1. Further logarithms

1. Solve for x
$125^{-x} \times 5^{2(x-2)} = 25^{(x+2)}$ (3mks)

2. Solve for y in the equation $(\log_3 y)^2 - \frac{1}{2}\log_3 y = \frac{3}{2}$ (3mks)

3. Find the value of x if $49^{x+1} + 7^{2x} = 350$ (3mks)

4. Find x in $2(4^x) - 10(2^x) + 8 = 0$ (4mks)

5. Solve for x in $2^{2x} - 18 \times 2^x = 40$ (3mks)

6. Evaluate without using mathematical tables. (3mks)

$$2\log 5 - \frac{1}{2}\log 16 + 2\log 40$$

7. Given that $\log_{10} 3 = x$ and $\log_{10} 7 = y$, Express $\frac{\log_{10} 63}{\log_{10} 147}$ in terms of x and y. (3mks)

8. Find x if $3^{2x+3} + 1 = 28$ (2 mks)

9. If $\left(\frac{16}{9}\right)^{-3x+2} = \left(\frac{3}{4}\right)^{\frac{2}{3}}$, find the value of x (3mks)

10. In this question, show all the steps in your calculations, giving the answer at each stage.
Use logarithms correct to 4 decimal places, to evaluate; $\frac{(1934)^2 \times \sqrt{0.00324}}{\text{Log } 746}$

11. The table below shows monthly income tax rates

Monthly taxable pay in KE	Rate of the tax (Kshs/ E)
1 – 342	2
343 – 684	3
685 – 1026	4
1027 – 1368	5
1369 – 1710	6
1710 and above	7

Mr. Kamau who is a civil servant earns a Monthly salary of Kshs.20000 and is provided with a house at a nominal rent of Kshs.700 per month

a) Taxable pay is the employee's salary plus 15% less nominal rent. Calculate Mr.Kamau's taxable pay

b) Calculate the total tax Mr. Kamau pays

c) Mr. Kamau is entitled to a personal relief of Kshs.600 per month. What was his net tax .

d) Mr. Kamau has the following deductions made on his pay;
Loan repayment of Kshs.2100 per month
NSSF Kshs.200 per month
WCPS calculated at 2 % of monthly salary

Calculate Mr. Kipchokes net pay

12. A man bought a matatu at Kshs.400,000 in January 1999. It depreciated at a rate of 16% per annum. If he valued it six months, calculate its value in January 2003

13. The table shows corresponding values of *x* and y for a certain curve;

x	1.0	1.2	1.4	1.6	1.8	2.0	2.3
y	6.5	6.2	5.2	4.3	4.0	2.6	2.4

Using 3 strips and mid-ordinate rule estimate the area between the curve, x-axis, the lines $x = 1$ and $x = 2.2$

14. Evaluate without using a calculator or mathematical tables.

$$\frac{\log 32 + \log 128 - \log 729}{\log 32 + \log 2 - \log 27}$$

15. Find the value of **x** that satisfies the equation:-
$\log (x+5) = \log 4 - \log(x+2)$

16. Find the least number of terms for which the sum of the GP $100 + 200 + 400 + \ldots\ldots\ldots\ldots$ exceeds 3100.

17. A two digit number is formed from the first four prime numbers.
a) Draw the table to show the possible outcomes, if each number can be used only once.
b) Calculate the probability that a number chosen from the digit numbers is an even number

18. Find the gradient of a line joining the centre of a circle whose equation is $\mathbf{x^2 + y^2 - 6x = 3 - 4y}$ and a point P(6,7) outside the circle..

19. A lady invests shs.10,000 in an account which pays 16% interest p.a. The interest is compounded quarterly. Find the amount in the account after 1½ hrs

20. Use logarithm tables to evaluate

$$\sqrt[3]{\frac{13.6 \cos 40^o}{63.5}}$$

21. Without using logarithms or calculator evaluate:

$$2\log_{10}5 - 3\log_{10}2 + \log_{10}32$$

22. Evaluate without using tables or calculators.

$$\text{Log}\left(3x + 8\right) - 3\log 2 = \log\left(x - 4\right)$$