1.2 | Analyzing Graphs of Functions and Relations

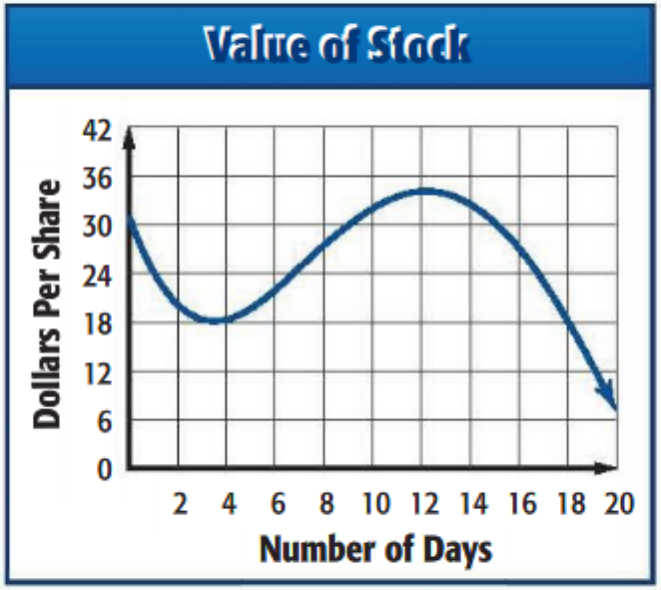
OBJECTIVES:

- Use graphs of functions to estimate function values and find domains, ranges, *y*-intercepts, and zeros of functions
- Explore symmetries of graphs and identify even and odd functions

Interpreting a graph:

GuidedPractice

1. **STOCKS** An investor assessed the average daily value of a share of a certain stock over a 20-day period. The value of the stock can be approximated by $v(d) = 0.002d^4 - 0.11d^3 + 1.77d^2 - 8.6d + 31, 0 \leq d \leq 20$, where d represents the day of the assessment.

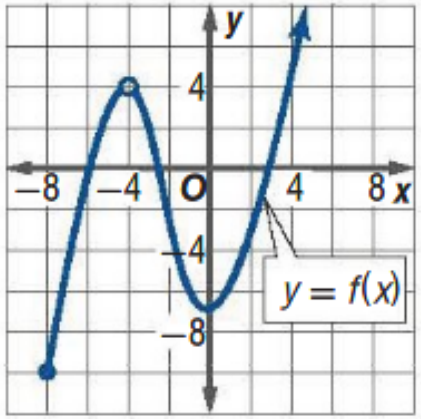


A. Use the graph to estimate the value of the stock on the 10th day. Confirm your estimate algebraically.

B. Use the graph to estimate the days during which the stock was valued at $30 per share. Confirm your estimate algebraically.

Finding the domain and range of each relation:

ex. 1

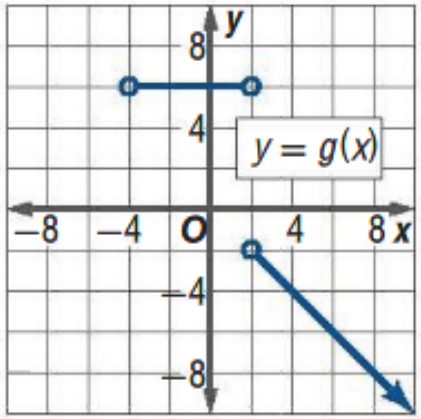


Is the relation a function?

Domain:

Range:

ex. 2

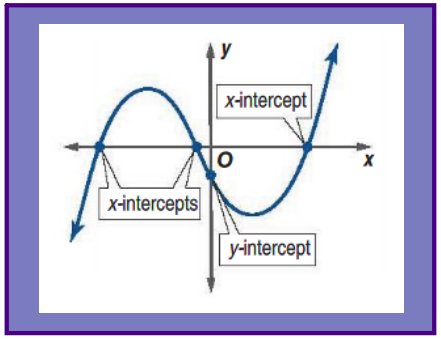


Is the relation a function?

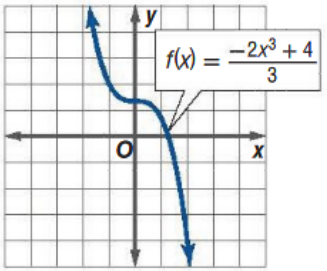
Domain:

Range:

Finding *x* and *y* intercepts algebraically:



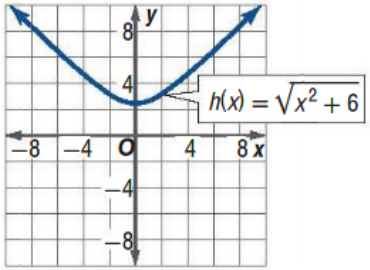
ex. 1



<u>*x*-intercept(s)</u> (zeros, solutions, roots)

<u>*y*-intercept</u>

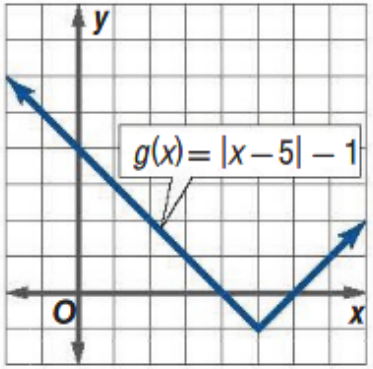
ex. 2



<u>*x*-intercept(s)</u>

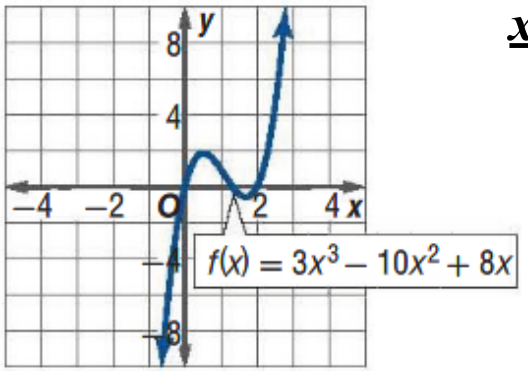
<u>*y*-intercept</u>

ex. 3



***x*-intercept(s)** ***y*-intercept**

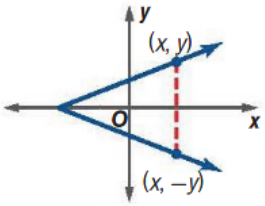
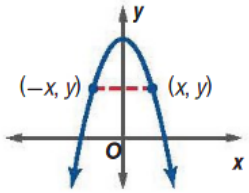
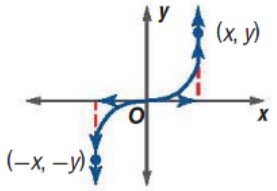
ex. 4



***x*-intercept(s)** ***y*-intercept**

Testing for Symmetry:

KeyConcept Tests for Symmetry

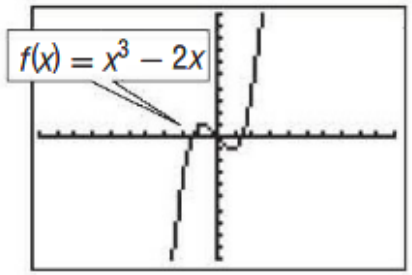
Graphical Test	Model	Algebraic Test
The graph of a relation is *symmetric with respect to the x-axis* if and only if for every point (x, y) on the graph, the point $(x, -y)$ is also on the graph.		Replacing y with $-y$ produces an equivalent equation.
The graph of a relation is *symmetric with respect to the y-axis* if and only if for every point (x, y) on the graph, the point $(-x, y)$ is also on the graph.		Replacing x with $-x$ produces an equivalent equation.
The graph of a relation is *symmetric with respect to the origin* if and only if for every point (x, y) on the graph, the point $(-x, -y)$ is also on the graph.		Replacing x with $-x$ and y with $-y$ produces an equivalent equation.

KeyConcept Even and Odd Functions

Type of Function	Algebraic Test
Functions that are symmetric with respect to the y-axis are called **even functions**.	For every x in the domain of f, $f(-x) = f(x)$.
Functions that are symmetric with respect to the origin are called **odd functions**.	For every x in the domain of f, $f(-x) = -f(x)$.

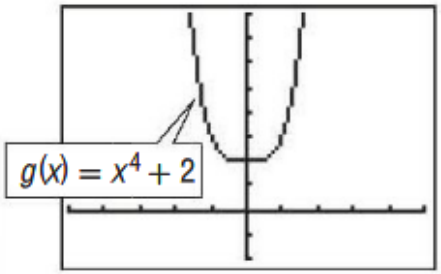
Determine if each relation has symmetry. Classify each function as *even*, *odd*, or *neither*.

ex. 1 $f(x) = x^3 - 2x$



[−10, 10] scl: 1 by [−10, 10] scl: 1

ex. 2 $g(x) = x^4 + 2$



[−5, 5] scl: 1 by [−2, 8] scl: 1

Assignment:

Pg. 19 (1-45) odd, 51, 55, 57