BE - Geometry 11 WEDNESDAY 4-11-12

Simplify

① $\frac{1}{\sqrt{5}}$ ② $\frac{1}{5^{\frac{1}{2}}}$

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

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

CAN'T 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) $(V^{\frac{1}{3}})^{-1} = \frac{1}{V^{\frac{1}{3}}} \cdot \frac{V^{\frac{2}{3}}}{V^{\frac{2}{3}}} = \frac{V^{\frac{2}{3}}}{V^1}$

CAN'T LEAVE A fractional EXPONENT IN denominator! Why?

$\frac{1}{V^{\frac{1}{3}}} = \frac{1}{\sqrt[3]{V}}$ ← SAME AS RADICAL IN denominator

FIX ⇒ MULTIPLY BY smallest fraction that will add to 1.* Why add??

* or SMALLEST INTEGER

(15) $(K^3)^{\frac{1}{2}} = K^{\frac{3}{2}}$ (17) $\frac{N^{\frac{3}{2}} \cdot N^{\frac{1}{1}}}{2}$ $+\{\frac{4}{2}\}$ → $\frac{N^{\frac{7}{2}}}{2}$

(19) $\frac{1}{b \cdot b^{\frac{3}{2}}} = \frac{1}{b^{\frac{2}{2}} \cdot b^{\frac{3}{2}}} = \frac{1}{b^{\frac{5}{2}}} \cdot \frac{b^{\frac{1}{2}}}{b^{\frac{1}{2}}} = \frac{b^{\frac{1}{2}}}{b^3}$ *

(21) $\{-\frac{1}{4}\}$ (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:

(Ex) $y = 2^x$ simple exponential growth

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

a = starting value, what y is when $x = 0$

r = amount of change expressed as a decimal

x = number of changes

(Ex) $y = 2^x$ since $a = 1$ and $r = 1.0$

$$y = 1(1+1.0)^x$$

(Ex) 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 = years, Now = 0

$r = 0.032$

$S = 600(1.032)^{25}$ $S_0 = 600$

$S = 600(2.197822)$

$S \approx 1319$ students

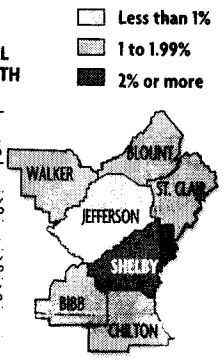
(EX)

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	JOBS 2011	JOBS 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%



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

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

$r = 1.36\% = .0136 \frac{per}{y}$

t = years = 4, 6

$J_0 = 18,040$

4 years of growth:

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

$J_6 = 18040(1.0136)^6 = 18040(1.08443) \approx \boxed{19563}$

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

		J_0	• $r = .0136$	Job Added
2011	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
2015	(J_4)	19,041	.0136	258.957
	J_5	19,300	.0136	262.48
2017	(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 $18,040 + (245)(4) = 18,040 + 980 = 19,020$

⇒ (21 fewer jobs)

Small J_0, low r

How about Shelby Co. in 2017?

$J_6 = 91340(1.0261)^6 = 106,610$ ⇒ 966 fewer if not "compounded"

⇒ bigger J_0, bigger r

What about exponential decay?

r = Negative!

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

$$C = C_0(1-r)^t$$

t = years
$r = -0.1$
$C_0 = 25000$

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

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

$$C = 25000(.59049)$$

$$\boxed{C = \$14,762}$$

Car lost ~$10,000 just by getting older!!!!!

- Do cars lose more value in year 1 or year 5?

Hint. Which is more, 10% of $25000 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 $\neq 1$