

keep scrolling to get  
a sneak peek!

Help your Algebra 2 students  
practice **identifying  
characteristics of exponential  
functions**. Students will be eager  
to get the self-checking benefits  
from this circuit activity!

# CHARACTERISTICS OF EXPONENTIAL FUNCTIONS

## Differentiated Circuit Worksheet

Key

Date: \_\_\_\_\_

### CHARACTERISTICS OF EXPONENTIAL FUNCTIONS CIRCUIT

A circuit is a route that starts and ends at the same place. Start in the first box labeled 1 and solve the problem. Search through the remaining boxes for the answer you got for question 1. Now complete that question. Continue until you have completed the questions and you are back to the original question. Record your path below.

1 → 3 → 10 → 6 → 2 → 9 → 4 → 8 → 5 →

1. Identify the y-intercept, asymptote, and if the function shows growth or decay. $y = 4(1/2)^x + 1$ y-int: (0, 5) Asymptote: $y = 1$ Circle: Growth <b>Decay</b>	Previous Answer: (0, -4), $y = 0$ , decay
2. Identify the y-intercept, asymptote, and if the function shows growth or decay. $y = -3(1/2)^x$ y-int: (0, -3) Asymptote: $y = 0$ Circle: Growth <b>Decay</b>	Previous Answer: (0, -4), $y = 0$ , decay
3. Identify the y-intercept, asymptote, and if the function shows growth or decay. $y = 4(1/2)^x + 1$ y-int: (0, 5) Asymptote: $y = 1$ Circle: Growth <b>Decay</b>	Previous Answer: (0, 1), $y = 0$ , growth
4. Identify the y-intercept, asymptote, and if the function shows growth or decay. $y = -3(1/2)^x$ y-int: (0, -3) Asymptote: $y = 0$ Circle: Growth <b>Decay</b>	Previous Answer: (0, 3), $y = 0$ , decay

Math with Ms. Rivera

2 versions + answer key included

© Malia Rivera, 2025

Why do you need this?

# Characteristics of Exponential Functions Circuit



It's self-checking! Your students will know if they are correct or not.



2 differentiated versions for all students practice this essential math skill.

Name: \_\_\_\_\_ Date: \_\_\_\_\_

## CHARACTERISTICS OF EXPONENTIAL FUNCTIONS CIRCUIT

Directions: A circuit is a route that starts and ends at the same place. Start in the first box labeled 1 and solve the problem. Search through the remaining boxes for the answer you got for question 1. Now complete that question. Continue until you have completed the questions and you are back to the original question. Record your path below.

1 → \_\_\_\_\_ → \_\_\_\_\_ → \_\_\_\_\_ → \_\_\_\_\_ → \_\_\_\_\_

Previous Answer: (0, 7), y = 3, growth # _____	Previous Answer: (0, 2), y = 0, growth # _____
1. Identify the y-intercept, asymptote, and if the function shows growth or decay.	2. Identify the y-intercept, asymptote, and if the function shows growth or decay.
Previous Answer: (0, -2.5), y = 0, decay # _____	Previous Answer: (0, 5), y = 1, decay # _____
3. Identify the y-intercept, asymptote, and if the function shows growth or decay.	4. Identify the y-intercept, asymptote, and if the function shows growth or decay.
Previous Answer: (0, 10), y = 4, decay # _____	Previous Answer: (0, -3), y = 0, growth # _____
5. Identify the y-intercept, asymptote, and if the function shows growth or decay.	6. Identify the y-intercept, asymptote, and if the function shows growth or decay.

Helpful Hints: Use these hints to help you solve the problems.

$y = a \cdot b^x + k$

Asymptote: y = k

Set x = 0, solve for y.

Decay

# Characteristics of Exponential Functions *includes:*

Challenge: Write an exponential function that satisfies the characteristics below. State the domain and range of your function.

Required characteristics:

- It is a decay function.
- A horizontal asymptote is  $y = -2$ .
- The y-intercept is 7.
- As  $x \rightarrow \infty$ ,  $f(x) \rightarrow -2$ .

How are you feeling about this topic? Circle one:

© Malia Rivera, 2025

Helpful Hints: Use these hints to help you solve the problems.

$$y = a \cdot b^x + k$$

Asymptote:  $y = k$

Y-intercept: Set  $x = 0$ , solve for  $y$ .

$b > 1 \rightarrow$  Growth     $0 < b < 1 \rightarrow$  Decay

How are you feeling about this topic? Circle one:

✓ 10 self-checking problems

✓ a detailed answer key

✓ a standard version with an extension question

✓ a basic version with helpful hints section

✓ student self assessment

# Characteristics of Exponential Functions

standards covered:

**CCSS:** HSF-BF.B.4

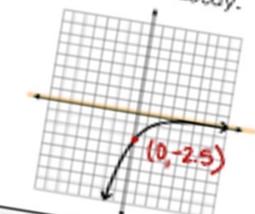
**TEKs:** A2.2.A

**VA SOLs:** F.A11.7

**CHARACTERISTICS OF EXPONENTIAL FUNCTIONS CIRCUIT**

Previous Answer:  $(0, -6)$ ,  $y = -4$ , growth # 1

7. Identify the y-intercept, asymptote, and if the function shows growth or decay.



$y = 6(2/3)^x + 4$   
 $y = 6 + 4$   
 $y = 10$   
 $(0, 10)$  asymptote:  
 $y = 4$

Previous Answer:  $(0, 2)$ ,  $y = -2$ , growth # 4

8. Identify the y-intercept, asymptote, and if the function shows growth or decay.

$y = 6(2/3)^x + 4$   
 $y = 6 + 4$   
 $y = 10$   
 $(0, 10)$  asymptote:  
 $y = 4$

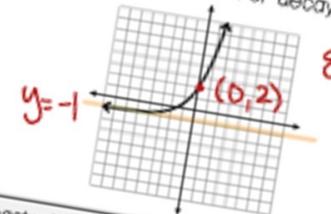
Previous Answer:  $(0, 2)$ ,  $y = 5$ , decay # 2

9. Identify the y-intercept, asymptote, and if the function shows growth or decay.

$y = -5(10^x) + 8$   
 $y = -5 + 8$   
 $y = 3$   
 $(0, 3)$  asymptote:  
 $y = 8$

Previous Answer:  $(0, 5)$ ,  $y = 2$ , decay # 3

10. Identify the y-intercept, asymptote, and if the function shows growth or decay.



Challenge: Write an exponential function that satisfies the characteristics below. State the domain and range of your function.

Required characteristics:

- It is a decay function.
- A horizontal asymptote is  $y = -2$ .
- The y-intercept is 7.
- As  $x \rightarrow \infty$ ,  $f(x) \rightarrow -2$ .

*Answers vary*

# how this circuit resource works

Then search for their answer on the worksheet. Once the answer is found, students complete the problem below it.

Students can track their path at the top.



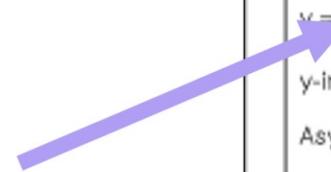
Name: \_\_\_\_\_ Date: \_\_\_\_\_

### CHARACTERISTICS OF EXPONENTIAL FUNCTIONS CIRCUIT

Directions: A circuit is a route that starts and ends at the same place. Start in the first box labeled 1 and solve the problem. Search through the remaining boxes for the answer you got for question 1. Now complete that question. Continue until you have completed the questions and you are back to the original question. Record your path below.

1 → \_\_\_ → \_\_\_ → \_\_\_ → \_\_\_ → \_\_\_ → \_\_\_ → \_\_\_ → \_\_\_ → 1

Previous Answer: (0, 5), $y = 3$ , growth # _____	Previous Answer: (0, -4), $y = 0$ , decay # _____
1. Identify the y-intercept, asymptote, and if the function shows growth or decay. $y = 2 \cdot 2^x$ y-int: _____ Asymptote: $y =$ _____ Circle: Growth Decay	2. Identify the y-intercept, asymptote, and if the function shows growth or decay. $y = 4(1/2)^x + 1$ y-int: _____ Asymptote: $y =$ _____ Circle: Growth Decay
Previous Answer: (0, 1), $y = -1$ , growth # _____	Previous Answer: (0, 1), $y = 0$ , growth # _____
3. Identify the y-intercept, asymptote, and if the function shows growth or decay. $y = -3 \cdot 2^x$ y-int: _____ Asymptote: $y =$ _____ Circle: Growth Decay	4. Identify the y-intercept, asymptote, and if the function shows growth or decay. $y = 6(1/2)^x - 2$ y-int: _____ Asymptote: $y =$ _____ Circle: Growth Decay



Students start with the first question.

The last question they answer should lead back to problem #1 to “close” the circuit.

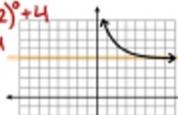
# how to use this resource

This is a great activity to use when reviewing identifying characteristics of exponential functions from graphs & equations.

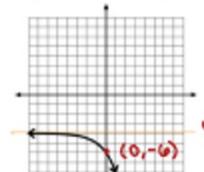
It can be used right after teaching the concept or as homework.

This is also a **substitute-friendly** assignment!

### CHARACTERISTICS OF EXPONENTIAL FUNCTIONS CIRCUIT

<p>Previous Answer: (0, 2), y = 0, growth # <u>1</u></p> <p>7. Identify the y-intercept, asymptote, and if the function shows growth or decay.</p> <p><math>y = 2 \cdot 2^x - 1</math></p> <p>y-int: <u>(0, 1)</u></p> <p>Asymptote: y = <u>-1</u></p> <p>Circle: <u>Growth</u> Decay</p> 	<p>Previous Answer: (0, 4), y = -2, decay # <u>4</u></p> <p>8. Identify the y-intercept, asymptote, and if the function shows growth or decay.</p> <p><math>y = 6(1/2)^x + 4</math></p> <p>y-int: <u>(0, 10)</u></p> <p>Asymptote: y = <u>4</u></p> 
---	---

<p>Name: <u>Answer Key</u> Date: _____</p> <h3 style="text-align: center;">CHARACTERISTICS OF EXPONENTIAL FUNCTIONS CIRCUIT</h3> <p><b>Directions:</b> A circuit is a route that starts and ends at the same place. Start in the first box labeled 1 and solve the problem. Search through the remaining boxes for the answer you got for question 1. Now complete that question. Continue until you have completed the questions and you are back to the original question. Record your path below.</p> <p style="text-align: center;">1 → <u>7</u> → <u>3</u> → <u>10</u> → <u>6</u> → <u>2</u> → <u>9</u> → <u>4</u> → <u>8</u> → <u>5</u> → 1</p>	
<p>Previous Answer: (0, 7), y = 3, growth # <u>5</u></p> <p>1. Identify the y-intercept, asymptote, and if the function shows growth or decay.</p> <p><math>y = (3/2)^x</math></p> <p>y-int: <u>(0, 1)</u></p> <p>Asymptote: y = <u>0</u></p> <p>Circle: <u>growth</u> Decay</p>	<p>Previous Answer: (0, -4), y = -2, growth # <u>6</u></p> <p>2. Identify the y-intercept, asymptote, and if the function shows growth or decay.</p> <p><math>y = -3(1/2)^x + 5</math></p> <p>y = -3 + 5</p> <p>y = 2</p> <p>(0, 2)</p> <p>asymptote: y = 5</p> 
<p>Previous Answer: (0, -2.5), y = 0, decay # <u>7</u></p> <p>3. Identify the y-intercept, asymptote, and if the function shows growth or decay.</p> <p><math>y = (3/2)^x</math></p> <p>y-int: <u>(0, 5)</u></p> <p>Asymptote: y = <u>4</u></p> <p>Circle: <u>decay</u> Growth</p>	<p>Previous Answer: (0, 3), y = 8, growth # <u>9</u></p> <p>4. Identify the y-intercept, asymptote, and if the function shows growth or decay.</p> <p><math>y = 4(3^x) - 2</math></p> <p>y = 4 - 2</p> <p>y = 2</p> <p>Asymptote: y = 8</p> 

Helpful Hints: Use these hints

Asymptote: y = k

Y-intercept: Set x = 0

b > 1 → Growth

0 < b < 1 → Decay

You may also enjoy...

## CHARACTERISTICS OF EXPONENTIAL FUNCTIONS

Algebra 2 Guided Notes

CHARACTERISTICS OF EXPONENTIAL FUNCTIONS

$f(x) = a \cdot b^x$

Exponential functions are written in the form  $f(x) = a \cdot b^x$  where  $a > 0$  and  $b > 1$ .

The asymptote of an exponential function always a horizontal line where the graph approaches but never crosses.

$a > 0$  and  $b > 1$  Exponential growth

$a > 0$  and  $0 < b < 1$  Exponential decay

x	y
-2	1
-1	2
0	4
1	8
2	16

Answer key included

© Malia Rivera, 2023

## CHARACTERISTICS OF EXPONENTIAL FUNCTIONS

Football Task Cards

CHARACTERISTICS OF EXPONENTIAL TASK CARDS

Directions: Identify the key characteristics of each graph in the box.

Name: \_\_\_\_\_ Date: \_\_\_\_\_

**ANSWER KEY**

**G** Domain:  $(-\infty, \infty)$   
Range:  $(-5, \infty)$   
Circle one: Growth or Decay  
Asymptote:  $y = -5$   
Y-Intercept:  $(0, -4)$   
End Behavior:  $x \rightarrow -\infty, f(x) \rightarrow -5$   
 $x \rightarrow \infty, f(x) \rightarrow \infty$

**H** Domain:  $(-\infty, \infty)$   
Range:  $(-5, \infty)$   
Circle one: Growth or Decay  
Asymptote:  $y = -5$   
Y-Intercept:  $(0, -4)$   
End Behavior:  $x \rightarrow -\infty, f(x) \rightarrow -5$   
 $x \rightarrow \infty, f(x) \rightarrow \infty$

**I** Domain:  $(-\infty, \infty)$   
Range:  $(4, \infty)$   
Circle one: Growth or Decay  
Asymptote:  $y = 4$   
Y-Intercept:  $(0, 4.5)$   
End Behavior:  $x \rightarrow -\infty, f(x) \rightarrow 4$   
 $x \rightarrow \infty, f(x) \rightarrow \infty$

**J** Domain:  $(-\infty, \infty)$   
Range:  $(-2, \infty)$   
Circle one: Growth or Decay  
Asymptote:  $y = 2$   
Y-Intercept:  $(0, -7)$   
End Behavior:  $x \rightarrow -\infty, f(x) \rightarrow 2$   
 $x \rightarrow \infty, f(x) \rightarrow \infty$

**K** Domain:  $(-\infty, \infty)$   
Range:  $(4, \infty)$   
Circle one: Growth or Decay  
Asymptote:  $y = 4$   
Y-Intercept:  $(0, 4.5)$   
End Behavior:  $x \rightarrow -\infty, f(x) \rightarrow 4$   
 $x \rightarrow \infty, f(x) \rightarrow \infty$

**L** Domain:  $(-\infty, \infty)$   
Range:  $(-2, \infty)$   
Circle one: Growth or Decay  
Asymptote:  $y = 2$   
Y-Intercept:  $(0, -7)$   
End Behavior:  $x \rightarrow -\infty, f(x) \rightarrow 2$   
 $x \rightarrow \infty, f(x) \rightarrow \infty$

Identify each characteristic of the graph.

Math with Ms. Rivera

Recording sheet & Answer key included

© Malia Rivera, 2025

## GRAPHING EXPONENTIAL FUNCTIONS

"S'Mitten About Math!"

S'MITTEN ABOUT MATH!

Student work bulletin board

Math with Ms. Rivera

© Malia Rivera, 2024

# Free Algebra Activities!

When you join my email list, I'll send you a free Algebra print & digital self-checking activities. There is an Algebra 1 and Algebra 2 version!

You'll also be getting exclusive freebies and content to help your Algebra students be successful this school year!

check it out!

**Rational Expression Operations - Addition & Subtraction**

Directions: Answer each question and type the question number with the matching answer in the answer column to the right.

#	Question	Answer	Type the matching question numbers here
1	$\frac{5}{x} + \frac{3}{x+1}$	$\frac{2x+1}{x+2}$	
2	$\frac{2}{x+4} - \frac{x^2}{x^2-16}$	$-\frac{1}{x^2-1}$	
3	$\frac{x+2}{x^2+4x+4} + \frac{2x}{x+2}$	$\frac{2x^2+2x+5}{x^2+x-2}$	
4	$\frac{x}{x-2} + \frac{3}{x-1}$	$\frac{-x^2+2x-8}{x^2-16}$	
5	$\frac{x}{4x+8} - \frac{1}{x^2+2x}$	$\frac{8x+5}{x^2+1}$	
6	$\frac{x+2}{x-1} + \frac{x-1}{x+2}$	$\frac{x^2-3x+7}{x^2-4}$	
7	$\frac{2x+1}{x^2-4} + \frac{x-3}{x+2}$	$\frac{x^2+2x-6}{x^2-3x+2}$	
8	$\frac{x^2+2x}{x^2-1} - \frac{x+1}{x-1}$	$\frac{x-2}{4x}$	

(c) Malia Rivera, 2024



hey there!

My name is Malia and I'm passionate about making learning and practicing math fun. I love creating engaging math resources for my students and I hope your students enjoy this activity too!

Did you know you could get **FREE** money from TPT??

All you need to do is leave feedback on the product after you purchase. [Click here](#) to leave reviews and earn credits towards your next TPT purchase!

let's connect!



Follow my TPT store



Follow my Instagram



Email me