Dr. Katiraie MA115A Section 3.3 Practice Quiz 3 Name:_____

1. Suppose that in January there is a magnitude 4.5 earthquake hitting the east coast of the United States. Six months later, a magnitude 6.5 earthquake hits the west coast. How many times more intense was the west coast quake compared to the east coast quake?

2. The _____ of an earthquake is a measure of ground movement.
   A) magnitude
   B) relative intensity
   C) Richter value
   D) degree

3. The _____ of an earthquake is the logarithm of relative intensity.
   A) magnitude
   B) scale
   C) Richter value
   D) degree

4. An increase of 1 unit on the Richter scale corresponds to increasing the relative intensity by a factor of 10.
   A) True
   B) False

5. The decibel rating of a sound is _____ times the logarithm of its relative intensity.

6. An increase of one decibel multiplies relative intensity by 2.16.
   A) True
   B) False

7. How many times more intense is a 6.0 magnitude earthquake compared to a 3.0 magnitude earthquake?

8. In an area prone to earthquakes there is a 6.9 magnitude quake. Two years before there was a 6.6 magnitude quake. Then the relative intensity of the 6.9 quake was about twice that of the 6.6 quake.
   A) True
   B) False

9. A speaker is playing music at 75 decibels. A second speaker playing the same music at the same decibel reading is placed beside the first. What is the decibel reading of the pair of speakers?

10. The loudness of sound decreases as the distance from the source increases. Doubling the distance from a sound multiplies the relative intensity of the sound by 1/4. If the sound of a speaker is recorded at 80 decibels at 4 feet, what is the decibel reading at 8 feet?

11. Use the properties of logarithms to rewrite the following: $\log\left(\frac{125}{T}\right)$

12. log(AB) = log(A) × log(B)
   A) True
   B) False

13. If the per capita growth rate of the world population continues to be what it was in the year 2000, the world population t years after July 1, 2000, will be 6.085×1.0121^{t} billion. According to this formula, when will the world population reach 9 billion?

14. The acidity of a solution is determined by the concentration *H* of hydrogen ions. The formula is pH = - log *H*. The accompanying exponential formula is $H = 0.1^{pH}$. Lower pH values indicate a more acidic solution. Normal rain has a pH of 5.6. Suppose acid rain has a pH of 4.3. How many times as acidic as normal rain is this?

15. What is the solution to $2.4 = 1.07^t$?

16. Suppose for a certain site there are initially 30 parts per million of a dangerous contaminant and that a cleaning process removes 5% of the remaining contaminant each day. How much contaminant (in parts per million) is removed after three days?

17. The rate of inflation measures the percentage increase in the price of consumer goods. The rate of inflation in the year 2000 was 3%. Suppose that this rate persisted through 2010. What would be the cost in 2010 of an item that costs $100 in 2000?
    A) $130.00
    B) $130.48
    C) $134.39
    D) $138.42

18. You have $500 and wish to buy a computer. You find an investment that increases by 6% each month, and you put your $500 into the account. When will the amount enable you to purchase a computer costing $1000?

19. Suppose that a certain jet engine up close produces sound at 150 decibels. What is the decibel reading of a pair of nearby jet engines?

20. Suppose a substance has a half-life of 30 years. Then if we started with 10kg, there would be 5kg left in 60 years.
    A) True
    B) False

21. Actinium-225 has a half-life of 10 days. Suppose we have an initial amount of 100 grams of actinium-225. How much would be present after 30 days?

22. Initially, a population is 750, and it grows by 3% each year. Find a formula for the population, P, at any time, t.

23. The common logarithm of a positive number x, written $\log x$, is the exponent of 10 that gives x.
    A) True
    B) False

24. From 1929 to the early 1930s, the prices of consumer goods actually decreased. Economists call this phenomenon *deflation*. The rate of deflation during this period was around 7% per year. Suppose this rate of deflation persisted over a period of 20 years. What would be the cost after 20 years of an item that costs $500 initially?

25. The energy released by an earthquake is related to the magnitude by an exponential function: Energy = $25{,}000 \times 31.6^{\text{Magnitude}}$. The unit of energy in the above equation is a *joule*. One joule is approximately the energy expressed in lifting ¾ of a pound 1 foot. The earthquake that devastated Haiti on January 12, 2010 had a magnitude of 7.0 and killed hundreds of thousand of people. How much energy was released by the Haiti earthquake?

Answer Key

1. 100
2. B
3. A
4. A
5. 10
6. B
7. 1000
8. A
9. 78 decibels
10. 74 decibels
11. $\log(125) - \log(T)$
12. B
13. 32.5 years after July 1, 2000
14. 20 times
15. $t = \log(2.4) \div \log(1.07)$
16. 4.28 ppm
17. C
18. 11.9 months
19. 153.6 decibels
20. B
21. 12.5 grams
22. $P = 750 \times (1.03)^t$
23. A
24. $117.12
25. 7.87×10^{14} joules