**Activity 2.1.4 How to Stretch It! with Standard and Vertex Forms**

Now that we have a solid set of rules for our vertical/horizontal stretches and compressions, we need to discuss the connections of these shifts to the various forms parabolas can be written in.

**Standard Form Vertex Form**

  

1. When we write , is that function written in standard form, vertex form or both?

For standard form, identify the values of *a, b*, and *c*.

*a* = \_\_\_\_\_\_\_\_\_ *b* = \_\_\_\_\_\_\_\_\_ *c* = \_\_\_\_\_\_\_\_\_

For vertex form, identify the values of a, h, and k.

*a* = \_\_\_\_\_\_\_\_\_ *h* = \_\_\_\_\_\_\_\_\_ *k* = \_\_\_\_\_\_\_\_\_

2. When we reflect back on one of our transformed examples,, what form is this written in?

For standard form, identify the values of *a, b*, and *c.*

*a* = \_\_\_\_\_\_\_\_\_ *b* = \_\_\_\_\_\_\_\_\_ *c* = \_\_\_\_\_\_\_\_\_

For vertex form, identify the values of a, h, and k.

*a* = \_\_\_\_\_\_\_\_\_ *h* = \_\_\_\_\_\_\_\_\_ *k* = \_\_\_\_\_\_\_\_\_

3. Now look at another example, . What form is this written in?

For vertex form, identify the values of *a, h*, and *k.*

*a* = \_\_\_\_\_\_\_\_\_ *h* = \_\_\_\_\_\_\_\_\_ *k* = \_\_\_\_\_\_\_\_\_

It is possible to identify the values of *a, b*, and *c* from the standard form. First we must expand the binomial, combine any like terms and rewrite the function in standard form.

We can now write the function as

For standard form, identify the values of *a, b,* and *c.*

*a* = \_\_\_\_\_\_\_\_\_ *b* = \_\_\_\_\_\_\_\_\_ *c* = \_\_\_\_\_\_\_\_\_

Let’s continue with that method of binomial expansion with some more examples.

4. More from our transformed examples, g(x) = (x + 5)2 + 2, what form is this written in?

For vertex form, identify the values of *a, h*, and *k*.

*a* = \_\_\_\_\_\_\_\_\_ *h* = \_\_\_\_\_\_\_\_\_ *k* = \_\_\_\_\_\_\_\_\_

Expand the binomial, combine any like terms and rewrite the function in standard form.

We can now write the function as

For standard form, identify the values of *a, b*, and *c*.

*a* = \_\_\_\_\_\_\_\_\_ *b* = \_\_\_\_\_\_\_\_\_ *c* = \_\_\_\_\_\_\_\_\_

5. If h(x) = 2(x + 3)2 + 4, what form is this in?

For vertex form, identify the values of *a, h*, and *k*.

*a* = \_\_\_\_\_\_\_\_\_ *h* = \_\_\_\_\_\_\_\_\_ *k* = \_\_\_\_\_\_\_\_\_

Expand the binomial, combine any like terms and rewrite the function in standard form.

We can now write the function as

For standard form, identify the values of *a, b*, and *c.*

*a* = \_\_\_\_\_\_\_\_\_ *b* = \_\_\_\_\_\_\_\_\_ *c* = \_\_\_\_\_\_\_\_\_

6. If g(x) = 5x2 + 7, what form is this written in?

For vertex form, identify the values of *a, h*, and *k*.

*a* = \_\_\_\_\_\_\_\_\_ *h* = \_\_\_\_\_\_\_\_\_ *k* = \_\_\_\_\_\_\_\_\_

For standard form, identify the values of a, b, and c.

*a* = \_\_\_\_\_\_\_\_\_ *b* = \_\_\_\_\_\_\_\_\_ *c* = \_\_\_\_\_\_\_\_\_

7. If f(x) = x2 + 8 x + 16, what form is it written in?

For standard form, identify the values of *a, b,* and *c*.

a = \_\_\_\_\_\_\_\_\_ b = \_\_\_\_\_\_\_\_\_ c = \_\_\_\_\_\_\_\_\_

It is possible to identify the values of **a, h,** and *k* from the vertex form. First we must factor the right hand side.

x2 + 8 x + 16 in factored form is equal to

For vertex form, identify the values of a, h, and k.

*a* = \_\_\_\_\_\_\_\_\_ *h* = \_\_\_\_\_\_\_\_\_ *k* = \_\_\_\_\_\_\_\_\_