

Algebra 2A Notes

Name: _____

7-1 Exploring Exponential Models

Date: _____ Hr: _____

Objective:

- To model exponential growth and decay

Common Core Content Standard:

F.IF.7.e Graph exponential ... functions, showing intercepts and end behavior...

A.CED.2 Create equations in two or more variables to represent relationships between quantities...

Also **F.IF.8**, **A.SSE.1.b**

You can represent repeated _____ with an _____ function of the form $y = abx^2$ where b is a positive constant other than 1.

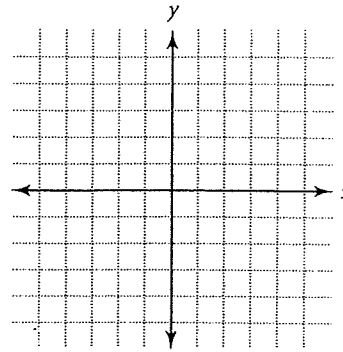
Example 1: Graphing an exponential function

What is the graph of $y = 3.1^x$?

Step 1

Make a table of values.

Step 2 Plot and connect the points



Two types of exponential behavior

For exponential _____, as the value of x increases, the value of y increases.

For exponential _____, as the value of x increases, the value of y decreases, approaching zero,

The exponential functions shown here are _____ to the x-axis.

Take note

Concept Summary Exponential Functions

For the function $y = ab^x$,

- if $a > 0$ and $b > 1$, the function represents exponential growth.
- if $a > 0$ and $0 < b < 1$, the function represents exponential decay.

In either case, the y-intercept is $(0, a)$, the domain is all real numbers, the asymptote is $y = 0$, and the range is $y > 0$.

Example 2: Identifying Exponential Growth and Decay

Identify each function or situation as an example of exponential growth or decay. What is the y-intercept?

a.) $y = 3(4^x)$

b.) $y = 11(0.75^x)$

c.) You put \$2000 into a college savings account for four years. The account pays 6% interest annually.

For exponential growth $v = ab^x$, with $b > 1$, the value of b is the _____. A quantity that exhibits exponential growth increases by a constant percentage each time period. The percentage increase r , written as a decimal, is the _____, _____, or _____ . For exponential growth, $b = 1 + r$.

For exponential decay, $0 < b < 1$ and b is the _____. The quantity decreases by a constant percentage each time period. The percentage decrease, r , is the _____. Usually, it is expressed as a negative quantity, so $b = 1 + r$.

Take note

Key Concept Exponential Growth and Decay

You can model exponential growth or decay with this function.

Amount after t time periods Rate of growth ($r > 0$) or decay ($r < 0$)

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

Initial amount Number of time periods

For growth or decay to be exponential, a quantity changes by a fixed percentage each time period.

Example 3: Modeling Exponential Growth

You buy a savings bond for \$25 that pays a yearly interest rate of 4.2%. What will the savings bond be worth after 15 years?

Example 4: Using Exponential Growth

What is each product? You open a savings account that pays 4.5% annual interest. If your initial investment is \$300 and you make no additional deposits or withdrawals, how many years will it take for the account to grow to at least \$500?

Example 5: Writing and Exponential Function

The initial value of a car is \$30,000. After one year, the value of the car is \$20,000. Estimate the value of the car after 5 years.

