High School Mathematics Test 2013

Year 10A

Logarithms

Non Calculator Section

Skills and Knowledge Assessed:

- Use the definition of a logarithm to establish and apply the laws of logarithms (ACMNA265)

Name_____

Section 1 Non Calculator Section

Write all working and answers in the spaces provided on this test paper.

1. Evaluate $log_5 125$.

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2. Simplify $log_x \left(\frac{1}{x^3}\right)$.

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3. Write a logarithm statement which is equivalent to $s = b^n$.

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4. The graph of $y = log_a x$ is reflected in the line $y = x$. What is the equation of the resulting graph?

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5. Evaluate $log_z\left(z^2 - 4z\right) - log_z(z - 4)$.

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Use the following information to answer questions 6 and 7.
$log_3 p = 0.81$ and $log_3 q = 0.09$.

6. Evaluate $log_3 pq^2$.

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7. Evaluate $log_3 \frac{1}{\sqrt{p}}$.

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8. Evaluate $log_4(8)$.

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9. The line $y = 2$ is drawn on the same set of axes as the graph of $y = log_2 x$.
What are the coordinates of the point of intersection of the two graphs?

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10. Express $log_a\left(x^2 - 6x - 16\right) - log_a(x + 2) + 2log_a(x)$ as a single logarithm to base a.

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Calculator Allowed Section

Name_____

Section 2 Multiple Choice Section

Mark all your answers on the accompanying multiple choice answer sheet, not on this test paper. You may do any working out on this test paper. Calculators are allowed for this section.

1. $log_b A = y$ is equivalent to :

A. $A = b^y$ B. $A = y^b$ C. $b = A^y$ D. $y = A^b$

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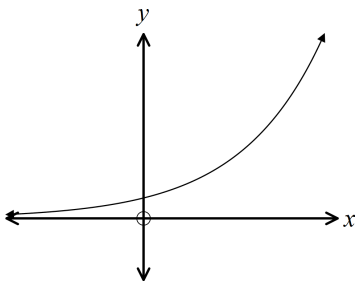
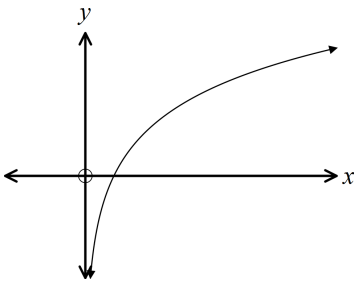
2. Which is the graph of $y = log_2(x)$?

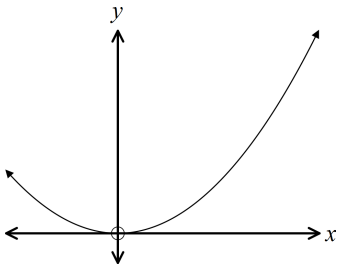
A.



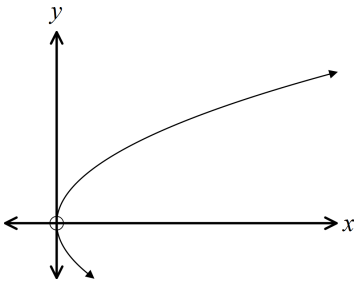
B.



C.



D.



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3. What is the value of $log_3 27$?

A. 1 B. 2 C. 3 D. 9

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4. $log_x(ab) =$

A. $b \times log_x a$ B. $log_x a \times log_x b$

C. $log_x a - log_x b$ D. $log_x a + log_x b$

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5. $\log_a 4 + \log_a 6 - \log_a 8 =$

A. $\log_a 2$. B. $\log_a 3$. C. $\log_a 6$. D. $\log_a 10$.

6. $\log_2\left(\frac{1}{8}\right) =$

A. -3 B. -2 C. $\frac{1}{3}$ D. $\frac{1}{2}$

7. Given $\log_b 2 = 0.43$ and $\log_b 3 = 0.68$, evaluate $\log_b 18$.

A. 0.2924 B. 0.8924 C. 1.11 D. 1.79

8. Simplify $\log_7 49a - \log_7 a$.

A. 2 B. $2a$ C. 7 D. $7a$

9. Given that $2\log_m 2 + \log_m 25 = 2$, find the value of m.

A. 2 B. 5 C. 10 D. 100

10. Simplify $\log_a\left(x^2 + 7x + 12\right) - \log_a(x + 3)$.

A. $\log_a\left(x^2 + 6x + 9\right)$. B. $\log_a\left(x^2 + 8x + 15\right)$.

C. $\log_a(x + 4)$. D. $\log_a(x) + \log_a(4)$.

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Multiple Choice Answer Sheet

Name _____

Completely fill the response oval representing the most correct answer.

1.	A ⬭	B ⬭	C ⬭	D ⬭
2.	A ⬭	B ⬭	C ⬭	D ⬭
3.	A ⬭	B ⬭	C ⬭	D ⬭
4.	A ⬭	B ⬭	C ⬭	D ⬭
5.	A ⬭	B ⬭	C ⬭	D ⬭
6.	A ⬭	B ⬭	C ⬭	D ⬭
7.	A ⬭	B ⬭	C ⬭	D ⬭
8.	A ⬭	B ⬭	C ⬭	D ⬭
9.	A ⬭	B ⬭	C ⬭	D ⬭
10.	A ⬭	B ⬭	C ⬭	D ⬭

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ANSWERS

Section 1	
1.	$log_5 125 = log_5 \left(5^3\right) = 3$
2.	$log_x \left(\frac{1}{x^3}\right) = log_x \left(x^{-3}\right) = -3$
3.	$log_b s = n.$
4.	$x = a^y$
5.	$log_z \left(z^2 - 4z\right) - log_z (z-4) = log_z \left(\frac{z^2-4z}{z-4}\right)$ $= log_z \left(\frac{z(z-4)}{z-4}\right)$ $= log_z (z)$ $= 1$
6.	$log_3 pq^2 = log_3 p + log_3 q^2$ $= log_3 p + 2log_3 q$ $= 0.81 + 2 \times 0.09$ $= 0.81 + 0.18$ $= 0.99$
7.	$log_3 \frac{1}{\sqrt{p}} = log_3 \left(p^{-\frac{1}{2}}\right)$ $= -\frac{1}{2}(log_3 p)$ $= -\frac{1}{2} \times 0.81$ $= -0.405$
8.	$log_4(8) = log_4(2 \times 4) = log_4 2 + log_4 4$ $= log_4 \left(4^{\frac{1}{2}}\right) + log_4 \left(4^1\right)$ $= \frac{1}{2} log_4 4 + log_4 4$ $= \frac{1}{2} + 1$ $= 1\frac{1}{2}$

9.	Substitute $y = 2$ into $y = log_2 x$. $2 = log_2 x$ $x = 2^2 = 4$ $y = log_2 4 = log_2 \left(2^2\right) = 2$ The point is (4, 2).
10.	$log_a \left(x^2 - 6x - 16\right) - log_a(x + 2) + 2log_a(x) = log_a (x - 8)(x + 2) - log_a(x + 2) + log_a\left(x^2\right)$ $= log_a (x - 8) + log_a \left(x^2\right)$ $= log_a \left(x^3 - 8x^2\right)$

Section 2	
1.	A
2.	B
3.	C
4.	D
5.	B
6.	A
7.	D
8.	A
9.	C
10.	C

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Multiple Choice Answer Sheet

Name Marking Sheet

Completely fill the response oval representing the most correct answer.

1.	A	●	B	○	C	○	D ○
2.	A	○	B	●	C	○	D ○
3.	A	○	B	○	C	●	D ○
4.	A	○	B	○	C	○	D ●
5.	A	○	B	●	C	○	D ○
6.	A	●	B	○	C	○	D ○
7.	A	○	B	○	C	○	D ●
8.	A	●	B	○	C	○	D ○
9.	A	○	B	○	C	●	D ○
10.	A	○	B	○	C	●	D ○