ILLAWARRA TUTORING

In this worksheet you will master the laws of logarithms to simplify and manipulate logarithmic expressions effectively. You will practise applying the product rule, the quotient rule, and the power rule in various contexts.

Easy Questions

1. Simplify the expression $\log(a) + \log(b)$.
2. Simplify the expression $\log(8) - \log(2)$.
3. Simplify the expression $3\log(x)$ by writing it as a single logarithm.
4. Express $\log(m^2 n)$ as a sum of logarithms.
5. Condense the expression $\log(2) + \log(3) - \log(5)$ into a single logarithm.

Intermediate Questions

6. Expand the expression $\log(xy^3)$ completely.
7. Condense the expression $2\log(a) + \frac{1}{2}\log(b)$ into a single logarithm.
8. Expand the expression $\log\left(\frac{m^4}{n^2}\right)$ completely.
9. Condense the expression $\frac{1}{3}\log(p) - \log(q)$ into a single logarithm.
10. Expand the expression $\log\left(\frac{a\sqrt{b}}{c^3}\right)$ completely.
11. Condense the expression $\log(x^2) + \log(\sqrt{y}) - \log(z)$ into a single logarithm.
12. Simplify the expression $\log(81) - \log(9)$.
13. Expand the expression $\log\left(\frac{2x^3}{5}\right)$ completely.
14. Condense the expression $\frac{1}{2}\log(32)$ into a single logarithm.
15. Expand the expression $\log\left(\frac{ab}{c}\right)$ completely.
16. Condense the expression $\log(x) - 2\log(y) + 3\log(z)$ into a single logarithm.

17. Expand the expression $\log\left(\frac{4a^3}{b^2c}\right)$ completely.

18. Condense the expression $5\log(d) - \log(e) - 2\log(f)$ into a single logarithm.

19. Expand the expression $\log\left(\frac{xy}{z^2}\right)$ completely.

20. Condense the expression $\log(x) + 2\log(y) + 3\log(z)$ into a single logarithm.

Hard Questions

21. Condense the expression $\frac{1}{2}\log(m) + \frac{1}{2}\log(n) - \log(p)$ into a single logarithm.

22. Expand the expression $\log\left(\frac{p^2q^3}{r\sqrt{s}}\right)$ completely.

23. Condense the expression $2\log(x)+\frac{1}{2}\log(y)-\frac{3}{2}\log(z)+\log(k)$ into a single logarithm.

24. Expand the expression $\log\left(\frac{16a^6b}{9c^4}\right)$ completely.

25. Expand the expression $\log\left(\frac{5xy^2}{3z}\right)$ completely.

26. Expand the expression $\log\left(\frac{27u^3v}{4w^2}\right)$ completely.

27. Condense the expression $\log(a)+\big(3\log(b)-\log(a^2)\big)-2\log(c)+\log(d^4)$ into a single logarithm.

28. Expand the expression $\log\left(\frac{2^5x^3}{3^2y}\right)$ completely.

29. Given that $\log(p) + \log(q) = \log(r)$, show that $r^{\frac{1}{2}} = \sqrt{p}\sqrt{q}$.

30. Condense the expression $\log(x^2) - \log(y^3) + \log(z)$ into a single logarithm.