

BE - Geometry 1 | Wednesday 3-30-11

Simplify

① $\frac{1}{\sqrt{5}}$

② $\frac{1}{5^{\frac{1}{2}}}$

① $\frac{1}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \boxed{\frac{\sqrt{5}}{5}}$

② $\frac{1}{5^{\frac{1}{2}}} \cdot \frac{5^{\frac{1}{2}}}{5^{\frac{1}{2}}} = \boxed{\frac{5^{\frac{1}{2}}}{5}}$

CANT LEAVE FRACTIONAL
EXPONENTS IN
DENOMINATOR!
S/A RADICALS

MUST USE SMALLEST
EXPONENT THAT WILL
ADD TO THE NEXT
WHOLE NUMBER, IN
THIS CASE 1

EX $\frac{1}{5^{\frac{2}{3}}} = ?$

$\frac{1}{5^{\frac{2}{3}}} \cdot \frac{5^{\frac{1}{3}}}{5^{\frac{1}{3}}} = \boxed{\frac{5^{\frac{1}{3}}}{5}}$

EX $\frac{1}{5^{\frac{5}{2}}} = ?$

$\frac{1}{5^{\frac{5}{2}}} \cdot \frac{5^{\frac{1}{2}}}{5^{\frac{1}{2}}} = \boxed{\frac{5^{\frac{1}{2}}}{5^3}}$

Geo. 1 - HW Review 9-27-00

⑨ $\frac{2}{K}$

⑪ $2x^3$

⑬ $(V^{\frac{1}{3}})^{-1} = \frac{1}{V^{\frac{1}{3}}} \cdot \left(\frac{V^{\frac{2}{3}}}{V^{\frac{2}{3}}} \right) = \boxed{\frac{V^{\frac{2}{3}}}{V^1}}$

⚡
CAN'T LEAVE A fractional
Exponent in denominator! Why?

$\frac{1}{V^{\frac{1}{3}}} = \frac{1}{3\sqrt{V}}$

same as
RADICAL
in denominator

↑
Fix $\Rightarrow$ multiply by smallest
fraction that will add to 1.
Why add??

* or smallest
integer

⑮ $(K^3)^{\frac{1}{2}} = \boxed{K^{\frac{3}{2}}}$

⑰ $N^{\frac{3}{2}} \cdot N^{\frac{1}{2}} = \boxed{\frac{N^{\frac{7}{2}}}{2}}$

⑲ $\frac{1}{b \cdot b^{\frac{3}{2}}} = \frac{1}{b^{\frac{2}{2}} \cdot b^{\frac{3}{2}}} = \frac{1}{b^{\frac{5}{2}}} \cdot \frac{b^{\frac{1}{2}}}{b^{\frac{1}{2}}} = \boxed{\frac{b^{\frac{1}{2}}}{b^3}}$

*

⑳ $\{-\frac{1}{4}\}$

㉓ $\{0\}$

㉕ $\{\frac{7}{23}\}$

㉗ $\{1\}$

Lets break A simple exponential
"change" function (growth or decay)
into A more general form as follows:

③ $y = 2^x$ Simple exponential growth

$y = a(1+r)^x$ $a = \text{STARTING VALUE, WHAT } y \text{ is when } x=0$

$r = \text{Amount of change expressed as a decimal}$

$x = \text{number of changes}$

③ $y = 2^x$ Since $a=1$
And $r=1.0$
 $y = 1(1+1.0)^x$

③ Population of frogs is 500 but growth is 100% per month. How many after 22 months? $100\% = 1.0$

$y = 500(1+1.0)^{22}$
 $= 500(2)^{22} = \boxed{2,097,152,000 \text{ frogs}}$

use of A, A_0, B, B_0, C, C_0 , etc.

usually, more meaningful variable names are used for x and y . A subscript of zero, read for example as "A naught" is often used for the "starting value" and the variable without the "naught" is used for y .

(Ex) The population of students at SMHS is 600 and is growing at 3.2% per year. What will be the population in 25 years?

$$S = S_0 (1 + r)^t$$

$t = \text{years,}$
 $\text{now} = 0$

$$S = 600 (1.032)^{25}$$

$$r = 0.032$$

$$S_0 = 600$$

$$S = 600 (2.197822)$$

$$S \approx 1319 \text{ students}$$

EX

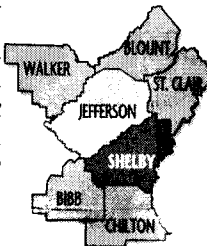
Birmingham News Sunday 3-27-11 BUSIN

METRO BIRMINGHAM JOB GROWTH

Shelby leads way but all seven metro counties are projected to add jobs over next four years.

AREA	2011	2015	ANNUAL % GROWTH RATE
Birmingham-Hoover metro	624,800	653,440	1.13%
Bibb Co.	6,220	6,550	1.31%
Blount Co.	18,040	19,040	1.36%
Chilton Co.	12,290	12,790	1.01%
Jefferson Co.	440,100	453,640	0.76%
St. Clair Co.	24,160	25,920	1.77%
Shelby Co.	91,340	101,260	2.61%
Walker Co.	32,660	34,230	1.19%

Less than 1%
1 to 1.99%
2% or more



Source: Woods & Poole Economics Inc.

NEWS STAFF

If the job growth reported in the Birmingham News continues at the predicted annual growth rate, do you agree with the 2015 prediction for Blount County? What would you predict for the year you graduate from college? (Assume 6 years from now).

Blount Co.

$$J = J_0 (1 + r)^t$$

$$r = 1.36\% = 0.0136 \frac{\text{per}}{\text{year}}$$

$$t = \text{years} = 4, 6$$

$$J_0 = 18,040$$

4 years of growth:

$$J_4 = 18040 (1.0136)^4 = 18040 (1.05552) \approx \boxed{19,042} \checkmark$$

$$J_6 = 18040 (1.0136)^6 = 18040 (1.08443) \approx \boxed{19,563}$$

4

The exponential growth formula just
replaces a long year-by-year calculation.

	<u>J_0</u>	<u>$r = .0136$</u>	<u>Job Added</u>
<u>2011</u>	J_0 18,040	.0136	245.344
	J_1 18,285	.0136	248.676
	J_2 18,534	.0136	252.062
	J_3 18,786	.0136	255.490
<u>2015</u>	J_4 19,041	.0136	258.957
	J_5 19,300	.0136	262.48
<u>2017</u>	J_6 19,562	.0136	266.043

If the growth was not proportional to
the number of jobs, that is, if it was
a constant 245 jobs per year, the J_4 would
be $18,040 + (245)(4) = 18,040 + 980 = 19,020$

$\Rightarrow$ 21 fewer jobs

How About Shelby Co. in 2017?

$\nearrow$ Small J_0 , low r

$J_6 = 91340(1.0261)^6 = 106,610 \Rightarrow$ 966 fewer if not "compounded"
 $\Rightarrow$ bigger J_0 , bigger r

What about exponential decay?

$r = \text{negative!}$

(EX) An average depreciation rate for a new automobile is $\approx 10\%$.
How much will a \$25,000 car be worth after 5 years of average driving (assume no accidents).

$$C = C_0 (1 - r)^t \quad \begin{array}{l} t = \text{years} \\ r = -0.1 \end{array}$$

$$C_0 = 25000$$

$$C = 25000 (1 - 0.1)^5$$

$$C = 25000 (.9)^5$$

$$C = 25000 (.59049)$$

$$C = \$14,762$$

CAR LOST $\approx \$10,000$ just by getting older!!!!

- Do cars lose more value in year 1 or year 5?
- Hint • Which is more, 10% of \$25,000 or 10% of \$15,000?
- Which is more, dealer price or what you get when you sell?
- Other fees eg taxes, delivery, etc ↑ for new.

Homework:

① Practice Worksheet # 10-28
even

② Following growth/decay problems:

Ⓐ Population of city is growing
At 2.5% per year. Current
population is 7000. Find population
in 12 years.

Ⓑ Population of a city is declining
1.4% per year. Current population
is 250,000. Find population in
15 years.

$$y = y_0 (1 \pm r)^x$$

General Form

↑
BASE MUST BE > 0

BASE MUST $\neq 1$