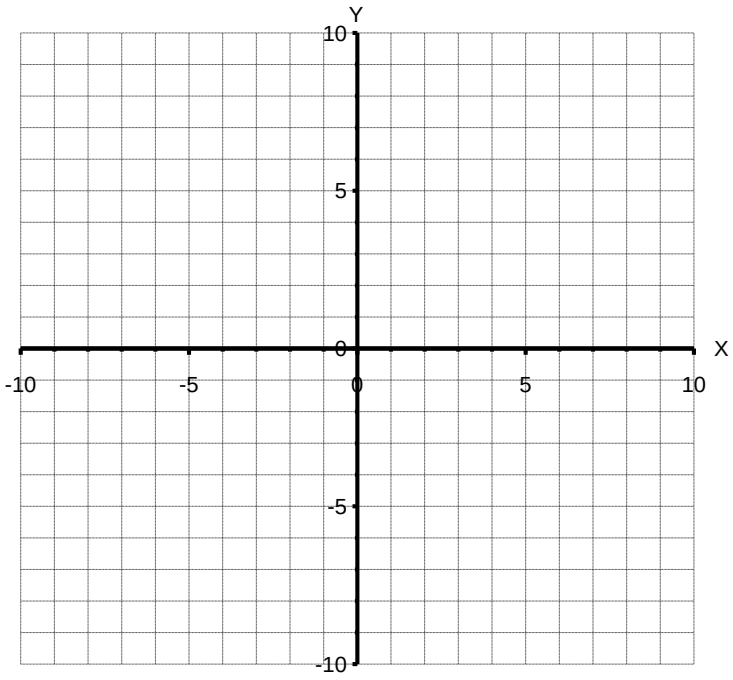
# Investigating Exponential Functions

**Part 1: Comparing Exponential Functions of the form $y = b^x$ where b >1**

*How does changing the base affect the rate of growth?*

$y = 2^x$

| $x$ | $y$ |
|---|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |
| 3 | |




$y = 3^x$

| $x$ | $y$ |
|---|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |
| 3 | |

$y = 5^x$

| $x$ | $y$ |
|---|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |
| 3 | |

**General Conclusions:**

**Rate of Growth:**

**Y – intercept:**

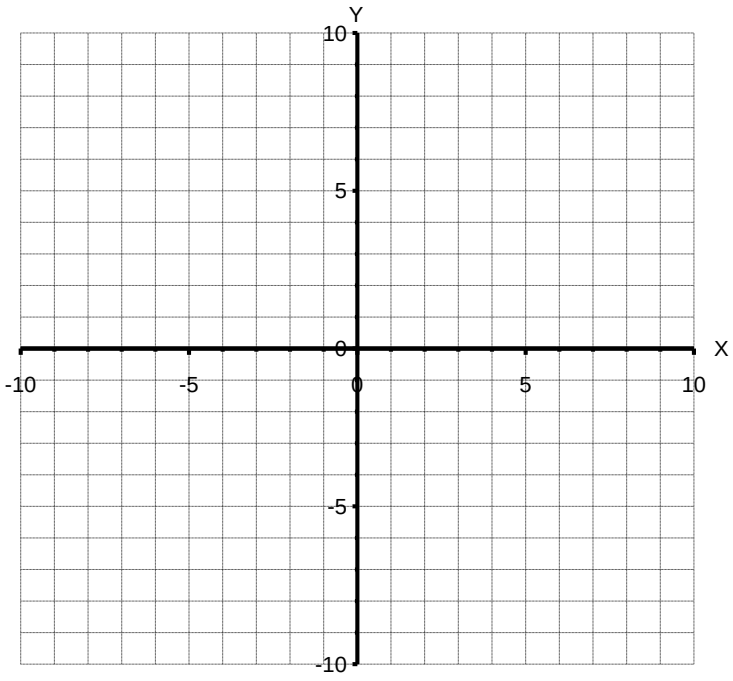
**Domain and Range:**

**Part 2: Comparing Exponential Functions of the form $y = b^x$ where 0 < b < 1**

*How does changing the base affect the rate of growth?*

$y = \left(\frac{1}{2}\right)^x$

| $x$ | $y$ |
|---|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |
| 3 | |




$y = \left(\frac{1}{3}\right)^x$

| $x$ | $y$ |
|---|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |
| 3 | |

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

| $x$ | $y$ |
|---|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |
| 3 | |

**<u>General Conclusions</u>:**

**Rate of Decay:**

**Y – intercept:**

**Domain and Range:**

**Part 3: Using the Graph of an Exponential Function to Solve a Related Equation**

**Task: G**raph the function $y = 2^x$ and use the graph to solve the equation $2^x = 5$

Using the Desmos application (or website), graph $y = 2^x$.

In order to solve the equation $2^x = 5$, we need to find the value of x at the point on the graph were y=5.

Since this is a decimal number, it is difficult to find the exact x value.

To make this easier, graph $y = 5$ and find coordinates of the point of intersection between the 2 graphs (by clicking on the point of intersection).

The value of x at this point of intersection is the solution to $2^x = 5$.
(The solution is x = 2.322)