TMUA Practice - Logarithms and Exponentials

1. Given that $5^a = 32$ and $2^b = 125$, find the value of ab

A $\frac{log5}{log2}$ B $\frac{5}{2}$ C $\frac{15}{2}$ D 10 E 15

2. Find the product of the real roots of the equation

$$(log_{10}x^2)^2 + log_{10}x = 3$$

A $-\frac{3}{4}$ B 10^{-1} C $10^{-\frac{1}{4}}$ D $\frac{3}{4}$ E $10^{\frac{1}{3}}$

3. Given $log_a y = \frac{1}{3}$ and $log_8 a = x + 1$ Express y in terms of x

A $y = x^{1/3}$ B $y = x^3 + 2$ C $y = 2^{x+1}$ D $y = 8^{x+1}$ E $y = 2^{x+\frac{1}{3}}$

4. In the following equation $xlog9 + log28 = log12 + xlog49$ the value of x is

A $\frac{log7}{log3}$ B $\frac{1}{2}$ C 2 D $\frac{7}{3}$ E 3

5. Given that x and y satisfy the following simultaneous equations

$$log_y x = 5 \qquad log_2 x = 2 + log_2 y$$

what is the value of $x + y$

A $\sqrt{2}$ B 2 C $4\sqrt{2}$ D $5\sqrt{2}$ E $2 + \sqrt{2}$

6. Given that x and y satisfy the following simultaneous equations

$$log_2(y - 1) = 1 + log_2 x \qquad 2log_3 y = 2 + log_3 x$$

the sum of the smallest solutions for x and y is

A $\frac{1}{4}$ B $\frac{5}{4}$ C $\frac{3}{2}$ D $\frac{7}{4}$ E 4

7. Find the sum of the real solutions of the equation

$$log_2 x = \frac{2}{log_2 x} + 1$$

A $\frac{9}{2}$ B 4 C $\frac{7}{2}$ D 2 E $\frac{3}{2}$

8. Given that 6^{4x-3} can be written as 216^a what is a in terms of x

A $12x - 9$ B $\frac{4x-3}{3}$ C $4x - 1$ D $\sqrt[3]{4x-3}$

9. $(log_{\frac{1}{2}}2)(log_{\frac{1}{3}}3)(log_{\frac{1}{4}}4).....(log_{\frac{1}{1000}}1000)$ is equal to:

A 2 B 1 C 0 D ± 1 E -1

10. The following three numbers are consecutive terms in an arithmetic progression

$$\log_{10}2 \qquad \log_{10}(2^x - 1) \qquad \log_{10}(2^x + 3)$$

what is the value of x

A 2^5 B 5 C $\log_2 5$ D $\log_5 2$ E $\log_{10}\frac{5}{2}$

11. The positive real numbers a and b satisfy the following simultaneous equations

$$\log_2 4a - \log_2 b = 4 \qquad \log_2 a + \log_2 2b = 3$$

what is the value of $2a + b$

A 2 B 4 C 5 D 9 E 12

12. The number of positive solutions x to the equation

$\log_2 x = \log_2(x + a) + b$ where *a, b* are non-zero real numbers, is

A zero if $ab < 1$, or one if $ab > 1$

B one if $ab < 1$, or two if $ab > 1$

C one if $ab < 0$, or zero if $ab > 0$

D zero if $ab < 0$, or one if $ab > 0$

E one if $ab < 1$, or zero if $ab > 1$

13. Let $a, b, c > 0$. The equations: $log_a b = c$ $log_b a = c + \frac{3}{2}$ $log_c a = b$

A specify *a, b* and *c* uniquely

B specify *c* uniquely but have infinitely many solutions for *a* and *b*

C specify *a* and *b* uniquely but have infinitely many solutions for *c*

D have no solutions for *a*, *b* and *c*

E have infinitely many solutions for *a*, *b* and *c*

14. The equation $log_b((b^x)^x) + log_a(\frac{c^x}{b^x}) + log_a(\frac{1}{b})log_a c = 0$ has a repeated root when:

A $b^2 = 4ac$ B $b = \frac{1}{a}$ C $c = \frac{1}{b}$ D $c = \frac{b}{a}$

15. If $\frac{loga}{b-c} = \frac{logb}{c-a} = \frac{logc}{a-b}$ then $(a^{b+c})(b^{c+a})(c^{a+b}) =$

A -1 B 1 C abc D 0 E $a+b+c$