**Chapter 8 – Expectations**

**Exponential and Logarithmic Functions**

OVERALL EXPECTATIONS - By the end of this course, students will:

**1. demonstrate an understanding of the relationship between exponential expressions and logarithmic expressions, evaluate logarithms, and apply the laws of logarithms to simplify numeric expressions;**

1. Why is it not possible to determine log10(– 3) or log20? Explain your reasoning.
2. Determine the approximate value of log418 **without a calculator**. Explain why your answer is reasonable.
3. Express in logarithmic form: 6-2 = 1/36
4. Express in exponential form:
5. Solve for x by rewriting the equations in another form:
6. Express as a single logarithm and evaluate.

i)

ii)

iii)

**2. identify and describe some key features of the graphs of logarithmic functions, make connections among the numeric, graphical, and algebraic representations of logarithmic functions, and solve related problems graphically;**

1. **Compare** (similarities and differences) the key features of the graphs of f(x) = log(2) x, g(x) = log(4) x, and h(x) = log(8) x using graphing technology. State the equation of the vertical and horizontal asymptotes, the intercepts, the intervals of increase and decrease, the domain and range
2. State the inverse of the equation
3. State the inverse of .
4. Use the key features of the graphs of logarithmic and exponential functions to give reasons why the inverse of an exponential function is a function.
5. Sketch the graph of . State the transformations performed on the parent function. State the domain and range. State the equation of the asymptotes.
6. The pH or acidity of a solution is given by the equation pH = –logC, where C is the concentration of [H(+)] ions in multiples of M = 1 mol/L. Use graphing software to graph this function. What is the change in pH if the solution is diluted from a concentration of 0.1M to a concentration of 0.01M? From 0.001M to 0.0001M? Describe the change in pH when the concentration of any acidic solution is reduced to 1/10 of its original concentration. Rearrange the given equation to determine concentration as a function of pH.
7. The formula used to measure sound is , where L is the loudness in DECIBELS, I is the intensity of the sound being measured, and is the intensity of sound at the threshold of hearing. How much more intense is the sound of a rock concert than the sound of a subway?

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| --- | --- |
| Sound | Loudness (dB) |
| Subway | 90 |
| Rock Concert | 120 |

**3. solve exponential and simple logarithmic equations in one variable algebraically, including those in problems arising from real-world applications.**

1. Graph the functions and . How do the graphs compare? Explain your findings algebraically.
2. Solve for x TWO ways:
3. Solve for n. 300(1.05)n = 600
4. Solve for x.
5. Solve for x.
6. The pH or acidity of a solution is given by the equation pH = –logC, where C is the concentration of [H(+)] ions in multiples of M = 1 mol/L. You are given a solution of hydrochloric acid with a pH of 1.7 and asked to increase the pH of the solution by 1.4. Determine how much you must dilute the solution. Does your answer differ if you start with a pH of 2.2?
7. Solve for x.
8. A bacteria culture doubles every 15 minutes. How long will it take for a culture of 20 bacteria to grow to a population 163 840?
9. Level 4 – Solve