

PC 12 LG 4 Worksheet (Base Change & Log Laws)

Write an exact expression for each of the following using base change then evaluate each to 4 decimal places.

1. $\log_3 8$

2. $\log_5 \frac{1}{8}$

3. $\log_{\frac{1}{2}} 24$

Write each expression in terms of individual logarithms of x, y, & z.

4. $\log_7 x^2 y^3 z$

5. $\log_7 \frac{x^2}{y^3 \sqrt{z}}$

6. $\log_7 (x^2 y z)^3$

Write each expression as a single logarithm in reduced form and state any restrictions

7. $\log A + 2\log B - \frac{1}{3}\log C$

8. $3\log C - 4\log D - \frac{1}{4}\log E$

9. $-\log_2 E + \log_2 F - 3\log_2 K$

10. $\log_3 A - 2\log_3 B + 3\log_3 C - \frac{1}{4}\log_3 D$

11. $2\log x - 3\log y - 4\log z$

Simplify

12. $\log_4 4^x$

13. $5^{\log_5 y^2}$

14. $\log_a a^8$

15. $b^{\log_b 7}$

16. $x^{3\log_x 2}$

17. $y^{-2\log_y 3}$

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Simplify.

18. $\log_a a^7$

19. $\log_{a^3} a$

20. $\log_{a^4} a^8$

21. $\log_{a^2} \frac{1}{a^6}$

22. $\log_{a^m} a^k$

23. $\log_4 8$

24. $\log_9 27$

25. $\log_9 8$

Evaluate the following

26. If $\log_5 x = 25$, evaluate $\log_5 \frac{x}{25}$

27. If $\log c = 3$, evaluate $\log c^2$

28. If $\log_4 x = a$, evaluate $\log_{16} x$

29. If $\log_n a = 5$ and $\log_n b = 3$, evaluate $\log_n ab^2$

Answer Key

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| <p>1. $\frac{\log 8}{\log 3} = 1.8928$</p> | <p>16. 8</p> |
| <p>2. $\frac{\log \frac{1}{8}}{\log 5} = -1.2920$</p> | <p>17. $\frac{1}{9}$</p> |
| <p>3. $\frac{\log 24}{\log \frac{1}{2}} = 4.5850$</p> | <p>18. 7</p> |
| <p>4. $2\log_7 x + 3\log_7 y + \log_7 z$</p> | <p>19. $\frac{1}{3}$</p> |
| <p>5. $2\log x - 3\log y - \frac{1}{2}\log z$</p> | <p>20. 2</p> |
| <p>6. $3(2\log x + \log y + \log z)$</p> | <p>21. -3</p> |
| <p>7. $\log \frac{AB^2}{\sqrt[3]{C}}$ $A, B, C \neq 0$</p> | <p>22. $\frac{k}{m}$</p> |
| <p>8. $\log \frac{C^3}{D^4 \sqrt[4]{E}}$ $C, D, E \neq 0$</p> | <p>23. $\frac{3}{2}$</p> |
| <p>9. $\log_2 \frac{F}{EK^3}$ $E, F, K \neq 0$</p> | <p>24. $\frac{3}{2}$</p> |
| <p>10. $\log_3 \frac{AC^3}{B^2 \sqrt[4]{D}}$ $A, B, C, D \neq 0$</p> | <p>25. $\frac{3}{2} \log_3 2$</p> |
| <p>11. $\log \frac{x^2}{y^3 z^4}$ $x, y, z \neq 0$</p> | <p>26. 23</p> |
| <p>12. x</p> | <p>27. 6</p> |
| <p>13. y^2</p> | <p>28. $\frac{a}{2}$</p> |
| <p>14. 8</p> | <p>29. 11</p> |
| <p>15. 7</p> | |