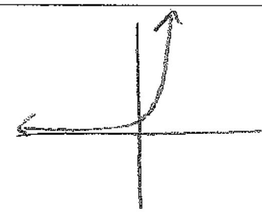
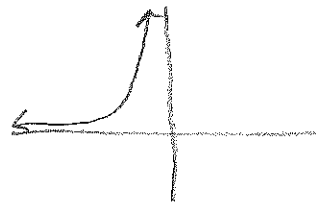
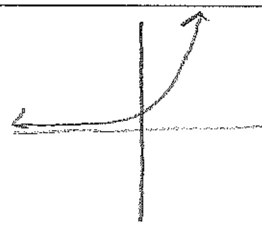
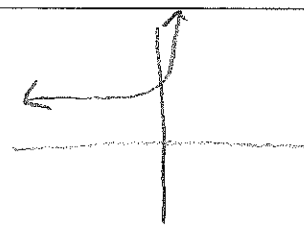
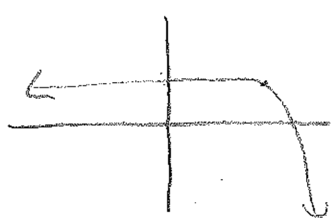
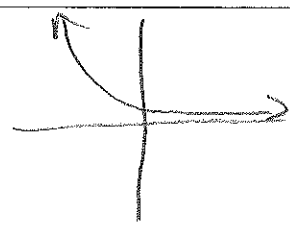
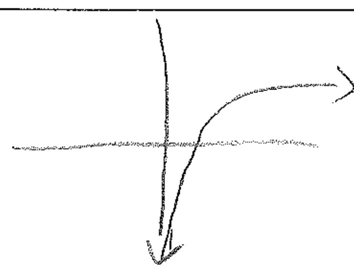
PreAP Algebra 2
5.1 Notes – Intro to Exponential Functions

Parent
$y = b^x$

Name: ____________________

#	Function	Transformations	Graph	Domain and Range	End Behavior and Asymptote
1	$y=(10)^x$	NONE		D: $(-\infty, \infty)$ R: $(0, \infty)$	$\lim_{x\to\infty} f(x) = \infty$ $\lim_{x\to-\infty} f(x) = 0$ Asymp: $y = 0$
2	$y=\frac{1}{2}(10)^{x+2}$	vert shrink left 2		D: $(-\infty, \infty)$ R: $(0, \infty)$	$\lim_{x\to\infty} f(x) = \infty$ $\lim_{x\to-\infty} f(x) = 0$ Asymp: $y = 0$
4	$y=(2)^x$	NONE		D: $(-\infty, \infty)$ R: $(0, \infty)$	$\lim_{x\to\infty} f(x) = \infty$ $\lim_{x\to-\infty} f(x) = 0$ Asymp: $y = 0$
5	$y=3(2)^x+4$	vert stretch up 4		D: $(-\infty, \infty)$ R: $(4, \infty)$	$\lim_{x\to\infty} f(x) = \infty$ $\lim_{x\to-\infty} f(x) = 4$ Asymp: $y = 4$
6	$y=-(2)^{x-5}+3$	Reflect over x-axis Right 5 Up 3		D: $(-\infty, \infty)$ R: $(-\infty, 3)$	$\lim_{x\to\infty} f(x) = -\infty$ $\lim_{x\to-\infty} f(x) = 3$ Asymp: $y = 3$
7	$y=\left(\frac{1}{2}\right)^x$	NONE		D: $(-\infty, \infty)$ R: $(0, \infty)$	$\lim_{x\to\infty} f(x) = 0$ $\lim_{x\to-\infty} f(x) = \infty$ Asymp: $y = 0$
8	$y=-\left(\frac{1}{2}\right)^{x-4}+3$	Reflect over x-axis Right 4 Up 3		D: $(-\infty, \infty)$ R: $(-\infty, 3)$	$\lim_{x\to\infty} f(x) = 3$ $\lim_{x\to-\infty} f(x) = -\infty$ Asymp: $y = 3$

Equation	$y=(.7)^{x-10}-8$	$y=(3)^{x+7}+12$	$y=-\frac{1}{3}(2)^{x}$
Transformations	rt. 10 dn 8	lt 7 up 12	reflect vert. shrink
Domain	$(-\infty, \infty)$	$(-\infty, \infty)$	$(-\infty, \infty)$
Range	$(-8, \infty)$	$(12, \infty)$	$(-\infty, 0)$
Asymptote and End Behavior	$\lim_{x\to\infty} f(x) = -8$ $\lim_{x\to-\infty} f(x) = \infty$	$\lim_{x\to\infty} f(x) = \infty$ $\lim_{x\to-\infty} f(x) = 12$	$\lim_{x\to\infty} f(x) = -\infty$ $\lim_{x\to-\infty} f(x) = 0$

Asymp. $y=-8$ $\quad y=12 \quad y=0$

General Exponential form: $y=a(b)^{x-h}+k$

You have Exponential growth **when** $a>0$ **and** $b>1$.

You have Exponential decay **when** $a>0$ **and** $0<b<1$.

<u>Properties of Equality for Exponential Functions</u>

If *b* is a positive number other than 1, then $b^x=b^y$ **if and only if** $x=y$.

Example: $2^x=2^8$

$\boxed{x=8}$

If exponential equations have like exponents, you can set their bases equal to each other and solve. If $a^x=b^x$**, then** $a=b$.

Example: $x^5=32$

$x^5=2^5$

$\boxed{x=2}$

Solve:

1. $4^{3x}=4^{x-4}$

$3x=x-4$

$2x=-4$

$\boxed{x=-2}$

2. $3^{x-2}=27$

$3^{x-2}=3^3$

$x-2=3$

$\boxed{x=5}$

3. $\left(\frac{1}{3}\right)^x=3^{x+5}$

$3^{-1(x)}=3^{x+5}$

$-x=x+5$

$-2x=5$

$\boxed{x=-5/2}$