MATHS

BOOKS - ICSE

LOGARITHMS

Questions

1. Find : (i) the logarithm of 1000 to the base 10.

(ii) the logarithm of $\dfrac{1}{9}$ to the base 3.

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2. Find x, if : (i) $\log_2 x = -2$

(ii) $\log_4(x + 3) = 2$

(iii) $\log_x 64 = \dfrac{3}{2}$

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3. Express $\log_{10} \sqrt[5]{108}$ in term of $\log_{10} 2$ and $\log_{10} 3$.

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4. Express as a single logarithm :

$2 + \dfrac{1}{2}\log_{10} 9 - 2\log_{10} 5$

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5. Find x, if : (i) $\log_{10}(x + 5) = 1$

(ii)

$$\log_{10}(x + 1) + \log_{10}(x - 1) = \log_{10} 11 + 2 \log_{10} 3$$

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6. If log 2 = 0.3010 and log 3 = 0.4771, find the value of

:

(i) log 6

(ii) log 5

(iii) $\log \sqrt{24}$

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7. If $\log_{10} 4 = 0.6020$, find the value of :

(i) $\log_{10} 8$

(ii) $\log_{10} 2.5$

8. Given $\log_{10} x = a$ and $\log_{10} y = b$.

(i) Write down 10^{a-1} in terms of x.

(ii) Write down 10^{2b} in terms of y.

(iii) If $\log_{10} P = 2a - b$, express P in terms of x and y.

9. Evaluate :

(i) $\log_{125} 625 - \log_{16} 64$

(ii) $\log_{16} 32 - \log_{25} 125 + \log_9 27.$

10. If $\dfrac{1}{\log_a x} + \dfrac{1}{\log_b x} = \dfrac{2}{\log_c x}$, prove that :
$c^2 = ab.$

Exercise 8 A

1. Express each of the following in logarithmic form :

(i) $5^3 = 125$

(ii) $3^{-2} = \dfrac{1}{9}$

(iii) $10^{-3} = 0.001$

(iv) $(81)^{\frac{3}{4}} = 27$

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2. Express each of the following in exponential form :

(i) $\log_8 0.125 = -1$

(ii) $\log_{10} 0.01 = -2$

(iii) $\log_a A = x$

(iv) $\log_{10} 1 = 0$

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3. Solve for $x : \log_{10} x = -2$.

4. Find the logarithm of :

(i) 100 to the base 10

(ii) 0.1 to the base 10

(iii) 0.001 to the base 10

(iv) 32 to the base 4

(v) 0.125 to the base 2

(vi) $\dfrac{1}{16}$ to the base 4

(vii) 27 to the base 9

(viii) $\dfrac{1}{81}$ to the base 27

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5. State, true or false :

(i) If $\log_{10} x = a$, then $10^x = a$

(ii) If $x^y = z$, then $y = \log_z x$.

(iii) $\log_2 8 = 3$ and $\log_8 2 = \dfrac{1}{3}$.

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6. Find x, if :

(i) $\log_3 x = 0$

(ii) $\log_x 2 = -1$

(iii) $\log_9 243 = x$

(iv) $\log_5 (x - 7) = 1$

(v) $\log_4 32 = x - 4$

(vi) $\log_7 (2x^2 - 1) = 2$

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7. Evaluate :

(i) $\log_{10} 0.01$

(ii) $\log_2 (1 \div 8)$

(iii) $\log_5 1$

(iv) $\log_5 125$

(v) $\log_{16} 8$

(vi) $\log_{0.5} 16$

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8. If $\log_a m = n$, express a^{n-1} in terms of a and m.

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9. Given $\log_2 x = m$ and $\log_5 y = n$

(i) Express 2^{m-3} in terms of x.

(ii) Express 5^{3n+2} in terms of y.

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10. If $\log_2 x = a$ and $\log_3 y = a$, write 72° in terms of x and y.

11. Solve for x : $\log(x - 1) + \log(x + 1) = \log_2 1$.

12. If $\log(x^2 - 21) = 2$, show that x = + 11.

1. Express in terms of log 2 and log 3 :

(i) log 36

(ii) log 144

(iii) log 4.5

(iv) $\log \dfrac{26}{51} - \log \dfrac{91}{119}$

(v) $\log \dfrac{75}{16} - 2\log \dfrac{5}{9} + \log \dfrac{32}{243}$

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2. Express each of the following in a form free from

logarithm :

(i) 2 log x - log y = 1

(ii) 2 log x + 3 log y = log a

(iii) a log x - b log y = 2 log 3

3. Evaluate each of the following without using tables

:

(i) log 5 + log 8 - 2 log 2

(ii) $\log_{10} 8 + \log_{10} 25 + 2\log_{10} 3 - \log_{10} 18$

(iii) $\log 4 + \dfrac{1}{3}\log 125 - \dfrac{1}{5}\log 32$

4. Prove that : $2\log\dfrac{15}{18} - \log\dfrac{25}{162} + \log\dfrac{4}{9} = \log 2$

5. Find x, if : $x - \log 48 + 3\log 2 = \dfrac{1}{3}\log 125 - \log 3.$

6. Express $\log_{10} 2 + 1$ in the form of $\log_{10} x.$

7. Solve for x :

(i) $\log_{10}(x - 10) = 1$

(ii) $\log(x^2 - 21) = 2$

(iii) $\log(x - 2) + \log(x + 2) = \log 5$

(iv) $\log(x + 5) + \log(x - 5) = 4\log 2 + 2\log 3$

8. Solve for x :

(i) $\dfrac{\log 81}{\log 27} = x$

(ii) $\dfrac{\log 128}{\log 32} = x$

(iii) $\dfrac{\log 64}{\log 8} = \log x$

(iv) $\dfrac{\log 225}{\log 15} = \log x$

9. Given log x = m + n and log y = m - n, express the value of $\log \dfrac{10x}{y^2}$ in terms of m and n.

10. State, true or false :

(i) $\log 1 \times \log 1000 = 0$

(ii) $\dfrac{\log x}{\log y} = \log x - \log y$

(iii) If $\dfrac{\log 25}{\log 5} = \log x$, then x = 2

(iv) $\log x \times \log y = \log x + \log y$

11. If $\log_{10} 2 = a$ and $\log_{10} 3 = b$, express each of the following in terms of 'a' and 'b' :

(i) log 12

(ii) log 2.25

(iii) $\log_2 \dfrac{1}{4}$

(iv) log 5.4

(v) log 60

(vi) $\log 3\dfrac{1}{8}$

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12. If log 2 = 0.3010 and log 3 = 0.4771, find the value of :

(i) log 12

(ii) log 1.2

(iii) log 3.6

(iv) log 15

(v) log 25

(vi) $\dfrac{2}{3}$ log 8

13. Given $2\log_{10} x + 1 = \log_{10} 250$, find :

(i) x

(ii) $\log_{10} 2x$

14. Given $3\log x + \dfrac{1}{2}\log y = 2$, express y in term of x.

15. If $x = (100)^a$, $y = (10000)^b$ and $z = (10)^c$, find $\log\dfrac{10\sqrt{y}}{x^2 z^3}$ in terms of a, b and c.

16. If 3(log 5 - log 3) - (log 5 - 2 log 6) = 2 - log x, find x.

Exercise 8 C

1. If $\log_{10} 8 = 0.90$, find the value of :

(i) $\log_{10} 4$

(ii) $\log \sqrt{32}$

(iii) log 0.125

2. If log 27 = 1.431, find the value of :

(i) log 9

(ii) log 300

3. If $\log_{10} a = b$, find 10^{3b-2} in terms of a.

4. If $\log_5 x = y$, find 5^{2y+3} in terms of x.

5. Given : $\log_3 m = x$ and $\log_3 n = y$

(i) Express 3^{2x-3} in terms of m.

(ii) Write down $3^{1-2y+3x}$ in terms of m and n.

(iii) If $2\log_3 A = 5x - 3y$, find A in terms of m and n.

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6. Simplify :

(i) $\log(a)^3 - \log a$

(ii) $\log(a)^3 \div \log a$

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7. If log(a + b) = log a + log b, find a in terms of b.

8. Prove that : (i)

$$(\log a)^2 - (\log b)^2 = \log\left(\frac{a}{b}\right) . \log(ab)$$

(ii) If a log b + b log a - 1 = 0, then $b^a . a^b = 10$

9. (i) If log(a + 1) = log(4a - 3) - log 3, find a.

(ii) If 2 log y - log x - 3 = 0, express x in termss of y.

(iii) Prove that : $\log_{10} 125 = 3(1 - \log_{10} 2)$.

10. Given log x = 2m - n, log y = n - 2m and log z = 3m - 2n, find in terms of m and n, the value of $\log \dfrac{x^2 y^3}{z^4}$.

11. Given $\log_x 25 - \log_x 5 = 2 - \log_x \dfrac{1}{125}$, find x.

Exercise 8 D

1. If $\dfrac{3}{2}\log a + \dfrac{2}{3}\log b - 1 = 0$, find the value of $a^9 . b^4$

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2.   If

$x = 1 + \log 2 - \log 5, \; y = 2\log 3 \;$ and $\; z = \log a - \log 5$

, find the value of a, if x + y = 2z.

3.   If

$x = \log 0.6, \; y = \log 1.25 \;$ and $\; z = \log 3 - 2\log 2,$

find the values of :

$(i) x + y - z$

(ii) 5^{x+y-z}

4. If $a^2 = \log x$, $b^3 = \log y$ and $3a^2 - 2b^3 = 6 \log z$,

express y in terms of x and z.

5. If $\log \dfrac{a - b}{2} = \dfrac{1}{2} (\log$ a + log b), show that :

$a^2 + b^2 = 6ab.$

6. If $a^2 + b^2 = 23ab$, show that :

$$\log\frac{a + b}{5} = \frac{1}{2}(\log a + \log b).$$

7. If m = log 20 and n = log 25, find the value of x, so that : 2 log(x - 4) = 2m - n.

8. Solve for x and y, if $x > 0$ and $y > 0$:

$$\log xy = \log\frac{x}{y} + 2\log 2 = 2.$$

9. Find x, if :

(i) $\log_x 625 = -4$

(ii) $\log_x(5x - 6) = 2.$

10. If p = log 20 and q = log 25, find the value of x, if 2

log(x + 1) = 2p - q.

11. If $\log_2(x + y) = \log_3(x - y) = \dfrac{\log 25}{\log 0.2}$, find the values of x and y.

12. Given : $\dfrac{\log x}{\log y} = \dfrac{3}{2}$ and log(xy) = 5, find the values of x and y.

13. Given $\log_{10} x = a$ and $\log_{10} y = b$.

(i) Write down 10^{a-1} in terms of x.

(ii) Write down 10^{2b} in terms of y.

(iii) If $\log_{10} P = 2a - b$, express P in terms of x and y.

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14. Solve : $\log_5(x + 1) - 1 = 1 + \log_5(x - 1)$.

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15. Solve for x, if :

$\log_x 49 - \log_x 7 + \log_x \dfrac{1}{343} + 2 = 0.$

16. If $a^2 = \log x$, $b^3 = \log y$ and $\dfrac{a^2}{2} - \dfrac{b^3}{3} = \log c$,

find c in terms of x and y.

17.   Given

$x = \log_{10} 12$, $y = \log_4 2 \times \log_{10} 9$ and $z = \log_{10} 0.4$,

find :

(i) x - y - z

(ii) 13^{x-y-z}

18. Solve for x, $\log_x 15\sqrt{5} = 2 - \log_x 3\sqrt{5}$.

19. Evaluate :

(i) $\log_b a \times \log_c b \times \log_a c$

(ii) $\log_3 8 \div \log_9 16$

(iii) $\dfrac{\log_5 8}{\log_{25} 16 \times \log_{100} 10}$

20. Show that : $\log_a m \div \log_{ab} m = 1 + \log_a b$

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21. If $\log_{\sqrt{27}} x = 2\dfrac{2}{3}$, find x.

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22. Evaluate :

$$\frac{1}{\log_a bc + 1} + \frac{1}{\log_b ca + 1} + \frac{1}{\log_c ab + 1}$$

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