

Name _____

College Math Section 14 - Quiz 3, November 18, 2010 [Shaw]

In order to maximize the possibility of receiving partial credit, be sure to show all work on the sheets provided.

1. Consider the equation

$$F = \frac{G \cdot M \cdot N}{r^2}$$

- (a) Write an equation for G in terms of the other variables.

- (b) Write an equation for r in terms of the other variables.

2. The *spring potential energy* of a loaded spring is given by the formula:

$$P = \frac{1}{2}k \cdot x^2$$

where P is the *spring potential energy* (in joules), k is the *spring constant*, and x is the *compression* (in meters) of the spring.

- (a) Write an equation for k in terms of P and x .

- (b) Use your equation from 2a to answer the question: If a spring with compression 0.01 meters has a potential energy of 0.5 joules, what is the spring constant?

3. Simplify the following so that they appear as a single exponential expression:

(a) $7^{-1} \cdot 7^3$

(c) $12^4 \cdot 12^3$

(b) $\frac{8^3 \cdot 8^2}{8^{-1}}$

(d) $\frac{3^{-2}}{3}$

4. For each of the following, complete the calculation and express your answer (i) in scientific notation and (ii) in standard notation.

(a) $\frac{4.30 \times 10^{-2}}{2.15 \times 10^3}$

(b) $\frac{1.2 \times 10^3}{6.3 \times 10^1 \cdot 3.4 \times 10^{-8}}$

5. (a) Solve for x :

$$\log(x) = 4$$

(b) Solve for x :

$$10^x = 331$$

6. Find the following quantities. Express each as a number.

(a) $\log(2230)$

(b) $\frac{\log(0.00001)}{\log(100)}$

7. The equation used to calculate the decibel level of a sound with intensity level I is:

$$dB = 10 \log \left(\frac{I}{10^{-12}} \right)$$

Suppose that the intensity of a certain sound is 3.17×10^{-7} watts per square meter. How many decibels are created by the sound?

8. The retirement fund for an employee of a company in financial decline is losing money; in recent years, the fund has *lost* 11% of its value each year. Grafton has \$900,000 invested in his retirement fund with this company. If the losing trend continues, how much money will he have left in his retirement fund in 5 years?

9. An extremely rare baseball card which was worth \$1.00 in 1960, has quadrupled in value every 10 years since then.

(a) How much was the card worth in 2000?

(b) How much was the card worth in 2005?

10. The fish population in a local pond, t years after initially being stocked with fish, is given by the equation $P = 500 - 450 \cdot (.5)^t$.

(a) About how many fish are in the pond after 5 years?

(b) About how many fish are in the pond after 50 years?