

BE - Geometry I | Thursday

4-12-12

- 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?

- Homework 10/11/12
- Scientific calculator.

Practice - Fractional Exponents, 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) $\left(\frac{1}{v^3}\right)^{-1}$

14) x^{-1}

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

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

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

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

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

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

Solve each equation.

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

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

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

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

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

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

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

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

Geo. 1 $\Rightarrow$ HW Review #10-28 even

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

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

$$(14) \quad x^{-1} = \boxed{\frac{1}{x}} \quad \checkmark$$

$$(16) \quad (p^{\frac{1}{2}})^2 = p^1 = \boxed{p} \quad \checkmark$$

$$(18) \quad \frac{V^3}{3V^{-1}} = \frac{V^3 \cdot V^1}{3} = \boxed{\frac{V^4}{3}} \quad \checkmark$$

$$(20) \quad \frac{2x^{-\frac{4}{3}}}{x^{-2}} = \frac{2x^2}{x^{\frac{4}{3}}} \cdot \frac{x^{\frac{2}{3}}}{x^{\frac{2}{3}}} = \frac{2x^{\frac{2}{1}} \cdot x^{\frac{2}{3}}}{x^2}$$
$$= \frac{2x^{\frac{6}{3}} \cdot x^{\frac{2}{3}}}{x^2}$$

$$(22) \quad 5^{-2V} = \frac{1}{25}$$
$$5^{-2V} = 5^{-2}$$
$$\frac{-2V}{-2} = \frac{-2}{-2}$$
$$\boxed{V=1} \quad \checkmark$$
$$= \frac{2x^{\frac{6}{3}}}{x^2}$$
$$= \frac{2x^{\frac{6}{3}}}{x^{\frac{6}{3}}} = \boxed{2x^{\frac{2}{3}}} \quad \checkmark$$

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

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

$$\boxed{x = -1} \quad -$$

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

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

$$3k+1 = 3$$

$$3k = 2$$

$$\therefore \boxed{k = \frac{2}{3}} \quad -$$

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

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

$$N+1 = 2$$

$$\boxed{N = 1} \quad -$$

Homework Review - Exponential Growth/Decay

② (A) $P = P_0 (1+r)^t$ $t = \text{time in years}$
 $t=0 = \text{now}$

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

$$r = \text{population } \uparrow \\ \text{rate} = 2.5\% \\ = .025$$

$$P = 7000(1.34469)$$

$$P_0 = 7000$$

$$t = 12 \text{ years}$$

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

③ $P = P_0 (1-r)^t$ $t = 15 \text{ years}$

$$r = 1.4\% = .014$$

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

$$P_0 = 250000 \text{ people}$$

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

$$P = 250000(.80938)$$

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

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"

$$\textcircled{\text{EX}} \quad A = P(1+r)^t$$

↓
Amount
of money

After t years.

↓
Principal = STARTING MONEY

per year
 r = interest
rate as a
decimal
 t = time in years

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.

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

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

$$A = 30000 (1.00333\bar{3})^{120}$$

$$A = 30000 (1.4908327)$$

$$A = 44,724.98$$

↑
WHY?

$\Rightarrow$ \$14,724.98
Earned just by
waiting !!