

4. Using the rules of logarithms, solve the equation

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

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$$\log a + \log b = \log(ab) \quad a \log b = \log b^a$$

$$\Rightarrow \Rightarrow$$

$$\log_2(x+2)(x+3) - \log_2 x^2 = 1 \quad (1 \text{ mark})$$

$$\log a - \log b = \log\left(\frac{a}{b}\right)$$

$$\Rightarrow$$

~~$$\log_2 \frac{(x+2)(x+3)}{x^2} = 1 = \log_2 2$$~~

$$\frac{(x+2)(x+3)}{x^2} = 2 \quad (1 \text{ mark})$$

$$x^2 + 5x + 6 = 2x^2$$

$$x^2 - 5x - 6 = 0$$

$$(x-6)(x+1) = 0$$

$$\Rightarrow x = 6, -1 \quad (1 \text{ mark})$$

The original equations contains $\log_2 x$

The log of a negative number is undefined, so $x \neq -1$

$x = 6$ is the only possible solution
(1 mark)