

# Riviera International Academy

## Assignment-2077

(Shrawan 22, 2077, Thursday)

Class: Ten

### Subject- Mathematics

Source: Photo of exercise are given below.

Work: Complete all the work according to the class.

**Do your work neatly**

Indices

### EXERCISE 10.2

**General section**

1. Solve.

a) $2^{x-4} = 4^{x-6}$	b) $9^{x-1} = 3^{x+1}$	c) $4^{2x-1} = 2^{x+1}$
d) $3^{2x+1} = 9^{2x-1}$	e) $25^{x+3} = \frac{1}{0.04}$	f) $10^{2x-1} = \frac{1}{0.001}$
g) $3 \times 81^x = 9^{x+4}$	h) $2^{x+1} - 2^x = 8$	i) $3^{x+1} - 3^x = 54$
j) $3^{x+2} + 3^{x+1} = 1\frac{1}{3}$	k) $4^{x+1} = \frac{1}{8^x}$	l) $4^{x-1} = (\sqrt{2})^x$
m) $(\sqrt{2})^{2x-1} = (\sqrt{4})^{x-2}$	n) $(\sqrt{9})^{x-1} = (\sqrt{3})^{x+2}$	o) $(0.5)^{\frac{x}{2}} = 0.25$
p) $3^{x-2} + 3^x = \frac{10}{9}$	q) $3^{2x+2} - 2.9^{x+1} = \frac{1}{3}$	r) $5^x + 5^{x-1} + 5^{x-2} = 155$

2. Solve.

a) $2^{x+1} \times 3^{x+4} = 18$	b) $2^{x-2} \times 3^{x-4} = 3^x$	c) $2^{2x-1} a^{x-2} = 2^{x-2} a^{1-x}$
d) $5^{x-3} \times 3^{2x-8} = 225$	e) $2^{x-2} \times 5^{x-4} = 5$	f) $7^{2x+1} \times 5^{2x-1} = \frac{2}{5}$

**Creative section**

3. Solve.

a) $2^{2x} + 3.2^x - 4 = 0$	b) $2^{2x} - 6.2^{x+1} + 32 = 0$	c) $4.3^{x+1} - 9^x = 27$
d) $2^{x-2} + 2^{3-x} = 3$	e) $3.2^{x+1} - 4^x = 8$	f) $5.4^{x+1} - 16^x = 64$
g) $5^{1-x} + 5^{x-1} = \frac{26}{5}$	h) $5^x + 5^{-x} = 25\frac{1}{25}$	i) $5^{x+1} + 5^{2-x} = 126$
j) $2^x + \frac{16}{2^x} = 10$	k) $3^{x-3} + \frac{1}{3^x} - 28 = 0$	l) $7^x + \frac{343}{7^x} = 56$
m) $4^x + \frac{1}{4^x} = 16\frac{1}{16}$	n) $2^x + \frac{1}{2^x} = 4\frac{1}{4}$	o) $3^x + \frac{1}{3^x} = 9\frac{1}{9}$
p) $3^{x+2} + \frac{1}{3^{x-2}} = 30$		

4.

- If  $a^x = b$ ,  $b^y = c$  and  $c^z = a$ , prove that  $xyz = 1$ .
- If  $x = y^z$ ,  $y = z^x$  and  $z = x^y$ , prove that  $xyz = 1$ .
- If  $a^x = b^y$  and  $b = a^2$ , show that  $x - 2y = 0$ .
- If  $a = 10^x$ ,  $b = 10^y$  and  $a^y b^x = 100$ , show that  $xy = 1$ .
- If  $x^a \cdot x^b = (x^a)^b$ , prove that  $\frac{a}{b} + \frac{b}{a} = ab - 2$ .
- If  $x^a = y^b = z^c$  and  $y^3 = xz$ , show that  $\frac{3}{b} = \frac{1}{a} + \frac{1}{c}$ .
- If  $a^p = b^q = c^r$  and  $b^2 = ac$ , prove that  $q = \frac{2pr}{p+r}$ .
- If  $2^x = 3^y = 12^z$ , show that  $\frac{1}{z} = \frac{1}{y} + \frac{2}{x}$ .
- If  $\sqrt[3]{a} = \sqrt[3]{b} = \sqrt[3]{c}$  and  $abc = 1$ , prove that  $x + y + z = 0$ .

- In how many years Rs 2,000 amounts to Rs 2,420 at 10% p.a. compound interest?
- In how many years Rs 8,000 amounts to Rs 9,261 at 5% p.a. compound interest?

**Example 2:**  $3^{x+2} \times 5^{x-1} = 405$

**Solution:**

Here,  $3^{x+2} \times 5^{x-1} = 405$

or,  $3^x \times 3^2 \times 5^x \times 5^{-1} = 405$

or,  $3^x \times 5^x \times \frac{9}{5} = 405$

or,  $(3 \times 5)^x = 225$

or,  $15^x = 15^2$

$\therefore x = 2$

**Example 3:** Solve  $2^{x+2} + \frac{1}{2^x} - 9 = 0$

**Solution:**

Here,  $2^{x+2} + \frac{1}{2^x} - 9 = 0$

or,  $2^x \times 2^2 + \frac{1}{2^x} - 9 = 0$

Let  $2^x = a$

Then,  $8a + \frac{1}{a} - 9 = 0$

or,  $\frac{8a^2 + 1 - 9a}{a} = 0$

or,  $8a^2 - 9a + 1 = 0$

or,  $8a^2 - 8a - a + 1 = 0$

or,  $8a(a-1) - 1(a-1) = 0$

or,  $(a-1)(8a-1) = 0$

Either,  $a - 1 = 0$

i.e.  $a = 1$

i.e.  $2^x = 2^0$

$\therefore x = 0$

So,  $x = 0, -3$

or,  $8a - 1 = 0$

i.e.  $a = \frac{1}{8} = \frac{1}{2^3} = 2^{-3}$

i.e.  $2^x = 2^{-3}$

$\therefore x = -3$

**Example 4:** If  $a = b^c$ ,  $b = c^a$  and  $c = a^b$ , prove that  $abc = 1$ .

**Solution:**

Here,  $a = b^c$ ,  $b = c^a$  and  $c = a^b$

Since  $c = a^b$ , i.e.  $a = c^{\frac{1}{b}}$

Now,  $a = b^c$  [Given]

or,  $c^{\frac{1}{b}} = b^c$  [Putting  $a = c^{\frac{1}{b}}$ ]

or,  $c^{\frac{1}{b}} = (c^a)^c$  [Putting  $b = c^a$ ]

or,  $c^{\frac{1}{b}} = c^{ac}$

or,  $\frac{1}{b} = ac$

or,  $abc = 1$  proved.

**Alternative process**

Here,  $a = b^c$ ,

$a = (c^a)^c$  [ $\because b = c^a$ ]

$a = c^{ac}$

$a = (a^b)^a$  [ $\because c = a^b$ ]

$a = a^{ab}$

$\therefore abc = 1$  Proved.

**Example 5:** If  $a^p \cdot a^q = (a^p)^q$ , prove that  $p(q-2) + q(p-2) = 0$ .

**Solution:**

$$\begin{aligned}\text{Here,} \quad a^p \cdot a^q &= (a^p)^q \\ \text{or,} \quad a^{p+q} &= a^{pq} \\ \text{or,} \quad p+q &= pq \\ \text{or,} \quad 2(p+q) &= 2pq \text{ (multiplying both sides by 2)} \\ \text{or,} \quad pq + pq - 2p - 2q &= 0 \\ \text{or,} \quad pq - 2p + pq - 2q &= 0 \\ \text{or,} \quad p(q-2) + q(p-2) &= 0 \text{ Proved.}\end{aligned}$$

**Example 6:** If  $x^a = y^b = z^c$  and  $y^2 = xz$ , show that  $\frac{2}{b} = \frac{1}{a} + \frac{1}{c}$ .

**Solution:**

$$\begin{aligned}\text{Here,} \quad x^a &= y^b, \text{ i.e. } x = y^{\frac{b}{a}} \\ \text{Also,} \quad z^c &= x^a, \text{ i.e. } z = x^{\frac{a}{c}} = \left(y^{\frac{b}{a}}\right)^{\frac{a}{c}} = y^{\frac{b}{c}} \\ \text{Now,} \quad y^2 &= xz \\ \text{or,} \quad y^2 &= y^{\frac{b}{a}} \cdot y^{\frac{b}{c}} \\ \text{or,} \quad y^2 &= y^{\frac{b}{a} + \frac{b}{c}} \\ \text{or,} \quad 2 &= \frac{b}{a} + \frac{b}{c} \\ \text{or,} \quad 2 &= b \left( \frac{1}{a} + \frac{1}{c} \right) \\ \text{or,} \quad \frac{2}{b} &= \frac{1}{a} + \frac{1}{c} \text{ Proved.}\end{aligned}$$

**Alternative process**

$$\begin{aligned}\text{Let, } x^a &= y^b = z^c = k \\ \text{Then, } x &= k^{\frac{1}{a}}, y = k^{\frac{1}{b}}, z = k^{\frac{1}{c}} \\ \text{Now, } y^2 &= xz \\ \text{or,} \quad \left(k^{\frac{1}{b}}\right)^2 &= k^{\frac{1}{a}} \cdot k^{\frac{1}{c}} \\ \text{or,} \quad k^{\frac{2}{b}} &= k^{\frac{1}{a} + \frac{1}{c}} \\ \text{or,} \quad \frac{2}{b} &= \frac{1}{a} + \frac{1}{c} \text{ Proved.}\end{aligned}$$

**Example 7:** If  $\sqrt[p]{x} = \sqrt[q]{y} = \sqrt[r]{z}$  and  $xyz = 1$ , prove that  $p + q + r = 0$ .

**Solution:**

$$\text{Here, } \sqrt[p]{x} = \sqrt[q]{y} = \sqrt[r]{z} = k \text{ (suppose)}$$

$$\text{Then, } \sqrt[p]{x} = k$$

$$\text{or, } x^{\frac{1}{p}} = k$$

$$\text{or, } x = k^p$$

$$\text{Similarly, } y = k^q \text{ and } z = k^r$$

$$\text{Now, } xyz = 1$$

$$\text{or, } k^p \cdot k^q \cdot k^r = 1$$

$$\text{or, } k^{p+q+r} = k^0$$

$$\text{or, } p + q + r = 0 \text{ Proved}$$

## Subject- HPE

1. Answer question C (Write difference) and question D (short notes) of Unit 2, page 67. (Readmore Publication)

## Subject- Science

1. What happens in the reactivity in the group of noble gas from top to bottom and why?
2. Define representative element. Why lanthanides and actinides are kept separately below the periodic table? Write two reasons.
3. What do you mean by metallic character of element? How do these characters vary in period and groups?
4. What do you mean by s-block elements? Why hydrogen is kept in group- IA of modern periodic table?

## विषय - नेपाली

नेपाली व्याकरणको सहयोग लनुहोस्।

१) खाली ठाउँ भर्नुहोस् उदार को पर्यायवाची शब्द --- हो।(दयालु ,सङ्कीर्ण,घर ) सोपान को पर्यायवाची शब्द ---हो।(दानव , संढी ,घर ) पृथ्वी को पर्यायवाची शब्द -- हो।(अरणी,धरणी ,तरणी ) अग्नि को पर्यायवाची शब्द -- हो।(पवक ,पवन हुरी ) उदार को पर्यायवाची शब्द -- हो।(दयालु ,सङ्कीर्ण,घर ) को सस को पर्यायवाची शब्द --हो।(जमर्को ,जल कर्म ) उद्यम को पर्यायवाची शब्द -- हो।(मलन,इलम ,जगत ) नियति को पर्यायवाची शब्द -- हो।(दयालु ,भाग्य ,पीडा ) वहान को पर्यायवाची शब्द -- हो।(राती बेलुकी प्रभात ) -----श्रुतिसम भन्नार्थक शब्द हुन्। (दिन -दीन ,तम -मन ,तल मा थ ) --- ---श्रुतिसम भन्नार्थक शब्द हुन्। (मल -जल ,यो -त्यो ,शाला साला ) -----श्रुतिसम भन्नार्थक शब्द हुन्। (हित - मत ,शीत - सत ,तल-पर ) -----श्रुतिसम भन्नार्थक शब्द हुन्। (कुल- कूल ,तम -मन ,तुल -फूल ) -----श्रुतिसम भन्नार्थक शब्द हुन्। (डर -भर ,पुरा -पूरा ,तल मा थ ) -----श्रुतिसम भन्नार्थक शब्द हुन्। (दिन -दीन ,तम -मन ,तल मा थ )

२) तलका उखान , टुक्का र शब्द वाक्यमा प्रयोग गर्नुहोस्। तातो लग्नु ,घप्लक्क ,टहटह ,मन मर्नु ,रतन्धो ,चन्द्रमा दाहिना हुनु , आँप गए झटारो ,काम गर्ने कालु मकै खाने भालु , आलु खाई पेडाको धाक ,जुन जोगी आए पनि कानै चरेका ,पो ,नि आशु क व ,अब्बल , वनिमय।

३) तल दिइएका वाक्यलाई शुद्ध परी लेख्नुहोस्।

१ )सुख सुवीधा र अवसर को खोजि गर्नु मान वय स्वभाव हो।

२ )आयुर्वेद चीकीत्सा वी धको मूल आदार हो।

३ )नेपालको राज निति ले रामरो वाटो लीने च।

४ )थान्का बिबसये मा अपांगता भका बेक्तिको सभागीता बद्दो छ ?

**The End.**