 8x^3 - 54x^2 + 51x - 12$
 d. $8x^4 - 18x^3 + 27x^2 - 15x + 4$

7) $i^8 = 1$

8) $1 - i$

9) -

- a. $-1 - 2i$
 b. $4 - 4i$
 c. $8 - 13i$
 d. $18 + i$

- e. $-29 - 3i$
 f. $16 + 5i$
 g. $-49 - 93i$

10) -

a. $x = \frac{1 \pm i\sqrt{39}}{4}$

b. $x = \frac{-2 \pm 2i\sqrt{11}}{6} = \frac{-1 \pm i\sqrt{11}}{3}$

c. $x = \frac{4 \pm i\sqrt{82}}{6}$ or $\frac{-4 \pm i\sqrt{82}}{-6}$