

4.5 general to standard form

Friday, January 15, 2016 9:05 AM

Pre-Calculus 11

4.5 Equivalent forms of the Equation of a Quadratic Function

Notes

Name _____

When the equation of a quadratic function is in general form $y = ax^2 + bx + c$, most characteristics of the graph cannot be identified. For this reason, we will convert from general form to standard form by completing the square. We learned how to complete the square in lesson 3.3, we will use those same skills to assist us now!

Example 1: Determine the coordinates of the vertex of the parabola with equation $y = 3x^2 - 12x + 7$

writes $y = a(x-p)^2 + q$

$$y = 3x^2 - 12x + 7$$

factor out a 3 from the leading terms

$$y = 3(x^2 - 4x) + 7$$
$$= 3(x^2 - 4x + 4 - 4) + 7$$
$$= 3(x^2 - 4x + 4) - 12 + 7$$
$$= 3(x^2 - 4x + 4) - 5$$

vertex

$$= 3(x-2)^2 - 5 \quad (2, -5)$$

$\frac{-4}{2} = (-2)^2 = 4$

$p = 2$
 $q = -5$

Example 2: Determine the equation of the axis of symmetry of the parabola with equation $y = -2x^2 + 5x - 3$.

$$y = -2x^2 + 5x - 3$$
$$y = -2(x^2 - 2.5x) - 3$$
$$= -2(x^2 - 2.5x + 1.5625 - 1.5625) - 3$$
$$= -2(x^2 - 2.5x + 1.5625) + 3.125 - 3$$
$$= -2(x^2 - 2.5x + 1.5625) + 0.125$$
$$= -2(x - 1.25)^2 + 0.125$$

axis of symmetry.

$p = 1.25$
 $q = 0.125$

$x = p$
 $x = 1.25$

$$x = 4$$

$$x = 1.25$$

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Example 3: Determine the y-coordinate of the vertex of the graph of $y = \frac{1}{5}x^2 + 2x - 1$.

you try

$$y = a(x-p)^2 + q$$

$$y = \frac{1}{5}x^2 + 2x - 1$$

$$= \frac{1}{5}(x^2 + 10x) - 1$$

$$\left(\frac{10}{2}\right)^2 = 25$$

$$= \frac{1}{5}(x^2 + 10x + 25 - 25) - 1$$

$$= \frac{1}{5}(x^2 + 10x + 25) - 5 - 1$$

$$y = \frac{1}{5}(x+5)^2 - 6$$

vertex (-5, -6)

the y coordinate: -6

assignment: p. 295 #2, 3, 4, 6, 7, 8, 11

