$$\log_a b = x \Leftrightarrow a^x = b$$

$m^x \times m^y = m^{x+y}$ $\log_c ab = \log_c a + \log_c b$

$m^x \div m^y = m^{x-y}$ $\log_c \frac{a}{b} = \log_c a - \log_c b$

$(m^x)^y = m^{x \times y}$ $\log_c a^r = r\log_c a$

1. Show that the equation $\log_2(x+2) + \log_2(x+3) = 1$ has only one solution and state its value
2. Make x the subject of the following formula

   $2 + \log_5 x = 3\log_5 y$

1.

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

$\log_c a + \log_c b = \log_c ab$

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

$\log_a b = x \Leftrightarrow a^x = b$

$(x+2)(x+3) = 2^1$

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

$x^2 + 5x + 4 = 0$

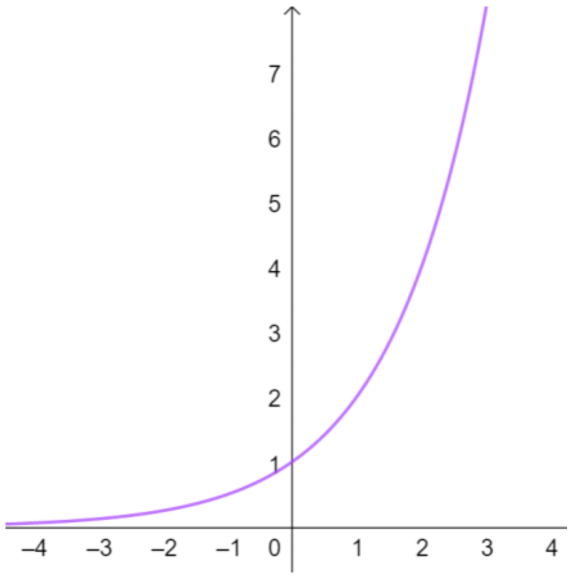
$(x+4)(x+1) = 0$

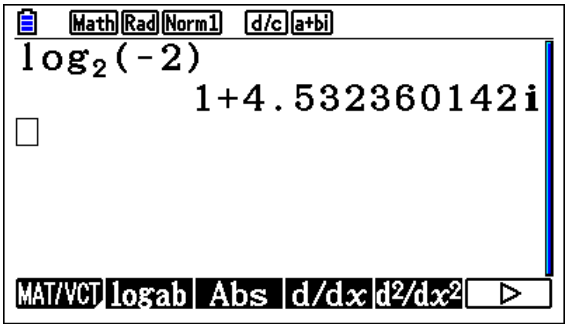
$x = -4, x = -1$

$x = -4$ $\log_2(-4+2) + \log_2(-4+3)$

$\log_2(-2) + \log_2(-1)$

Consider $\log_2(-2) = x \Leftrightarrow 2^x = -2$





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

$\log_2(1) + \log_2(2)$

$0 + 1$

1

Solution is $x = -1$

2. Make x the subject of the formula

$2 + \log_5 x = 3\log_5 y$

$\log_5 x = 3\log_5 y - 2$

$\log_a b = x \Leftrightarrow a^x = b$

$\log_5 x = 3\log_5 y - \log_5 5^2$

$\log_5 x = 3\log_5 y - \log_5 25$

$\log_c a^r = \mathrm{r}\log_c a$

$\log_5 x = \log_5 y^3 - \log_5 25$

$\log_c \frac{a}{b} = \log_c a - \log_c b$

$\log_5 x = \log_5 \left(\frac{y^3}{25}\right)$

$x = \frac{y^3}{25}$