

The Quadratic Formula

When given a quadratic equation such as $ax^2 + bx + c = 0$
 There is a formula that solves for x, the Quadratic Formula:

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

Example:

$$-4x^2 + 3x = -5$$

Solution:

First, we need to zero on one side by itself

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

In this case, $a = -4$, $b = 3$, $c = 5$

$$x = \frac{-3 \pm \sqrt{9 - 4(-4)(5)}}{2(-4)}$$

$$x = \frac{-3 \pm \sqrt{9 + 80}}{-8}$$

$$x = \frac{-3 \pm \sqrt{89}}{-8}$$

Since we prefer not to have a negative single term in the denominator, we multiply top and bottom by -1.

$$\boxed{x = \frac{3 \pm \sqrt{89}}{8}}$$

Solve: $4x^2 - 5x + 10 = 0$ using the Quadratic Formula

$$x = \frac{5 \pm \sqrt{25 - 4(4)(10)}}{2(4)}$$

$$x = \frac{5 \pm \sqrt{25 - 160}}{8}$$

$$x = \frac{5 \pm \sqrt{-135}}{8}$$

At this point it would be good to remember the divisibility test for 9

$$x = \frac{5 \pm \sqrt{9} \sqrt{15} \sqrt{-1}}{8}$$

$$\boxed{x = \frac{5 \pm 3\sqrt{15}i}{8}}$$

Ex 1-3: Write in vertex form, write the Vertex, and write the Focus. 3 Answers per problem.

1. $f(x) = x^2 - 8x + 19$

2. $g(x) = \frac{1}{4}x^2 - 3x - 4$

3. $h(x) = -3x^2 + 12x - 5$

4. A farmer is building a rectangular pen along the side of a barn for animals. The barn will serve as one side of the pen. The farmer has 120 feet of fence to enclose an area of 1512 square feet and wants the each side of the pen to be at least 20 feet long. Find the dimensions of the pen.

Ex: 5-7: Solve using the Quadratic Formula.

5. $6x^2 - 2x + 1 = 0$

6. $2x^2 + 4x = 30$

7. $-3x = 2x^2 - 4$