Foundations of Algebra Unit 6

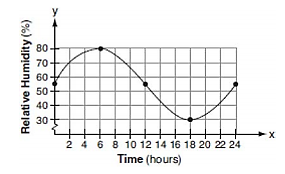
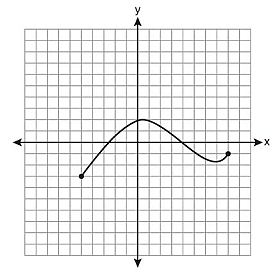
**Day 7 – Characteristics of Linear Functions**

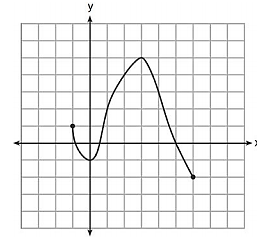
One key component to fully understanding linear functions is to be able to describe characteristics of the graph and its equation. **Important:** If a graph is a line (arrows), we need to assume that it goes on forever.

**Domain and Range**

|  |  |  |
| --- | --- | --- |
| **Domain** | | |
| **Define:**  All possible values of x | **Think:**  How far left to right does the graph go? | **Write:**  [smallest #, largest #] |
| **Range** | | |
| **Define:**  All possible values of y | **Think:**  How far down to how far up does the graph go? | **Write:**  [smallest #, largest #] |

**Non Linear Examples:**

1. 2. 3.

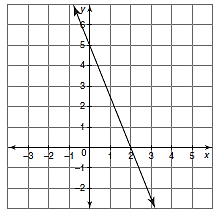


Domain: Domain: Domain:

Range: Range: Range:

**Linear Examples:**

1. 2.

Domain: Domain:

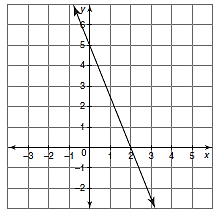
Range: Range:

**X and Y intercepts**

|  |  |  |
| --- | --- | --- |
| **Y-Intercept** | | |
| **Define:**  Point where the graph crosses the y-axis | **Think:**  At what coordinate point does the graph cross the y-axis? | **Write:**  (0, b) |
| **X-Intercept** | | |
| **Define:**  Point where the graph crosses the x-axis | **Think:**  At what coordinate point does the graph cross the x-axis? | **Write:**  (a, 0) |
| **Zero** | | |
| **Define:**  Where the function (y-value) equals 0 | **Think:**  At what x-value does the graph cross the x-axis? | **Write:**  x = \_\_\_\_ |

**Linear Examples:**

1. 2.

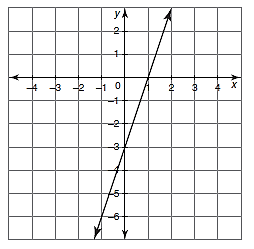
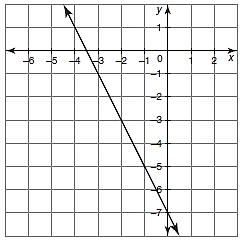
 

Y-intercept: Y-intercept:

X-intercept X-intercept:

Zero: Zero:

3. 4.

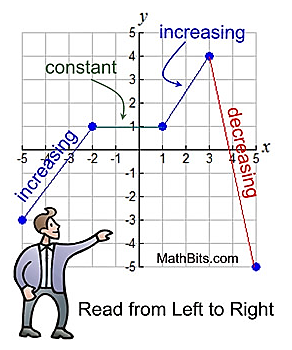
Y-intercept: Y-intercept:

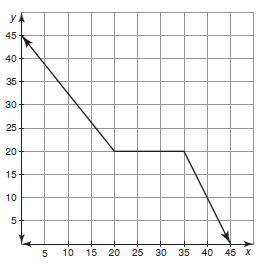
X-intercept X-intercept:

Zero: Zero:

**Interval of Increase and Decrease**

|  |  |  |
| --- | --- | --- |
| **Interval of Increase** | | |
| **Define:**  The part of the graph that is rising as you read left to right. | **Think:**  From left to right, is my graph going up? | **Write:**  [x value where it starts increasing,  x value where is stops increasing] |
| **Interval of Decrease** | | |
| **Define:**  The part of the graph that is falling as you read from left to right. | **Think:**  From left to right, is my graph going down? | **Write:**  [x value where it starts decreasing, x value where is stops decreasing] |
| **Interval of Constant** | | |
| **Define:**  The part of the graph that is a horizontal line as you read from left to right. | **Think:**  From left to right, is my graph a flat line? | **Write:**  [x value where it starts flat-lining,  x value where is stops flat-lining] |



**Non Linear Example:**

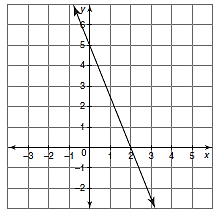
Interval of Increase:

Interval of Decrease:

Interval of Constant:

**Linear Examples:**

1. 2.

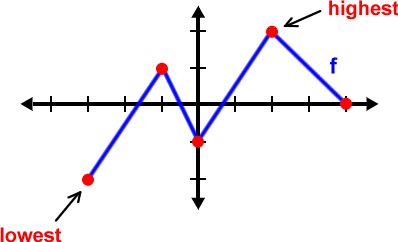
Interval of Increase: Interval of Increase:

Interval of Decrease: Interval of Decrease:

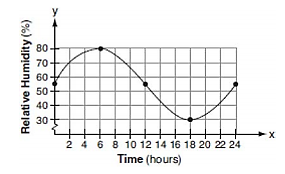
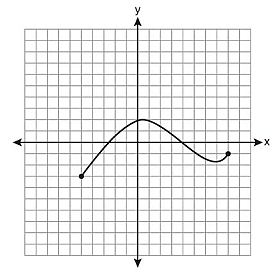
Interval of Constant: Interval of Constant:

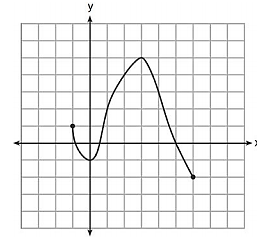
**Maximum and Minimum (Extrema)**

|  |  |  |
| --- | --- | --- |
| **Maximum** | | |
| **Define:**  Highest point or peak of a function. | **Think:**  What is my highest point or value on my graph? | **Write:**  y = biggest y-value |
| **Minimum** | | |
| **Define:**  Lowest point or valley of a function. | **Think:**  What is the lowest point or value on my graph? | **Write:**  y = smallest y-value |



**Non Linear Examples:**

1. 2. 3.

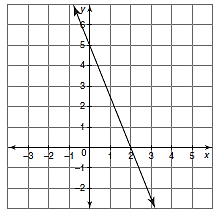


Maximum: Maximum: Maximum:

Minimum: Minimum: Minimum:

**Linear Examples:**

1. 2.

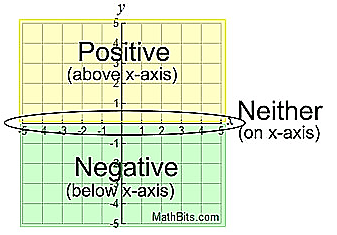
 

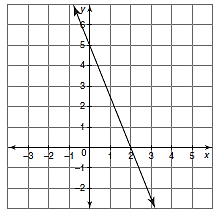
Maximum: Maximum:

Minimum: Minimum:

**Positive and Negative Regions on a Graph**

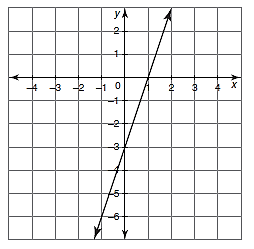
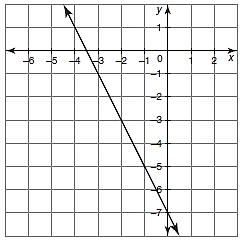
|  |  |  |
| --- | --- | --- |
| **Positive** | | |
| **Define:**  The part of the function that is above the x-axis. | **Think:**  Which part of the function is in the positive region and where? | **Write:**  [smallest x-value that is positive, largest x-value that is positive] |
| **Negative** | | |
| **Define:**  The part of the function that is below the x-axis. | **Think:**  Which part of the function is in the negative region and where? | **Write:**  [smallest x-value that is negative, largest x-value that is negative] |

1.



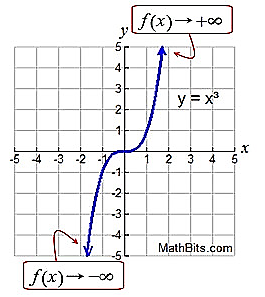
Positive: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Negative: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. 3.

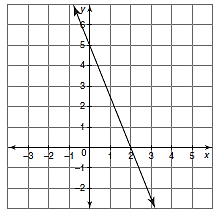
Positive: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Positive: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Negative: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Negative: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**End Behavior**

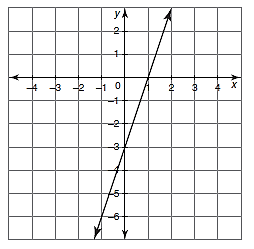
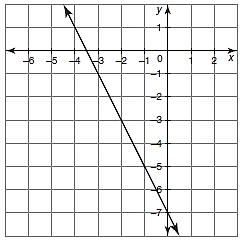
|  |  |
| --- | --- |
| **End Behavior** | |
| **Define:**  Behavior of the ends of the function (what happens to the y-values or f(x)) as x approaches positive or negative infinity. The arrows indicate the function goes on forever so we want to know where those ends go. | |
| **Think:**  As x goes to the left (negative infinity), what direction does the left arrow go? | **Write:**  As x 🡪 -, f(x) 🡪 \_\_\_\_\_ |
| **Think:**  As x goes to the right (positive infinity), what direction does the right arrow go? | **Write:**  As x 🡪 , f(x) 🡪 \_\_\_\_\_ |

1. 2.

As x 🡪 -, f(x) 🡪 \_\_\_\_\_ As x 🡪 -, f(x) 🡪 \_\_\_\_\_

As x 🡪 , f(x) 🡪 \_\_\_\_\_ As x 🡪 , f(x) 🡪 \_\_\_\_\_

3. 4.

As x 🡪 -, f(x) 🡪 \_\_\_\_\_ As x 🡪 -, f(x) 🡪 \_\_\_\_\_

As x 🡪 , f(x) 🡪 \_\_\_\_\_ As x 🡪 , f(x) 🡪 \_\_\_\_\_

**Practice**

|  |  |
| --- | --- |
| **Practice Example 1** | **Practice Example 2** |
| *Domain:*  *Range:* | *Domain:*  *Range:* |
| *Y-intercept:*  *X-intercept:*  *Zero:* | *Y-intercept:*  *X-intercept:*  *Zero:* |
| *Interval of Increase:*  *Interval of Decrease:*  *Interval of Constant:* | *Interval of Increase:*  *Interval of Decrease:*  *Interval of Constant:* |
| *Maximum:*  *Minimum:* | *Maximum:*  *Minimum:* |
| *Positive:*  *Negative:* | *Positive:*  *Negative:* |
| *End Behavior:*  As x 🡪 -, f(x) 🡪 \_\_\_\_\_  As x 🡪 , f(x) 🡪 \_\_\_\_\_ | *End Behavior:*  As x 🡪 -, f(x) 🡪 \_\_\_\_\_  As x 🡪 , f(x) 🡪 \_\_\_\_\_ |