

Name:	Date:	Period:
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5.1 Exponential Function Review and Graphing Notes

Warm up

a. What is $\frac{1}{2}$ of 1? $\frac{1}{2}$

b. What is $\frac{1}{2}$ of $\frac{1}{2}$? $\frac{1}{4}$ $\frac{1}{2} \cdot \frac{1}{2}$

c. What is $\frac{1}{2}$ of $\frac{1}{4}$? $\frac{1}{8}$ $\frac{1}{2} \cdot \frac{1}{4}$

d. What is $\frac{1}{2}$ of $\frac{1}{8}$? $\frac{1}{16}$ $\frac{1}{2} \cdot \frac{1}{8}$

d. If this pattern continues, will the product ever be 0?
 No, it will continue to approach 0, but it will not = 0

Exponential Function

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

a: starting value (0, a)

b: multiplier or growth/decay factor

$b > 1$ growth

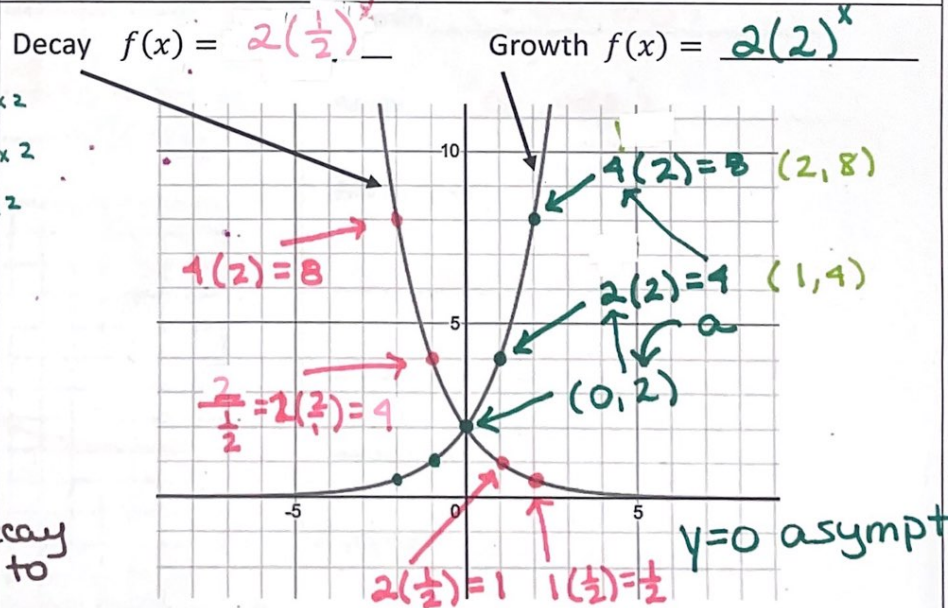
$0 < b < 1$ decay

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

(Note: Red arrows in original image indicate multiplication by 1/2 for the left column and multiplication by 2 for the right column.)

Exponential Graphs

- multiply y by the growth/decay factor moving to the right
- multiply by reciprocal (divide by factor) moving to left to determine next y.



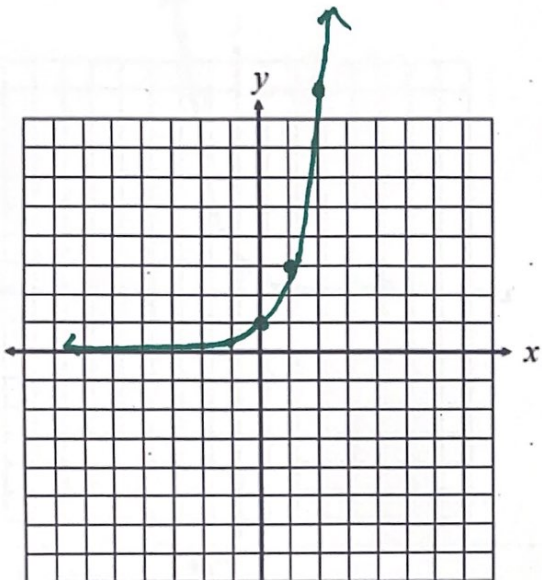
Asymptote: A line a graph approaches, but does not touch.

Directions: Classify as an exponential growth or decay, graph, then identify its key features.

1. $f(x) = 3^x$

Growth or Decay growth

a: 1 b: 3 ←



Each output is multiplied by "3" for the next consecutive output

Domain $(-\infty, \infty)$

Range: $(0, \infty)$

End Behavior:

as $x \rightarrow \infty, f(x) \rightarrow \infty$

as $x \rightarrow -\infty, f(x) \rightarrow 0$

y-intercept: $(0, 1)$

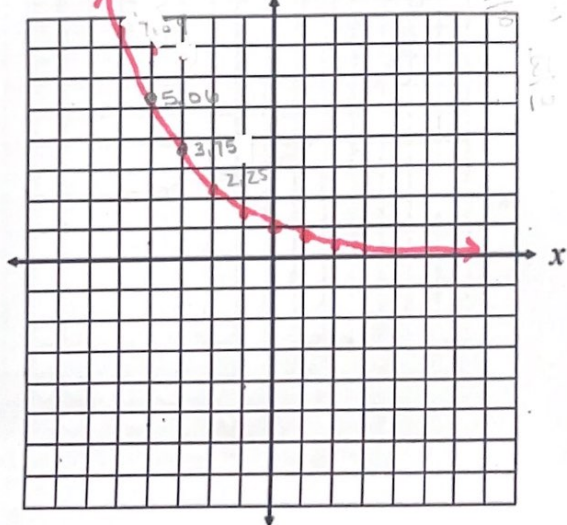
Asymptote: $y = 0$
 ↪ horizontal line (x axis)

2. $f(x) = \left(\frac{2}{3}\right)^x$

Growth or Decay decay

a: 1 b: $\frac{2}{3}$

← $\left(\frac{3}{2}\right)$ $\left(\frac{2}{3}\right)$ →



Domain $(-\infty, \infty)$

Range: $(0, \infty)$

End Behavior:

as $x \rightarrow \infty, f(x) \rightarrow 0$

as $x \rightarrow -\infty, f(x) \rightarrow \infty$

y-intercept: $(0, 1)$

Asymptote: $y = 0$