# Graphing Exponential Functions
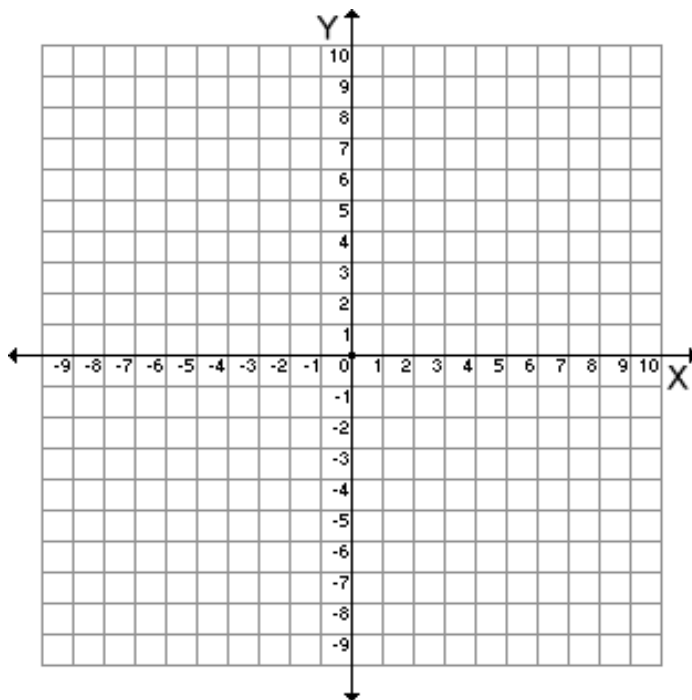
Name _____                    Period # _____

**Ex 1**:  The function $y = 3^x$ is called an _____ function because the exponent is a
_____.

*Now, let's look at how to graph the exponential function $y = 3^x$.*

| $x$ | $y = 3^x$ | $y$ | $(x, y)$ |
|---|---|---|---|
| -3 | $y = 3^{(-3)} = \dfrac{1}{3^3} = \dfrac{1}{27}$ | | |
| -2 | | | |
| -1 | | | |
| 0 | | | |
| 1 | | | |
| 2 | | | |
| 3 | | | |



*Definition 1*:  Since the $y$ values increase as the $x$ values increase in the example above, this is what we call exponential _____.  (The graph goes up the hill from left to right)

**QUESTION**:  In the exponential function $y = 3^x$, the y-values can never equal or be less than _____.

*Definition 2*:  Since the y-value can NEVER equal zero in this function, there is a horizontal
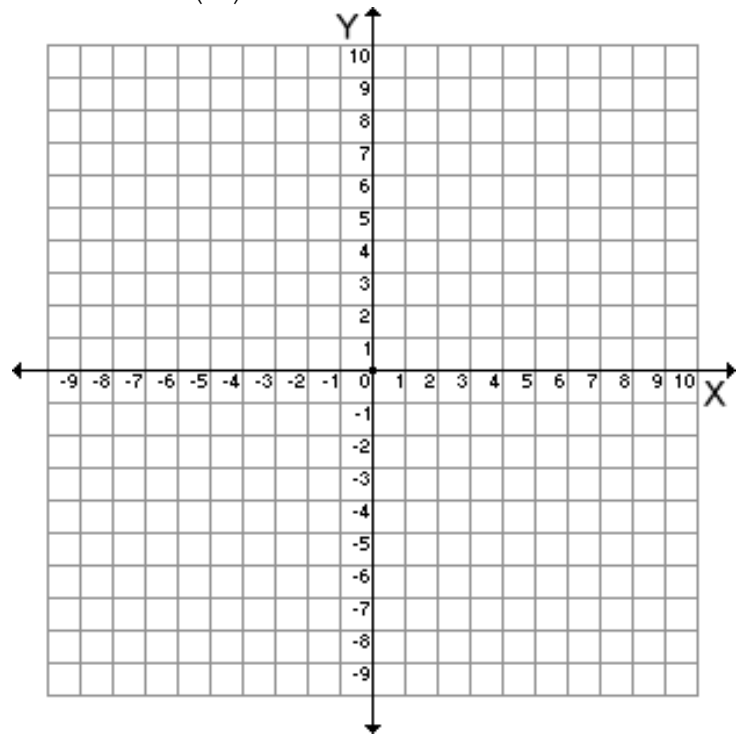_____ at $y = 0$.

**Ex 2**:  By looking at the graph above, list the domain and range of the function $y = 3^x$

        **DOMAIN**:

        **RANGE**:

**Ex 3**: *Now, let's look at how to graph the exponential function* $y = \left(\dfrac{1}{3}\right)^x$.

| $x$ | $y = \left(\dfrac{1}{3}\right)^x$ | $y$ | $(x, y)$ |
|---|---|---|---|
| -3 | | | |
| -2 | | | |
| -1 | | | |
| 0 | | | |
| 1 | | | |
| 2 | | | |
| 3 | | | |

**Definition 3**: Since the $y$ values decrease as the $x$ values increase in the example above, this is what we call exponential _____. (The graph goes down the hill from left to right)

**QUESTION**: Is there an asymptote? If so, where is it?

**Ex 4**: By looking at the graph above, list the domain and range of the function $y = \left(\dfrac{1}{3}\right)^x$

    **DOMAIN**:

    **RANGE**:

**Tell whether the functions below show exponential GROWTH or DECAY.**

5) $y = \left(\dfrac{1}{4}\right)^x$      6) $y = 2^x$      7) $y = 1^x$

8) $y = 5^x$      9) $y = 0^x$      10) $y = \left(\dfrac{2}{3}\right)^x$
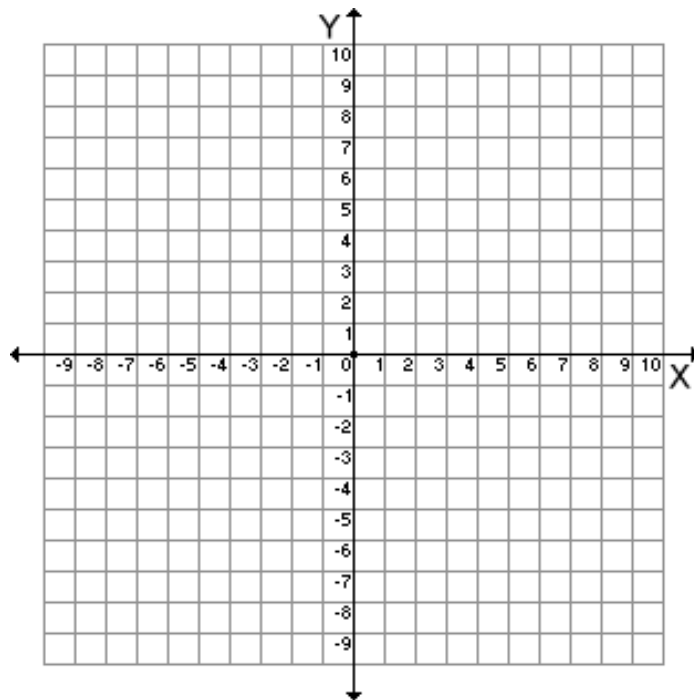
# Graphing Exponential Functions Practice Worksheet

Name _____          Period # _____

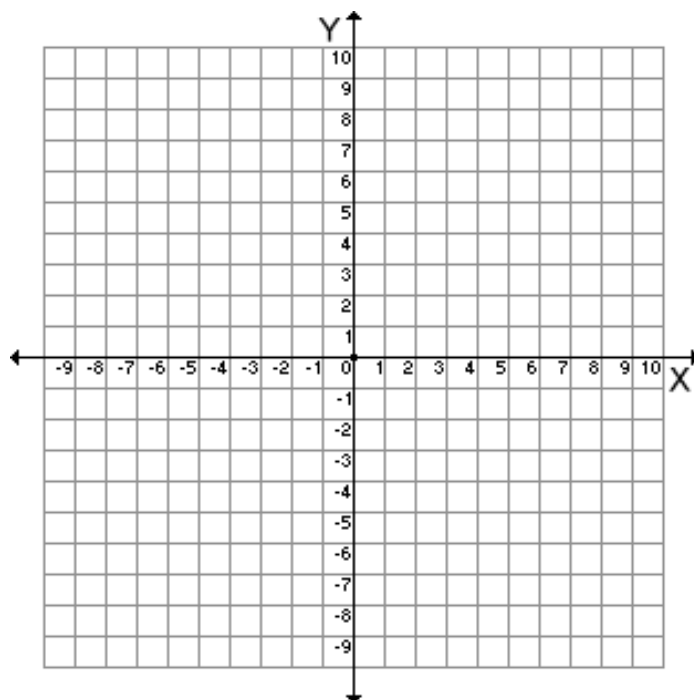**Graph the following functions and tell whether they show exponential growth or decay.**

1)

| $x$ | $y = 2^x$ | $y$ | $(x, y)$ |
|-----|-----------|-----|----------|
| -3  |           |     |          |
| -2  |           |     |          |
| -1  |           |     |          |
| 0   |           |     |          |
| 1   |           |     |          |
| 2   |           |     |          |
| 3   |           |     |          |



**Does the function above show exponential GROWTH or DECAY?**

2)

| $x$ | $y = \left(\dfrac{1}{2}\right)^x$ | $y$ | $(x, y)$ |
|-----|-----------------------------------|-----|----------|
| -3  |                                   |     |          |
| -2  |                                   |     |          |
| -1  |                                   |     |          |
| 0   |                                   |     |          |
| 1   |                                   |     |          |
| 2   |                                   |     |          |
| 3   |                                   |     |          |



**Does the function above show exponential GROWTH or DECAY?**

3)

| $x$ | $y = 1^x$ | $y$ | $(x, y)$ |
|-----|-----------|-----|----------|
| -3 | | | |
| -2 | | | |
| -1 | | | |
| 0 | | | |
| 1 | | | |
| 2 | | | |
| 3 | | | |
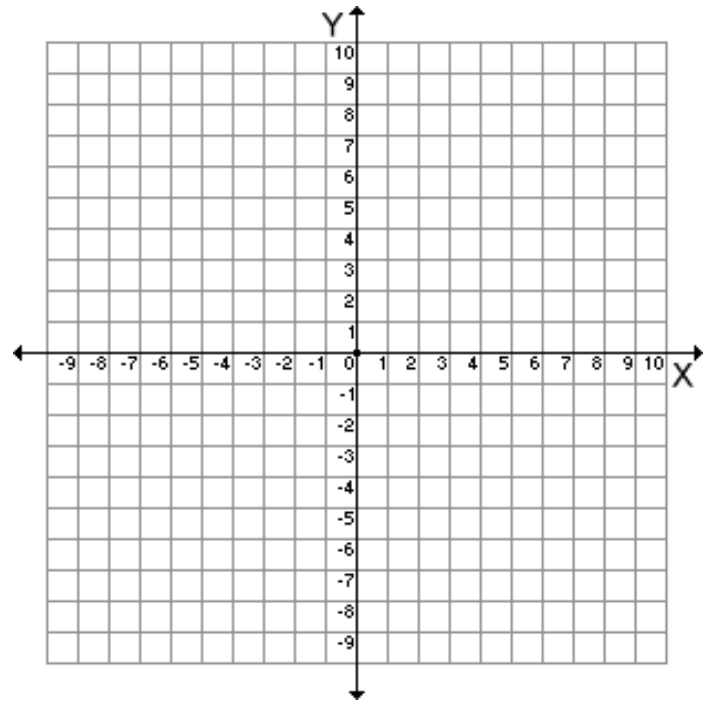


**Does the function above show exponential GROWTH or DECAY?**

**Tell whether the functions below show exponential GROWTH or DECAY.**

4) $y = 9^x$

5) $y = \left(\dfrac{1}{5}\right)^x$

6) $y = 4^x$

7) $y = \left(\dfrac{2}{7}\right)^x$

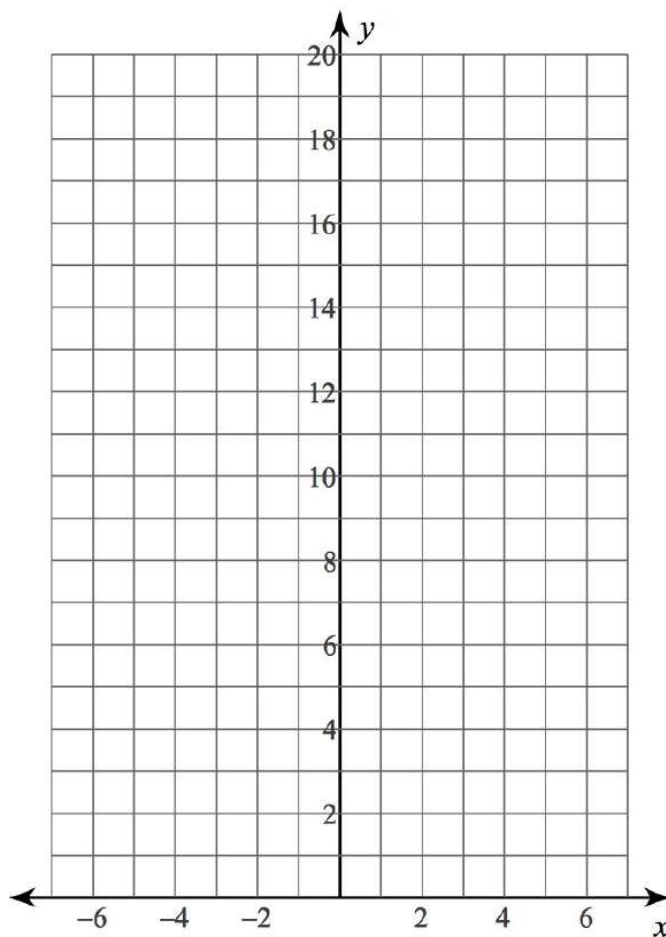8) $y = \left(\dfrac{5}{6}\right)^x$

9) $y = 0^x$

## Graphing Exponential Functions Worksheet #2

Directions: Answer all questions. Show all work!!!

**Sketch the graph of each function. Then, state the Domain, Range, and Y-intercept, and change of Y-values of the function.**

1. $y = 8 \cdot \left(\frac{1}{2}\right)^x$
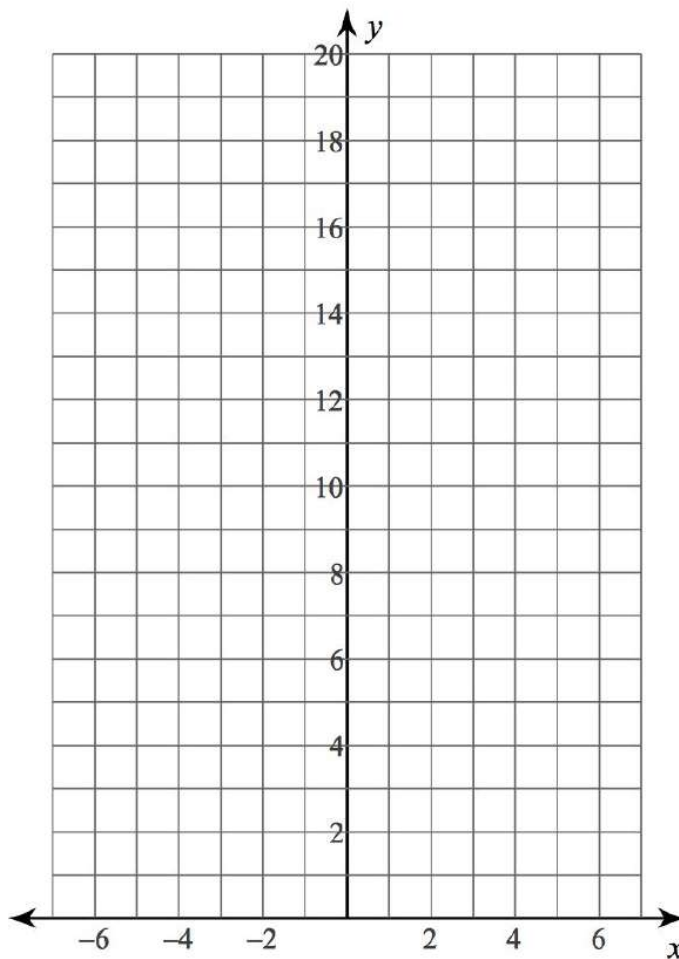
| X | Y |
|---|---|
| -1 | |
| 0 | |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |



Domain:

Range:

Y-Intercept: (     ,     )

Change in Y-Values:

Growth or Decay? _____

1

2. $y = \frac{7}{2} \cdot 2^x$

| X | Y |
|---|---|
| -4 | |
| -3 | |
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |
| 3 | |
| 4 | |



Domain:

Range:

Y-Intercept: (    ,    )

Change in Y-Values:

Growth or Decay? _____

3. $y = -6 \cdot \left(\frac{1}{2}\right)^x$

| X | Y |
|---|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
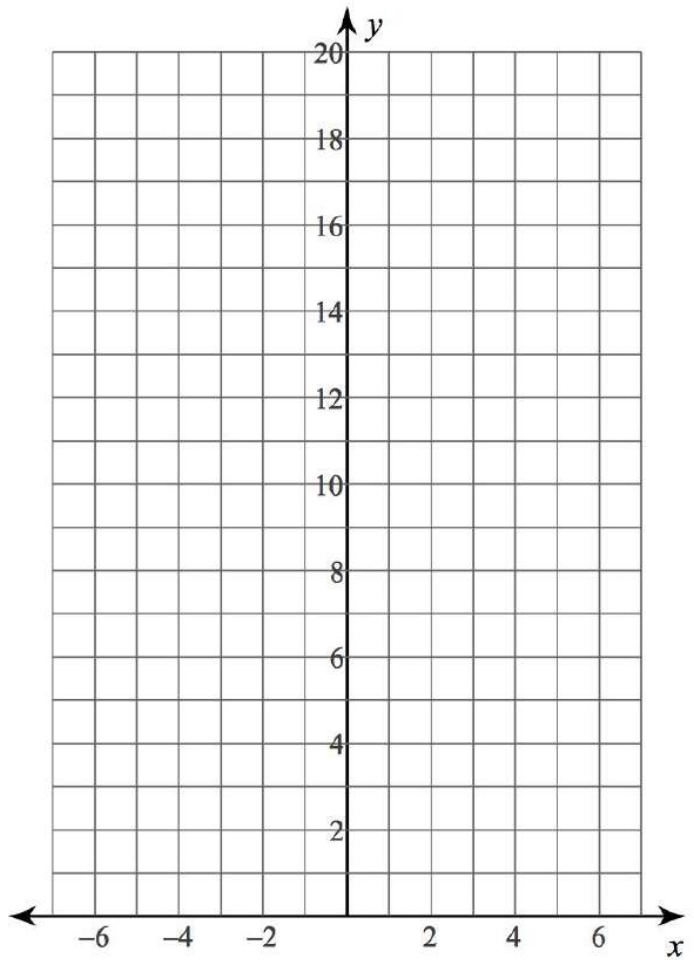


Domain:

Range:

Y–Intercept: (   ,   )

Change in Y–Values:

Growth or Decay? _____

4.  $y = 0.5^{x}$

| X | Y |
|---|---|
| -3 | |
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |
| 3 | |
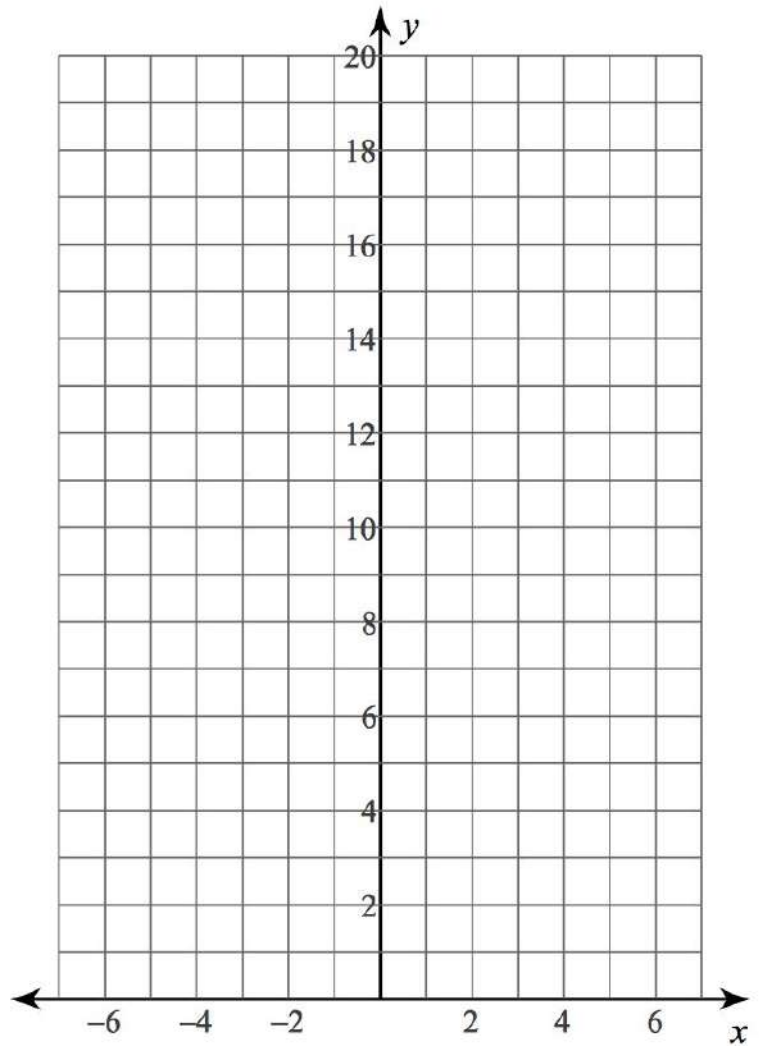


Domain:

Range:

Y-Intercept: (    ,    )

Change in Y-Values $(b)$:

Growth or Decay? _____

4