7-4 Graphing Exponentials

I can graph exponential functions given an equation
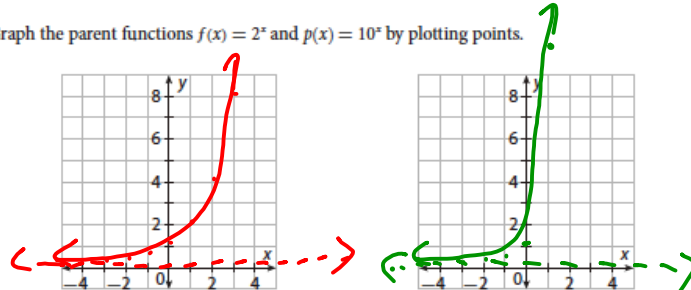
I can identify key features from an equation or a graph

Complete the input-output table for each of the parent exponential functions below.

x	$f(x) = 2^x$
−3	$2^{-3} = .125$
−2	$2^{-2} = .25$
−1	$2^{-1} = .5$
0	1
1	2
2	4
3	8

x	$p(x) = 10^x$
−3	$10^{-3} = .001$
−2	$10^{-2} = .01$
−1	$10^{-1} = .1$
0	1
1	10
2	100
3	1000

Graph the parent functions $f(x) = 2^x$ and $p(x) = 10^x$ by plotting points.

Task

R or L x slie

$$y = -a(b)^{x-h} + K \rightarrow U\ or\ D$$

reflection
x-axis

vertical
stretch

asymptote
$y = K$

plug-in
parent

graph

x	y	b^x
-1		$\cdot a$
0		$\cdot a$
1		$\cdot a$

} plot on graph $\rightarrow$ Shift R/L
U/D

$D: (-\infty, \infty)$

$R: +a\ (K, \infty)$

$: -a\ (-\infty, K)$

Graphing Exponential Task

Describe the transformations, find the domain and range, and write the equation of the asymptote:

parent

$$g(x) = 2(3)^{x+5} + 0$$

Stretch by 2
left 5

$y = 0$

$D: (-\infty, \infty)$
$R: (0, \infty)$

$$f(x) = -3\left(\frac{1}{2}\right)^{x-2} + 1$$

reflection
stretch by 3
right 2
up 1

$y = 1$

$D: (-\infty, \infty)$

$R:$

$$\boxed{(-\infty, 1)}$$

$k(x) = 5(2)^x + 0$

2^x

X	y	
-1	1/2	5·½
0	1	5 = 5
1	2	5·10

Initial Value:

Asymptote: $y = 0$

Reference Point:

Use your graphing calculator to check your prediction.

$k(x) = \dfrac{1}{2}^x - 4$

$\dfrac{1}{2}^x$

down 4

X	y
-1	2
0	1
1	1/2

Initial Value:

Asymptote: $y = -4$

Reference Point:

Use your graphing calculator to check your prediction.

$k(x) = e^{x-3}$

e^x

$R: 3$

x	y
-1	1/2.7
0	1
1	2.7

Initial Value:

Asymptote:
$y = 0$

Reference Point:

Use your graphing calculator to check your prediction.

$k(x) = -3(2)^x$

2^x

x	y
-1	1/2 · -3 = -3/2
0	1 · -3 = -3
1	2 · -3 = -6

Initial Value:

Asymptote:
$y = 0$

Reference Point:

Use your graphing calculator to check your prediction.

Use the information you have gathered from all of the examples and predict and sketch the following functions. **Check each answer with your calculator.**

$f(x) = 3(2)^x + 1$

up

Initial Value:

Asymptote: $y = 1$

Ref. Point:

2^x

x	y
-1	1/2 ·3 = 3/2
0	1 ·3 = 3
1	2 ·3 = 6

$g(x) = -4^x + 1$

Initial Value:

Asymptote:

Ref. Point:

$h(x) = \dfrac{1}{2}^{x-1} - 3$

Initial Value:

Asymptote:

Ref. Point:

$k(x) = 1.5e^x - 2$
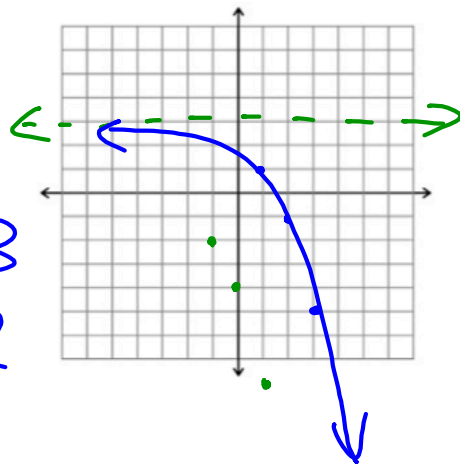
Initial Value:

Asymptote:

Ref. Point:

State the transformations, then sketch the graph. Use your graphing calculator to check your answer.

$j(x) = -4(2)^{x-2} + 3$

2^x

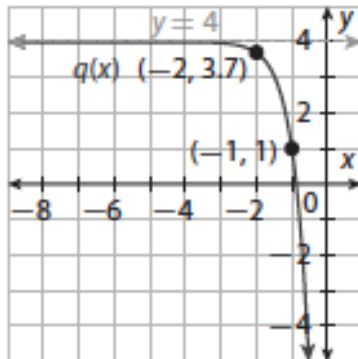| X	y
-1	1/2 · -4 -2
0	1 · -4 -4
1	2 · -4 -8

S/o to makayla ☺

up 3
R 2

Graph each function and state the domain, range, y-intercept, and asymptote for each.

$g(x) = 4(2^{x+2}) - 6$

$q(x) = -\frac{3}{5}(10^{x+2}) + 3$

State the domain, range, y-intercept, asymptote, increasing, decreasing, and end behavior.

Domain:

Range:

Y-intercept:

Horizontal Asymptote:
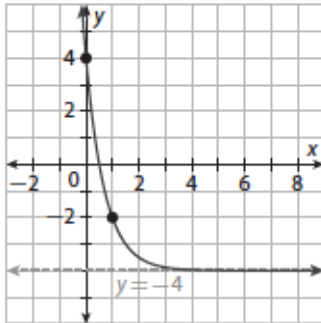
Increasing:

Decreasing:

End Behavior:

Graph each function and state the domain, range, y-intercept, and asymptote for each.

$g(x) = 3\left(\frac{1}{2}\right)^{x-2} - 2$

$g(x) = 3\left(\frac{1}{3}\right)^{x+2} - 4$

State the domain, range, y-intercept, asymptote, increasing, decreasing, and end behavior.

Domain:

Range:

Y-intercept:

Horizontal Asymptote:

Increasing:

Decreasing:

End Behavior: