Warm Up 3.10

Name _____ Period _____

Find the roots of the quadratics.

1. $2x^2 - 7x + 6 = 0$

2. $2x^2 + 7x + 7 = 0$

3. $2x^2 + 7x - 6 = 0$

4. Do all quadratics have x-intercepts? Why or Why not?

5. If they don't have x-intercepts, what happens when you do the quadratic formula?

6. Factored Form: $(x + 3)(x - 7)$ Find the standard form and vertex forms.

7. Factored Form: $(x + 2 - i)(x + 2 + i)$ Find the standard and vertex forms.

8. Simplify each of the following. Use imaginary numbers as needed.

a. $\sqrt{-2} \cdot \sqrt{-8}$

b. $\sqrt{-36}$

c. $(2i)^4$

d. $\sqrt{-4} \cdot \sqrt{-4}$

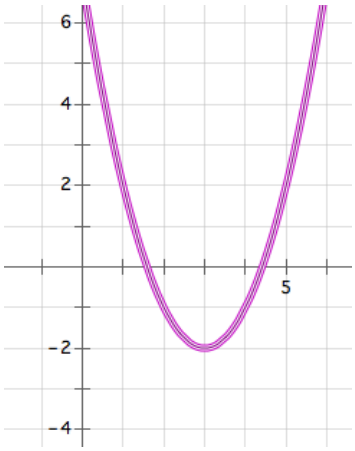
e. $\left(\sqrt{-100}\right)$

f. i^5

9. What is the discriminant? What does the value of the discriminant help you to know about the quadratic and its roots?

The quadratic formula is usually written in the form $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$. An equivalent form is $\frac{-b}{2a} \pm \frac{\sqrt{b^2 - 4ac}}{2a}$. If a, b and c are rational coefficients, then $\frac{-b}{2a}$ is a rational term, and $\frac{\sqrt{b^2 - 4ac}}{2a}$ may be a rational term, an irrational term or an imaginary term, depending on the value of the expression under the square root sign.

10. Examine the roots of the quadratic $y = x^2 - 6x + 7$ shown in the graph at the right. How do the terms $\frac{-b}{2a}$ and $\frac{\sqrt{b^2 - 4ac}}{2a}$ show up in this graph?



A polynomial function is a function of the form:

$$y = a_0x^n + a_1x^{n-1} + a_2x^{n-2} + \cdots a_{n-3}x^3 + a_{n-2}x^2 + a_{n-1}x + a_n$$

where all of the exponents are positive integers and all of the coefficients a_0 . . . a_n are constants.

As the theory of finding roots of polynomial functions evolved, a 17th century mathematician, Girard (1595-1632) made the following claim which has come to be known as the Fundamental Theorem of Algebra: *An n^{th} degree polynomial function has n roots*.

11. Based on you work in this task, do you believe this theorem holds for quadratic functions? That is, do all functions of the form $y = ax^2 + bx + c$ always have two roots?