Math 3 **3.9 Converting Between Forms** Unit 3

*SWBAT convert quadratic equations into Standard Form, Intercept Form, or Vertex Form.*

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| **Standard Form** | **Vertex Form** | **Intercept (Root) Form** |
| f(x) = ax2 + bx + cwhere (0, c) is your y-intercept | f(x) = a(x – h)2 + kwhere (h, k) is the vertex | f(x) = a(x – p)(x – q)Where p and q are the roots. |

**Example 1:** Convert the following into standard form.

1. *f*(*x*) = 3(*x* – 4)(*x* + 2) ***Hint:*** First do (*x* – 4)(*x* + 2) then

distribute the 3.

1. *f*(*x*) = –2(*x* + 5)2 + 6 ***Hint:*** Expand (*x* + 5)2, then distribute

the –2, then add the 6.

1. *f*(*x*) = –(*x* – 5)2 – 3

**Example 2:** Convert the following into intercept form.

1. *f*(*x*) = *x*2 – 4*x* – 96
2. *f*(*x*) = 4*x*2 – 4*x* – 3
3. *f*(*x*) = (*x* – 1)2 – 1 ***Hint:*** Expand, FOIL, simplify, and then

factor.

**Converting into Vertex Form**

**(by Completing the Square)**

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| **Steps to Solve:** | **Example:** Convert y = 2x2 - 4x + 5 into vertex form. |
| **Step 1:** Since we will be "completing the square" we will isolate the x2 and x terms ... so move the + 5 to the other side of the equal sign. |  |
| **Step 2:** We need a leading coefficient of 1 for completing the square ... so factor out the current leading coefficient of 2. |
| **Step 3:** Get ready to create a perfect square trinomial. *BUT be careful!!* In previous completing the square problems with a leading coefficient not 1, our equations were set equal to 0. Now, we have to deal with an additional variable, "y" ... so we cannot "get rid of " the factored 2. When we add a box to both sides, the box will be multiplied by 2 on both sides of the equal sign. |
| **Step 4:** Find the perfect square trinomial by finding your new “c” term $\left(\frac{b}{2}\right)^{2}$ |
| **Step 5:** Simplify and convert the right side to a squared expression. |
| **Step 6:** Isolate the y-term ... so move the -3 to the other side of the equal sign. |

**Example 3:** Convert the following into vertex form.

1. *f*(*x*) = *x*2 – 4*x* – 96
2. *f*(*x*) = 3(*x* – 4)(*x* + 2) ***Hint:*** First distribute, then complete

the square.

**Note:** You can also convert into vertex form by simply knowing your “a” value and finding your vertex. Then just substitute what you know into y = a(x – h)2 + k!