
 1. Evaluate $\log_3 18 + \log_3 6 - \log_3 4 + \log_5 \sqrt{5}$. 4

 2. Solve $\log_2 x^2 - 3\log_2 x = 4 - \log_2 7$ for $x > 0$. 3



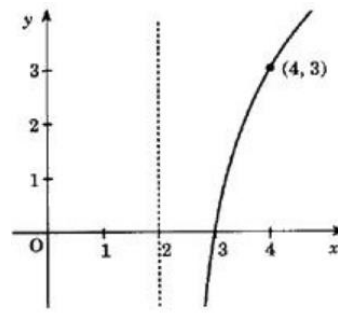
3. The intensity I_t of light is reduced as it passes through a filter according to the law $I_t = I_0 e^{-kt}$ where I_0 is the initial intensity and I_t is the intensity after passing through a filter of thickness t centimetres. k is a constant.

- (a) A filter of thickness 4 cm reduces the intensity from 120 candle-power to 90 candle-power. Find the value of k . 4
- (b) The light is passed through a filter of thickness 10 cm. Find the percentage reduction in its intensity. 3



4. The diagram shows a sketch of the graph of $y = f(x)$ where $f(x) = a \log_2(x-b)$.

Find the values of a and b .





5. The results of an experiment were recorded and it is thought that x and y are connected by a relationship of form $y = ab^x$ where a and b are constants.

By taking logarithms of the y -values, this table was constructed.

| | | | | |
|---------------|------|------|------|------|
| x | 1.70 | 2.10 | 2.50 | 2.90 |
| $\log_{10} y$ | 6.37 | 6.81 | 7.25 | 7.69 |

When plotted, these values produced a graph of a straight line.

Find the values of a and b and hence state a formula connecting the data.

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Answers to Homework 7 - Logs & exponentials

1. $3\frac{1}{2}$

2. $x = \frac{7}{16}$

3(a) $k = 0.0719$ (3 SF)

3(b) The % reduction is approximately 51.3%

4. $a = 3, b = 2$

5. $a = 9.3 \times 10^{-16}$ and $b = 10^{1.1}$ leading to $y = (9.3 \times 10^{-16})(10^{1.1})^x$