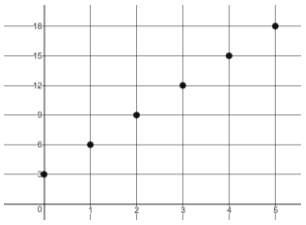
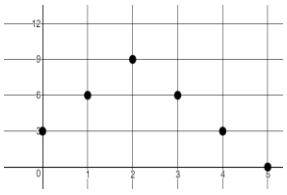
**GSE Algebra 1**
**Unit 4 Exponential Functions Review**

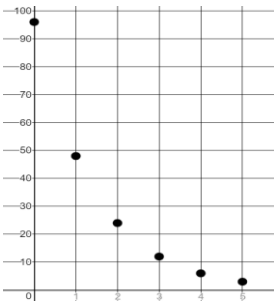
1. A local newspaper said that the city of Luttrell is expected to **grow** by 8% each year. The population in 2010 is 160,000 people. Let t represent the number of years after 2010. Write an equation that could be used to determine the total expected population of Luttrell in t years?

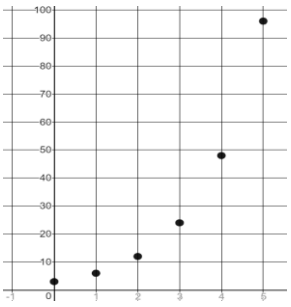
$$y = a(1 + r)^t$$

2. A population of 3 rabbits is released into a wild-life region. The population doubles each year for 5 years. Which of the following graphs represents this situation?

A) 

C) 

B) 

D) 

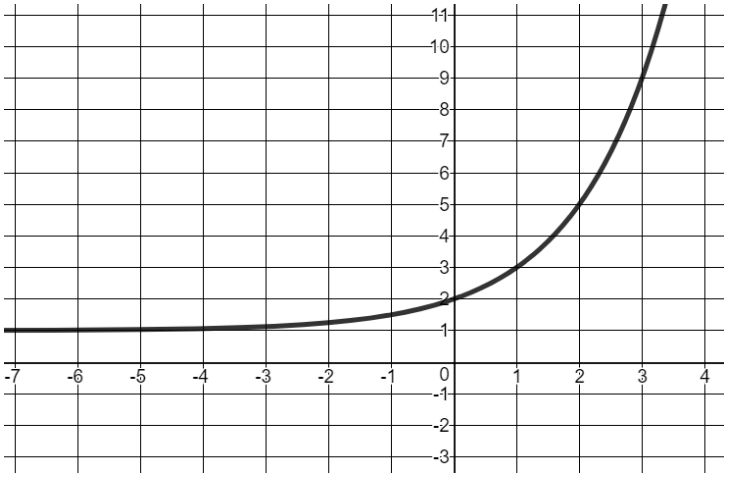
3. The table below represents the function $F$.

| x | 2 | 3 | 4 | 6 | 7 |
|---|---|---|---|---|---|
| f(x) | 10 | 28 | 82 | 730 | 2188 |

A) $F(x) = 3^x + 1$
B) $F(x) = 3x$
C) $F(x) = 2^x + 1$
D) $F(x) = 2x + 3$

4. What is the rate of change for the function $f(x) = 4(2)^{\frac{x}{3}}$ over the interval [9, 15]?

5. Given the graph of *f* (*x*) below, find

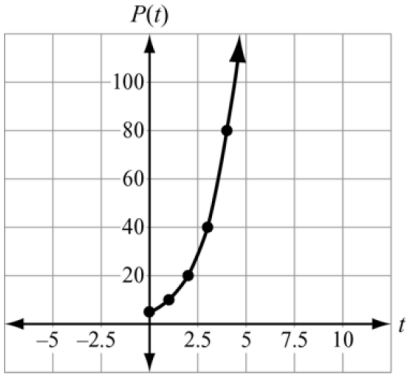


f(0)= f(2)= f(3)=

6. Write the explicit equation that represents the pattern in the table below?

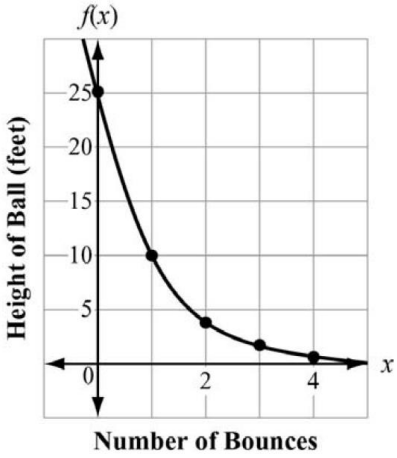
| $x$ | $f(x)$ |
|---|---|
| 1 | $-36$ |
| 2 | $-12$ |
| 3 | $-4$ |
| 4 | $-\frac{4}{3}$ |

7. A population of squirrels doubles every year. Initially there were 7 squirrels. A biologist studying the squirrels created a function to model their population growth, $P(t) = 7(2)^t$ where $t$ is time. The graph of the function is shown. What is the range of the function?)




A) any whole number greater than 7
B) any whole number greater than 0
C) any real number
D) any whole number greater than or equal to 7

8. The function graphed on this coordinate grid shows $f(x)$, the height of a dropped ball in feet after its $x^{th}$ bounce.




On which bounce was the height of the ball 4 feet?

What was the height of the ball on bounce 1?

How far was the ball dropped?

9. The explicit formula for a geometric sequence is $a_n = 4(-3)^{n-1}$. What is the seventh term of the sequence?

10. Find the 6th term of the following geometric sequence.

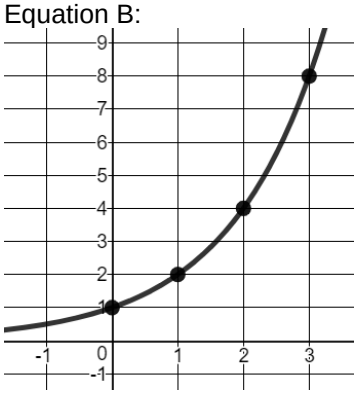
4 , 12 , 36 , ...

11. Find the average rate of change over the interval [0, 2] for both equations.

Equation A:

| *X* | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| *Y* | 1 | 2.5 | 5 | 7.5 |

Equation B:




Which statement is true for the average rate of change for the given interval?

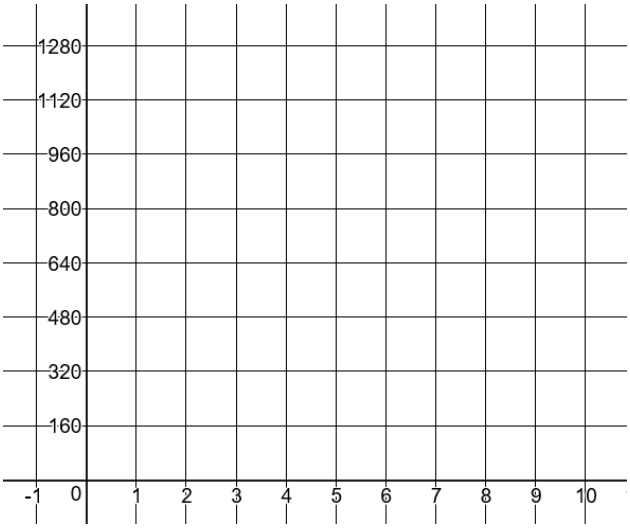
A) The average rate of change of A is greater than B.
B) The average rate of change of B is greater than A.
C) The average rate of change for both is equal.
D) The answer cannot be determined from the given information.

12. A population of bees is **decreasing**. The population in a particular region this year is $1{,}200$. After one year, it is estimated that the population will be $900$. After three years, it is estimated that the population will be $506.25$ (about 506 bees).

a. Write an equation to model this scenario.

$$y = a(1 - r)^t$$

b. Create a graph to show the bee population over the next 10 years.




c. Identify the key features of the function. Identify the *x*- and *y*-intercepts. Determine whether the function is increasing or decreasing, the rate of change of the function over the interval [0, 10], and any asymptotes.
Increasing or decreasing: _____

Rate of Change from [0,10] :_____

Asymptote: _____

13. Write a compound interest function to model the situation. Then find the balance after the given number of years. John invested $4000 at a rate of 3.5% compounded quarterly for 4 years.

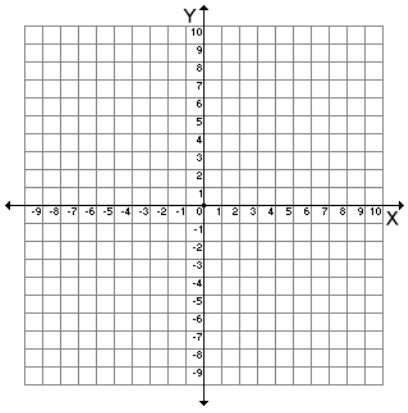
$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

14. Write a compound interest function to model the situation. Then find the balance after the given number of years. Sarah invested $3000 at a rate of 4% compounded annually for 5 years.

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

15. Graph $y = 3^x$

| x | y |
|---|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |

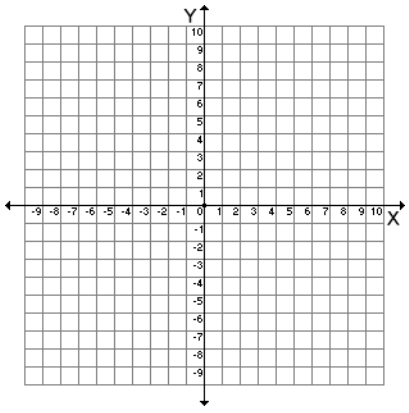



Domain: Range:

x-intercept: y-intercept:

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

| x | y |
|---|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |




Domain: Range:

x-intercept: y-intercept:

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

$y = \left(\frac{1}{4}\right)^x$ $y = 2^x$ $y = 1^x$ $y = 5^x$ $y = 0^x$ $y = \left(\frac{2}{3}\right)^x$

Identify whether the following sequences are arightmetic, geometric, or neither. If it is arithmetic, find d and if its geometric, find r. Then write the explicit formula.

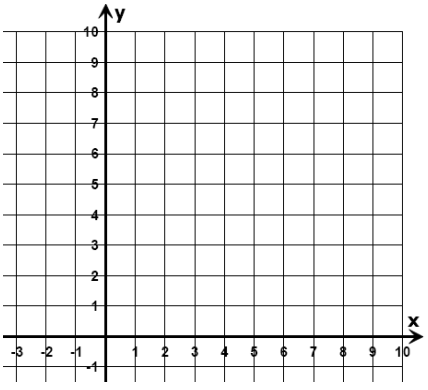
$$Aritmetic\ Explicit\ Formula: a_n = a_1 + (n-1)d$$
$$Geometric\ Explicit\ Formula: a_n = a_1 \cdot r^{n-1}$$

| | |
|---|---|
| 18. 4, 10, 18, 28, 40… | 19. 625, 125, 25, 5, 1… |
| 20. 81, 27, 9, 3, 1… | 21. 1, 2, 6, 24, 120… |
| 22. -4, 8, -16, 32, -64… | 23. 8, 1, -6, -13, -20… |

24. Graph the exponential functions.

$f(x) = 2^x - 1$

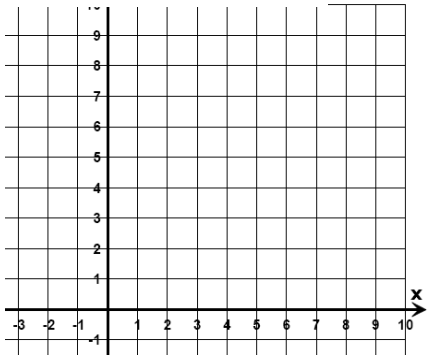
| x | y |
|---|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |



x-intercept: y-intercept:

$f(x) = 4^x$

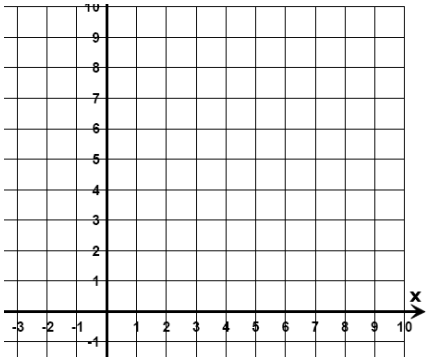
| x | y |
|---|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |



x-intercept: y-intercept:

$f(x) = (3)2^x$

| x | y |
|---|---|
| -2 | |
| -1 | |
| 0 | |
| 1 | |
| 2 | |



x-intercept: y-intercept: