Q Unit 2

Ex: 2.6

Q1 Find the number of digits in.

i) 3^{30}

Taking log

$= \log 3^{30}$

$= 30 \log 3$

$= 30(0.4771)$

$= 14.313$ Ans.

~~digits of $3^{30} = 15$ Ans.~~

ii) 100^{100}

Taking log

$= \log 100^{100}$

$= 100 \log 100$

$= 100(2)$

$= 200$

digits of 100^{100} is $= 201$ Ans.

iii) 2^{10}

Taking log

~~$= 2^{10}$~~ $\log 2^{10}$

$= 10 \log 2$

$= 10(0.3010)$

$= 3.01$

digits of 2^{10} is $= 4$ Ans.

iv) 5^{37}

Taking log

$= \log 5^{37}$

$= 37 \log 5$

$= 37(0.6990)$

$= 25.863$

digits of 5^{37} is $= 26$ Ans.

v) 529^{30}

Taking log

$\log 529^{30}$

$30 \log 529$

$30(2.7235)$

$= 81.705$ Ans.

$= \text{digits of } 529^{30} = 82$

vi) 23^{15}

Taking log

$= \log 23^{15}$

$= 15 \log 23$

$= 15(1.3617)$

$= 20.4255$

$= \text{digits of } 23^{15} = 21$ Ans.

Q2

i) 23.57×5.967

Taking log on b/s

$\log X = \log 23.57 + \log 5.967$

$\log X = 1.3723 + 0.7757$

$\log X = 2.1481$

Taking antilog on b/s

$\text{antilog}(\log) X = \text{antilog}\ 2.1481$

$X = \text{antilog}\ 2.1481$

$X = 140.6$ Ans.

ii) $\frac{65.89}{7.392}$

Taking log on b/s.

$\log X = \log \frac{65.89}{7.392}$

$\log X = \log 65.89 - \log 7.392$

$\log X = 1.8188 - 0.8687$

$\log X = 0.9501$

Taking antilog on b/s.

$\text{antilog}(\log X) = \text{antilog}(0.9501)$

$X = \text{antilog}\, 0.9501$

$X = 8.915$ Ans.

(iii) $\frac{47.27 \times 5.321}{9.712 \times 4.171}$

Let $X = \frac{47.27 \times 5.321}{9.712 \times 4.171}$

Taking log on b/s

$\log X = \log \frac{47.27 \times 5.321}{9.712 \times 4.171}$

$\log X = \log 47.27 + \log 5.321 - \log 9.712 - \log 4.171$.

$\log X = 1.6745 + 0.7260 - 0.9873 - 0.6202$

$\log X = 2.4005 - 1.6075$

$\log X = 0.793$

Taking antilog on b/s

$\text{antilog}(\log X) = \text{antilog}(0.793)$

$X = \text{antilog } 0.793$

$X = 6.209$ Ans

-0.1773

iv) $\frac{\sqrt[3]{27.98}}{\sqrt[2]{28.73}}$

$= \frac{(27.98)^{\frac{1}{3}}}{(28.73)^{\frac{1}{2}}}$

let $X = \frac{(27.98)^{\frac{1}{3}}}{(28.73)^{\frac{1}{2}}}$

Taking log on b/s

$\log X = \log \frac{(27.98)^{\frac{1}{3}}}{(28.73)^{\frac{1}{2}}}$

$\log X = \frac{1}{3}\log 27.98 - \frac{1}{2}\log 28.73$

$\log X = \frac{1}{3}(1.4468) - \frac{1}{2}(1.4583)$

$\log X = 0.4822 - 0.7291$

$\log X = -0.2469$

$\log X = 1 - 0.2469 - 1$

$\log X = \bar{1}.7531$

Taking antilog on b/s

antilog (log X) = antilog ($\bar{1}.7531$)

X = antilog $\bar{1}.7531$

X = ~~5663~~ 0.5663 Ans.

$\frac{\sqrt[7]{129.4}}{\sqrt[3]{27.37}}$

$= \frac{(129.4)^{\frac{1}{7}}}{(27.37)^{\frac{1}{3}}}$

let $X = \frac{(129.4)^{\frac{1}{7}}}{(27.37)^{\frac{1}{3}}}$

= Taking log on b/s.

$\log X = \log \frac{(129.4)^{\frac{1}{7}}}{(27.37)^{\frac{1}{3}}}$

$\log X = \log(129.4)^{\frac{1}{7}} - \log(27.37)^{\frac{1}{3}}$

$\log X = \frac{1}{7}\log 129.4 - \frac{1}{3}\log 27.37$

$\log X = \frac{1}{7}(2.1120) - \frac{1}{3}(1.4372)$

~~$\log X = \frac{1}{7}(1.4372) \frac{1}{3}($~~

$\log X = 0.3017 - 0.4790$

$\log X = -0.1773$

$\log X = +1 - 0.1773 - 1$

$\log X = \bar{1}.8227$

Taking antilog on b/s

antilog (log X) = antilog ($\bar{1}.8227$)

X = antilog $\bar{1}.8227$

X = 0.6648 Ans

vi) $\dfrac{\sqrt{39.24} \times \sqrt[3]{1.931}}{\sqrt[4]{64.4} \times \sqrt{23.91}}$

$\dfrac{(39.24)^{\frac{1}{2}} \times (1.931)^{\frac{1}{3}}}{(64.4)^{\frac{1}{4}} \times (23.91)^{\frac{1}{2}}}$

let $X = \dfrac{(39.24)^{\frac{1}{2}} \times (1.931)^{\frac{1}{3}}}{(64.4)^{\frac{1}{4}} \times (23.91)^{\frac{1}{2}}}$

Taking log on b/s

$\log X = \log \dfrac{(39.24)^{\frac{1}{2}} \times (1.931)^{\frac{1}{3}}}{(64.4)^{\frac{1}{4}} \times (23.91)^{\frac{1}{2}}}$

$\log X = \log (39.24)^{\frac{1}{2}} + \log (1.931)^{\frac{1}{3}} - \log (64.4)^{\frac{1}{4}} - \log 23.91)^{\frac{1}{2}}$

$\log X = \frac{1}{2}\log(39.24) + \frac{1}{3}\log(1.931) - \frac{1}{4}\log 64.4 - \frac{1}{2}\log 23.91$

$\log X = \frac{1}{2}(1.5938) + \frac{1}{3}(0.2857) - \frac{1}{4}(1.8088) - \frac{1}{2}(1.3786)$

$\log X = 0.7969 + 0.0952 - 0.4522 - 0.6893$

$\log X = 0.8921 - 1.1415$

$\log X = -0.2494$

$\log X = 1 - 0.2494$

$\log X = \bar{1}.7506$

Taking antilog on b/s

antilog (log x) = antilog $(\bar{1}.7506)$

$X = \text{antilog } \bar{1}.7506$

$X = 5631$

$X = 0.5631$ Ans.

vii) $\dfrac{\sqrt{16\frac{3}{4}}}{\sqrt[3]{53}}$

$= \dfrac{\sqrt{\frac{67}{4}}}{(53)^{\frac{1}{3}}}$

$x = \dfrac{\left(\frac{67}{4}\right)^{\frac{1}{2}}}{(53)^{\frac{1}{3}}}$

Taking log on b/s.

$\log X = \log \dfrac{\left(\frac{67}{4}\right)^{\frac{1}{2}}}{(53)^{\frac{1}{3}}}$

$\log X = \log \left(\frac{67}{4}\right)^{\frac{1}{2}} - \log (53)^{\frac{1}{3}}$

$\log X = \frac{1}{2}(\log 67 - \log 4) - \frac{1}{3}\log 53$

$\log X = \frac{1}{2}(\log 67 - \log 4) - \frac{1}{3}\log 53$

$\log X = \frac{1}{2}(1.8260 - 0.6020) - \frac{1}{3}(1.7242)$

$\log X = \frac{1}{2}(1.224) - 0.5747$

$\log X = 0.612 - 0.5747$

$\log X = 0.0373$

Taking antilog on b/s.

$\text{antilog}(\log x) = \text{antilog}(0.0373)$

$X = \text{antilog } 0.0373$

$X = 1.090$ Ans.

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viii) $\frac{(27.98)^2}{(28.73)^3}$

Let $X = \frac{(27.98)^2}{(28.73)^3}$

Taking log on b/s

$\log X = \log \frac{(27.98)^2}{(28.73)^3}$

$\log X = \log(27.98)^2 - \log(28.73)^3$

$\log X = 2\log(27.98) - 3\log 28.73$

$\log X = 2(1.4468) - 3(1.4583)$

$\log X = 2.8936 - 4.3749$

$\log X = \bar{1}.4813$

$\log X = +1 - 1.4813 - 1$

$\log X = \bar{1}.4813$

Taking antilog on b/s

$\text{antilog}(\log X) = \text{antilog}(\bar{1}.4813)$

$X = \text{antilog}\ \bar{1}.4813$

$X = 30289$

$X = 0.3029$ Ans.

The Kansu China earthquake of 1920 was measured about 8.5 on Richter Scale and the Tokyo, Japan earthquake of 1923 was measured 7.8 that Scale how many times stronger was the 1920 earthquake 1923 earthquakes?

Sol:-

I_1 be the Intensity of chinais earthquake.

I_2 be the Intensity of japanis earthquake.

As we know = $m = \log \frac{I}{I_0}$

Chinais	Japan
$M = \log \frac{I}{I_0}$	$M = \log \frac{I}{I_0}$
$8.5 = \log \frac{I_1}{I_0}$	$7.8 = \log \frac{I_2}{I_0}$
$8.5 = \log I_1 - \log I_0 \rightarrow$ i)	$7.8 = \log I_2 - \log I_0 \rightarrow$ ii

eg i – eg ii

$8.5 = \log I_1 - \log I_0$

$\pm 7.8 = \pm \log I_2 \mp \log I_0$

$0.7 = \log I_1 - \log I_2$

$0.7 = \log \frac{I_1}{I_2}$

taking antilog on b/s

$\text{Antilog } 0.7 = \text{antilog}(\log) \frac{I_1}{I_2}$

$5.012 = \frac{I_1}{I_2}$ or $\frac{I_1}{I_2} = 5$ ∵ $5.012 \approx 5$

$I_1 = 5 I_2$

China → I_1, Japan → I_2

China earthqurke is nearly 5times Stronger than Tokyo Japan.