

PROPERTIES OF LOGS

1. $\text{LOG } M + \text{LOG } N = \text{LOG } (MN)$

2. $\text{LOG } M - \text{LOG } N = \text{LOG } \left(\frac{M}{N}\right)$

3. $P \text{LOG } M = \text{LOG } M^P$

① $\text{LOG}_3 (27X)$

$$\text{LOG}_3 27 + \text{LOG}_3 X$$

$$\text{LOG}_3 3^3 + \text{LOG}_3 X$$

$$3 + \text{LOG}_3 X$$

② $\text{LOG}_2 \left(\frac{16}{X}\right)$

$$\text{LOG}_2 16 - \text{LOG}_2 X$$

$$\text{LOG}_2 2^4 - \text{LOG}_2 X$$

$$4 - \text{LOG}_2 X$$

③ $\text{LOG } P^3$
 $= 3 \text{LOG } P$

④ $\text{LOG} \left(\frac{X^5 Y^3}{Z^4}\right)$

$$\text{LOG } (X^5 Y^3) - \text{LOG } Z^4$$

$$\text{LOG } X^5 + \text{LOG } Y^3 - \text{LOG } Z^4$$

$$5 \text{LOG } X + 3 \text{LOG } Y - 4 \text{LOG } Z$$

⑤ $\text{LOG}_3 \sqrt[4]{\frac{X^2 Y^5}{27Z}}$

$$\text{LOG}_3 \left(\frac{X^2 Y^5}{27Z}\right)^{\frac{1}{4}}$$

$$\frac{1}{4} \text{LOG}_3 \left(\frac{X^2 Y^5}{27Z}\right)$$

$$\frac{1}{4} \text{LOG}_3 (X^2 Y^5) - \frac{1}{4} \text{LOG}_3 (27Z)$$

$$\frac{1}{4} \text{LOG}_3 X^2 + \frac{1}{4} \text{LOG}_3 Y^5 - \left(\frac{1}{4} \text{LOG}_3 27 + \frac{1}{4} \text{LOG}_3 Z\right)$$

$$\frac{2}{4} \text{LOG}_3 X + \frac{5}{4} \text{LOG}_3 Y - \frac{1}{4} \text{LOG}_3 3^3 - \frac{1}{4} \text{LOG}_3 Z$$

$$\frac{1}{2} \text{LOG}_3 X + \frac{5}{4} \text{LOG}_3 Y - \frac{3}{4} - \frac{1}{4} \text{LOG}_3 Z$$

⑥ $\text{LN} \left[\frac{e^{2x} x^5 \sqrt[4]{3+x}}{5(x-2)^4} \right]$

$$\text{LN} [e^{2x} x^5 (3+x)^{\frac{1}{4}}] - \text{LN} [5(x-2)^4]$$

$$\text{LN } e^{2x} + \text{LN } x^5 + \text{LN } (3+x)^{\frac{1}{4}} - (\text{LN } 5 + \text{LN } (x-2)^4)$$

$$2 + 5 \text{LN } X + \frac{1}{4} \text{LN} (3+X) - \text{LN } 5 - 4 \text{LN} (X-2)$$