Name___ *Key* ___

$$\log_a b = c \qquad a^c = b$$

NO WORK = NO CREDIT!!!.....SHOW ALL WORK!

1. Write in exponent form: a) $\log_3 25 = y$ $$3^y = 25$$ b) $\log_{10} 19 = x$ $$10^x = 19$$ c) $\log_n p = w$ $$n^w = p$$	**2. Write in Logarithmic form:** a) $81 = 3^4$ $$\log_3 81 = 4$$ b) $10^{-2} = .001$ $$\log_{10} .01 = -2$$ c) $\sqrt[3]{125} = 5$ $$\log_{125} 5 = \tfrac{1}{3}$$	**3. Simplify:** a) $\log_3 \sqrt{81}$ $$\log_3 3^2 = 2$$ b) $\log_3 \dfrac{1}{.27}$ $$\log_3 3^{-3} = -3$$
4. solve for t $$3 = \frac{2}{n}\left(\frac{6}{t} - \frac{4n}{7}\right)$$ $$\frac{3n}{2} = \frac{6}{t} - \frac{4n}{7}$$ $$\tfrac{7}{7}\,\frac{3n}{2} + \frac{4n}{7}\tfrac{2}{2} = \frac{6}{t}$$ $$\frac{21n + 8n}{14} = \frac{6}{t}$$ $$\frac{29n}{14} = \frac{6}{t} \quad \frac{t}{6} = \frac{14}{29n}$$ $$\boxed{t = \frac{84}{29n}}$$	**5. Use synthetic division to find:** $(x^3 - 6x^2 - 3x + 1) \div (x - 2)$ $$\begin{array}{c|cccc} & 1 & -6 & -3 & 1 \\ 2 & & -4 & -11 & -21 \\ \hline & 1 & -4 & -11 & -21 \end{array}$$ $$\boxed{x^2 - 4x - 11 - \frac{21}{x-2}}$$	**6. Simplify:** $\sqrt{5}\sqrt{2}\sqrt{-5}\sqrt{-2} + \sqrt{3}\sqrt{-9} + 5\sqrt{-8}\sqrt{2} + 6i$ $\sqrt{5}\sqrt{2}\,i\sqrt{5}\,i\sqrt{2} + \sqrt{3}\,i3 + 5i\sqrt{8}\sqrt{2} + 6i$ $-10 + 3\sqrt{3}i + 20i + 6i$ $-10 + 26i + 3\sqrt{3}i$ $$-10 + (26 + 3\sqrt{3})i$$
7. Solve by completing the square: $4x^2 = -12 + 8x$ $x^2 = -3 + 2x$ $x^2 - 2x + 1 = -3 + 1$ $(x-1)^2 = -2$ $x - 1 = \pm i\sqrt{2}$ $x = 1 \pm i\sqrt{2}$	**8. Factor:** $8c^3 x^6 - 27p^3$ $(2cx^2)^3 - (3p)^3$ $(2cx^2 - 3p)(4c^2x^4 + 6cpx^2 + 9p^2)$	**9. Simplify:** $\left(\dfrac{2 - 3\sqrt{24}}{3 + 2\sqrt{6}}\right)\left(\dfrac{3 - 2\sqrt{6}}{3 - 2\sqrt{6}}\right)$ $\dfrac{6 - 4\sqrt{6} - 9\sqrt{24} + 6\sqrt{24}\sqrt{6}}{9 - 4 \cdot 6}$ $\dfrac{6 - 4\sqrt{6} - 18\sqrt{6} + 72}{-15} = \dfrac{78 - 22\sqrt{6}}{-15}$

10. Use Cramer's rule to solve:	11. Solve:	12. Solve:

10. Use Cramer's rule to solve:
$$\begin{cases} 4x - 3y = 5 \\ 2x - 4y = -3 \end{cases}$$

$$X = \frac{\begin{vmatrix} 5 & -3 \\ -3 & -4 \end{vmatrix}}{\begin{vmatrix} 4 & -3 \\ 2 & -4 \end{vmatrix}} \quad \frac{-20-9}{-16+6} = \frac{-29}{-10} = 2.9$$

$$Y = \frac{\begin{vmatrix} 4 & 5 \\ 2 & -3 \end{vmatrix}}{\begin{vmatrix} 4 & -3 \\ 2 & -4 \end{vmatrix}} \quad \frac{-12-10}{-16+6} = \frac{-22}{-10} = 2.2$$

$$\boxed{(2.9, 2.2)}$$

11. Solve:
$$\log_2(x+1) - \log_2(x-1) = 1$$

$$\log_2\left(\frac{x+1}{x-1}\right) = 1$$

$$2^1 = \left(\frac{x+1}{x-1}\right)$$

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

$$2x - 2 = x + 1$$

$$\boxed{x = 3}$$

12. Solve:
$$2\log_7 x + \log_7 49 = 5^{\log_5 2}$$

$$\log_7 x^2 + \log_7 7^2 = 2$$

$$\log_7 x^2 + 2 = 2$$

$$\log_7 x^2 = 0$$

$$7^0 = x^2$$

$$1 = x^2$$

$$x = \pm 1 \qquad \boxed{x = 1}$$

13. Simplify:
$$\frac{\dfrac{6z^2 + 18z}{z+3}}{\dfrac{z+3}{z^2-9}}$$

$$\frac{6z^2 + 18z}{z+3} \cdot \frac{z^2-9}{z+3}$$

$$\frac{6z(z+3)}{z+3} \cdot \frac{(z+3)(z-3)}{z+3}$$

$$\boxed{6z(z-3)}$$

14. Simplify:
$$\frac{27x^3 - 8}{9x^2 - 4}$$

$$\frac{(3x-2)(9x^2 + 6x + 4)}{(3x-2)(3x+2)}$$

$$\boxed{\frac{9x^2 + 6x + 4}{3x + 2}}$$

15. Simplify:
$$\frac{x^2 - 9x + 20}{x^2 - 2x - 8}$$

$$\frac{(x-5)(x-4)}{(x-4)(x+2)}$$

$$\boxed{\frac{x-5}{x+2}}$$

$$\frac{n(n+1)(2n+1)}{6}$$

16. Simplify:
$$\frac{2-x}{9-x^2} \cdot \frac{-x^2 + x + 12}{x^2 - 5x + 6}$$

$$\frac{x-4 \quad x+3}{-1(x^2 - x - 12)}$$

$$\frac{(x-2)}{2-x} \cdot \frac{-1(x-4)(x+3)}{(3+x)(3-x) \quad (x-3)(x-2)}$$

$$\boxed{\frac{x-4}{-(x-3)^2}}$$

17. Simplify:
$$\frac{x^2 - 25}{x^3 + 216} \div \frac{x+5}{x+6}$$

$$\frac{(x+5)(x-5)}{(x+6)(x^2 - 6x + 36)} \cdot \frac{(x+6)}{(x+5)}$$

$$\boxed{\frac{(x-5)}{x^2 - 6x + 36}}$$

18.
$$\sum_{i=1}^{100}(5i^2 - 3i + 4) =$$

$$\frac{5(100)(101)(201)}{6} - \frac{3(100)(101)}{2} + 4(100)$$

$$1691750 - 15150 + 400$$

$$1{,}677{,}000$$

$$1{,}677{,}000$$