
بسم الله الرحمن الرحيم

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

Sol: Let $x = \dfrac{(1.23)(0.6975)}{(0.0075)(1278)}$

Taking log of both sides

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

$$= \log 1.23 + \log 0.6975 - \log 0.0075 - \log 1278$$

$$= 0.0899 + \bar{1}.8435 - \bar{3}.8751 - 3.1065$$

$$= 0.0899 - 1 + 0.8435 + 3 - 0.8751 - 3.1065$$

$$\log x = -1.0482$$

$$= -2 + 2 - 1.0482$$

$$= -2 + 0.9518$$

$$\log x = \bar{2}.9518$$

Characteristics	=	$\bar{2}$
Mantissa	=	.9518
$x =$ antilog $\bar{2}.9518$	=	0.0895

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

$$\text{Let } x = \sqrt[3]{\frac{0.7214 \times 20.37}{60.8}}$$

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

Taking log of both sides

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

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

$$= \frac{1}{3}(\log 0.7214 + \log 20.37 - \log 60.8)$$

$$= \frac{1}{3}(\bar{1}.8582 + 1.3090 - 1.7839)$$

$$= \frac{1}{3}(-1 + 0.8582 + 1.3090 - 1.7839)$$

$$= \frac{1}{3}(-0.6167)$$

$$\log x = -0.2056$$

$$= -1 + 1 - 0.2056$$

$$= -1 + 0.7944$$

$$\log x = \bar{1}.7944$$

Characteristics = $\bar{1}$

Mantissa = .7944

$x =$ antilog $\bar{1}.7944$

$= 0.6229$

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

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

$$x=\frac{83\times(92)^{\frac{1}{3}}}{127\times(246)^{\frac{1}{5}}}$$

Taking log of both sides

$$\log x=\log\frac{83\times(92)^{\frac{1}{3}}}{127\times(246)^{\frac{1}{5}}}$$

$$= \log 83 + \log (92)^{\frac{1}{3}} - \log 127 - \log (246)^{\frac{1}{5}}$$

$$= \log 83 + \frac{1}{3}\log (92) - \log 127 - \frac{1}{5}\log (246)$$

$$= 1.9191 + \frac{1}{3}(1.9638) - 2.1038 - \frac{1}{5}(2.391)$$

$$= 1.9191 + 0.6546 - 2.1038 - 0.4782$$

$$\log x = -0.0083$$

$$= -1 + 1 - 0.0083$$

$$= -1 + 0.9917$$

$$\log x = \bar{1}.9917$$

Characteristics = $\bar{1}$

Mantissa = .9917

$x = \text{antilog } \bar{1}.9917 = 0.9811$

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

Sol: Let $x = \dfrac{(438)^3 \sqrt{0.056}}{(388)^4}$

$$x = \frac{(438)^3 \times (0.056)^{\frac{1}{2}}}{(388)^4}$$

Taking log of both sides

$$\log x = \log \frac{(438)^3 \times (0.056)^{\frac{1}{2}}}{(388)^4}$$

$$= \log(438)^3 + \log(0.056)^{\frac{1}{2}} - \log(388)^4$$

$$= 3\log(438) + \frac{1}{2}\log(0.056) - 4\log(388)$$

$$= 3(2.6415) + \frac{1}{2}(\bar{2}.7482) - 4(2.5888)$$

$$= 3(2.6415) + \frac{1}{2}(-2 + 0.7482) - 4(2.5888)$$

$$= 7.9245 + \frac{1}{2}(-1.2518) - 10.3552$$

$$= 7.9245 - 0.6259 - 10.3552$$

$$\log x = -3.0566$$

$$= -4 + 4 - 3.0566$$

$$= -4 + 0.9434$$

$$\log x = \bar{4}.9434$$

Characteristic = $\bar{4}$

Mantissa = .9434

x = antilog $\bar{4}.9434$ = 0.0008778

Q2. 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:

$$\log PV^n = \log C$$

$$\log P + \log V^n = \log C$$

$$\Rightarrow \log C = \log P + \log V^n$$

$$\log C = \log P + n\log V$$

$$\log C = \log 80 + \frac{5}{4}\log 3.1$$

$$\log C = 1.9031 + 1.25(0.4914)$$

$$\log C = 1.9031 + 1.25(0.4914)$$

$$\log C = 2.5173$$

Taking antilog on both sides:

$$Antilog(\log C) = Antilog(2.5173)$$

$$C = 329.07$$

Q3.The formula $p = 90(5)^{-\frac{q}{10}}$ 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=18 ; $p = 90(5)^{-\frac{q}{10}}$

Taking log on both sides:

$$\log p = \log 90(5)^{-\frac{q}{10}}$$

$$\log p = \log 90 + \log(5)^{-\frac{q}{10}}$$

$$\log 18 = \log 90 + \left(-\frac{q}{10}\log 5\right)$$

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

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

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

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

$$q = 10\ units$$

Q4. If $A = \pi r^2$

$$\pi = \frac{22}{7},\ r = 15,\ A = ?$$

As $A = \pi r^2$

Taking log of both sides

$$\log A = \log \pi r^2$$

$$= \log \pi + \log r^2$$

$$= \log \pi + 2\log r$$

$$= \log \frac{22}{7} + 2\log 15$$

$$= \log 22 - \log 7 + 2\log 15$$

$$= 1.3424 - 0.8451 + 2(1.1761)$$

$$= 1.3424 - 0.8451 + 2.3522$$

$$\log A = 2.8495$$

Characteristics = 2

Mantissa = .8495

A = antilog 2.8495

A = 707.1

Q5. If $v = \frac{1}{3}\pi r^2 h$, **find** v **when** $\pi = \frac{22}{7}, r = 2.5$ **and** $h = 4.2$.

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

Taking log on both sides:

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

$$\log V = \log \pi + \log r^2 + \log h - \log 3$$

$$\log V = \log \frac{22}{7} + 2\log 2.5 + \log 4.2 - \log 3$$

$$\log V = \log 22 - \log 7 + 2\log 2.5 + \log 4.2 - \log 3$$

$$\log V = 1.3424 - 0.8450 + 2(0.3979) + 0.6232 - 0.4771$$

$$\log V = 2.7614 - 1.3221$$

$$\log V = 1.4393$$

Taking antilog on both sides:

$$Antilog(\log V) = Antilog(1.4393)$$

$$V = 27.50$$


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