A2: Properties of Logarithms WKST 2

Expand each expression.

1. $\log_a\left(\frac{x^2y^3}{m+n}\right)$
2. $\log_3\sqrt{9a^7}$
3. $5\log_4\left(\frac{a^2b}{n^3}\right)$
4. $\log_2\left(\frac{b}{c}\right)^4$

Condense each expression into a single logarithm.

5. $4\log_5 x+5\log_5 y-\log_5 z$
6. $12\log_7 n-3\log_7 p+3\log_7 m$
7. $\frac{1}{3}(4\log s+\log t)$
8. $40\log_8 t-(8\log_8 w+16\log_8 x)$
9. $\ln x\cdot\ln 2$

Use the change of base formula to rewrite the expression in terms of common logarithms, then evaluate using a calculator. Round to 3 decimal places.

10. $\log_3 5$
11. $\log_4\left(\frac{2}{5}\right)$
12. $\ln 2$

Use the change of base formula to rewrite the expression in terms of natural logarithms, then evaluate using a calculator. Round to 3 decimal places.

13. $\log_{25} 4$
14. $\log_5 3$
15. $\log 15$

ANSWERS

1. $2\log_a x + 3\log_a y - \log_a (m+n)$
2. $1 + \frac{7}{2}\log_3 a$
3. $10\log_4 a + 5\log_4 b - 15\log_4 n$
4. $4\log_2 b - 4\log_2 c$
5. $\log_5\left(\frac{x^4 y^5}{z}\right)$
6. $\log_7\left(\frac{n^4 m}{p}\right)^3$
7. $\log\sqrt[3]{s^4 t}$
8. $\log_8\left(\frac{t^5}{wx^2}\right)^8$
9. Can't be condensed; $\ln x \cdot \ln 2$
10. $\frac{\log 5}{\log 3} \approx 1.465$
11. $\frac{\log(2/5)}{\log 4} \approx -0.661$
12. $\frac{\log 2}{\log e} \approx 0.693$
13. $\frac{\ln 4}{\ln 25} \approx 0.431$
14. $\frac{\ln 3}{\ln 5} \approx 0.683$
15. $\frac{\ln 15}{\ln 10} \approx 1.176$