Unit 6 Day 7

MAP4CI – Algebraic Models Review

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. $-(-x)^0$ f. m^{-2}

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. $27^{\frac{2}{3}}$ 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. $\frac{1}{\sqrt[4]{a}}$

5. The formula $B = 0.4089M^{\frac{3}{4}}$ gives the bird inhalation rate, B (cubic metres of air per day) for a bird with mass M (kilograms).
a. rewrite the formula using radicals
b. calculate the inhalation rate for a 4.5 kg bald eagle and a 8.0 kg Canada goose.
c. Determine the mass of a bird whose inhalation rate is twice that of a bald eagle.

B. Exponential Equations

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

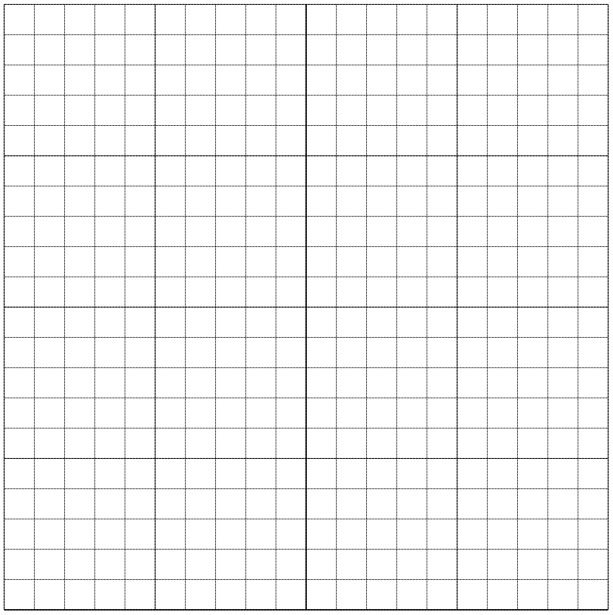
a. $4^{2x} = 4^6$ b. $5^x = 625$ c. $3^{2x+1} = 9$

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

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

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

8. In the equation $3^{z+1} = 99$ Solve for z by graphing.



***C. Application Problems (*Exponential Models)**

9. The amount of medicine A remaining in a body after t hours can be calculated using the formula $A = 300(0.8)^t$.

a. Calculate the amount of medicine remaining in a body after 3 hours.
b. Determine the time it takes (to the nearest hour) so that there is only 1 mg of medicine remaining in a body.

10. $1500 was invested for 2 years in an account that pays interest compounded annually. What was the interest rate if the investment was worth $1800 after two years? Use the formula $A = P(1+i)^n$.

11. $25000 was invested in an account that pays 5.0% interest compounded annually. How many years was the money in the account if the investment was worth $28500 at the end of the term? (Hint – use systematic trial or graphing to solve this problem).

12. A ball is dropped and bounces several times, losing some of its rebound height after each bounce. The height reached, h, in metres, after n bounces is given by the equation $h=1.5(0.75)^n$.

a) Graph the relation and describe the trend.
b) What is the maximum height after i) the first bounce?
ii) the second bounce?
iii) the third bounce?

Answers:

1.a. m^7, **b.** t^3, **c.** x^{15}, **d.** $\frac{y^3}{x^3}$, **e.** -1, **f.** $\frac{1}{m^2}$,

2.a. -675**, b**. 0.36, **c**. -2.4, **d**.9,

3.a. 9, **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. $\frac{1}{a^4}$

5a. $B = 0.4089\sqrt[4]{M^3}$, **b**. 1.26, 1.94**, c**. 11.34kg,
6a. 3, **b.** 4, **c.** 0.5, **d**. 4, **e**. 9, **f**. 8,
7a. 2.1, **b**. 1.6, **c.** 15.9
8. z≈3.2,
9a. 153.6, **b**. 25.56hrs
10. *i* ≈ 0.095 or 9.5%,

11. n ≈ 2.7 years

12. a) The height of successive bounces is decreasing exponentially. (As the number of bounces increases, the height decreases exponentially.)

b) i) 1.125 m ii) 0.84 m iii) 0.63 m

Also try,
Pg. 390-391 # 1ac, 2ac, 3, 4a, 5, 6ab, 7abcd, 8, 9ace, 10, 12, 15, 16, 17