

EXPONENTS LAWS AND EQUATIONS

- Express the first number as a power of the second: 1296, 6
- If a cottage, originally bought for \$25 000, appreciates at the rate of 6% per year, what is it worth after 7 years?

3. Simplify

(a) $(2^b)^4(2^{b+2})^2$

(b) $-21c^4d^4 \div 7c^5d^{-6}$

(c) $265(0.85)^{-3.7}$

(d) $5^{\frac{3}{4}} \times 25^{\frac{-1}{3}}$

(e) $\frac{3^{n+1} \times 9^{n-1}}{27^{n-3}}$

4. Solve:

(a) $3^x = 1$

(b) $2^{3x+1} = 32$

(c) $10 \times 2^x = 160$

5. If
- $x = a^3$
- and
- $y = 3b^2$
- , write the following expression in terms of
- a
- and
- b
- :
- $(3x^3y^4)^3$

6. Express each root as a power:

(a) $\sqrt{28^5}$

(b) $\sqrt[3]{(-7)^{11}}$

7. The number of insects in a colony doubles every month. If there are now 1000 insects in the colony, about how many insects will there be 2 weeks from now?

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|-------------------|-------------------|-------------------|-------------------------|----------------|-----------|
| 1) 6^4 | (2) \$37 590 | (3) a) 2^{6b+4} | (b) $-3c^{-1}d^{10}$ | (c) 483.500 45 | (d) 3^8 |
| (4) a) 0 | (b) $4/3$ | (c) 4 | (5) $243^3a^{27}b^{24}$ | | |
| (6) a) $28^{5/2}$ | (b) $(-7)^{11/3}$ | | (7) 1414 | | |

LOGARITHMS

1. Express in logarithmic form: (a) $4^5 = 1024$ (b) $8^0 = 1$ (c) $5^{-2} = \frac{1}{25}$
2. Evaluate: (a) $\log_6 \frac{1}{36}$ (b) $\log_2 0.25$ (c) $\log_6 \sqrt{6}$
3. What is the value of x? (a) $\log_x 49 = 2$ (b) $\log_8 x = \frac{1}{3}$ (c) $\log_9 3\sqrt{3} = x$
4. Use the product and quotient laws to express each as a single logarithm and then evaluate:
 - (a) $\log_4 32 + \log_4 2$ (b) $\log_8 6 - \log_8 3 + \log_8 2$
5. Use power and root laws to simplify and then evaluate each:
 - (a) $\log 3\sqrt[3]{9}$ (b) $\log_7 49^{2.5}$ (c) $\log_2 16^5$
6. If $\log 17 = k$, determine an expression for each of the following:
 - (a) $\log 170$ (b) $\log \sqrt{17}$ (c) $\log 17^{10}$ (d) $\log \frac{17}{1000}$
7. If $\log_3 4 = x$, express each of the following in terms of x: (a) $\log_3 144$ (b) $\log_3 \sqrt[5]{4^7}$
8. If $\log_3 x = 8$, evaluate the following: (a) $\log_3 9x$ (b) $\log 3 \frac{x^4}{27}$
9. Evaluate: (a) $\log_4 6 + \log_4 \frac{64}{3} - \log_4 8$ (b) $\frac{1}{2} \log_3 144 - \log_3 4 + 2 \log_3 3$
 - (c) $7^{\log_7 3}$ (d) $\log_5 \sqrt{175} - \log_5 \sqrt{7}$
10. Write each expression as a single logarithm: (a) $\log x^2 - 5 \log y$ (b) $\log_7 \sqrt[3]{x} - \log_7 y^3 + 2 \log_7 y$

1(a) $\log_4 1024 = 5$	b) $\log_8 1 = 0$	c) $\log 5 \frac{1}{25} = -2$	2 (a) -2 (b) -2 (c) $\frac{1}{2}$	3 (a) 7 (b) 2 (c) $\frac{3}{4}$
4(a) 3 (b) $\frac{2}{3}$	5(a) $\frac{2}{3}$ (b) 5 (c) 20	6(a) $k+1$ (b) $\frac{k}{2}$ (c) $10k$	(d) $k-3$	7(a) $2x+2$ (b) $\frac{7x}{5}$
8(a) 10 (b) 29	9(a) 2 (b) 3 (c) 3 (d) 1	10(a) $\log \frac{x^2}{y^5}$	(b) $\log \frac{\sqrt[3]{x}}{y}$	