Welcome Back!

	Assignment Effort Grade (Circle One)	Comments (What was interesting or challenging?)
Monday Date: 2/26 Topic: Exponential Project Due!	0 1 2	
Tuesday Date: 2/27 Topic: ACT For Juniors	0 1 2	
Wednesday Date: 2/28 Topic: Finish project or add problems to study guide	0 1 2	
Thursday Date: _____ Topic: _____	0 1 2	
Friday Date: _____ Topic: _____	0 1 2	

Warm-up: $y = 500(1.002)^x$

Miles deposited $500 into a bank account with .2% annual interest. Predict his investment after 3 years.

3 Years; $500, .2% $1 + r = 1 + .002$

$y = 500(1.002)^x$ $y = 500(1.002)^3$

$y \approx 500(1.1006)$

$y \approx \$503$

Class Plan:

1. Warm-up
2. Review: **Trashketball! :)**

-Properties of exponents

-Growth/Decay applications

Recall the Properties of Indices

$b^m \cdot b^n = b^{m+n}$	$(b^m)^n = b^{m \cdot n}$	$(ab)^n = a^n \cdot b^n$	$b^0 = 1$
$\frac{b^m}{b^n} = b^{m-n}$	$b^{-n} = \frac{1}{b^n}$	$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$	

Recall our Exponential Equation:

a: Starting value $y = a \cdot b^x$

b: Constant multiplier (multiplier is always positive.)

r: Rate of growth/decay, interpreted as a %

Exponential Growth

b>1

$$y = a(1+r)^x$$

Ant Population Example:

$$y = 16(1.5)^x$$

r = 50% growth

Exponential Decay

0<b<1

$$y = a(1-r)^x$$

Car Value Example:

$$y = 21{,}700(0.83)^x$$

r = 17% depreciation

Trashketball

Table 1

Table 2

Table 3

Table 4

Table 5

Table 6

Table 7

Table 8

Table 9

Trashketball

1. Work together to put 1 solution on your board, **wait** to hold it up until told.

2. Table correct? **1 point.**

3. Every 2 points, a person from the ***table*** gets to shoot for 1, 2 or 3 bonus points

4. Teacher is the judge - if you are taking too long - or losing focus - you lose your shot :) Stay on your game!

Property Examples:

Simplify. Your answer should contain only positive exponents.

1) $4x^1 \cdot 2x^2 = 8x^3$

$b^m \cdot b^n = b^{m+n}$	$(b^m)^n = b^{m \cdot n}$	$(ab)^n = a^n \cdot b^n$	$b^0 = 1$
$\frac{b^m}{b^n} = b^{m-n}$	$b^{-n} = \frac{1}{b^n}$	$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$	

Property Examples:

Simplify. Your answer should contain only positive exponents.

2) $\left(4^3\right)^{-2}$

$b^m \cdot b^n = b^{m+n}$	$(b^m)^n = b^{m \cdot n}$	$(ab)^n = a^n \cdot b^n$	$b^0 = 1$
$\frac{b^m}{b^n} = b^{m-n}$	$b^{-n} = \frac{1}{b^n}$	$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$	

Property Examples:

Simplify. Your answer should contain only positive exponents.

3) $\left(2p^{-1}\right)^3$

$b^m \cdot b^n = b^{m+n}$	$(b^m)^n = b^{m \cdot n}$	$(ab)^n = a^n \cdot b^n$	$b^0 = 1$
$\frac{b^m}{b^n} = b^{m-n}$	$b^{-n} = \frac{1}{b^n}$	$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$	

Property Examples:

Simplify. Your answer should contain only positive exponents.

4) $\dfrac{k^{-3}}{4k^{0}}$ $= \dfrac{k^{-3}}{4} = \dfrac{1}{4k^{3}}$

$b^m \cdot b^n = b^{m+n}$	$(b^m)^n = b^{m \cdot n}$	$(ab)^n = a^n \cdot b^n$	$b^0 = 1$
$\dfrac{b^m}{b^n} = b^{m-n}$	$b^{-n} = \dfrac{1}{b^n}$	$\left(\dfrac{a}{b}\right)^n = \dfrac{a^n}{b^n}$	

Property Examples:

Simplify. Your answer should contain only positive exponents.

5) $\dfrac{3n^0}{2n^4 \cdot 3n}$

$b^m \cdot b^n = b^{m+n}$	$(b^m)^n = b^{m \cdot n}$	$(ab)^n = a^n \cdot b^n$	$b^0 = 1$
$\dfrac{b^m}{b^n} = b^{m-n}$	$b^{-n} = \dfrac{1}{b^n}$	$\left(\dfrac{a}{b}\right)^n = \dfrac{a^n}{b^n}$	

Property Examples:

Simplify. Your answer should contain only positive exponents.

6) $m \cdot \left(m^{-2}\right)^3 = m^1 \cdot m^{-6} = m^{-5} = \frac{m}{1} = \frac{1}{m^5}$

$b^m \cdot b^n = b^{m+n}$	$(b^m)^n = b^{m \cdot n}$	$(ab)^n = a^n \cdot b^n$	$b^0 = 1$
$\frac{b^m}{b^n} = b^{m-n}$	$b^{-n} = \frac{1}{b^n}$	$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$	

Property Examples:

Simplify. Your answer should contain only positive exponents.

7) $\dfrac{2x^3}{(x^{-1})^3}$ $= \dfrac{2 \cdot x \cdot x \cdot x}{(x^{-1})(x^{-1})(x^{-1})} = \dfrac{2x^3}{x^{-3}} = 2x^6$

$\dfrac{2x^3}{x^{-3}}$

$b^m \cdot b^n = b^{m+n}$	$(b^m)^n = b^{m \cdot n}$	$(ab)^n = a^n \cdot b^n$	$b^0 = 1$
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Property Examples:

Simplify. Your answer should contain only positive exponents.

8) $(2m)^3 \cdot (2m^{-3}n^{-2})^4$

$b^m \cdot b^n = b^{m+n}$	$(b^m)^n = b^{m \cdot n}$	$(ab)^n = a^n \cdot b^n$	$b^0 = 1$
$\frac{b^m}{b^n} = b^{m-n}$	$b^{-n} = \frac{1}{b^n}$	$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$	

Property Examples:

Simplify. Your answer should contain only positive exponents.

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Property Examples:

Simplify. Your answer should contain only positive exponents.

9) $\dfrac{\left(x^{-4}y^{3}\right)^{4}}{2x}$

$b^m \cdot b^n = b^{m+n}$	$(b^m)^n = b^{m \cdot n}$	$(ab)^n = a^n \cdot b^n$	$b^0 = 1$
$\dfrac{b^m}{b^n} = b^{m-n}$	$b^{-n} = \dfrac{1}{b^n}$	$\left(\dfrac{a}{b}\right)^n = \dfrac{a^n}{b^n}$	

Property Examples:

Simplify. Your answer should contain only positive exponents.

10) $\dfrac{2m^0 \cdot 3m^4 n^{-3}}{2n^4}$

$b^m \cdot b^n = b^{m+n}$	$(b^m)^n = b^{m \cdot n}$	$(ab)^n = a^n \cdot b^n$	$b^0 = 1$
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Property Examples: **Solutions!**

1) $8x^3$

2) $\frac{1}{4^6}$

3) $\frac{8}{p^3}$

4) $\frac{1}{4k^3}$

5) $\frac{1}{2n^5}$

6) $\frac{1}{m^5}$

7) $2x^6$

8) $\frac{128}{m^9n^8}$

9) $\frac{y^{12}}{2x^{17}}$

10) $\frac{3m^4}{n^7}$

Growth and Decay Applications

$$T = 80(.913)^t$$

Equation represents the temperature (C) of a cup of tea t minutes after it was heated.

11) What was the initial temperature of the tea?

Growth and Decay Applications

$$T = 80(.913)^t$$

Equation represents the temperature (C) of a cup of tea t minutes after it was heated.

11) What was the initial temperature of the tea?

The temperature when the tea was poured was 80°C.

$P = 815(1.16)^{12}$
$P \approx 815(5.936)$
$P \approx 4838$ zebras!

Growth and Decay Applications

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12) Find the temperature after 12 minutes. **Show work!**

Growth and Decay Applications

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12) Find the temperature after 12 minutes. **Show work!**

$T = 80(.913)^{12}$

$T \approx 80(.335)$

$T \approx 26.84\,^{\circ}C$

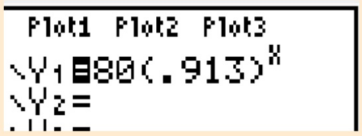
Growth and Decay Applications

$$T = 80(.913)^t$$

Equation represents the temperature (C) of a cup of tea t minutes after it was heated.

13) Enter the equation into your graphing calculator. [$y = 80(.913)^x$]

Determine when the temperature will fall below 30 C.



X	Y1
12	26.837
13	24.502
14	22.371
15	20.425
16	18.648
17	17.025
18	15.544

X=12

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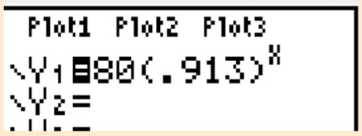
13) Enter the equation into your graphing calculator. [$y = 80(.913)^x$]

Determine when the temperature will fall below 30 C.

The table shows that after **11** minutes, the temperature will drop below 30° **C.**



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$$P = 815(1.16)^t$$

Equation shows the population (P) of zebras, *t* years after an initial count.

14) At what percentage rate is the zebra population growing?

Growth and Decay Applications

$$P = 815(1.16)^t$$

Equation shows the population (P) of zebras, *t* years after an initial count.

14) At what percentage rate is the zebra population growing?

The growth rate is 0.16, or 16%.

[(1 + r) = 1.16, or 1 + .16]

Growth and Decay Applications

$$P = 815(1.16)^t$$

Equation shows the population (P) of zebras, *t* years after an initial count.

15) Predict the population of zebras after 12 years. **Show work!**

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Equation shows the population (P) of zebras, *t* years after an initial count.

15) Predict the population of zebras after 12 years. **Show work!**

$P = 815(1.16)^{12}$

$P \approx 815(5.936)$

$P \approx 4838$ zebras!

Growth and Decay Applications

$$P = 815(1.16)^t$$

Equation shows the population (P) of zebras, *t* years after an initial count.

16) Predict the population of zebras after 18 years. **Show work!**

Growth and Decay Applications

$$P = 815(1.16)^t$$

Equation shows the population (P) of zebras, *t* years after an initial count.

16) Predict the population of zebras after 18 years. **Show work!**

$P = 815(1.16)^{18}$

$P \approx 815(14.46)$ $P \approx 11,787$ Zebras!