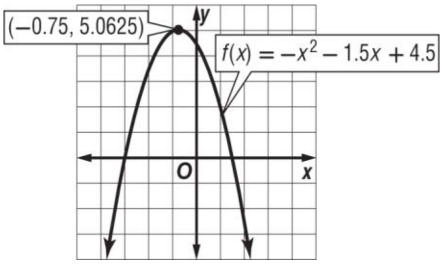
NAME ____ DATE ___________________________ PERIOD ____________

1-2 Study Guide and INFORMATION

Analyzing Graphs of Functions and Relations

Analyzing Function Graphs By looking at the graph of a function, you can determine the function's domain and range and estimate the *x*- and *y*-intercepts. The *x*-intercepts of the graph of a function are also called the **zeros** of the function because these input values give an output of 0.

Example: Use the graph and the function to find the domain and range of the function and to approximate the *y*-intercept and zero(s). Then confirm the estimate algebraically.



The graph is not bounded on the left or right, so the domain is the set of all real numbers.

D: [-∞, ∞]

The graph does not extend above 5.0625 or *f*(–0.75), so the range is all real numbers less than or equal to 5.0625.

R: (-∞, 5]

The *y*-intercept is the point where the graph intersects the *y*-axis. It appears to be 4.5. Likewise, the zeros are the *x*-coordinates of the points where the graph crosses the *x*-axis. They seem to occur at –3 and 1.5.

To find the *y*-intercept algebraically, find *f*(0).

$$f(0) = -(0)^2 - 1.5(0) + 4.5 = 4.5$$

To find the x-intercept OR zeros algebraically, let *f*(*x*) = 0 and solve for *x*.

$$-x^2 - 1.5x + 4.5 = 0$$

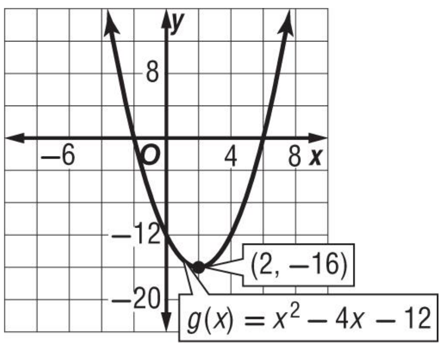
$$-1(x + 3)(x - 1.5) = 0$$

$$x = -3 \text{ or } x = 1.5$$

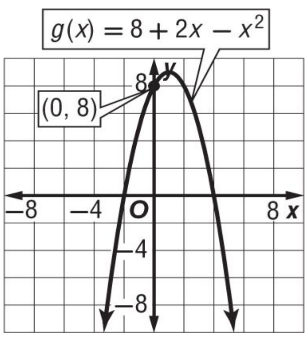
Exercises

Use the graph of *g* to find the domain and range of the function and to approximate its *y*-intercept and zero(s). Then find its *y*-intercept and x-intercept OR zeros algebraically.

1.



2.



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1-2 Study Guide and Information

Analyzing Graphs of Functions and Relations

Symmetry of Graphs A graph of a relation that is symmetric to the *x*–axis and/or the *y*-axis has **line symmetry**. A graph of a relation that is symmetric to the origin has **point symmetry**.

Symmetric with respect to…	Description	Algebraic Test
***x*-axis**	For every (x, y) on the graph, $(x, -y)$ is also on the graph.	Replacing y with $-y$ produces an equivalent equation.
***y*-axis**	For every (x, y) on the graph, $(-x, y)$ is also on the graph.	Replacing x with $-x$ produces an equivalent equation.
origin	For every (x, y) on the graph, $(-x, -y)$ is also on the graph.	Replacing x with $-x$ and y with $-y$ produces an equivalent equation.

Functions symmetric with respect to the *y*-axis are **EVEN FUNCTIONS**, and for every *x* in the domain, $f(-x) = f(x)$.

Functions symmetric with respect to the origin are **ODD FUNCTIONS** and for every *x* in the domain, $f(-x) = -f(x)$.

Exercises

ALGEBRAICALLY DETERMINE whether each function has SYMMETRY with respect to the x-axis, y-axis or the origin AND DETERMINE IF it is *even*, *odd*, or *neither*.

1. $f(x) = 4x^3 + 1$

2. $g(x) = x^4 - 10x^2 + 9$

3. $g(x) = \frac{5}{x^4}$

4. $g(x) = x^3 - 6x$