Please attempt the following questions in preparation for the online session on 27th April.

Q1

Evaluate $\log_6 12 + \frac{1}{3} \log_6 27$.

(This is a non-calculator question)

Q2

Sketch the graph of $y = \log_6 2x$?

Q3

Before a forest fire was brought under control, the spread of the fire was described by a law of the form $A = A_0 e^{kt}$ where A_0 is the area covered by the fire when it was first detected and A is the area covered by the fire t hours later.

If it takes one and a half hours for the area of the forest fire to double, find the value of the constant k.

Q4

Scientists are studying the growth of a strain of bacteria.

The number of bacteria present is given by the formula

$$B(t) = 200e^{0.107t},$$

where t represents the number of hours since the study began.

(a) State the number of bacteria present at the start of the study.

(b) Calculate the time taken for the number of bacteria to double.

Q5

Given that $\log_4 8 + \log_4 q = 1$, what is the value of q?

Q6
(a) Evaluate $\log_5 25$.

(b) Hence solve $\log_4 x + \log_4(x - 6) = \log_5 25$, where $x > 6$.
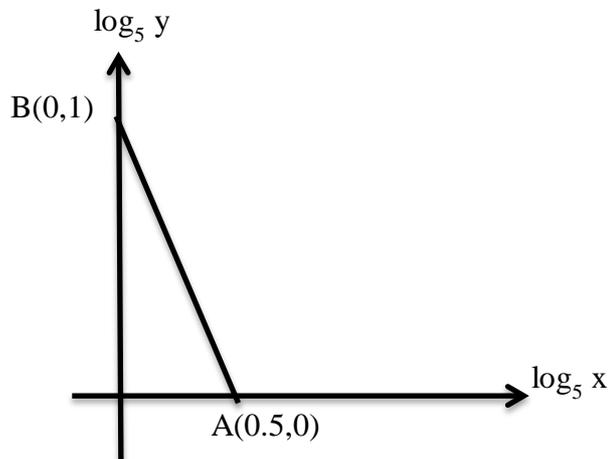
Q7
Given that $\log_{10}(x) = y \log_{10}(3) + 1$, express x in terms of y.
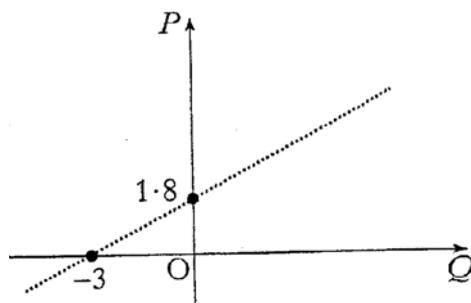
Q8
Solve $\log_2(x + 3) + \log_2(x^2 + 5x - 4) = 3$

Q9
The graph illustrates the law $y = kx^n$

The straight line passes through the points A(0.5,0) and B(0,1).
What are the values of k and n?

Q10
The results of an experiment give rise to the graph shown below.

It is given that $P = \log_e p$ and $Q = q$.
Show that p and q satisfy a relationship of the form $p = ab^q$.