Name_____Review for quiz on Exponential Models and solving equations

	Model	Initial population	Change factor	Change rate as a decimal	Change rate as a percent	Growth or decay?	When does this model reach
1	$A=100(0.023)^x$	100	0.023	0.977	97.7%	Decay	20 X=_____
2	$A=200(1.12)^x$	200	1.12	0.12	12%	Growth	250 X=_____
3	$A=900(0.66)^x$	900	0.66	0.34	34%	Decay	400 X=_____
4	$A(x) = 300(1.2)^x$	300	1.2	0.20	20%	Growth	650 X=_____
5	$A=500(0.854)^x$	500	0.854	0.146	14.6%	Decay	325 X=_____
6	$A=600(1.0025)^x$	600	1.0025	0.0025	0.25%	Growth	640 X=_____
7	$A=700(3.1225)^x$	700	3.1225	2.1225	212.25%	Growth	2000 X=_____
8	$A(x) = 1700(2.22)^x$	1700	2.22	1.22	122%	Growth	5000 X=_____
9	$A=800(3.25)^x$	800	3.25	2.25	225%	Growth	1200 X=_____
10	$A=1200(0.982)^x$	1200	0.982	0.018	1.8%	Decay	1100 X=_____
11	$A=1500(0.003)^x$	1500	0.003	0.997	99.7%	Decay	10 X=_____
12	$A(x) = 40000(0.002)^x$	40000	0.002	0.998	99.8%	Decay	1500 X=_____

1. How does a change factor tell you the model is growth or decay?
2. How does the model tell its growth or decay?
3. How do you determine the change rate when your change factor is less than 1?
4. How do you determine the rate of change as a percentage from the model?
5. How do you determine the rate of change as a percentage from the change factor?
6. How do you answer WHEN does this population occur problems?
7. How do you determine the change factor when you know the change rate as a percentage and it is growth model?
8. How do you determine the change factor when you know the change rate as a percentage and it is decay model?

Solve each equation

$5^x = 250$ $\log_5 250 = x$ $x \approx 3.431$	$x^5 = 250$ $x = \sqrt[5]{250}$ ≈ 3.017	$\log_2 x = 6$ $2^6 = x$ $64 = x$	$\log_x 2 = 6$ $x^6 = 2$ $x = \sqrt[6]{2}$ $x \approx 1.122$
$2 \cdot 5^x = 250$ $5^x = 125$ $\log_5 125 = 3 = x$	$2 \cdot x^5 = 250$ $x^5 = 125$ $x = \sqrt[5]{125}$ ≈ 2.627	$\log_6 x = 2$ $6^2 = x$ $x = 36$	$\log_x 6 = 2$ $x^2 = 6$ $x = \sqrt{6}$ $x \approx 1.048$
$\frac{4}{5} \cdot 5^x = 2500$ $5^x = 2500 \cdot \frac{5}{4}$ $5^x = \frac{12500}{4}$ $5^x = 3125$ $\log_5 3125 = 5$	$\frac{4}{5} \cdot x^{\frac{2}{3}} = 2500$ $x^{\frac{2}{3}} = 2500 \cdot \frac{5}{4}$ $x^{2/3} = \frac{12500}{4}$ $x^{2/3} = 3125$ $x = (3125)^{3/2}$ $x = 174692.811$	$3\log_2 x = 12$ $\log_2 x = 4$ $2^4 = x$ $x = 16$	$3\log_x 12 = 24$ $\log_x 12 = 8$ $x^8 = 12$ $x = \sqrt[8]{12}$ ≈ 1.364

What if the directions stated that you needed the EXACT solution and NOT an approximation?

Solve #1

$$20 = 100(0.023)^x$$

$$\frac{20}{100} = 0.023^x$$

$$\log_{0.023} \frac{20}{100} = x = \log_{0.023} \frac{1}{5} \approx 0.427$$

Solve #2

$$250 = 200(1.12)^x$$

$$\frac{250}{200} = 1.12^x$$

$$\log_{1.12}\left(\frac{250}{200}\right) = x = \log_{1.12}\left(\frac{5}{4}\right) \approx 1.969$$

Solve #3

$$400 = 900(0.66)^x$$

$$\frac{400}{900} = 0.66^x$$

$$\log_{0.66}\left(\frac{400}{900}\right) = x = \log_{0.66}\left(\frac{4}{9}\right) = 1.952$$

Solve #4

$650 = 300(1.2)^x$

$\frac{650}{300} = 1.2^x$

$\log_{1.2}\left(\frac{650}{300}\right) = x = \log_{1.2}\left(\frac{13}{6}\right) \approx 4.241$

Solve #5

$325 = 500(0.854)^x$

$\frac{325}{500} = 0.854^x$

$\log_{0.854}\left(\frac{325}{500}\right) = x = \log_{0.854}\left(\frac{13}{20}\right) \approx 2.730$

Solve #6

$640 = 600(1.0025)^x$

$\frac{640}{600} = 1.0025^x$

$\log_{1.0025}\left(\frac{640}{600}\right) = x = \log_{1.0025}\left(\frac{16}{15}\right) \approx 25.848$

Solve#7

$$2000 = 700(3.1225)^x$$

$$\frac{2000}{700} = 3.1225^x$$

$$\log_{3.1225}\left(\frac{2000}{700}\right) = x = \log_{3.1225}\left(\frac{20}{7}\right) \approx 0.922$$

Solve#8

$$5000 = 1700(2.22)^x$$

$$\frac{5000}{1700} = 2.22^x$$

$$\log_{2.22}\left(\frac{5000}{1700}\right) = x = \log_{2.22}\left(\frac{50}{17}\right) \approx 1.353$$

Solve#9

$$1200 = 800(3.25)^x$$

$$\frac{1200}{800} = 3.25^x$$

$$\log_{3.25}\left(\frac{1200}{800}\right) = x = \log_{3.25}\left(\frac{3}{2}\right) = 0.344$$

Solve #10

$$1100 = 1200(0.982)^x$$

$$\frac{1100}{1200} = 0.982^x$$

$$\log_{0.982}\frac{1100}{1200} = x = \log_{0.982}\left(\frac{11}{12}\right)$$

$$\approx 4.790$$

Solve #11

$$10 = 1500(0.003)^x$$

$$\frac{10}{1500} = 0.003^x$$

$$\log_{0.003}\left(\frac{10}{1500}\right) = x = \log_{0.003}\left(\frac{1}{150}\right) \approx 0.863$$

Solve #12

$$1500 = 40000(0.002)^x$$

$$\frac{1500}{40000} = 0.002^x$$

$$\log_{.002}\frac{1500}{40000} = x = \log_{0.002}\left(\frac{3}{80}\right)$$

$$= 0.899$$