

## Exponents and Logarithms

(1) Simplify the following expression,

$$\left(64^{\frac{4}{3}}\right)^{-\frac{1}{2}} \quad (1)$$

(2) Simplify the following expression,

$$(16 \cdot 81)^{-\frac{1}{4}} \quad (2)$$

(3) Simplify the following expression,

$$\left(\frac{3^{\frac{1}{2}}}{2^{\frac{1}{3}}}\right)^4 \quad (3)$$

(4) Simplify the following expression,

$$\left[\left(-\frac{5ax^2}{3b^2y}\right)^4 \div \left(\frac{5ax}{12b^3y^2}\right)^3\right] \cdot \left(\frac{by}{2ax}\right)^4 \quad (4)$$

(5) Simplify the following expression,

$$\sqrt[3]{108} - \sqrt[3]{32} \quad (5)$$

(6) Simplify the following expression,

$$(2s^3t^{-1})\left(\frac{1}{4}s^6\right)(16t^4) \quad (6)$$

(7) Simplify the following expression,

$$(3ab^2c)\left(\frac{2a^2b}{c^3}\right)^{-2} \quad (7)$$

(8) Simplify the following expression,

$$\frac{2v + 3w}{\sqrt{4v^2 - 9w^2}} \quad (8)$$

Exercises **(9)** Simplify the following expression,

$$\left(\frac{x^{-3}}{y^{-2}}\right)^2 \left(\frac{y}{x}\right)^4 \quad (9)$$

Exercises **(10)** Simplify the following expression,

$$\sqrt[3]{x^{-2}} \cdot \sqrt{4x^5} \quad (10)$$

Exercises **(11)** Evaluate the following expression,

$$\left(\frac{7^{-5} \cdot 7^2}{7^{-2}}\right)^{-1} \quad (11)$$

Exercises **(12)** Evaluate the following expression,

$$\sqrt[3]{\frac{-8}{27}} \quad (12)$$

Exercises **(13)** Evaluate the following expression,

$$\left(\frac{1}{\sqrt{3}}\right)^0 \quad (13)$$

**(14)** Show that

$$-\ln(x - \sqrt{x^2 - 1}) = \ln(x + \sqrt{x^2 - 1}) \quad (14)$$

**(15)** Use the Change of Base Formula and the calculator to evaluate  $\log_7 24$  and  $\log_3 59049$ .

**(16)** Rewrite the expression as a single logarithm,

$$\ln(a + b) + \ln(a - b) - 2 \ln c \quad (15)$$

**(17)** Use the change of base formula and the natural logarithm to evaluate:  
 $\log_4 125$

(18) Analyze the expression so there is no longer a logarithm of a product, quotient, root, or power:

$$\log \left( \frac{a^2}{b^4 \sqrt{c}} \right) \quad (16)$$

(19) Solve the following equations.

$$4^{1-2x} = 2 \quad (17)$$

$$8^{6+3x} = 4 \quad (18)$$

$$3^{x^2+x} = \sqrt{3} \quad (19)$$

(20) Solve the following equations.

$$4^{x-x^2} = \frac{1}{2} \quad (20)$$

$$\log_x 64 = -3 \quad (21)$$

$$\log_{\sqrt{2}} x = -6 \quad (22)$$

(21) Solve the following equations.

$$5^x = 3^{x+2} \quad (23)$$

$$5^{x+2} = 7^{x-2} \quad (24)$$

$$9^{2x} = 27^{3x-4} \quad (25)$$

(22) Solve the following equations.

$$25^{2x} = 5^{x^2-12} \quad (26)$$

$$\log_3 \sqrt{x-2} = 2 \quad (27)$$

$$2^{x+1} \cdot 8^{-x} = 4 \quad (28)$$

(23) Solve the following equations.

$$8 = 4^{x^2} \cdot 2^{5x} \quad (29)$$

$$2^x \cdot 5 = 10^x \quad (30)$$

$$\log_6(x+3) + \log_6(x+4) = 1 \quad (31)$$

$$\log(7x - 12) = 2 \log x \quad (32)$$

(24) Solve the following equations.

$$e^{1-x} = 5 \quad (33)$$

$$e^{1-2x} = 4 \quad (34)$$

$$2^{3x} = 3^{2x+1} \quad (35)$$

(25) Solve the following equations.

$$2^{x^3} = 3^{x^2} \quad (36)$$

$$2^{\frac{2}{\log_5 x}} = \frac{1}{16} \quad (37)$$

$$e^{2x} - e^x - 6 = 0 \quad (38)$$