

EduSahara™ Learning Center Assignment

Grade : Class IX, ICSE

Chapter : Logarithms

Name : Logarithmic Expressions involving Variables

1. Express $\log_{10} \frac{x^4 y}{z^5}$ in terms of $\log_{10} x$, $\log_{10} y$ and $\log_{10} z$

(i) $4 \log_{10} x + \log_{10} y - 5 \log_{10} z$

(ii) $4 \log_{10} x - \log_{10} y - 5 \log_{10} z$

(iii) $4 \log_{10} x + \log_{10} y + 5 \log_{10} z$

(iv) $4 \log_{10} x - 5 \log_{10} z + \log_{10} y$

(v) $4 \log_{10} x - \log_{10} y + 5 \log_{10} z$

2. If $\log_{10} y + 3 \log_{10} x = 2$ express y in terms of x

(i) $y = \frac{100}{x}$ (ii) $y = \frac{x^3}{100}$ (iii) $y = \frac{100}{x^3}$ (iv) $y = \frac{x}{100}$

3. Express $\log_3 \frac{a^5 c^5}{\sqrt{b}}$ in terms of $\log_3 a$, $\log_3 b$ and $\log_3 c$

(i) $5 \log_3 a + 5 \log_3 c - \frac{1}{2} \log_3 b$

(ii) $5 \log_3 a - 5 \log_3 c - \frac{1}{2} \log_3 b$

(iii) $5 \log_3 a + 5 \log_3 c + \frac{1}{2} \log_3 b$

(iv) $5 \log_3 a - 5 \log_3 c + \frac{1}{2} \log_3 b$

(v) $5 \log_3 c - \frac{1}{2} \log_3 b + 5 \log_3 a$

4. Express $\log_7 \frac{\sqrt{pq^5}}{rs^4}$ in terms of $\log_7 p$, $\log_7 q$, $\log_7 r$ and $\log_7 s$

(i) $\frac{5}{2} \log_7 p - \frac{3}{2} \log_7 q - \log_7 r - 4 \log_7 s$

(ii) $\frac{1}{2} \log_7 p + \frac{5}{2} \log_7 q + \log_7 r - 4 \log_7 s$

(iii) $\frac{1}{2} \log_7 p + \frac{5}{2} \log_7 q - \log_7 r - 4 \log_7 s$

(iv) $\frac{1}{2} \log_7 p - \frac{5}{2} \log_7 q + \log_7 r - 4 \log_7 s$

(v) $\frac{1}{2} \log_7 p - \frac{5}{2} \log_7 q - \log_7 r + 4 \log_7 s$

5. If $\log_7 x = p$ and $\log_7 y = q$, then $xy =$

(i) $7^{(p-q)}$ (ii) 7^{2pq} (iii) 7^{pq} (iv) $7^{(p+q)}$

6. If $\log_4 x = p$ and $\log_4 y = q$, then $\frac{x}{y} =$

(i) $4^{(p+q)}$ (ii) 4^{pq} (iii) $4^{(p-q)}$ (iv) 4^{2pq}

7. Express $\log_{10} \frac{x^4 y^4}{z^2}$ in terms of $\log_{10} x$, $\log_{10} y$ and $\log_{10} z$

(i) $4 \log_{10} x + 4 \log_{10} y + 2 \log_{10} z$

(ii) $4 \log_{10} x - 4 \log_{10} y + 2 \log_{10} z$

(iii) $4 \log_{10} x - 4 \log_{10} y - 2 \log_{10} z$

(iv) $4 \log_{10} x + 4 \log_{10} y - 2 \log_{10} z$

(v) $4 \log_{10} x - 2 \log_{10} z + 4 \log_{10} y$

8. If $\log_5 y + 2 \log_5 x = 2$ express y in terms of x

(i) $y = \frac{25}{x^2}$ (ii) $y = \frac{25}{x}$ (iii) $y = \frac{x}{25}$ (iv) $y = \frac{x^2}{25}$

9. Express $\log_7 \frac{ac^5}{\sqrt{b}}$ in terms of $\log_7 a$, $\log_7 b$ and $\log_7 c$

(i) $\log_7 a - \log_7 c - \frac{1}{2} \log_7 b$

$$\log_7 a - 5 \log_7 c + \frac{1}{2} \log_7 b$$

$$(ii) \log_7 a + 5 \log_7 c - \frac{1}{2} \log_7 b$$

$$(iii) \log_7 a - 5 \log_7 c - \frac{1}{2} \log_7 b$$

$$(iv) 5 \log_7 c - \frac{1}{2} \log_7 b + \log_7 a$$

$$(v) \log_7 a + 5 \log_7 c + \frac{1}{2} \log_7 b$$

10. Express $\log_3 \frac{\sqrt{p^2 q^4}}{rs^5}$ in terms of $\log_3 p$, $\log_3 q$, $\log_3 r$ and $\log_3 s$

$$(i) \log_3 p - 2 \log_3 q - \log_3 r + 5 \log_3 s$$

$$(ii) \log_3 p + \frac{4}{2} \log_3 q - \log_3 r - 5 \log_3 s$$

$$(iii) \log_3 p - 2 \log_3 q - \log_3 r - 5 \log_3 s$$

$$(iv) \log_3 p - 2 \log_3 q + \log_3 r - 5 \log_3 s$$

$$(v) \log_3 p + \frac{4}{2} \log_3 q + \log_3 r - 5 \log_3 s$$

11. If $\log_3 x = p$ and $\log_3 y = q$, then $xy =$

$$(i) 3^{pq} \quad (ii) 3^{(p+q)} \quad (iii) 3^{2pq} \quad (iv) 3^{(p-q)}$$

12. If $\log_6 x = p$ and $\log_6 y = q$, then $\frac{x}{y} =$

$$(i) 6^{(p-q)} \quad (ii) 6^{pq} \quad (iii) 6^{(p+q)} \quad (iv) 6^{2pq}$$

13. If $\log_3 x = a$ and $\log_3 y = b$, then $3^{(a+1)} =$

$$(i) 3b \quad (ii) 3a \quad (iii) 3 \quad (iv) 3x \quad (v) 3y$$

14. If $\log_7 x = a$ and $\log_7 y = b$, then $7^{(a+b)} =$

$$(i) 7 \quad (ii) ab \quad (iii) yb \quad (iv) xy \quad (v) ax$$

15. If $\log x = a$ and $\log y = b$, then $3^{(a-b)} =$

3

3

$$(i) \frac{a}{b} \quad (ii) \frac{a}{y} \quad (iii) \frac{y}{x} \quad (iv) \frac{x}{y} \quad (v) \frac{x}{b}$$

16. If $\log_3 x = a$ and $\log_3 y = b$, then $3^{3b} =$

(i) $3y$ (ii) x^3 (iii) y^3 (iv) a^3 (v) $3b$

17. Express $\log p^2q$ in terms of $\log p$ and $\log q$

(i) $2 \log p - \log q$

(ii) $\frac{2 \log p}{\log q}$

(iii) $2 \log p + \log q$

(iv) $\log q - 2 \log p$

18. Express $\log \sqrt{pq^3}$ in terms of $\log p$ and $\log q$

(i) $\log p - 3 \log q$

(ii) $3 \log q - \log p$

(iii) $\frac{1}{2} \log p + \frac{3}{2} \log q$

(iv) $\frac{\frac{1}{3} \log p}{\log q}$

(v) $\log p + 3 \log q$

19. Express $\log \sqrt[3]{p^2q^2}$ in terms of $\log p$ and $\log q$

(i) $\frac{2}{3} \log p + \frac{2}{3} \log q$

(ii) $2 \log q - 2 \log p$

(iii) $2 \log p - 2 \log q$

$$(iv) \frac{\log p}{\log q}$$

$$(v) 2 \log p + 2 \log q$$

20. Express $\log \frac{p^3}{q}$ in terms of $\log p$ and $\log q$

$$(i) \frac{3 \log p}{\log q}$$

$$(ii) 3 \log p + \log q$$

$$(iii) \log q - 3 \log p$$

$$(iv) 3 \log p - \log q$$

21. Express $\log \sqrt{\frac{p}{q^5}}$ in terms of $\log p$ and $\log q$

$$(i) \frac{1}{2} \log p + \frac{5}{2} \log q$$

$$(ii) \frac{1}{2} \log p - \frac{5}{2} \log q$$

$$(iii) \frac{\frac{1}{5} \log p}{\log q}$$

$$(iv) \frac{5}{2} \log q - \frac{1}{2} \log p$$

22. If $(x^2 + y^2) = 47xy$, then $2 \log(x+y) =$

$$(i) \log x - \log y - 2 \log 7$$

$$(ii) \log x - \log y + 2 \log 7$$

$$(iii) \log x + \log y + 2 \log 7$$

$$(iv) \log x + \log y - 2 \log 7$$

23. If $(x^2 + y^2) = 27xy$, then $\log(x-y) =$

(i) $\frac{1}{2} \log x + \frac{1}{2} \log y + \log 5$

(ii) $\frac{1}{2} \log x - \frac{1}{2} \log y + \log 5$

(iii) $\frac{1}{2} \log x + \frac{1}{2} \log y - \log 5$

(iv) $\frac{1}{2} \log x - \frac{1}{2} \log y - \log 5$

24. If $(x^4 + y^4) = 47x^2y^2$, then $\log(x^2+y^2) =$

(i) $\log x - \log y - \log 7$

(ii) $\log x + \log y - \log 7$

(iii) $\log x - \log y + \log 7$

(iv) $\log x + \log y + \log 7$

25. If $x = \frac{y^2}{(y-1)}$, then $\log(x-y) =$

(i) $\log x + \log y$

(ii) $\log x \log y$

(iii) $\log x - \log y$

(iv) $\frac{\log x}{\log y}$

26. If $(x^2 + y^2) = z^2$, then which of the following is true?

(i) $\frac{\log(z+y)}{\log(z-y)} = 3$

(ii)

$$\log_x (z+y) - \log_x (z-y) = 2$$

$$(iii) \log_x (z+y) + \log_x (z-y) = 5$$

$$(iv) \log_x (z+y) + \log_x (z-y) = 4$$

$$(v) \log_x (z+y) + \log_x (z-y) = 2$$

27. If $(x^3 + y^3) = z^3$, then which of the following is true?

$$(i) \log_x (z-y) + \log_x (z^2+zy+y^2) = 5$$

$$(ii) \frac{\log (z-y)}{\log (z^2+zy+y^2)} = 4$$

$$(iii) \log_x (z-y) + \log_x (z^2+zy+y^2) = 3$$

$$(iv) \log_x (z-y) - \log_x (z^2+zy+y^2) = 3$$

$$(v) \log_x (z-y) + \log_x (z^2+zy+y^2) = 6$$

28. If $(x^4 + y^4) = z^4$, then which of the following is true?

$$(i) \log_x (z^2-y^2) + \log_x (z^2+y^2) = 7$$

$$(ii) \log_x (z^2-y^2) + \log_x (z^2+y^2) = 6$$

$$(iii) \log_x (z^2-y^2) - \log_x (z^2+y^2) = 4$$

$$(iv) \log_x (z^2-y^2) + \log_x (z^2+y^2) = 4$$

$$(v) \frac{\log (z^2-y^2)}{\log (z^2+y^2)} = 5$$

29.

If $x = 1 + \log_c ab$; $y = 1 + \log_a bc$; $z = 1 + \log_b ac$,

then which of the following is true?

(i) $(xy + xz - yz) = xyz$

(ii) $(xy + xz + yz) = xyz$

(iii) $(x + y + z) = xyz$

(iv) $(xy - xz - yz) = xyz$

(v) $(xy - xz + yz) = xyz$

30. If $\log_4 x = a$ and $\log_4 y = b$, then $4^{(a+1)} =$

(i) $4b$ (ii) $4y$ (iii) $4x$ (iv) 4 (v) $4a$

31. If $\log_2 x = a$ and $\log_2 y = b$, then $2^{(a+b)} =$

(i) yb (ii) ab (iii) ax (iv) 2 (v) xy

32. If $\log_2 x = a$ and $\log_2 y = b$, then $2^{(a-b)} =$

(i) $\frac{y}{x}$ (ii) $\frac{x}{b}$ (iii) $\frac{a}{b}$ (iv) $\frac{x}{y}$ (v) $\frac{a}{y}$

33. If $\log_9 x = a$ and $\log_9 y = b$, then $9^{3b} =$

(i) y^3 (ii) x^3 (iii) $3y$ (iv) a^3 (v) $3b$

34. Express $\log p^3 q^2$ in terms of $\log p$ and $\log q$

(i) $\frac{\frac{3}{2} \log p}{\log q}$

(ii) $3 \log p + 2 \log q$

(iii) $2 \log q - 3 \log p$

(iv) $3 \log p - 2 \log q$

35. Express $\log \sqrt{p^3 q^2}$ in terms of $\log p$ and $\log q$

(i) $\frac{\frac{3}{2} \log p}{\log q}$

(ii) $\frac{3}{2} \log p + \log q$

(iii) $3 \log p - 2 \log q$

(iv) $2 \log q - 3 \log p$

(v) $3 \log p + 2 \log q$

36. Express $\log \sqrt[3]{p^3 q^4}$ in terms of $\log p$ and $\log q$

(i) $3 \log p + 4 \log q$

(ii) $4 \log q - 3 \log p$

(iii) $3 \log p - 4 \log q$

(iv) $\log p + \frac{4}{3} \log q$

(v) $\frac{\frac{3}{4} \log p}{\log q}$

37. Express $\log \frac{p}{q}$ in terms of $\log p$ and $\log q$

(i) $\log p + \log q$

(ii) $\frac{\log p}{\log q}$

(iii) $\log q - \log p$

(iv) $\log p - \log q$

38. Express $\log \frac{p}{q}$ in terms of $\log p$ and $\log q$

$$\frac{\sqrt{p^2}}{q^4}$$

(i) $2 \log q - \log p$

(ii) $\frac{\frac{1}{2} \log p}{\log q}$

(iii) $\log p + 2 \log q$

(iv) $\log p - 2 \log q$

39. If $(x^2 + y^2) = 123xy$, then $2 \log(x+y) =$

(i) $\log x + \log y + 3 \log 5$

(ii) $\log x - \log y + 3 \log 5$

(iii) $\log x - \log y - 3 \log 5$

(iv) $\log x + \log y - 3 \log 5$

40. If $(x^2 + y^2) = 18xy$, then $\log(x-y) =$

(i) $\frac{1}{2} \log x + \frac{1}{2} \log y - \log 4$

(ii) $\frac{1}{2} \log x + \frac{1}{2} \log y + \log 4$

(iii) $\frac{1}{2} \log x - \frac{1}{2} \log y + \log 4$

(iv) $\frac{1}{2} \log x - \frac{1}{2} \log y - \log 4$

41. If $(x^4 + y^4) = 7x^2y^2$, then $\log(x^2+y^2) =$

(i) $\log x + \log y + \log 3$

(ii) $\log x - \log y - \log 3$

(iii) $\log x + \log y - \log 3$

(iv) $\log x - \log y + \log 3$

Assignment Key

- 1) (i)
- 2) (iii)
- 3) (i)
- 4) (iii)
- 5) (iv)
- 6) (iii)
- 7) (iv)
- 8) (i)
- 9) (ii)
- 10) (ii)
- 11) (ii)
- 12) (i)
- 13) (iv)
- 14) (iv)
- 15) (iv)
- 16) (iii)
- 17) (iii)
- 18) (iii)
- 19) (i)
- 20) (iv)
- 21) (ii)
- 22) (iii)
- 23) (i)
- 24) (iv)
- 25) (iii)
- 26) (v)
- 27) (iii)
- 28) (iv)
- 29) (ii)
- 30) (iii)
- 31) (v)
- 32) (iv)
- 33) (i)
- 34) (ii)
- 35) (ii)
- 36) (iv)
- 37) (iv)
- 38) (iv)
- 39) (i)
- 40) (ii)
- 41) (i)