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Lesson 1.05 Key Features of Functions

Students will be able to:
- Define and identify:
  - x and y intercepts
  - maxima and minima
  - domain and range
  - intervals where functions are increasing, decreasing, positive, and negative.

- Language Objective: Explain to a partner how to identify key features of functions from a table.

Warm Up

If the graph of the equation $y = 4x - 3$ is reflected in the line $y = x$, the equation of the image is

(1) $y = x + \frac{3}{4}$ 　　　　 (2) $y = \frac{x+3}{4}$ 　　　　 (3) $y = \frac{x}{4} + 3$ 　　　　 $y = -4x + 3$

Vocabulary Review

Match each term below with its correct definition.

1. _____Domain

2. _____Range

3. _____Increasing Interval

4. _____Decreasing Interval

5. _____Y-Intercept

6. _____x-Intercept(s)

7. _____ $f(x) > 0$

8. _____ $f(x) < 0$

a. As x increases, y decreases.

b. Where a function crosses the y-axis, always at $x = 0$.

c. The set of inputs, x values, defined by a function.

d. The set of outputs, y values, defined by a function.

e. Where a function crosses the x-axis, also called zeros and always at $y = 0$.

f. As x increases, y increases.

g. Where $f(x)$ is negative (below the x-axis)

h. Where $f(x)$ is positive (above the x-axis)

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Graphic Organizer

$f(x) > 0$

$f(x) = 0$

$f(x) < 0$
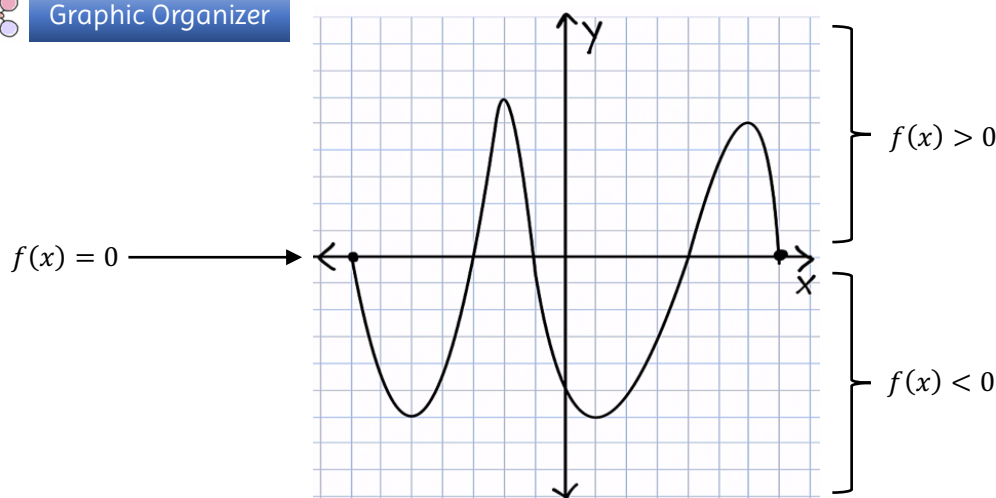
Relative Maximum Points
$(-2,6), (6,5)$

Y-Intercept
$(0,-5)$

Increasing Interval
$-5 < x < -2$ & $1 < x < 6$

Relative Minimum Points
$(-5,-6), (1,-6)$

X-Intercepts
$(-7,0), (-3,0), (-1,0), (4,0), (7,0)$

Decreasing Interval
$-2 < x < 1$ & $6 < x < 7$

Skill 1: Key Features of Functions

Use the graph of $h(x)$ to identify the following:

a. x-intercepts   b. y-intercept

c. What else do we call x −intercepts?

d. State the x coordinates of all relative minima and maxima.

e. State the absolute maximum and minimum. Circle them on the graph.

f. Is $h(x)$ increasing or decreasing over the interval $0 < x < 1$?

g. Interval where $h(x) > 0$:   h. Interval where $h(x) < 0$:
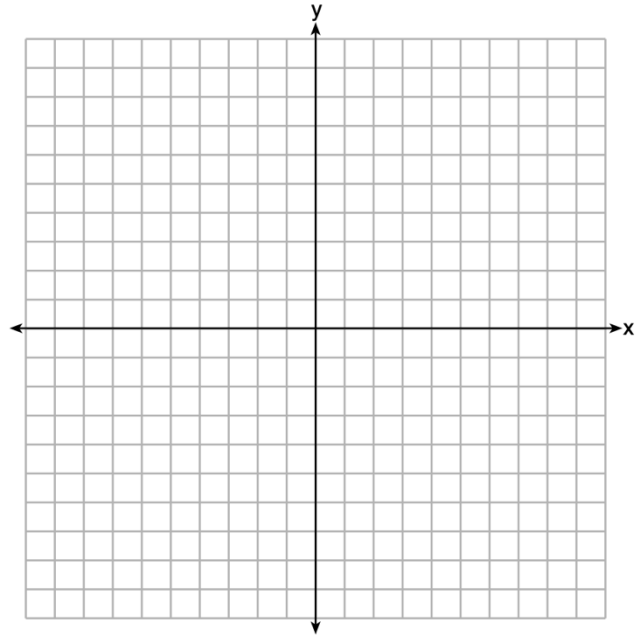
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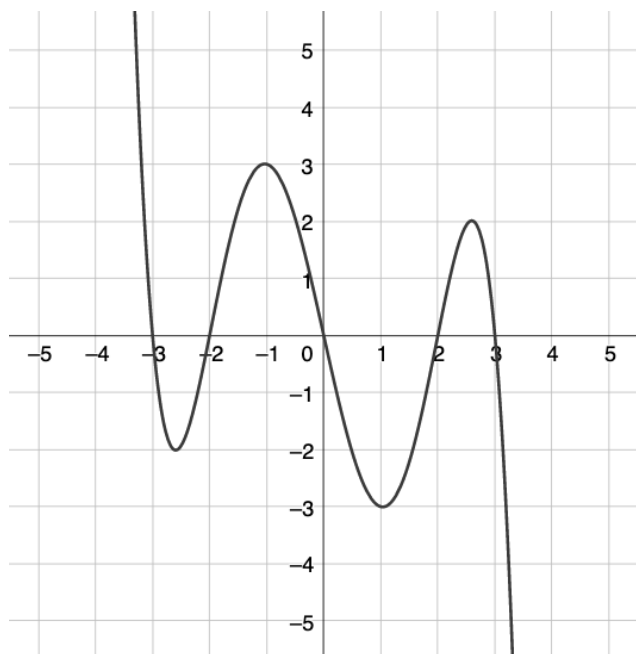
Exercise 2: Key Features of Functions

Graph the function $f(x) = -|x + 3| + 4$ on the set of axes provided.

Hint: To get absolute value bars on the graphing calculator press:

MATH→ NUM: (1)abs(

a.   What does the point $(-3,4)$ represent?

b.   State the zeros of $f(x)$.

c.   State a domain interval for which $f(x)$ is increasing.

d.   State a domain interval for which $f(x) > 0$

e.   Evaluate $f(0)$. What key feature does this represent in terms of the graph?

Talk it Out

The function $g(x)$ can be represented by the table below with selected values over the domain $-5 \leq x \leq 8$. The function has two zeros and two turning points, one at $(-3,0)$ and $(2,150)$.

x	-5	-3	-2	-1	2	5	6	8
$g(x)$	80	0	14	48	150	0	-162	-400

a.   State the interval where $g(x) < 0$.

b.   State an interval over which $g(x)$ is increasing.

Check Point

If $f(x) = \frac{1}{2}x + 8$ and $g(x) = \sqrt{(f(x + 2))}$, then what is the y-intercept of g?
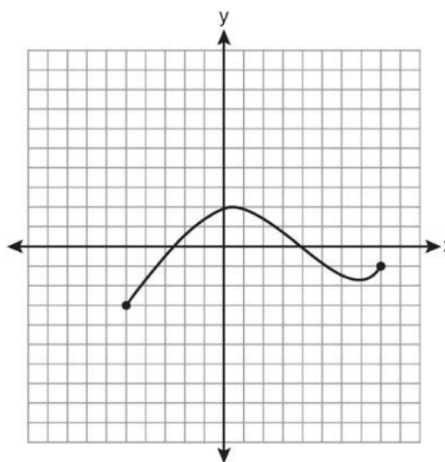
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1.05- Problem Set

Name:_____

1. Which value is in the domain of the function shown graphed below but is *not* in its range?

   (1) 3

   (2) 2

   (3) −3

   (4) 0

2. Given that $f(x) = 3x + 1$, find the y-intercept of $g(x)$ if $g(x) = 2[f(x)]^2 - 3$.

3. If $f(x) = \frac{3}{2}x + 6$, find the x-intercept of $f^{-1}(x)$.

4. Jared was asked to state a domain for which $f(x)$ is increasing. He wrote the following:

$$-2 \leq x \leq 1.5$$

   Is Jared Correct? Explain.