1. Simplify

    (a) $\log_5 125$ (b) $\log_4 16 + \log_4 8 - \log_4 32$ (c) $\frac{1}{3}\log_9 27$ **(6)**
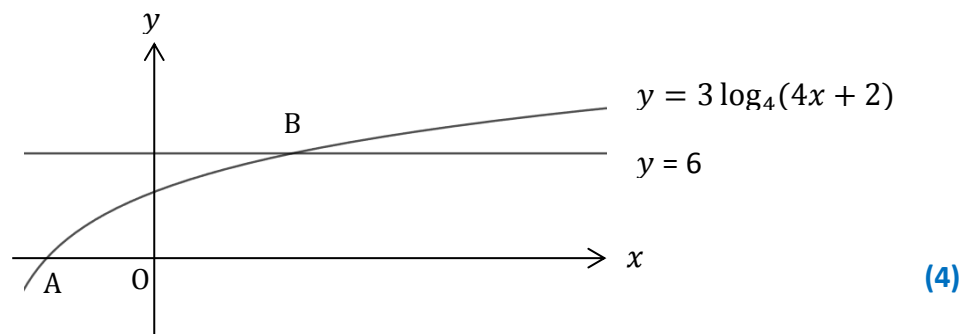
2. Solve the following for x, $x > 0$

    (a) $\log_5(x^2 - 1) - \log_5(x + 1) = 3$ (b) $\log_3(x - 1) + \log_3(x + 1) = 1$ **(6)**

3. Part of the graph of $y = 3\log_4(4x + 2)$ is shown below.
   The graph crosses the x-axis at the point A and the line $y = 6$ at the point B.

    Find the x-coordinate of B

    (4)

4. The formula $A = A_0 e^{-kt}$ gives the amount of a radioactive substance after a time t minutes.
   After 4 minutes 50g is reduced to 45g.

    (a) Find the value of k to two significant figures   **(3)**

    (b) How long does it take for the substance to reduce to half its original weight?   **(3)**

5. Two variables, x and y, are related by the equation $y = kx^n$

    When $\log_5 y$ is plotted against $\log_5 x$, a straight line passing through the points A(0.5, 0) and B(0, 1) is obtained, as shown in the diagram.

    Find the values of k and n.

    (5)