## Unit 6 Lesson 16: Graphing from the Vertex Form

### 1 Which Form to Use? (Warm up)

#### Student Task Statement

Expressions in different forms can be used to define the same function. Here are three ways to define a function $f$.

$f\left(x\right)=x^{2}−4x+3$

(standard form)

$f\left(x\right)=\left(x−3\right)\left(x−1\right)$

(factored form)

$f\left(x\right)=\left(x−2\right)^{2}−1$

(vertex form)

Which form would you use if you want to find the following features of the graph of $f$? Be prepared to explain your reasoning.

1. the $x$-intercepts
2. the vertex
3. the $y$-intercept

### 2 Sharing a Vertex

#### Student Task Statement

Here are two equations that define quadratic functions.

$p\left(x\right)=-\left(x−4\right)^{2}+10q\left(x\right)=\frac{1}{2}\left(x−4\right)^{2}+10$

1. The graph of $p$ passes through $\left(0,-6\right)$ and $\left(4,10\right)$, as shown on the coordinate plane.
* Find the coordinates of another point on the graph of $p$. Explain or show your reasoning. Then, use the points to sketch and label the graph.
* 
1. On the same coordinate plane, identify the vertex and two other points that are on the graph of $q$. Explain or show your reasoning. Sketch and label the graph of $q$.
2. Priya says, "Once I know the vertex is $\left(4,10\right)$, I can find out, without graphing, whether the vertex is the maximum or the minimum of function $p$. I would just compare the coordinates of the vertex with the coordinates of a point on either side of it."
* Complete the table and then explain how Priya might have reasoned about whether the vertex is the minimum or maximum.

|  |  |  |  |
| --- | --- | --- | --- |
| * $x$
 | * 3
 | * 4
 | * 5
 |
| * $p\left(x\right)$
 |  | * 10
 |  |

### 3 Card Sort: Matching Equations with Graphs

#### Student Task Statement

Your teacher will give you a set of cards. Each card contains an equation or a graph that represents a quadratic function. Take turns matching each equation to a graph that represents the same function.

* For each pair of cards that you match, explain to your partner how you know they belong together.
* For each pair of cards that your partner matches, listen carefully to their explanation. If you disagree, discuss your thinking and work to reach an agreement.
* Once all the cards are matched, record the equation, the label and a sketch of the corresponding graph, and write a brief note or explanation about how you knew they were a match.

Equation:



Explanation:

Equation:



Explanation:

Equation:



Explanation:

Equation:



Explanation:

Equation:



Explanation:

Equation:



Explanation:



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