

Year 1 Pure Chapter 14: Exponentials and Logarithms - Exam Questions (Total Marks 54)

1. Find, giving your answer to 3 significant figures where appropriate, the value of x for which

(a) $3^x = 5$,

(3)

(b) $\log_2 (2x + 1) - \log_2 x = 2$.

(4)

(Total 7 marks)

2. Solve

(a) $5^x = 8$, giving your answers to 3 significant figures,

(3)

(b) $\log_2(x + 1) - \log_2 x = \log_2 7$.

(3)

(Total 6 marks)

3. Solve

$$2 \log_3 x - \log_3 (x - 2) = 2, x > 2.$$

(Total 6 marks)

4. Given that $0 < x < 4$ and

$$\log_5(4 - x) - 2\log_5 x = 1,$$

find the value of x .

(Total 6 marks)

5. (a) Find, to 3 significant figures, the value of x for which $5^x = 7$.

(2)

- (b) Solve the equation $5^{2x} - 12(5^x) + 35 = 0$.

(4)

(Total 6 marks)

6. (a) Find the positive value of x such that

$$\log x \, 64 = 2$$

(2)

- (b) Solve for x

$$\log_2(11 - 6x) = 2 \log_2(x - 1) + 3$$

(6)

(Total 8 marks)

7. Find the exact solutions of

(i) $e^{2x+3} = 6,$

(3)

(ii) $\ln(3x + 2) = 4.$

(3)

(Total 6 marks)

8. A heated metal ball is dropped into a liquid. As the ball cools, its temperature, T °C, t minutes after it enters the liquid, is given by

$$T = 400 e^{-0.05t} + 25, t \geq 0.$$

- (a) Find the temperature of the ball as it enters the liquid. (1)
- (b) Find the value of t for which $T = 300$, giving your answer to 3 significant figures. (4)
- (c) Find the rate at which the temperature of the ball is decreasing at the instant when $t = 50$. Give your answer in °C per minute to 3 significant figures. (3)
- (d) From the equation for temperature T in terms of t , given above, explain why the temperature of the ball can never fall to 20 °C. (1)

(Total 9 marks)