**Parts of a Graph – Activity**

**Directions:** In the following activity, fill in the table, plot the points on the graph, and find the maximum or minimum, vertex, x-intercepts, and y-intercepts. Then state the shape and answer the question at the end of each category.

**Example:** $f\left(x\right)=(x+1)^{2}-9$ Shape: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **x** | -6 | -5 | -4 | -3 | -2 | -1 | 0 |
| **y** |  |  |  |  |  |  |  |

x-intercept: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

y-intercept: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Max or Min: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Vertex: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Interval Increasing: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Interval Decreasing: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**X-Intercept:** When the value of “y” is zero; where the graph crosses the x-axis.

**Y-Intercept:** When the value of “x” is zero; where the graph crosses the y-axis.

**Maximum/Minimum:** Graph comes to a high point or low point

**Vertex:** Highest or lowest point of a graph (x, y)

  

Vertex (x, y)

 ****

Minimum

Maximum

**Parts of a Graph Activity**

**Absolute Value #1:** $f\left(x\right)=\left|x-4\right|-2$ Shape: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **x** | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| **y** |  |  |  |  |  |  |  |

x-intercept: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

y-intercept: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Max or Min: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Vertex: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Interval Increasing: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Interval Decreasing: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* **What similarities do you see between the vertex and the equation?**
* **What part of the equation do you think gives the graph its shape?**

**Quadratic #1:** $f\left(x\right)=(x-2)^{2}-1$ Shape: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **x** | -1 | 0 | 1 | 2 | 3 | 4 | 5 |
| **y** |  |  |  |  |  |  |  |

x-intercept: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

y-intercept: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Max or Min: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Vertex: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Interval Increasing: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Interval Decreasing: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* **What similarities do you see between the vertex and the equation?**
* **What part of the equation do you think gives the graph its shape?**

**Absolute Value #2:** $f\left(x\right)=-\left|x\right|+7$ Shape: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **x** | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| **y** |  |  |  |  |  |  |  |  |

x-intercept: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

y-intercept: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Max or Min: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Vertex: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Interval Increasing: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Interval Decreasing: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* **What similarities do you see between the vertex and the equation?**
* **Do you believe the vertex has any bearing on where the graph is located? Explain your reasoning.**
* **What part of the equation do you think gives the graph its shape?**

**Quadratic #2:** $f\left(x\right)=-(x+1)^{2}-7$ Shape: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **x** | -4 | -3 | -2 | -1 | 0 | 1 | 2 |
| **y** |  |  |  |  |  |  |  |

x-intercept: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

y-intercept: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Max or Min: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Vertex: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Interval Increasing: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Interval Decreasing: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* **What similarities do you see between the vertex and the equation?**
* **Do you believe the vertex has any bearing on where the graph is located? Explain your reasoning.**
* **What part of the equation do you think gives the graph its shape?**

**Parts of a Graph - Solutions**

**Absolute Value #1:** $f\left(x\right)=\left|x-4\right|-2$ Shape: V

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **x** | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| **y** | 1 | 0 | -1 | -2 | -1 | 0 | 1 |

x-intercept: (2, 0) and (6, 0)

y-intercept: (0, 2)

Max or Min: Min

Vertex: (4, -2)

Interval Increasing: $(4, \infty )$ or $x>4$

Interval Decreasing: $(-\infty , 4)$ or $x<4$

* **What similarities do you see between the vertex and the equation?**

The vertex and the equation share the same numbers, both have a 4 and -2, the only difference is the 4 in the equation is negative and the 4 in the vertex is positive.

* **What part of the equation do you think gives the graph its shape?**

The absolute value bars.

**Quadratic #1:** $f\left(x\right)=(x-2)^{2}-1$ Shape: U

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **x** | -1 | 0 | 1 | 2 | 3 | 4 | 5 |
| **y** | 8 | 3 | 0 | -1 | 0 | 3 | 8 |

x-intercept: (1, 0) and (3, 0)

y-intercept: (0, 3)

Max or Min: Minimum

Vertex: (2, -1)

Interval Increasing: $(2, \infty )$ or $x>2$

Interval Decreasing: $(-\infty , 2)$ or $x<2$

* **What similarities do you see between the vertex and the equation?**

The vertex and the equation share the same numbers, both have a 2 and -1, the only difference is the 2 in the equation is negative and the 2 in the vertex is positive.

* **What part of the equation do you think gives the graph its shape?**

The exponent of the number 2.

**Absolute Value #2:** $f\left(x\right)=-\left|x\right|+7$ Shape: V

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **x** | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| **y** | 4 | 5 | 6 | 7 | 6 | 5 | 4 |

x-intercept: (7, 0) and (-7, 0)

y-intercept: (0, 7)

Max or Min: Maximum

Vertex: (0, 7)

Interval Increasing: $(-\infty , 0)$ or $x<0$

Interval Decreasing:$ (0, \infty )$ or $x>0$

* **What similarities do you see between the vertex and the equation?**

Both share the number 7.

* **Do you believe the vertex has any bearing on where the graph is located? Explain your reasoning.**

Yes, it shows that the height of the graph is 7, and the graph has moved 7 units up from the origin (0, 0).

* **What part of the equation do you think gives the graph its shape?**

The absolute value bars.

**Quadratic #2:** $f\left(x\right)=-(x+1)^{2}-7$ Shape: U

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **x** | -4 | -3 | -2 | -1 | 0 | 1 | 2 |
| **y** | -16 | -11 | -8 | -7 | -8 | -11 | -16 |

x-intercept: None

y-intercept: (0, -8)

Max or Min: Maximum

Vertex: (-1, -7)

Interval Increasing: $(-\infty , -1)$ or $x<-1$

Interval Decreasing: $(-1, \infty )$ or $x>-1$

* **What similarities do you see between the vertex and the equation?**

Both contain a 1 and -7, however the vertex has a -1 and the equation contains a positive 1.

* **Do you believe the vertex has any bearing on where the graph is located? Explain your reasoning.**

Yes. The vertex is (-1, -7), which means the graph moved left 1 and down 7, which you can tell by looking at the graph it has.

* **What part of the equation do you think gives the graph its shape?**

The exponent of the number 2.