# Exercise 3.3

**Q.1 Write the following into sum or difference** $\log(A\times B)$

**(i)** $\log(A\times B)$

**Solution:** $\log(A\times B)$

$\log A\times B=\log A+\log B$ **Ans**

**(ii)** $\log\frac{15.2}{30.5}$

**Solution:** $\log\frac{15.2}{30.5}$

$\log\frac{15.2}{30.5}=\log 15.2-\log 30.5$ **Ans**

**(iii)** $\log\frac{21\times 5}{8}$

**Solution:** $\log\frac{21\times 5}{8}$

$\log\frac{21\times 5}{8}=\log(21\times 5)-\log 8$

$=\log 21+\log 5-\log 8$ **Ans**

**(iv)** $\log\sqrt[3]{\frac{7}{15}}$

**Solution:** $\log\sqrt[3]{\frac{7}{15}}$

$\log\sqrt[3]{\frac{7}{15}}=\log\left(\frac{7}{15}\right)^{\frac{1}{3}}$

$=\frac{1}{3}\log\left(\frac{7}{15}\right)$

$=\frac{1}{3}(\log 7-\log 15)$

$=\frac{1}{3}\log 7-\frac{1}{3}\log 15$ **Ans**

**(v)** $\log\frac{(22)^{\frac{1}{3}}}{5^3}$

**Solution:** $\log\frac{(22)^{\frac{1}{3}}}{5^3}$

$\log\frac{(22)^{\frac{1}{3}}}{5^3}=\log 22^{\frac{1}{3}}-\log 5^3$

$=\frac{1}{3}\log 22-3\log 5$ **Ans**

**(vi)** $\log\frac{25\times 97}{29}$

**Solution:** $\log\frac{25\times 97}{29}$

$\log\frac{25\times 47}{29}=\log(25\times 47)-\log 29$

$=\log 25+\log 47-\log 29$ **Ans**

**Q.2 Express**

$\log x-2\log x+3\log(x+1)-\log(x^2-1)$ **as a single logarithm.**

**Solution:**

$\log x-2\log x+3\log(x+1)-\log(x^2-1)$

$=\log x-\log x^2+\log(x+1)^3-\log(x^2-1)$

$=\log\left(\frac{x}{x^2}\right)+\log\frac{(x+1)^3}{x^2-1}$

$=\log\left(\frac{x}{x^2}\times\frac{(x+1)^3}{x^2-1}\right)$

$=\log\left(\frac{x(x+1)^3}{x^2(x^2-1)}\right)$

$=\log\frac{x(x+1)^2\cancel{(x+1)}}{x\times x(x-1)\cancel{(x+1)}}$

$=\log\frac{(x+1)^2}{x(x-1)}$ **Ans**

**Q.3 Write the following in the form of a single logarithm.**

**(i)** $\log 21+\log 5$

**Solution:** $\log 21+\log 5$

$=\log(21\times 5)$ **Ans**

**(ii)** $\log 25-2\log 3$

**Solution:** $\log 25-2\log 3$

$=\log 25-2\log 3$

$=\log 25-\log 3^2$

$=\log\frac{25}{3^2}$ **Ans**

**(iii)** $2\log x-3\log y$

**Solution:** $2\log x-3\log y$

$=2\log x-3\log y$

$=\log x^2-\log y^3$

$=\log\frac{x^2}{y^3}$ **Ans**

**(iv)** $\log 5+\log 6-\log 2$

**Solution:** $\log 5+\log 6-\log 2$

$=\log 5+\log 6-\log 2$

$=\log(5\times 6)-\log 2$

$=\log\frac{5\times 6}{2}$ **Ans**

**Q.4 Calculate the following.**

**(i)** $\log_3 2\times\log_2 81$

**Solution:** $\log_3 2\times\log_2 81$

$=\frac{\cancel{\log 2}}{\log 3}\times\frac{\log 81}{\cancel{\log 2}}$

$=\frac{\log 81}{\log 3}$

$=\frac{\log 3^4}{\log 3}$

$=\frac{4\cancel{\log 3}}{\cancel{\log 3}}$

$=4$ **Ans**

**(ii)** $\log_3\times\log_3 25$

**Solution:** $\log_3\times\log_3 25$

$=\frac{\cancel{\log 3}}{\log 5}\times\frac{\log 25}{\cancel{\log 3}}$

$=\frac{\log 25}{\log 5}$

$=\frac{\log 5^2}{\log 5}$

$=\frac{2\cancel{\log 5}}{\cancel{\log 5}}$

$=2$ **Ans**

**Q.5 If** $\log 2=0.3010, \log 3=0.4771$ **and** $\log 5=0.6990,$ **then find the values of the following.**

**(i)** $\log 32$

$=\log 2^5$

$\because$ using $3^{rd}$ law of logarithm

$=5\log 2$

By putting the value of $\log 2$

$=5(0.3010)$

$=1.5050$ **Ans**

**(ii)** $\log 24$

**Solution: log 24**

$=\log(2^3\times 3)$

$=\log 2^3+\log 3$

$=3\log 2+\log 3$

By putting the value of $\log 2$ and $\log 3$

$=3(0.3010)+0.4771$

$=0.9030+0.4771$

$=1.3801$ **Ans**

**(iii)** $\log\sqrt{3\frac{1}{3}}$

**Solution:** $\log\sqrt{3\frac{1}{3}}$

$=\log\left(\frac{10}{3}\right)^{\frac{1}{2}}$

$$= \frac{1}{2}\log\left[\frac{2\times 5}{3}\right]$$

$$= \frac{1}{2}(\log 2 + \log 5 - \log 3)$$

By putting the values of $\log 2, \log 3$ and $\log 5$

$$= \frac{1}{2}(0.3010 + 0.69900 - 0.4771)$$

$$= \frac{1}{2}(1 - 0.4771)$$

$$= \frac{1}{2}(0.5229)$$

$$= 0.26145 \quad \textbf{Ans}$$

**(iv)** $\log \frac{8}{3}$

**Solution:** $\log \frac{8}{3}$

$$= \log \frac{2^3}{3}$$

$$= \log 2^3 - \log 3$$

$$= 3\log 2 - \log 3$$

By putting the values of $\log 2$ and $\log 3$

$$= 3(0.3010) - 0.4771$$

$$= 0.9030 - 0.4771$$

$$= 0.4259 \quad \textbf{Ans}$$

**(v)** $\log 30$

**Solution:** $\log 30$

$$= \log(5\times 2\times 3)$$

$\because$ using first law of logarithm

$$= \log 5 + \log 2 + \log 3$$

By putting the values of $\log 2, \log 3$ $\log 5$

$$= (0.6990) + (0.3010) + (0.4771)$$

$$= 1.4771 \quad \textbf{Ans}$$

**Last Updated: September 2020**

Report any mistake at freeilm786@gmail.com