**Functions in Factored Form**

In this activity, we will investigate functions represented in factored form with tables and graphs.

Use the following Window settings for your calculator: Xmin = –4.7, Xmax = 4.7, Ymin = –20, Ymax = 20.

|  |  |
| --- | --- |
| ***f(x) =* 3*x* + 9** | |
| *x* | *y* |
| –4 |  |
| –3 |  |
| –2 |  |
| –1 |  |
| 0 |  |
| 1 |  |
| 2 |  |
| 3 |  |
| 4 |  |

|  |  |
| --- | --- |
| ***g(x) =* –*x* + 2** | |
| *x* | *y* |
| –4 |  |
| –3 |  |
| –2 |  |
| –1 |  |
| 0 |  |
| 1 |  |
| 2 |  |
| 3 |  |
| 4 |  |

|  |  |
| --- | --- |
| ***h(x)* = (3*x* + 9)(–*x* + 2)** | |
| *x* | *y* |
| –4 |  |
| –3 |  |
| –2 |  |
| –1 |  |
| 0 |  |
| 1 |  |
| 2 |  |
| 3 |  |
| 4 |  |

Sketch the graphs of all three functions  
on the grid and answer these questions.

1. Which functions are linear?
2. Which function appears to be quadratic?
3. Describe the relationship between *f(x), g(x),*

and *h(x).*

1. For what values of *x* is : *f(x)* = 0? *x =* \_\_\_\_\_ *g(x)* = 0? *x =* \_\_\_\_\_ *h(x)* = 0*? x =* \_\_\_\_\_and *x =* \_\_\_\_\_
2. Which functions share the *x*-intercept (–3, 0)?
3. Which functions share the *x*-intercept (2,0)?

**Quadratic Function in Factored Form**

A function that is the product of two linear factors in *x* is a quadratic function and its graph is a parabola. In the example above the linear factors are \_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_ and the quadratic function is *y* = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**The Zero Product Property**

If a product is zero, then one or more of the factors must be zero. In the example above,  
if (3*x* + 9)(–*x* + 2) = 0, then either \_\_\_\_\_\_\_\_\_\_ = 0 or \_\_\_\_\_\_\_\_\_\_ = 0.

Use the Zero Product Property to find all values of *x* that make each equation true.

1. (*x* + 3)(*x* – 6) = 0 *x = \_\_\_\_\_\_\_* or *x* = \_\_\_\_\_\_\_
2. (2*x* – 10)(4 – *x*) = 0 *x = \_\_\_\_\_\_\_* or *x* = \_\_\_\_\_\_\_
3. *x*(*x* – 6) = 0 *x = \_\_\_\_\_\_\_* or *x* = \_\_\_\_\_\_\_
4. *x = \_\_\_\_\_\_\_* or *x* = \_\_\_\_\_\_\_

Use the Zero Product Property to find the *x­-*intercepts for each of these functions.

1. *x-*intercepts are (\_\_\_\_,0) and (\_\_\_\_, 0)
2. *x-*intercepts are (\_\_\_\_,0) and (\_\_\_\_, 0)
3. *x-*intercepts are (\_\_\_\_,0) and (\_\_\_\_, 0)
4. Check your answer to #11 with a graph. Find the vertex of the parabola: (\_\_\_\_, \_\_\_\_)
5. Check your answer to #12 with a graph. Find the vertex of the parabola: (\_\_\_\_, \_\_\_\_)
6. Check your answer to #13 with a graph. Find the vertex of the parabola: (\_\_\_\_, \_\_\_\_)
7. Make a conjecture about how you can find the *x*-coordinate of the vertex of a parabola when you know two *x*-intercepts.