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.

$$f(x) = x^2 - 4x + 3 \qquad\qquad \text{(standard form)}$$

$$f(x) = (x - 3)(x - 1) \qquad\qquad \text{(factored form)}$$

$$f(x) = (x - 2)^2 - 1 \qquad\qquad \text{(vertex form)}$$

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
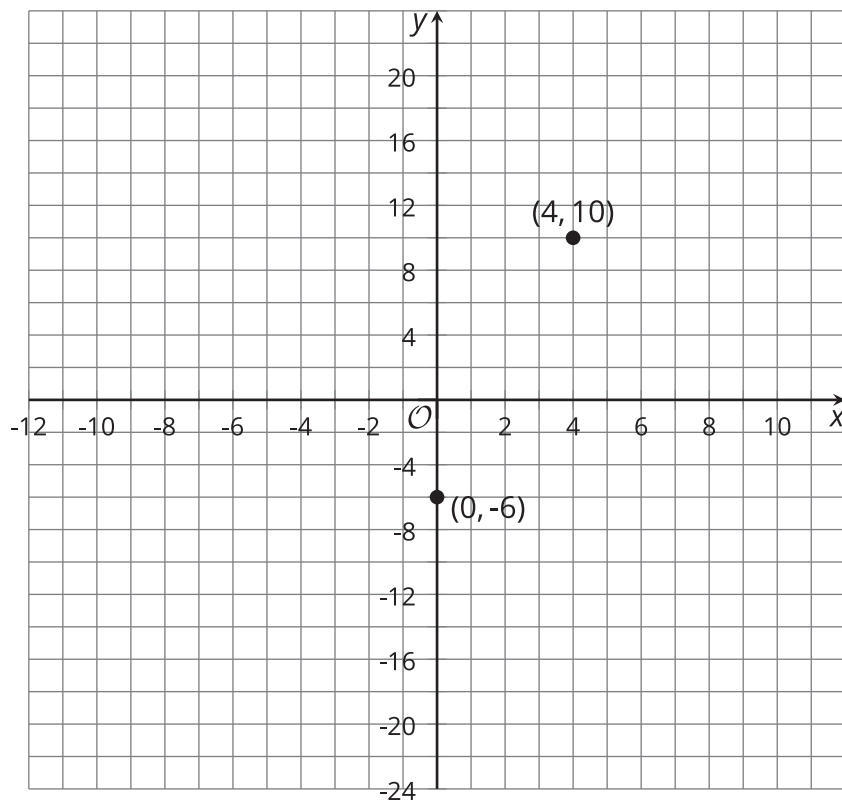
2 Sharing a Vertex

Student Task Statement

Here are two equations that define quadratic functions.

$p(x) = -(x - 4)^2 + 10$

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

1. The graph of p passes through $(0, \text{-}6)$ and $(4, 10)$, 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.

2. 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.

3. Priya says, "Once I know the vertex is $(4, 10)$, 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.
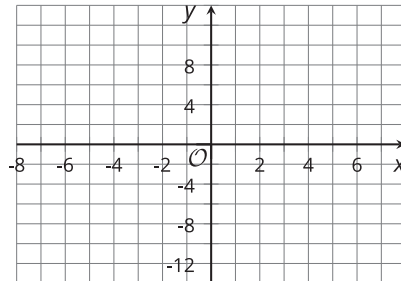
x	3	4	5
$p(x)$		10	

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.
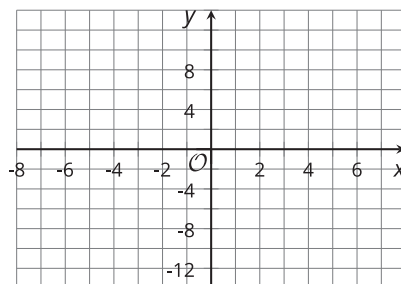
- For each pair of cards that you match, explain to your partner how you know they belong together.

- 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.
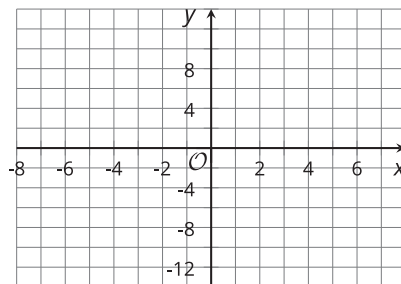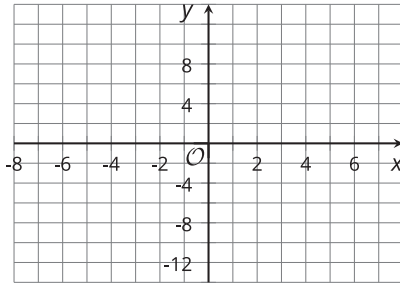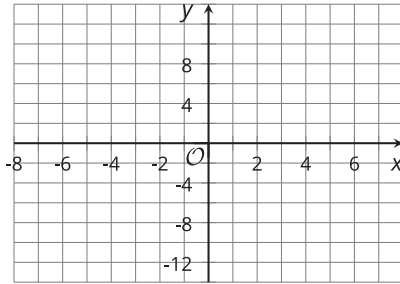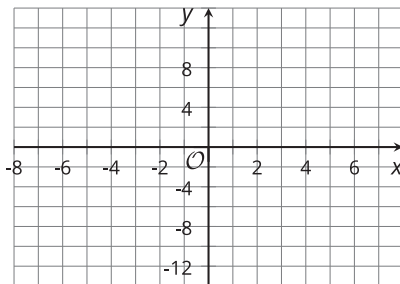
Equation:

Explanation:

Equation:

Explanation:

Equation:

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