

Task 7.2 exercises

$$\textcircled{2} \log_5 \sqrt[3]{9} = \log_5 9^{1/3} = \boxed{\frac{1}{3} \log_5 9}$$

exponent law power Rule

$$\textcircled{4} \log_4 4^6 = \boxed{6 \log_4 4} \quad \text{Power Rule}$$

$$\textcircled{6} \log_5 \left(\frac{6}{7}\right) = \boxed{\log_5 6 - \log_5 7} \quad \text{quotient Rule}$$

$$\textcircled{8} \log_6 (3 \cdot 11)^6 = 6 [\log_6 (3 \cdot 11)] \quad \text{Power Product}$$
$$= 6 [\log_6 3 + \log_6 11]$$
$$= \boxed{6 \log_6 3 + 6 \log_6 11}$$

$$\textcircled{82} \log_6 (3^6 11^6) = \log_6 3^6 + \log_6 11^6 \quad \text{Product exponent laws}$$
$$= \boxed{6 \log_6 3 + 6 \log_6 11} \quad \text{Power}$$

$$\textcircled{10} \log_4 (a \cdot b \cdot c) = \boxed{\log_4 a + \log_4 b + \log_4 c} \quad \text{Product}$$

$$\begin{aligned}
 (12.1) \quad \log_7 (xy)^6 &= 6 \log_7 (xy) && \text{Power Rule} \\
 &= 6 [\log_7 x + \log_7 y] && \text{Product Rule} \\
 &= \boxed{6 \log_7 x + 6 \log_7 y}
 \end{aligned}$$

$$\begin{aligned}
 (12.2) \quad \log_7 (xy)^6 &= \log_7 x^6 y^6 && \text{Exponential Laws} \\
 &= \log_7 x^6 + \log_7 y^6 && \text{Product Rule} \\
 &= \boxed{6 \log_7 x + 6 \log_7 y} && \text{Power Rule}
 \end{aligned}$$

$$\begin{aligned}
 (14) \quad \log_3 z^4 \sqrt{x} &= \log_3 z^4 + \log_3 \sqrt{x} && \text{Product} \\
 &= \log_3 z^4 + \log_3 x^{\frac{1}{2}} && \text{exp law} \\
 &= \boxed{4 \log_3 z + \frac{1}{2} \log_3 x} && \text{Power}
 \end{aligned}$$

$$\begin{aligned}
 (16.1) \quad \log_8 \left(\frac{9}{b^4} \right)^5 &= \log_8 \left(\frac{9^5}{b^{20}} \right) && \text{exp laws} \\
 &= \log_8 9^5 - \log_8 b^{20} && \text{Quotient Laws} \\
 &= \boxed{5 \log_8 9 - 20 \log_8 b}
 \end{aligned}$$

$$\begin{aligned}
 (16.2) \quad \log_8 \left(\frac{9}{b^4} \right)^5 &= 5 \log_8 \left(\frac{9}{b^4} \right) && \text{Power Rule} \\
 &= 5 [\log_8 9 - \log_8 b^4] && \text{Quotient} \\
 &= 5 [\log_8 9 - 4 \log_8 b] && \text{Power} \\
 &= \boxed{5 \log_8 9 - 20 \log_8 b}
 \end{aligned}$$

$$\begin{aligned}
 (18.1) \quad \log_2 \left(\frac{a}{b^4} \right)^2 &= \log_2 \left(\frac{a^2}{b^8} \right) && \text{exponent laws} \\
 &= \log_2 a^2 - \log_2 b^8 && \text{quotient} \\
 &= \boxed{2 \log_2 a - 8 \log_2 b} && \text{Power}
 \end{aligned}$$

$$\begin{aligned}
 (18.2) \quad \log_2 \left(\frac{a}{b^4} \right)^2 &= 2 \log_2 \left(\frac{a}{b^4} \right) && \text{Power} \\
 &= 2 \left[\log_2 a - \log_2 b^4 \right] && \text{quotient} \\
 &= 2 \left[\log_2 a - 4 \log_2 b \right] && \text{Power} \\
 &= \boxed{2 \log_2 a - 8 \log_2 b}
 \end{aligned}$$

$$\begin{aligned}
 (20) \quad \frac{\log X}{3} &= \frac{1}{3} \log X = \boxed{\log X^{\frac{1}{3}}} && \text{Power} \\
 &= \boxed{\log \sqrt[3]{X}} && \text{Rule}
 \end{aligned}$$

$$(22) \quad \log_b x - \log_b y = \log_b \left(\frac{x}{y} \right) \quad \text{quotient}$$

$$(29) \quad \log_3 a + \log_3 b = \log_3 (ab) \quad \text{Product}$$

$$\begin{aligned}
 (26) \quad \log_3 x + 2 \log_3 y &= \log_3 x + \log_3 y^2 = \boxed{\log_3 x y^2} \\
 &\text{Power} && \text{Product}
 \end{aligned}$$

$$\textcircled{28} \quad 2 \log_9 9 = \boxed{\log_9 9^2} \quad \text{Power}$$

$$\textcircled{30} \quad \log_2 12 + \log_2 7 + \log_2 5$$
$$\log_2 (12 \cdot 7 \cdot 5) \quad \text{Product}$$
$$\boxed{\log_2 (420)}$$

$$\textcircled{32} \quad 3 \log_6 a - 6 \log_6 b$$
$$\log_6 a^3 - \log_6 b^6 \quad \text{Power}$$
$$\boxed{\log_6 \left(\frac{a^3}{b^6} \right)} \quad \text{quotient}$$

$$\textcircled{34.1} \quad 3 \log_4 a - 3 \log_4 b$$
$$\log_4 a^3 - \log_4 b^3 \quad \text{Power Rule}$$
$$\boxed{\log_4 \left(\frac{a^3}{b^3} \right)} \quad \text{quotient Rule}$$

$$\textcircled{34.2} \quad 3 \log_4 a - 3 \log_4 b = 3(\log_4 a - \log_4 b)$$
$$= 3 \log_4 \left(\frac{a}{b} \right) \quad \text{quotient}$$
$$= \log_4 \left(\frac{a}{b} \right)^3 = \boxed{\log_4 \left(\frac{a^3}{b^3} \right)}$$

$$\textcircled{36} \quad 3 \log_5 4 + 12 \log_5 v$$

$$\log_5 4^3 + \log_5 v^{12}$$

Power Rule

Product Rule

$$\boxed{\log_5(4^3 v^{12})}$$