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Condense each expression to a single logarithm.

1)
$$3\log_9 2 - 2\log_9 5$$

2)
$$\log_6 x + \log_6 y + 6\log_6 z$$

3)
$$2\log_5 x + 12\log_5 y$$

4)
$$\log_3 12 + \log_3 7 + 4\log_3 5$$

5)
$$\log_2 5 + \frac{\log_2 6}{2} + \frac{\log_2 11}{2}$$

6)
$$3\log_2 3 - 12\log_2 7$$

Expand each logarithm.

7)
$$\log_7 \frac{x^4}{y^2}$$

8)
$$\log_7 \frac{2^3}{5^2}$$

9)
$$\log_3\left(z\sqrt[3]{x\cdot y}\right)$$

10)
$$\log_5 \frac{a^3}{h^3}$$

11)
$$\log_6 \left(uv^3\right)^2$$

12)
$$\log_4 (12 \cdot 7^2)^4$$

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Condense each expression to a single logarithm.

1)
$$3\log_9 2 - 2\log_9 5$$

 $\log_9 \frac{2^3}{5^2}$

2)
$$\log_6 x + \log_6 y + 6\log_6 z$$

 $\log_6 (yxz^6)$

3)
$$2\log_5 x + 12\log_5 y$$

 $\log_5 (y^{12}x^2)$

4)
$$\log_3 12 + \log_3 7 + 4\log_3 5$$

 $\log_3 (84 \cdot 5^4)$

5)
$$\log_2 5 + \frac{\log_2 6}{2} + \frac{\log_2 11}{2}$$

 $\log_2 (5\sqrt{66})$

6)
$$3\log_2 3 - 12\log_2 7$$

$$\log_2 \frac{3^3}{7^{12}}$$

Expand each logarithm.

7)
$$\log_7 \frac{x^4}{y^2}$$
 $4\log_7 x - 2\log_7 y$

8)
$$\log_7 \frac{2^3}{5^2}$$

$$3\log_7 2 - 2\log_7 5$$

9)
$$\log_3 (z \sqrt[3]{x \cdot y})$$

 $\log_3 z + \frac{\log_3 x}{3} + \frac{\log_3 y}{3}$

$$10) \log_5 \frac{a^3}{b^3}$$

$$3\log_5 a - 3\log_5 b$$

11)
$$\log_6 (uv^3)^2$$

 $2\log_6 u + 6\log_6 v$

12)
$$\log_4 (12 \cdot 7^2)^4$$

 $4\log_4 12 + 8\log_4 7$