ERL MAP UNIT 6 Algebraic Models Practice

Friday, January 19, 2018 8:06 AM

ERL MAP UNIT 6 Al...

Chapter 6 : Algebraic Models

A. Simplifying / Evaluating Exponents

1. Simplify (Remember: leave no negative exponents in your answer.)

a. $\dfrac{y^{-1}}{y^{-2}}$

$= y^{-1-(-2)}$

$= y^{-1+2}$

$= y$

$= y$

b. $x^{-1}(x^{-3})^{-2}x^{-7}$

$= x^{-1}(x^{6})x^{-7}$

$= x^{-1+6-7}$

$= x^{-2}$

$= \dfrac{1}{x^2}$

c. $\frac{t}{v}\left(\frac{v}{t}\right)^{-3} v^4$

$= \frac{t}{v}\left(\frac{t}{v}\right)^3 \frac{v^4}{1}$

$= \frac{t^1}{v^1} \cdot \frac{t^3}{v^3} \cdot \frac{v^4}{1}$

$= \frac{t^4 v^4}{v^4}$

$= t^4 v^0$

$= t^4$

2. Convert to Radical Form $x^{\frac{4}{3}}$

$\sqrt[3]{x^4}$ OR $\left(\sqrt[3]{x}\right)^4$

3. Convert to Exponent Form $\sqrt[4]{\frac{1}{x^3}} \rightarrow x^{-3}$

$= \sqrt[4]{x^{-3}}$

$= x^{-\frac{3}{4}}$ OR $x^{\frac{-3}{4}}$

4. Evaluate

a. $16^{\frac{1}{2}}$

$= \sqrt{16}$

$= 4$

b. $16^{\frac{1}{4}}$

$= \sqrt[4]{16}$

$= 2$

c. $(-27)^{\frac{1}{3}}$

$= \sqrt[3]{-27}$

$= -3$

d. $\left(\frac{1}{9}\right)^{\frac{3}{2}}$

$= \frac{1}{(\sqrt{9})^3}$

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

$= \frac{1}{27}$

B. Exponential Equations

5. Solve for the unknown. Express with a common base, if possible. Otherwise use systematic trial.

a. $4^x = 8$

$(2^2)^x = (2^3)$

$2^{2x} = 2^3$

$2x = 3$

$\boxed{x = \frac{3}{2}}$

b. $(81)^{\frac{x}{2}} = (243)^{x+1}$

$(3^4)^{\frac{x}{2}} = (3^5)^{x+1}$

$3^{\frac{4x}{2}} = 3^{5(x+1)}$

$3^{2x} = 3^{5x+5}$

$2x = 5x+5$

$2x - 5x = 5$

$-3x = 5$

$\boxed{x = \frac{-5}{3}}$

c. $4^x = 40$

try $x=3$ $4^3=64$

$x=2$ $4^2=16$

$x=2.7$ $4^{2.7}=42.2$ ← closer

$x=2.6$ $4^{2.6}=36.75$

$\boxed{x \doteq 2.7}$

note: $4^{2.66} \doteq 39.9$

Chapter 6: **Algebraic Models - Practice Problems**

A. Simplifying and Evaluating Exponents

1. Simplify, with no negative exponents:

a. $(m^5)(m^2)$ b. $t^4 \div t$

c. $(x^5)^3$ d. $\left(\frac{x}{y}\right)^{-3}$ e. $-(-x)^0$

2. Evaluate the following when c=5 and d=-3.

a. $c^2 d^3$

b. $\dfrac{c^2 d^3}{c^4 d}$

c. $\dfrac{4c^{1/2} d}{c^{3/2}}$

d. $c^{-1} d^2 \times c^3 \div c^2$

3. Evaluate, round to nearest 1000^{th} if necessary.

a. $64^{\frac{2}{3}}$

b. $\left(\frac{36}{121}\right)^{\frac{3}{2}}$

c. $2.1^{-1.6}$

4a. Write in radical form:

i. $a^{\frac{1}{3}}$ ii. $a^{\frac{2}{3}}$ iii. $a^{-\frac{1}{5}}$

4b. Write in exponential form:

i. $\sqrt{x}$ ii. $\sqrt[3]{x^2}$ iii. $\frac{1}{\sqrt[4]{a}}$

B. Exponential Equations

5. Solve the following equations algebraically (using common base). Check your answers.

a. $4^{2x} = 4^{6}$

b. $5^{x} = 625$

c. $3^{2x+1} = 9$

d. $10^{x+1} = 10^{2x-3}$

e. $4^{3x-2} = 32^{x+1}$

f. $25^{x+1} = 125^{x-2}$

6. Determine the value of *y* to the nearest tenth, using systematic trial.

a. $10^y = 125$ b. $3^y = 6$

c. $250(1.03)^y = 400$

C. Application Problems

7. The amount of medicine *A(mg)* remaining in a body after *t* hours can be calculated using the formula $A = 250(0.75)^t$.

a. Calculate the amount of medicine in *mg* remaining in a body after 5 hours.

b. How long to the nearest hour will it take until there is 10 *mg* remaining.

Chapter 6: **Algebraic Models - Practice Problems**

A. Simplifying and Evaluating Exponents

1. Simplify, with no negative exponents:

a. $(m^5)(m^2)$ b. $t^4 \div t$ c. $(x^5)^3$ d. $\left(\frac{x}{y}\right)^{-3}$ e. $-(-x)^0$

2. Evaluate the following when c=5 and d=-3.

a. c^2d^3 b. $\frac{c^2d^3}{c^4d}$ c. $\frac{4c^{1/2}d}{c^{3/2}}$ d. $c^{-1}d^2 \times c^3 \div c^2$

3. Evaluate, round to nearest 1000th if necessary.

a. $64^{\frac{2}{3}}$ b. $\left(\frac{36}{121}\right)^{\frac{3}{2}}$ c. $2.1^{-1.6}$

4a. Write in radical form: i. $a^{\frac{1}{3}}$ ii. $a^{\frac{2}{3}}$ iii. $a^{-\frac{1}{5}}$

4b. Write in exponential form: i. $\sqrt{x}$ ii. $\sqrt[3]{x^2}$ iii. $\frac{1}{\sqrt[4]{a}}$

B. Exponential Equations

5. Solve the following equations algebraically (using common base). Check your answers.

a. $4^{2x} = 4^6$ b. $5^x = 625$ c. $3^{2x+1} = 9$

d. $10^{x+1} = 10^{2x-3}$ e. $4^{3x-2} = 32^{x+1}$ f. $25^{x+1} = 125^{x-2}$

6. Determine the value of y to the nearest tenth, using systematic trial.

a. $10^y = 125$ b. $3^y = 6$ c. $250(1.03)^y = 400$

C. Application Problems

7. The amount of medicine $A(mg)$ remaining in a body after t hours can be calculated using the formula $A = 250(0.75)^t$.

a. Calculate the amount of medicine in *mg* remaining in a body after 5 hours.

b. How long to the nearest hour will it take until there is 10 *mg* remaining.

Answers:

1a. m^7, **b.** t^3, **c.** x^{15}, **d.** $\frac{y^3}{x^3}$, **e.** -1, **2a**. -675, **b.** 0.36, **c.** -2.4, **d.** 9, **3a.** 16, **b.** $\frac{216}{1331} = 0.1623$, **c.** 0.3051,

4a.. i. $\sqrt[3]{a}$, ii.. $(\sqrt[3]{a})^2$ iii. $\frac{1}{\sqrt[5]{a}}$ **4b.** i. $x^{1/2}$, ii. $x^{3/2}$ iii. $\frac{1}{x^{1/4}}$ **5a**. 3, **b.** 4, **c.** 0.5, **d.** 4, **e.** 9, **f.** 8,

6a. 2.1, **b.** 1.6, **c.** 15.9 **7a.** 59.3 **b.** 11 hours