Logarithmic scales: pH, decibels and earthquakes worksheet – Grade 12

Grade 12 · Mixed level · 20 questions · **Version X5945**

Name: _____ Date: _____ Score: ___ / 20

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1. A sound is 10^{9} times as intense as the quietest sound a person can hear (I_0). What is its sound level, in decibels? Use $L = 10 \log(I \div I_0)$.

   Answer: _____

2. A solution has a hydrogen ion concentration of $[H^+] = 10^{-6}$ mol/L. What is its pH? (pH = −log[H⁺])

   Answer: _____

3. Solution A has pH 6 and solution B has pH 10. How many times as acidic is solution A?

   Answer: _____

4. A sound is 10^{1} times as intense as the quietest sound a person can hear (I_0). What is its sound level, in decibels? Use $L = 10 \log(I \div I_0)$.

   Answer: _____

5. A solution has a hydrogen ion concentration of $[H^+] = 10^{-13}$ mol/L. What is its pH? (pH = −log[H⁺])

   Answer: _____

6. Solution A has pH 6 and solution B has pH 9. How many times as acidic is solution A?

   Answer: _____

7. Solution A has pH 9 and solution B has pH 10. How many times as acidic is solution A?

   Answer: _____

8. A sound measures 49 dB and another measures 29 dB. How many times as intense is the louder sound?

   Answer: _____

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9. An earthquake of magnitude 7.6 and another of magnitude 4.6 are recorded. How many times as large is the amplitude of the stronger one's waves?

   Answer: _____

10. The hydrogen ion concentration of a solution is 5×10^{-9} mol/L. What is its pH, to two decimal places?

    Answer: _____

11. The hydrogen ion concentration of a solution is 7×10^{-5} mol/L. What is its pH, to two decimal places?

    Answer: _____

12. A sound measures 67 dB and another measures 37 dB. How many times as intense is the louder sound?

    Answer: _____

13. An earthquake of magnitude 4.4 and another of magnitude 3.4 are recorded. How many times as large is the amplitude of the stronger one's waves?

    Answer: _____

14. The hydrogen ion concentration of a solution is 9×10^{-5} mol/L. What is its pH, to two decimal places?

    Answer: _____

15. A sound at 89 dB is compared with one at 60 dB. How many times as intense is the louder sound, to one decimal place?

    Answer: _____

16. An earthquake has magnitude 4.2. A second earthquake's waves have 40 times the amplitude. What is the magnitude of the second earthquake, to one decimal place?

    Answer: _____

17. Solution A has pH 2.7 and solution B has pH 5.2. How many times as acidic is solution A, to the nearest whole number?

    Answer: _____

18. An earthquake has magnitude 3.2. A second earthquake's waves have 40 times the amplitude. What is the magnitude of the second earthquake, to one decimal place?

    Answer: _____

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19. A sound at 90 dB is compared with one at 75 dB. How many times as intense is the louder sound, to one decimal place?

    Answer: _____

20. Solution A has pH 5.4 and solution B has pH 8.8. How many times as acidic is solution A, to the nearest whole number?

    Answer: _____

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Answer key · Version X5945

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1. **90**
2. **6**
3. **10000**
4. **10**
5. **13**
6. **1000**
7. **10**
8. **100**
9. **1000**
10. **8.30**
11. **4.15**
12. **1000**
13. **10**
14. **4.05**
15. **794.3**
16. **5.8**
17. **316**
18. **4.8**
19. **31.6**
20. **2512**

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