

Name: _____

No work No credit

Date: _____

CW # 4-1: Math IB SL - Standard 37-38: Chapter 9: Exponents and Logarithms

50 points

1. Simplify: Answer must be expressed with positive integers only.

$$\left(\frac{7a^1b^5}{4c^3}\right)^2$$

$$\left(\frac{14a^4b^5c^2}{8a^3c^5}\right)^2$$

$$\frac{49a^2b^{10}}{16c^6}$$

2. Find all values of x that solve the following equation by finding a common base:

$$(3^{2x-1})(3^{5x+4}) + 2 = 29$$

$$3^{2x-1+5x+4} = 27$$

$$3^{7x+3} = 3^3$$

$$7x+3=3$$

$$7x=0$$

$$\boxed{x=0}$$

3. The rate of decay of the radioactive substance carbon 14 can be modelled by

$$A = A_0(2)^{\frac{-t}{5730}}$$

where A is the mass of carbon 14 at time t (measured in years) and A_0 is the initial mass.

a. If you start with 100 mg of carbon 14, find how much will remain after 1000 years.

b. How long will it take for there to be only half of the original amount of carbon 14?

$$a) A = 100(2)^{\frac{-1000}{5730}}$$

$$\boxed{A = 88.6 \text{ g}}$$

$$b) 50 = 100(2)^{\frac{-t}{5730}}$$

$$\frac{1}{2} = 2^{\frac{-t}{5730}}$$

$$\downarrow_1 \quad \downarrow_2$$

$$\boxed{5730 \text{ years}}$$

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4. a. Find the asymptote for $f(x) = \ln(x + 4) + 3$

b. If $g(x) = 3e^{x-4} + 1$, find the solution to $f(x) = g(x)$

a) $x = -4$

y₁ y₂

b) $x = -3.86$

$x = 4.32$

5. Write the equation in exponential form:

$$\log_x \frac{1}{27} = -3$$

$$x^{-3} = \frac{1}{27}$$

6. Solve for x without a calculator: (show work for full credit)

$$\log_x \frac{1}{27} = -3$$

$$x^{-3} = \frac{1}{27}$$

$$x^{-3} = 3^{-3}$$

$$x = 3$$

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7. Evaluate without a calculator: (show work for full credit)

$$\log_8 128$$

$$\log_{2^3} 2^7$$

$$\boxed{\frac{7}{3}}$$

$$\log_4 2$$

$$\log_{2^2} 2^1$$

$$\boxed{\frac{1}{2}}$$

8. Write as a single logarithm:

$$3(\log_2 a + \log_2 c) - \log_2 f$$

$$(\log_2 a + \log_2 c)^3 - \log_2 f$$

$$\log_2 (ac)^3 - \log_2 f$$

$$\boxed{\log_2 \frac{(ac)^3}{f}}$$

9. Given $\log_7 4 = x$ and $\log_7 3 = y$ write the following expressions in terms of x and y :

$$\log_7 21$$

$$\log_7 7 \cdot 3$$

$$\log_7 7 + \log_7 3$$

$$\boxed{1 + y}$$

$$\log_7 0.75$$

$$\log_7 \frac{3}{4}$$

$$\log_7 3 - \log_7 4$$

$$\boxed{y - x}$$

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10. Solve each of the following for x :

$$\log_3(2x - 9) = 2$$

$$3^2 = 2x - 9$$

$$9 = 2x - 9$$

$$18 = 2x$$

$$x = 9$$

$$2^{3x-1} + 4 = 20$$

$$2^{3x-1} = 16$$

$$2^{3x-1} = 2^4$$

$$3x-1 = 4$$

$$3x = 5$$

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

11. You are saving up for college. You put \$5000 in the bank that pays you 3% interest quarterly.

a. Write an expression to represent the value of the account after t months.

b. Find the value of the account after five years.

c. How long does it take for the account to double in value?

$$a) A = 5000 \left(1 + \frac{.03}{4}\right)^{4t}$$

$$A = 5000(1.0075)^{4t}$$

$$b) A = 5000(1.0075)^{20}$$

$$A = 5805.90$$

$$c) 10000 = 5000(1.0075)^{4t}$$
$$2 = 1.0075^{4t}$$

\downarrow \downarrow
 y_1 y_2

$$23.2 \text{ years}$$