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Name KEY _____ raw _____ scaled _____ percent

Math 11 Trimester 1 Exam 2 (162 Points)

Logarithms and exponents

- **Partial credit may be given for correct work. Therefore, it is to your advantage to write clear solutions. If I cannot understand a solution within 90 seconds, then it will receive no partial credit.**
- **Answers must be completely simplified. No denominators may include radicals. All fractions reduced. Arithmetic must be completely performed; e.g. write 9 instead of $\sqrt{81}$.**
- **No calculators. All answers must be exact.**

■ **A1. Change each equation to logarithmic form. (7 points each answer)**

[1] $4^2 = 16$ $\log_4 16 = 2$

[2] $10^{-4} = 0.0001$ $\log_{10} .0001 = -4$

[3] $x^3 = \frac{1}{8}$ $\log_x \frac{1}{8} = 3$

■ **A2. Change each equation to exponential form. (7 points each answer)**

[1] $\log_5 125 = 3$ $5^3 = 125$

[2] $\log_3 \frac{1}{27} = -3$ $3^{-3} = \frac{1}{27}$

[3] $\log_4 \frac{1}{64} = -3$ $4^{-3} = \frac{1}{64}$

■ **B. Find each of the numbers. (8 points each answer)**

[1] $\log_3 \frac{1}{9}$

$3^x = \frac{1}{9}$

$3^x = 3^{-2}$

$x = -2$

[2] $\log_{10} 0.0001$

$10^x = .0001$

$x = -4$

[3] $\log_8 \sqrt[5]{8}$

$8^x = 8^{\frac{1}{5}}$

$x = \frac{1}{5}$

[4] $10^{3 \log_{10} 2} = Y$

$10^{\log_{10} 8}$

8

OR $\text{Log}_{10} 10^{3 \log_{10} 2} = \text{Log}_{10} Y$

$3 \log_{10} 2 = \text{Log}_{10} Y$

$\log_{10} 8 = \text{Log}_{10} Y$

$\therefore \quad y = 8$

[5] $\log_4 \sqrt[3]{4}$

$4^x = 4^{1/3}$

$x = 1/3$

[6] $10^{5 \log_{10} 2} = Y$

$10^{\log_{10} 32}$

32

OR $\text{Log}_{10} 10^{5 \log_{10} 2} = \text{Log}_{10} Y$

$5 \log_{10} 2 = \log_{10} Y$

$\text{Log}_{10} 32 = \log_{10} Y$

$y = 32$

next tma specify w/ NO coef.

■ **C. Write the expression as one logarithm. (5 points each answer)** to rule out $\frac{7}{2}\log(x-2)$

[1] $3\log_a x + \log_a(x-2)$

$= \log_a x^3 + \log_a(x-2)$

$= \log_a(x^3(x-2))$

$= \log_a(x^4 - 2x^3)$

[2] $3\log_a(x-2) - 2\log_a(x-2)$

$= \log_a[(x-2)^3] - \log_a[(x-2)^2]$

$= \log_a\left[\frac{(x-2)^3}{(x-2)^2}\right]$

$= \log_a(x-2)$

[3] $4\log_2(x-2) - \frac{1}{2}\log_2(x-2)$

$= \log_2(x-2)^4 - \log_2(x-2)^{1/2}$

$= \log_2\left[\frac{(x-2)^4}{(x-2)^{1/2}}\right]$

$= \log_2\left[(x-2)^{7/2}\right]$

[4] $\log_2 x - \log_2 y + \log_2(x+y)$

$= \log_2\left[\frac{x(x+y)}{y}\right]$

$= \log_2\left[\frac{x^2+xy}{y}\right]$

■ **D. Find the solution sets. (13 points each answer)**

[1] $\log_4(x-3)=2$

$4^2 = x-3$

$16 = x-3$

$x = 19$

[2] $2\log_5\sqrt{x}=3$

$\log_5 x = 3$

$5^3 = x$

$x = 125$

[3] $\log_2(x^2+3x+4)=1$

$2^1 = x^2+3x+4$

$x^2+3x+2=0$

$(x+1)(x+2)=0$

$x=-1$ or $x=-2$

$\log_2(1-3+4) = \log_2(2) = 1$ ✓

$\log_2(4-6+4) = \log_2(2) = 1$ ✓

[4] $10^{\log_{10} x} = \frac{2}{13}$

$x = \frac{2}{13}$