

## 7.5 Properties of Logs

**Expand each logarithm.**

1)  $\log_3 \sqrt[3]{a \cdot b \cdot c}$

2)  $\log_2 \left( \frac{u^3}{v} \right)^5$

3)  $\log_5 \left( \frac{a}{b^2} \right)^3$

4)  $\log_5 \left( \frac{x}{y^5} \right)^6$

5)  $\log_3 (x^6 y^2)$

6)  $\log_3 (a^5 \cdot b)^2$

7)  $\log_3 (x^5 \cdot y)^4$

8)  $\ln (x^2 \cdot y)^5$

**Condense each expression to a single logarithm.**

9)  $4 \log_5 w + \frac{\log_5 u}{3}$

10)  $5 \log_3 x - 25 \log_3 y$

$$11) \log_5 c + \frac{\log_5 a}{3} + \frac{\log_5 b}{3}$$

$$12) 5 \log_4 u - 6 \log_4 v$$

$$13) 3 \log_2 w + \frac{\log_2 u}{2}$$

$$14) 3 \log_9 u + 9 \log_9 v$$

$$15) \log_8 a + \log_8 b + 3 \log_8 c$$

$$16) 20 \log_2 x - 4 \log_2 y$$

**Use the properties of logarithms and the logarithms provided to rewrite each logarithm in terms of the variables given.**

$$17) \log_8 7 = X$$

$$\log_8 6 = Y$$

$$\log_8 9 = Z$$

$$\text{Find } \log_8 81$$

$$18) \log_8 6 = A$$

$$\log_8 10 = B$$

$$\log_8 9 = C$$

$$\text{Find } \log_8 \frac{1}{6}$$

$$19) \log_9 7 = X$$

$$\log_9 10 = Y$$

$$\log_9 6 = Z$$

$$\text{Find } \log_9 700$$

$$20) \log_7 8 = P$$

$$\log_7 10 = Q$$

$$\log_7 9 = R$$

$$\text{Find } \log_7 \frac{49}{9}$$

## Answers to 7.5 Properties of Logs

- 1)  $\frac{\log_3 a}{3} + \frac{\log_3 b}{3} + \frac{\log_3 c}{3}$       2)  $15 \log_2 u - 5 \log_2 v$       3)  $3 \log_5 a - 6 \log_5 b$
- 4)  $6 \log_5 x - 30 \log_5 y$       5)  $6 \log_3 x + 2 \log_3 y$       6)  $10 \log_3 a + 2 \log_3 b$       7)  $20 \log_3 x + 4 \log_3 y$
- 8)  $10 \ln x + 5 \ln y$       9)  $\log_5 (w^4 \sqrt[3]{u})$       10)  $\log_3 \frac{x^5}{y^{25}}$       11)  $\log_5 (c \sqrt[3]{ba})$
- 12)  $\log_4 \frac{u^5}{v^6}$       13)  $\log_2 (w^3 \sqrt{u})$       14)  $\log_9 (v^9 u^3)$       15)  $\log_8 (bac^3)$
- 16)  $\log_2 \frac{x^{20}}{y^4}$       17)  $2Z$       18)  $-A$       19)  $X + 2Y$
- 20)  $2 - R$