BE - Geometry | Thursday 9-31-11

1. List the 7 exponent rules and give an example of each.

2. A new tractor that costs $40,000 depreciates at 15% per year. What is its value after 10 years?

- Notebook paper
- Scientific calculator.

Geometry 1 - Mr. C. Name_____

Practice - Fractional Exponets, Exponential Equations Date_____ Period____

Write each expression in exponential form.

1) $(\sqrt{7m})^3$

2) $(\sqrt[5]{r})^6$

3) $(\sqrt{6x})^3$

4) $\sqrt{5n}$

Write each expression in radical form.

5) $x^{\frac{3}{5}}$

6) $(5n)^{\frac{4}{3}}$

7) $a^{\frac{8}{5}}$

8) $v^{\frac{3}{2}}$

Simplify. Your answer should contain only positive exponents with no fractional exponents in the denominator.

9) $k \cdot 2k^{-2}$

10) $3p^2 \cdot p^{-1}$

11) $2x^2 \cdot x$

12) $2n^0 \cdot 3n^3$

13) $\left(v^{\frac{1}{3}}\right)^{-1}$

14) x^{-1}

15) $\left(k^3\right)^{\frac{1}{2}}$

16) $\left(p^{\frac{1}{2}}\right)^2$

17) $\dfrac{n^{\frac{3}{2}}}{2n^{-2}}$

18) $\dfrac{v^3}{3v^{-1}}$

19) $\dfrac{b^{-1}}{b^{\frac{3}{2}}}$

20) $\dfrac{2x^{-\frac{4}{3}}}{x^{-2}}$

Solve each equation.

21) $5^{-n-3} = 5^{3n-2}$

22) $5^{-2v} = \dfrac{1}{25}$

23) $6^{-3x} = 6^{3x}$

24) $6^{2x} = \dfrac{1}{36}$

25) $32^{3n-3} = \left(\dfrac{1}{16}\right)^{2n+2}$

26) $6^{3k+1} = 216$

27) $2^{2p} = 2^{-p+3}$

28) $2^{n+1} = 2^2$

Geo. 1 ⇒ HW Review #10-28 evens

(10) $3p^2 \cdot p^{-1} = \frac{3p^2}{p} = \boxed{3p}$ ✓

(12) $2N^{0} \cdot 3N^3 = \boxed{6N^3}$ ✓

(14) $x^{-1} = \boxed{\frac{1}{x}}$ ✓

(16) $\left(p^{\frac{1}{2}}\right)^2 = p^1 = \boxed{p}$ ✓

(18) $\frac{v^3}{3v^{-1}} = \frac{v^3 \cdot v^1}{3} = \boxed{\frac{v^4}{3}}$ ✓

(20) $\frac{2x^{-\frac{4}{3}}}{x^{-2}} = \frac{2x^2}{x^{\frac{4}{3}}} \cdot \frac{x^{\frac{2}{3}}}{x^{\frac{2}{3}}} = \frac{2x^{\frac{2}{1}} \cdot x^{\frac{2}{3}}}{x^2}$

$= \frac{2x^{\frac{6}{3}} \cdot x^{\frac{2}{3}}}{x^2}$

$= \frac{2x^{\frac{8}{3}}}{x^2}$

$= \frac{2x^{\frac{8}{3}}}{x^{\frac{6}{3}}}$

$= \boxed{2x^{\frac{2}{3}}}$ ✓

(22) $5^{-2v} = \frac{1}{25}$

$5^{-2v} = 5^{-2}$

$\frac{-2v}{-2} = \frac{-2}{-2}$

$\boxed{v = 1}$ ✓

(24) $6^{2x} = \frac{1}{36}$

$6^{2x} = 6^{-2}$ $\therefore$ $2x = -2$

$\boxed{x = -1}$ ✓

(26) $6^{3k+1} = 216$

$6^{3k+1} = 6^3$

$3k+1 = 3$

$3k = 2$ $\therefore$ $\boxed{k = \frac{2}{3}}$ ✓

$\begin{array}{r} 36 \\ \times\ 6 \\ \hline 216 \end{array}$ ✓

(28) $2^{N+1} = 2^2$

$N+1 = 2$

$\boxed{N = 1}$ ✓

Homework Review – Exponential Growth/Decay

(2) (A) $P = P_0(1+r)^t$

$P = 7000(1.025)^{12}$

$P = 7000(1.34489)$

$\boxed{P \approx 9414 \text{ people}}$

t = time in years
$t = 0$ = now
r = population ↑ rate = 2.5% = .025
$P_0 = 7000$
$t = 12$ years

(B) $P = P_0(1-r)^t$

$P = 250000(1-.014)^{15}$

$P = 250000(.986)^{15}$

$P = 250000(.80938)$

$t = 15$ years
$r = 1.4\% = .014$
$P_0 = 250000$ people

$\therefore \boxed{P \approx 202346 \text{ people}}$

Compound Interest Rate Problems

Interest RATE is always given per year. Usually, NO UNITS are given, the per year is understood.

If interest WAS always PAID per year, you could use the general EXPONENTIAL growth formula "AS-is"

(ex) $A = P(1+r)^t$

r = interest rate per year as a decimal

t = time in years

A = Amount of money after t years.

P = principal = STARTING MONEY

BUT compound interest is PAID more OFTEN than ONCE per year so you have to ADJUST r AND t so they "match"

Example Compounding Periods	Times Interest Paid per year
monthly	12
quarterly	4
SEMI-ANNUAL	2
DAILY	365

Examples of matching interest rates to compounding periods

(Ex) Assume $r = 5\%$ per year
$t = 10$ years

Compounded

Monthly $\Rightarrow$ $A = P\left(1 + \frac{.05}{12}\right)^{12 \cdot 10}$

Quarterly $\Rightarrow$ $A = P\left(1 + \frac{.05}{4}\right)^{4 \cdot 10}$

DAILY $\Rightarrow$ $A = P\left(1 + \frac{.05}{365}\right)^{365 \cdot 10}$

Semi-annual $\Rightarrow$ $A = P\left(1 + \frac{.05}{2}\right)^{2 \cdot 10}$

(Ex) You invest \$30,000 at 4% interest compounded monthly. Find the value of this investment after 10 years.

$A = P\left(1 + \frac{r}{N}\right)^{Nt}$ $\quad N = 12$

$A = 30000\left(1 + \frac{.04}{12}\right)^{12 \cdot 10}$

$A = 30000\left(1.00333\overline{3}\right)^{120}$

$A = 30000\,(1.4908327)$

$A = 44,724.98$ $\Rightarrow$ \$14,724.98 Earned just by waiting!!

↑ WHY?