

Name: _____ Date: _____

Standard Form of an Exponential Function

$$y = a(b)^{(x-h)} + k$$

Notation	Type of Transformation	Change to Graph
a	Reflection \longrightarrow Stretch \longrightarrow Shrink \longrightarrow	$-a$ flips $a > 1$ $a < 1$ fraction
b * PARENT FUNCTION *	BASE * Not a transformation *	$b > 1$ Growth $b < 1$ Decay fractions
h	horizontal shift Left or Right	$-h$ Right $+h$ Left
k	Vertical shift Up or Down	$+k$ UP $-k$ down

* Asymptote: $y =$ _____

Examples:

Describe the transformations of the parent graph for each equation.

1. $f(x) = 2^x + 7$

↑ parent growth
 ↑ 7 up asymptote

2. $f(x) = -3^{x+5} - 2$

Reflect ↑ parent growth
 ↓ 5 Left
 ↓ 2 Down Asym.

3. $f(x) = 2\left(\frac{1}{2}\right)^{x-3} + 12$

Stretch ↑ parent decay
 ↓ 3 Right
 ↑ 12 up 12

Transformations of Exponential Functions

Identify each transformation of the Exponential Function.

1) $f(x) = \left(\frac{1}{3}\right)^{x-2} + 1$
 Right
 up
 P → D

2) $f(x) = 2^{x-1} - 1$
 Right
 Down
 P → G

3) $f(x) = 2^{x+2} - 1$
 Left
 Down
 P → G

4) $f(x) = 4^{x+1} - 1$
 Left
 Down
 P → G

5) $f(x) = \left(\frac{1}{2}\right)^{x+1} + 2$
 Left
 up
 P → D

6) $f(x) = -2(4)^{x-1} + 3$
 Reflect
 Stretch
 P → G
 Right
 up

Write the equation given the following transformations.

6) Parent Function: 3^x
 Transformations: Left 2, Down 1
 $3^{x+2} - 1$

7) Parent Function: $\frac{1}{4}^x$
 Transformations: Right 1, Up 1
 $\left(\frac{1}{4}\right)^{x-1} + 1$

8) Parent Function: 3^x
 Transformations: Left 1, Up 2
 $3^{x+1} + 2$

9) Parent Function: 3^x
 Transformations: Right 2, Down 1
 $3^{x-2} - 1$

10) Parent Function: 4^x
 Transformations: Left 2, Up 2
 $4^{x+2} + 2$

11) Parent: $\frac{1}{2}^x$
 Transformations: Reflection, Down 2
 $-\left(\frac{1}{2}\right)^x - 2$

Write the equation given the graph

