

REVIEW - Logarithmic Functions

KEY

$$\textcircled{1} \log_4 3.2 = \frac{\log 3.2}{\log 4} = \boxed{.839}$$

$$\textcircled{2} \log 2.35 = \boxed{.371}$$

$$\textcircled{3} \log_{5.6} 5 = \frac{\log 5}{\log 5.6} = \boxed{.934}$$

$$\textcircled{4} 3 \log_2 c - \log_2 d = \log_2 c^3 - \log_2 d = \boxed{\log_2 \frac{c^3}{d}}$$

$$\textcircled{5} 3 \log_7 x + 5 \log_7 y + 2 \log_7 z = \log_7 x^3 + \log_7 y^5 + \log_7 z^2$$
$$= \boxed{\log_7 x^3 y^5 z^2}$$

$$\textcircled{6} \log_3 x - \frac{1}{2} \log_3 y^3 + 2 \log_3 z = \log_3 x - \log_3 y^{3/2} + \log_3 z^2$$
$$= \boxed{\log_3 \frac{x z^2}{y^{3/2}}}$$

$$\textcircled{7} \log_{64} x = \frac{1}{2}$$
$$x = 64^{1/2}$$
$$x = (8^2)^{1/2}$$
$$\boxed{x = 8}$$

$$\textcircled{8} \log_x 36 = 2$$
$$x^2 = 36$$
$$\boxed{x = \pm 6}$$

$$\textcircled{9} \log_3 x = 4$$
$$3^4 = x$$
$$\boxed{x = 81}$$

$$\textcircled{10} \log_5 125 = x$$
$$5^x = 125$$
$$5^x = 5^3$$
$$\boxed{x = 3}$$

$$\textcircled{11} \log_5 x = -2$$
$$5^{-2} = x$$
$$\frac{1}{5^2} = x$$
$$\boxed{\frac{1}{25} = x}$$

$$\textcircled{12} \log_4 \frac{1}{16} = x$$
$$4^x = \frac{1}{16}$$
$$4^x = \frac{1}{4^2}$$
$$4^x = 4^{-2}$$
$$\boxed{x = -2}$$

$$(11) \quad 4^{\log_4 10} = \boxed{10}$$

$$(12) \quad \log_{24} 1 = \boxed{0}$$

$$(13) \quad \log_5 25 = \log_5 5^2 = \boxed{2}$$

$$(14) \quad 10^x = 350$$

$$\log_{10} 350 = x$$

$$\log 350 = x$$

$$\boxed{x \approx 2.544}$$

$$(15) \quad 10^x - 2 = 29$$

$$10^x = 31$$

$$x = \log 31$$

$$\boxed{x \approx 1.491}$$

$$(16) \quad 3^x + 6 = 15$$

$$3^x = 9$$

$$3^x = 3^2$$

$$\boxed{x = 2}$$

$$(17) \quad 2^x - 1 = 104$$

$$2^x = 105$$

$$x = \log_2 105$$

$$\boxed{x \approx 6.714}$$

$$(18) \quad 4^{3x} = 1500$$

$$3x = \log_4 1500$$

$$3x = 5.27537$$

$$\boxed{x \approx 1.758}$$

$$(19) \quad \log_{10} x = -2$$

$$10^{-2} = x$$

$$\boxed{0.01 = x}$$

$$(20) \quad \log_2 \frac{xy}{3} = \log_2 x + \log_2 y - \log_2 3$$

$$(21) \quad \log_3 \left(\frac{x^2 y}{5} \right)^4 = 4 \log_3 \left(\frac{x^2 y}{5} \right)$$

$$= 4 \left[\log_3 x^2 + \log_3 y - \log_3 5 \right]$$

$$= 4 \left(2 \log_3 x + \log_3 y - \log_3 5 \right)$$

$$= 8 \log_3 x + 4 \log_3 y - 4 \log_3 5$$

$$(22) \quad \log (x \sqrt[3]{y}) = \log x + \log \sqrt[3]{y} = \log x + \log y^{1/3}$$
$$= \log x + \frac{1}{3} \log y$$

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$$\log_3 \frac{\sqrt[3]{a^2 b}}{a} = \log_3 \frac{(a^2 b)^{1/3}}{a}$$

$$= \frac{1}{3} \log_3 (a^2 b) - \log_3 a$$

$$= \frac{1}{3} \log_3 a^2 + \frac{1}{3} \log_3 b - \log_3 a$$

$$= \frac{1}{3} \cdot 2 \log_3 a + \frac{1}{3} \log_3 b - \log_3 a$$

$$= \frac{2}{3} \cdot 2 + \frac{1}{3} \cdot 5 - 2$$

$$= \frac{4}{3} + \frac{5}{3} - \frac{2}{1}$$

$$= \frac{9}{3} - 2$$

$$= 3 - 2$$

$$= \boxed{1}$$