Cosmo School

Work sheet – 02 (Mathematics) for class – Ten (14.10.2020)

Chapter- Four, Exercise - 4.1

Exponents and Logarithms

Creative Questions:

1. **If $x = 2, y = 3$ and $z = 5$ then -** **[All B.- 18]**

a) Find the value of $\log_7(\sqrt[3]{7}.\sqrt{7})$.

b) Simplify: $\frac{y^{a+1}}{(y^a)^{a-1}} \div \frac{(3y)^{a+1}}{(y^{a+1})^{a-1}} \times \frac{1}{y^{-2}}$.

c) Show that, $\left(\log\sqrt{y^3} + \log x^3 - \log\sqrt{x^3 z^3}\right) \div \log 1.2 = \frac{3}{2}$.

2. **$A = 4^{2p+1}$, $B = \frac{5^{m+1}}{(5^m)^{m-1}}$, $C = \frac{25^{m+1}}{(5^{m-1})^{m+1}}$ and $D = 3^x + 3^{1-x}$** **[B.B- 16]**

a) If $A = 128$ then find the value of P.

b) Prove that, $B \div C = \frac{1}{25}$.

c) Find the value of x, when $D = 4$.

3. **L, M, N three algebraic expressions where $L = \frac{x^a}{x^b}$, $M = \frac{x^b}{x^c}$ and $N = \frac{x^c}{x^a}$** **[Ctg.B.- 15]**

a) If $L = 1$ then show that, a = b.

b) Prove that, $\sqrt[ab]{L} \times \sqrt[bc]{M} \times \sqrt[ca]{N} = 1$.

c) On the basis of the questions, show that, $\log_k L^{a+b} + \log_k M^{b+c} + \log_k N^{c+a} = 0$.

4. **If $P = x^a$, $Q = x^b$ and $R = x^c$ then -**

a) Find the value of $P^{bc}.Q^{-ca}$.

b) Find the value of $\left(\frac{P}{Q}\right)^{a+b} \times \left(\frac{Q}{R}\right)^{b+c} \div 2(RP)^{a-c}$.

c) Show that, $\left(\frac{P}{Q}\right)^{a^2+ab+b^2} \times \left(\frac{Q}{R}\right)^{b^2+bc+c^2} \times \left(\frac{R}{P}\right)^{c^2+ca+a^2} = 1$.

5. **If $X = (2a^{-1} + 3b^{-1})$, $Y = \sqrt[pq]{\frac{x^p}{x^q}} \times \sqrt[qr]{\frac{x^q}{x^r}} \times \sqrt[rp]{\frac{x^r}{x^p}}$ and $Z = \frac{5^{m+1}}{(5^m)^{m-1}} \div \frac{25^{m+1}}{(5^{m-1})^{m+1}}$, where $x, p, q, r > 0$.**

a) Find the value of X.

b) Show that, $Y + \sqrt[3]{81} = 4$.

c) Show that, $Y \div Z = 25$.

6. **$A = (2a^{-1} + 3b^{-1})^{-1}$, $B = \sqrt[pq]{x^p \div x^q} \times \sqrt[qr]{x^q \div x^r} \times \sqrt[rp]{x^r \div x^p}$ where $x > 0$ and $p, q, r > 0$ and $C = \frac{5^{m+1}}{(5^m)^{m-1}} \div \frac{25^{m+1}}{(5^{m-1})^{m+1}}$.**

a) Simplify: A.

b) Show that, $B + \sqrt[4]{81} = 4$.

c) Prove that, $B \div C = 25$.

7. **If $x = 2, y = 3, z = 5$ and $w = 7$ then**

a) What is the log of $\sqrt{y^3}$ to the base 3?

b) Find the value of $w\log\frac{xz}{y^2} - x\log\frac{z^2}{x^2y} + y\log\frac{y^4}{x^4z}$.

c) Show that, $\frac{\log\sqrt{y^3} + y\log x - \frac{y}{x}\log(xz)}{\log(xy) - \log z} = \log_y\sqrt{y^3}$.