## Unit 6 Lesson 11: Graphing from the Factored Form

### 1 Finding Coordinates (Warm up)

#### Student Task Statement



Here is a graph of a function $w$ defined by $w\left(x\right)=\left(x+1.6\right)\left(x−2\right)$. Three points on the graph are labeled.

Find the values of $a,b,c,d,e$, and $f$. Be prepared to explain your reasoning.

### 2 Comparing Two Graphs

#### Student Task Statement

Consider two functions defined by $f\left(x\right)=x\left(x+4\right)$ and $g\left(x\right)=x\left(x−4\right)$.

1. Complete the table of values for each function. Then, determine the $x$-intercepts and vertex of each graph. Be prepared to explain how you know.

| * $x$
 | * $f\left(x\right)$
 |
| --- | --- |
| * -5
 | * 5
 |
| * -4
 | *
 |
| * -3
 | *
 |
| * -2
 | * -4
 |
| * -1
 | * -3
 |
| * 0
 | *
 |
| * 1
 | *
 |
| * 2
 | *
 |
| * 3
 | *
 |
| * 4
 | * 32
 |
| * 5
 | *
 |

* $x$-intercepts:
* Vertex:

| * $x$
 | * $g\left(x\right)$
 |
| --- | --- |
| * -5
 | * 45
 |
| * -4
 | *
 |
| * -3
 | *
 |
| * -2
 | * 12
 |
| * -1
 | * 5
 |
| * 0
 | *
 |
| * 1
 | *
 |
| * 2
 | *
 |
| * 3
 | * -3
 |
| * 4
 | *
 |
| * 5
 | *
 |

* $x$-intercepts:
* Vertex:
1. Plot the points from the tables on the same coordinate plane. (Consider using different colors or markings for each set of points so you can tell them apart.)
* Then, make a couple of observations about how the two graphs compare.
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* ​​​​​​

### 3 What Do We Need to Sketch a Graph?

#### Student Task Statement

1. The functions $f$, $g$, and $h$ are given. Predict the $x$-intercepts and the $x$-coordinate of the vertex of each function.

| * equation
 | * $x$-intercepts
 | * $x$-coordinate of the vertex
 |
| --- | --- | --- |
| * $f\left(x\right)=\left(x+3\right)\left(x−5\right)$
 | *
 | *
 |
| * $g\left(x\right)=2x\left(x−3\right)$
 | *
 | *
 |
| * $h\left(x\right)=\left(x+4\right)\left(4−x\right)$
 | *
 | *
 |

1. Use graphing technology to graph the functions $f$, $g$, and $h$. Use the graphs to check your predictions.
2. Without using technology, sketch a graph that represents the equation $y=\left(x−7\right)\left(x+11\right)$ and that shows the $x$-intercepts and the vertex. Think about how to find the $y$-coordinate of the vertex. Be prepared to explain your reasoning.
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