

Name Key Your score _____ Percent _____ %

Chapter 3 STUDY GUIDE Melott Possible points _____ Grade _____

Show Work on ALL Problems

Simplify the expression.

1) $7a - 2(9a - 4) - (-5a) - 13$

$$7a - 18a + 8 + 5a - 13$$

$$-11a + 8 + 5a - 13$$

$$\boxed{-6a + -5} \checkmark$$

Determine the value of n to make the statement true.

2) $(-3)^{-n} \times \frac{1}{-2,187} = (-3)^5$

$$(-3)^{-n} \cdot (-3)^7 = (-3)^5$$

$$-n + 7 = 5$$

$$-n = -12$$

$$\boxed{n = 12} \checkmark$$

Simplify completely. Express all answers as fractions in simplest form. Choose 4 problems from 3-8. Additional problems can be solved for extra credit after you complete the rest of the test.

3) $(-0.6)^{-2}$

$$\left(-\frac{6}{100}\right)^{-2}$$

$$\left(-\frac{3}{50}\right)^{-2} = \left(\frac{50}{3}\right)^2$$

$$\boxed{\frac{2500}{9}} \checkmark$$

4) $\left[\frac{-3}{8}\right]^{-3}$

$$\left[-\frac{8}{3}\right]^3 \checkmark$$

$$\boxed{-512/27}$$

5) $[7(x+3)^3]^{-9}$

$$\frac{1}{7^3} (x+3)^{-9}$$

$$\boxed{\frac{1}{343} \cdot (x+3)^9} \checkmark$$

6) $\frac{36x^8y^{-3}z^5}{-4xy^3z^6}$

$$\boxed{\frac{-9x^7}{y^8z}}$$

7) $\left[\frac{xyz}{2}\right]^3$

$$\left[\frac{2^{10}xyz}{10xyz}\right]^3$$

$$\boxed{\frac{1}{5xyz}}$$

8) $\frac{(-3ax^{-2})^{-3}}{5a^{-6}x^4}$

$$\frac{-3^{-3}a^{-3}x^6}{5a^{-6}x^4}$$

$$\frac{1a^3x^2}{-27 \cdot 5}$$

$$\boxed{\frac{1}{125x^2y^3z^3}}$$

$$\frac{a^3x^2}{-135}$$

9) How many different 4-letter words are possible using the letters from the word **wildcats**? Each letter can only be used once.

$$8 \cdot 7 \cdot 6 \cdot 5 = 1680 \text{ possibilities}$$

What is the probability that a randomly chosen set of 4 letters from the word **wildcats** taken in order would result in the word **slid**?

$$P(\text{slid}) = \frac{1}{1680} \quad \checkmark$$

10) A combination lock has the numbers 0 - 30 printed on it. What is the probability that you randomly walk up to a locker and try three numbers and they open the locker? Note: combinations must be made up of three different numbers.

$$31 \cdot 30 \cdot 29 = 26,970$$

$$P(\text{pick 3 out of 31 no repeat}) = \frac{1}{26,970}$$

11) The population of a colony of crickets t days from now is modeled by the equation $y = 80 \times 2.3^{t/8}$. What will the population of crickets be in 12 days?

$$y = 80 \cdot (2.3)^{12/8}$$

$$y = 80 \cdot 2.3^{3/2}$$

$$y = 279.05 \text{ Crickets}$$

12) The fish population in a certain lake in year t is approximated by the following model

$$y = \frac{800}{3 + 197e^{-.3875t}}$$

- What is the population now?
- What will the population be in 8 years?
- Make sure you understand the idea of having a limited number of species living in a certain area.

$$a) y = \frac{800}{(3 + 197e^{-.3875 \times 0})}$$

$$y = \frac{800}{200} = 4 \text{ fish}$$

look back @ examples that talk about population!!!

$$b) \frac{800}{(3 + 197e^{-.3875 \times 8})}$$

$$y = \frac{800}{11.87469287} = 67.37$$

(p5 + p6 ex #4)

$$67.37 \text{ fish}$$

13) An initial count of the number of lizards in a colony puts the number of lizards at 1,325. Three days later, the count was 5,275. Assume that the lizards grow exponentially.

- a) Find the equation that models the data.
- b) What is the growth factor per day?
- c) How many lizards are there after 2 weeks?

$(0, 1325)$ and $(3, 5275)$

pay close attention to each coordinate pair!

$$y = y_0 b^t$$

$$5272 = 1325 \cdot b^{(3-0)}$$

$$y = 1325 \cdot (1.58)^t$$

equation a) →

$$\frac{5272}{1325} = \frac{1325 \cdot b^3}{1325}$$

$$\sqrt[3]{3.978} = \sqrt[3]{b^3}$$

$$1.58 = b$$

(growth rate)

$$y = 1325 \cdot 1.58^{14}$$

$$y = 800599.10$$

14) A daily study of the ant population at the "Ant House", an ant farm in Texas, gained the following results. At day 3, there were 324 ants and by the 5th day, there were 2,916 ants. If they cannot control the growth of the ants, the Environmental Protection Agency (EPA) will shut down the ant farm. The EPA said that if they have more than 25,000 ants by the end of the week, day 7, then they will shut them down.

- a) How many ants do they have on the 7th day?
- b) Will the EPA shut the ant farm down?

$(3, 324)$ and $(5, 2916)$

Find growth rate!

$$y = y_0 b^t$$

$(5-3)$

$$2916 = 324 \cdot b$$

$$2916 = 324 \cdot b^2$$

$$\frac{2916}{324} = \frac{324 \cdot b^2}{324}$$

$$\sqrt{9} = \sqrt{b^2}$$

$b = 3$

growth rate

$$324 = y_0 \cdot 3^3$$

$$324 = y_0 \cdot 27$$

$$\frac{324}{27} = \frac{y_0 \cdot 27}{27}$$

$$y_0 = 12$$

$$y = y_0 b^t$$

$$y = 12 \cdot 3^t$$

$$y = 12 \cdot 3^7$$

$$y = 26244$$

EPA

WILL

Shut # down

15)

The half-life of americium-241 is 432.2 years. Find the amount of 975mg of americium that will be left after 300yrs?

$y = y_0 \cdot (0.5)^{t/h}$ y_0 =initial amount; y =future amount; t =time; h =half-life

$$y = y_0 (0.5)^{t/h}$$

$$y = 975 (0.5)^{(300/432.2)}$$

$$y = 602.6 \text{ mg}$$