

Quiz 8.3/8.4(F)

1. If $\log_2 5 = x$ and $\log_2 3 = y$, express $\log_2 90$ in terms of x and y .

$$\begin{aligned} \log_2 90 &= \log_2 (3^2 \cdot 5 \cdot 2) \\ &= 2\log_2 3 + \log_2 5 + \log_2 2 = 2y + x + 1 \quad \text{OR} \quad \boxed{x + 2y + 1} \end{aligned}$$

2. Express as a single logarithm: $2 \log A - 3 \log B - \log C + \log D$

$$\begin{aligned} &= \log A^2 - \log B^3 - \log C + \log D \\ &= \log \left(\frac{A^2 D}{B^3 C} \right) \end{aligned}$$

3. Solve (nearest hundredth): $3^x = 25$

$$\begin{aligned} \log 3^x &= \log 25 \\ x \log 3 &= \log 25 \\ x &= \frac{\log 25}{\log 3} = \boxed{2.43} \end{aligned} \quad \begin{aligned} &\text{OR} \quad \log_3 25 = x \\ &\frac{\log 25}{\log 3} = x \quad \text{change of base rule} \end{aligned}$$

4. Solve (nearest hundredth): $2^{x+2} = 3^x$

$$\begin{aligned} \log 2^{x+2} &= \log 3^x \\ (x+2) \log 2 &= x \log 3 \\ x \log 2 + 2 \log 2 &= x \log 3 \\ 2 \log 2 - x \log 3 &= -2 \log 2 \\ x (\log 2 - \log 3) &= -2 \log 2 \\ x &= \frac{-2 \log 2}{\log 2 - \log 3} = \frac{-\log 4}{\log 2/3} = \boxed{3.42} \end{aligned}$$

5. Solve: $\log x + \log(x+2) = \log 5x$

$$\begin{aligned} \log(x(x+2)) &= \log 5x \quad (x > 0) \\ \therefore x^2 + 2x &= 5x \\ x^2 - 3x &= 0 \\ x(x-3) &= 0 \\ x &\neq 0 \quad \boxed{x=3} \end{aligned}$$

6. Solve: $\log_3(x+12) - 3 \log_3 2 = 2$

$$\begin{aligned} \log_3 \left(\frac{x+12}{8} \right) &= 2 \quad (x > -12) \\ 3^2 &= \frac{x+12}{8} \\ 72 &= x+12 \\ \boxed{x=60} \end{aligned}$$