# Exercise 3.4

**Q. 1: Use log tables to find the value of**

(i) $0.8176 \times 13.64$

Let $x = 0.8176 \times 13.64$

Taking log on both sides

$$\begin{aligned} \log x &= \log(0.8176 \times 13.64) \\ &= \log 0.8176 + \log 13.64 \\ &= \bar{1}.9125 + 1.1348 \\ &= (-1 + .9125) + 1.1348 \\ &= -0.0875 + 1.1348 \\ &= 1.0473 \end{aligned}$$

Taking Antilog on both sides

$$\begin{aligned} x &= Antilog(1.0473) \\ &= 11.15 \end{aligned}$$

(ii) $(789.5)^{1/8}$

Let $x = (789.5)^{1/8}$

Taking log on both sides

$$\begin{aligned} \log x &= \log(789.5)^{1/8} \\ &= \frac{1}{8}\log(789.5) \\ &= \frac{1}{8}(2.8974) \\ &= 0.3622 \end{aligned}$$

Taking Antilog on both sides

$$\begin{aligned} x &= Antilog(0.3622) \\ &= 2.3025 \end{aligned}$$

(iii) $\frac{0.678 \times 9.01}{0.0234}$

Let $x = \frac{0.678 \times 9.01}{0.0234}$

Taking log on both sides

$$\begin{aligned} \log x &= \log 0.678 + \log 9.01 - \log 0.0234 \\ &= (-1 + 0.8312) + 0.9547 - (-2 + 0.3692) \\ &= -0.1688 + 0.9547 - (-1.6308) \\ &= -0.1688 + 0.9547 + 1.6308 \\ &= 2.4167 \end{aligned}$$

Taking Antilog on both sides

$$\begin{aligned} x &= Antilog(2.4167) \\ &= 261 \end{aligned}$$

(iv) $\sqrt[5]{2.709} \times \sqrt[7]{1.239}$

Let $x = \sqrt[5]{2.709} \times \sqrt[7]{1.239}$

Taking log on both sides

$$\begin{aligned}
log x &= log\sqrt[5]{2.709} + log\sqrt[7]{1.239} \\
&= log(2.709)^{\frac{1}{5}} + log(1.239)^{\frac{1}{7}} \\
&= \frac{1}{5}log(2.709) + \frac{1}{7}log(1.239) \\
&= \frac{1}{5}(0.4328) + \frac{1}{7}(0.0931) \\
&= 0.0866 + 0.0133 \\
&= 0.0999
\end{aligned}$$

Taking Antilog on both sides

$$\begin{aligned}
x &= Antilog(0.0999) \\
&= 1.2586
\end{aligned}$$

(v) $\frac{(1.23)(0.6975)}{(0.0075)(1278)}$

Let $x = \frac{(1.23)(0.6975)}{(0.0075)(1278)}$

Taking log on both sides

$$\begin{aligned}
log x &= log\frac{(1.23)(0.6975)}{(0.0075)(1278)} \\
&= log(1.23 \times 0.6975) - log(0.0075 \times 1278) \\
&= log1.23 + log0.6975 - (log0.0075 + log1278) \\
&= log1.23 + log0.6975 - log0.0075 - log1278 \\
&= 0.0899 + (-1 + 0.8435) - (-3 + 0.8751) - 3.1065 \\
&= 0.0899 + (-0.1565) - (-2.1249) - 3.1065 \\
&= 0.0899 - 0.1565 + 2.1249 - 3.1065 \\
&= -1.0482
\end{aligned}$$

Taking Antilog on both sides

$$\begin{aligned}
x &= Antilog(-1.0482) \\
&= 0.0895
\end{aligned}$$

(vi) $\sqrt[3]{\frac{0.7214 \times 20.37}{60.8}}$

Let $x = \left(\frac{0.7214 \times 20.37}{60.8}\right)^{\frac{1}{3}}$

Taking log on both sides

$$\begin{aligned}
log x &= \frac{1}{3}log\frac{0.7214 \times 20.37}{60.8} \\
&= \frac{1}{3}[log0.7214 + log20.37 - log60.8] \\
&= \frac{1}{3}[-1 + 0.8582 + 1.3090 - 1.7839] \\
&= \frac{1}{3}[-0.6167] \\
&= -0.2056
\end{aligned}$$

Taking Antilog on both sides

$$\begin{aligned}
x &= Antilog(-0.2056) \\
&= 0.6229
\end{aligned}$$

(vii) $\frac{83 \times \sqrt[3]{92}}{127 \times \sqrt[5]{246}}$

Let $x$ $= \frac{83\times\sqrt[3]{92}}{127\times\sqrt[5]{246}}$

Taking log on both sides

$$\begin{aligned}
logx &= log\frac{83\times\sqrt[3]{92}}{127\times\sqrt[5]{246}} \\
&= log83 + log\sqrt[3]{92} - log127 - log\sqrt[5]{246} \\
&= log83 + \frac{1}{3}log92 - log127 - \frac{1}{5}log246 \\
&= 1.9190 + 0.6546 - 2.1038 - 0.4782 \\
&= -0.0084
\end{aligned}$$

Taking Antilog on both sides

$$\begin{aligned}
x &= Antilog(-0.0084) \\
&= 0.9808
\end{aligned}$$

(viii) $\frac{(438)^3\times\sqrt{0.056}}{(388)^4}$

Let $x$ $= \frac{(438)^3\times\sqrt{0.056}}{(388)^4}$

Taking log on both sides

$$\begin{aligned}
logx &= log\frac{(438)^3\times\sqrt{0.056}}{(388)^4} \\
&= log(438)^3 + log\sqrt{0.056} - log(388)^4 \\
&= 3log438 + \frac{1}{2}log0.056 - 4log388 \\
&= 3(2.6415) + \frac{1}{2}(-2 + 0.7482) - 4(2.5888) \\
&= 7.9245 - 0.6259 - 10.3552 \\
&= -3.0566
\end{aligned}$$

Taking Antilog on both sides

$$\begin{aligned}
x &= Antilog(-3.0566) \\
&= 0.00088
\end{aligned}$$

**Q. 2: A gas is expanding according to the law $pv^n = C$. Find C when $p = 80$, $v = 3.1$and $n = \frac{5}{4}$.**

$$pv^n = C$$

taking log on both sides

$$\begin{aligned}
log(pv^n) &= logC \\
logC &= log(pv^n) \\
&= logp + nlogv \\
&= log80 + \frac{5}{4}log3.1 \\
&= 1.9030 + 0.6142 \\
&= 2.5172
\end{aligned}$$

Taking Antilog on both sides

$$\begin{aligned}
C &= Antilog(2.5172) \\
&= 329.2
\end{aligned}$$

**Q. 3: The formula $p = 90(5)^{-q/10}$ applies to the demand of a product, where q is the number of units and p is the price of one unit. How many units will be demanded if the price is Rs 18.00?**

$p \quad = 90(5)^{-q/10}$

taking log on both sides

$logp \quad = log\left[90(5)^{-q/10}\right]$

$= log90 - \frac{q}{10}log5$

$log18 = log90 - \frac{q}{10}log5$

$1.2553 = 1.9542 - \frac{q}{10}(0.6990)$

$\frac{q}{10}(0.6990) \quad = 1.9542 - 1.2553$

$\frac{q}{10}(0.6990) \quad = 0.6989$

$q \quad = \frac{0.6989}{0.6990} \times 10$

$= 9.9986$

= 10 units

**Q. 4: If $A = \pi r^2$, find A, when $\pi = \frac{22}{7}$ and $r = 15$.**

$A \quad = \pi r^2$

Taking log on both sides

$logA \quad = log[\pi r^2]$

$= log\pi + 2logr$

$= log\frac{22}{7} + 2log15$

$= log22 - log7 + 2log15$

$= 1.3424 - 0.8451 + 2.3522$

$logA \quad = 2.8495$

Taking Antilog on both sides

$A \quad = Antilog(2.8495)$

= 707.1

**Q. 5: If $V = \frac{1}{3}\pi r^2 h$, find V, when $\pi = \frac{22}{7}$ and $r = 2.5$ and $h = 4.2$**

$V \quad = \frac{1}{3}\pi r^2 h$

Taking log on both sides

$V \quad = log\left[\frac{1}{3}\pi r^2 h\right]$

$= log\frac{1}{3} + log\pi + 2logr + logh$

$= log1 - log3 + log\frac{22}{7} + 2logr + logh$

$= log1 - log3 + log22 - log7 + 2log2.5 + log4.2$

$= 0 - 0.4771 + 1.3424 - 0.8451 + 0.7959 + 0.6232$

$= 1.4393$

$logV \quad = 1.4393$

Taking Antilog on both sides

$V \quad = Antilog(1.4393)$

= 27.50