

Subject: Mathematics

Quiz

INSTRUCTIONS

- **Please use the Answer Sheet below to type your work.**

Problem 1: Solve the equation: $(4x - 5)^4 = 81$.

Problem 2: Determine the inverse of the function: $h(x) = \frac{2x-3}{1-x}$

Problem 3: Solve the equation: $(1 - x)^{\frac{3}{2}} = 8$

Problem 4: Find the domain of the function: $f(x) = \log_4(4 - 3x)$.

Problem 5: Evaluate the expression: $\log_8 2$

Problem 6: Find the real value(s) of x that verify: $\sqrt{x} + \sqrt{7x} + 2 = 0$

Problem 7: Evaluate the expression: $\log_{\frac{1}{5}}(1)$

Problem 8: Solve: $\sqrt[3]{6x+9} + 8 = 5$

Problem 9: Determine if the following function is one-to-one (explain your answer);

$$F = \{(-2,1), (-5,-1), (3,-5), (1,-2), (0,5), (-1,6), (-6,7), (7,-6)\}$$

Problem 10: Let $f(x) = \sqrt{x-3}$ and $g(x) = (x-3)^2$, find $(g \circ f)(7)$.

Name _____

Answer Sheet

Record your answers and work.

Problem Number	Solution
1	<p>Answer: $x = 2$</p> <p>Work: $(4x - 5)^4 = 81 = 3^4$</p> $4x - 5 = 3$ $4x = 8$ $x = 2$
2	<p>Answers: $h^{-1}(x) = (x+3) / (2+x)$</p> <p>Work: $h(x) = y = (2x-3)/(1-x)$; Interchange x and y to find the inverse equation.</p> $x = (2y-3) / (1-y)$ <p>solving for y to get the inverse</p> $x - xy = 2y - 3 \quad ; \quad 2y + xy = x + 3 \quad ; \quad y(2+x) = x + 3$ $y = (x+3)/(2+x)$ $h^{-1}(x) = (x+3)/(2+x)$
3	<p>Answer: $x = -3$</p> <p>Work: $(1 - x)^{3/2} = 8 = 2^3$</p> $((1 - x)^{3/2})^{2/3} = (2^3)^{2/3} \quad ; \quad 1 - x = 2^2 \quad ; \quad 1 - x = 4$ $\therefore x = -3$

4	<p>Answer: $\{x \in \mathbf{R} \mid x > 1.333\}$</p> <p>Work: $f(x) = \log_4(4 - 3x)$ Domain of this log function should fall between $(4 - 3x = 0)$ and ∞ solving $(4 - 3x = 0)$; $4 = 3x$ $x = 4/3$</p> <p>Therefore, the domain is $\{x \in \mathbf{R} \mid x > 1.333\}$</p>
5	<p>Answers: $\log_8 2 = 1/3$</p> <p>Work: $\log_8 2 = y$; $8^y = 2$; $2^{3y} = 2$ $\log 2^{3y} = \log 2$; $3y \log 2 = \log 2$ $3y = \log 2 / \log 2$; $3y = 1$ $\therefore y = 1/3$</p>
6	<p>Answer: $x = -1/3$</p> <p>Work: $\sqrt{x} + \sqrt{7x + 2} = 0$ $\sqrt{x} = -\sqrt{7x + 2}$; squaring both sides to eliminate the $\sqrt{}$ $(\sqrt{x})^2 = (-\sqrt{7x + 2})^2$; $x = 7x + 2$ $-6x = 2$; $x = 2/-6$ $\therefore x = -1/3$</p>
7	<p>Answer: $\log_{1/5}(1) = 0$</p> <p>Work: $\log_{1/5}(1) = y$; $(1/5)^y = 1$ <u>Alternative 1</u> : Any number raised to power 0 is equal to 1 (no need for further calculations) $\therefore y = 0$</p> <p><u>Alternative 2</u> : Using Logarithms</p> <p>$(1^y / 5^y) = 1$; $(1 / 5^y) = 1$ $\log 1 - \log 5^y = \log 1$; $\log 1 - y \log 5 = \log 1$</p>

	$y \log 5 = \log 1 - \log 1$; $y \log 5 = 0$; $y = 0$ $\therefore \log_{1/5}(1) = 0$
8	<p>Answers: $x = -6$</p> <p>Work: ${}^3\sqrt{(6x+9)} + 8 = 5$; ${}^3\sqrt{(6x+9)} = -3$</p> <p>Power both sides by 3 to eliminate the ${}^3\sqrt{}$; $({}^3\sqrt{(6x+9)})^3 = (-3)^3$</p> <p>$6x + 9 = -27$; $6x = -36$</p> <p>$\therefore x = -6$</p>
9	<p>Answer: $f(x)$ is a one-to-one function</p> <p>Work: Every element in the domain maps to exactly one and only one element in the range.</p>
10	<p>Answer: $\text{gof}(7) = -5$</p> <p>Work: $f(x) = \sqrt{x-3}$; $g(x) = (x-3)^2$</p> <p>$\text{gof} = g(f(x))$</p> <p>\therefore in gof, x is equivalent to $f(x)$</p> <p>$\text{gof} = ((\sqrt{x-3}) - 3)^2$; $\text{gof} = x - 3 - 9$; $\text{gof} = x - 12$</p> <p>$\text{gof}(7) = 7 - 12$</p>

	$\therefore \text{gof}(7) = -5$
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