Riviera International Academy

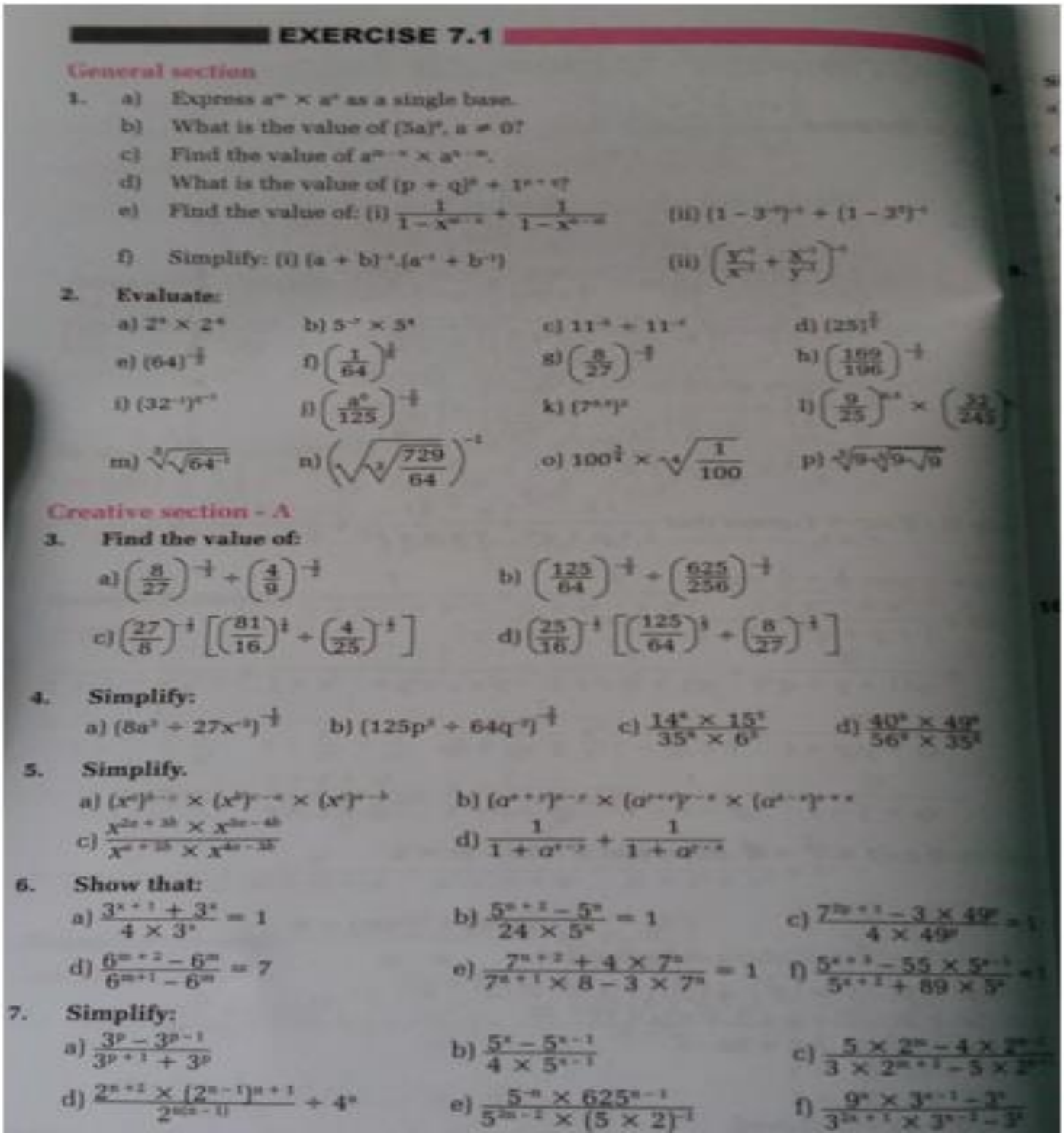
Assignment-2077

(Ashwin 21, 2077, Wednesday)

Class: Nine

Subject- Mathematics

Source: Photos of exercises are given below.
Work: Complete exercise from 7.1 according to the class.
Do your work neatly



EXERCISE 7.1

General section

1. a) Express $a^m \times a^n$ as a single base.
   b) What is the value of $(5a)^0$, $a \neq 0$?
   c) Find the value of $a^{m-n} \times a^{n-m}$.
   d) What is the value of $(p+q)^0 + 1^{p-q}$?
   e) Find the value of: (i) $\frac{1}{1-x^{a-b}} + \frac{1}{1-x^{b-a}}$ (ii) $(1-3^{-1})^{-1} \div (1-3^{-2})^{-1}$
   f) Simplify: (i) $(a+b)^{-1}(a^{-1}+b^{-1})$ (ii) $\left(\frac{x^2}{x^{-1}} + \frac{x^{-2}}{y^{-1}}\right)^{-1}$

2. **Evaluate:**
   a) $2^5 \times 2^{-4}$ b) $5^{-7} \times 5^4$ c) $11^{-5} \div 11^{-4}$ d) $(25)^{\frac{1}{2}}$
   e) $(64)^{-\frac{1}{3}}$ f) $\left(\frac{1}{64}\right)^{\frac{1}{3}}$ g) $\left(\frac{8}{27}\right)^{-\frac{1}{3}}$ h) $\left(\frac{169}{196}\right)^{-\frac{1}{2}}$
   i) $(32^{-1})^{\frac{4}{5}}$ j) $\left(\frac{a^6}{125}\right)^{-\frac{1}{3}}$ k) $(7^{n-1})^2$ l) $\left(\frac{9}{25}\right)^{n-1} \times \left(\frac{25}{243}\right)^{n-1}$
   m) $\sqrt[3]{\sqrt{64^{-1}}}$ n) $\left(\sqrt{\sqrt[3]{\frac{729}{64}}}\right)^{-1}$ o) $100^{\frac{1}{2}} \times \sqrt[4]{\frac{1}{100}}$ p) $\sqrt[3]{9\sqrt[3]{9\sqrt{9}}}$

Creative section - A

3. **Find the value of:**
   a) $\left(\frac{8}{27}\right)^{-\frac{1}{3}} + \left(\frac{4}{9}\right)^{-\frac{1}{2}}$ b) $\left(\frac{125}{64}\right)^{-\frac{1}{3}} \div \left(\frac{625}{256}\right)^{-\frac{1}{4}}$
   c) $\left(\frac{27}{8}\right)^{\frac{1}{3}}\left[\left(\frac{81}{16}\right)^{\frac{1}{4}} \div \left(\frac{4}{25}\right)^{\frac{1}{2}}\right]$ d) $\left(\frac{25}{16}\right)^{\frac{1}{2}}\left[\left(\frac{125}{64}\right)^{\frac{1}{3}} \div \left(\frac{8}{27}\right)^{\frac{1}{3}}\right]$

4. **Simplify:**
   a) $(8a^3 \div 27x^{-3})^{-\frac{1}{3}}$ b) $(125p^3 \div 64q^{-3})^{-\frac{1}{3}}$ c) $\frac{14^n \times 15^n}{35^n \times 6^n}$ d) $\frac{40^n \times 49^n}{56^n \times 35^n}$

5. **Simplify.**
   a) $(x^a)^{b-c} \times (x^b)^{c-a} \times (x^c)^{a-b}$ b) $(a^{n+1})^{n-1} \times (a^{n-1})^{n-0} \times (a^{n-1})^{n+1}$
   c) $\frac{x^{2a+3b} \times x^{3a-4b}}{x^{a+3b} \times x^{4a-3b}}$ d) $\frac{1}{1+a^{n-1}} + \frac{1}{1+a^{1-n}}$

6. **Show that:**
   a) $\frac{3^{n+1}+3^n}{4 \times 3^n} = 1$ b) $\frac{5^{n+2}-5^n}{24 \times 5^n} = 1$ c) $\frac{7^{2n+1}-3 \times 49^n}{4 \times 49^n} = 1$
   d) $\frac{6^{m+2}-6^m}{6^{m+1}-6^m} = 7$ e) $\frac{7^{n+2}+4 \times 7^n}{7^{n+1} \times 8 - 3 \times 7^n} = 1$ f) $\frac{5^{n+3}-55 \times 5^{n-1}}{5^{n+1}+89 \times 5^n} = 1$

7. **Simplify:**
   a) $\frac{3^p - 3^{p-1}}{3^{p+1}+3^p}$ b) $\frac{5^n - 5^{n-1}}{4 \times 5^{n-1}}$ c) $\frac{5 \times 2^m - 4 \times 2^{m-1}}{3 \times 2^{m+1} - 5 \times 2^m}$
   d) $\frac{2^{n+2} \times (2^{n-1})^{n+1}}{2^{n(n-1)}} + 4^n$ e) $\frac{5^{-n} \times 625^{n-1}}{5^{2n-1} \times (5 \times 2)^{-1}}$ f) $\frac{9^n \times 3^{n-1} - 3^n}{3^{2n+1} \times 3^{n-1} - 3^n}$

Simplify:

a) $\sqrt{25a^2b^4} \times \sqrt[3]{27a^3}$

b) $\sqrt{a^6b^{-2}c^4} \div \sqrt[4]{a^8b^{-4}c^8}$

c) $\sqrt[4]{16x^8y^4} \div \sqrt[3]{8x^6y^3}$

d) $\dfrac{\sqrt[3]{56p^7q^4}}{\sqrt[4]{7p^4q^7}}$

e) $\sqrt[4]{216m^7n^5} \div \sqrt[4]{6^{-1}m^{-1}n}$

f) $\sqrt[3]{(a+b)^{-7}} \times (a+b)^{\frac{1}{3}}$

g) $\sqrt[3]{(2x-y)^4} \div (2x-y)^{\frac{4}{3}}$

h) $\sqrt{(a+b)^{-1}} \times \sqrt{(a-b)(a^2-b^2)}$

9. **Simplify:**

a) $\left(\dfrac{x^a}{x^b}\right)^{a+b} \times \left(\dfrac{x^b}{x^c}\right)^{b+c} \times \left(\dfrac{x^c}{x^a}\right)^{c+a}$

b) $\left(\dfrac{a^x}{a^{-y}}\right)^{x-y} \times \left(\dfrac{a^y}{a^{-z}}\right)^{y-z} \times \left(\dfrac{a^z}{a^{-x}}\right)^{z-x}$

c) $\left(\dfrac{x^a}{x^b}\right)^{a^2+ab+b^2} \times \left(\dfrac{x^b}{x^c}\right)^{b^2+bc+c^2} \times \left(\dfrac{x^c}{x^a}\right)^{c^2+ca+a^2}$

d) $\left(\dfrac{x^{l^2+m^2}}{x^{lm}}\right)^{l-m} \times \left(\dfrac{x^{m^2+n^2}}{x^{mn}}\right)^{m-n} \times \left(\dfrac{x^{n^2+l^2}}{x^{nl}}\right)^{n-l}$

e) $\left(\dfrac{x^{a+b}}{x^{a-b}}\right)^{a-b} \times \left(\dfrac{x^{b+c}}{x^{b-c}}\right)^{b-c} \times \left(\dfrac{x^{c+a}}{x^{c-a}}\right)^{c-a}$

f) $\left(\dfrac{x^{m+n}}{x^p}\right)^{m-n} \times \left(\dfrac{x^{n+p}}{x^m}\right)^{n-p} \times \left(\dfrac{x^{p+m}}{x^n}\right)^{p-m}$

g) $\dfrac{p+(pq^2)^{\frac{1}{3}}+(p^2q)^{\frac{1}{3}}}{p-q} \times \left(1-\dfrac{q^{\frac{1}{3}}}{p^{\frac{1}{3}}}\right)$

h) $\left(x^{\frac{a^2}{b-c}}\right)^{\frac{1}{a-b}} \times \left(x^{\frac{b^2}{c-a}}\right)^{\frac{1}{b-c}} \times \left(x^{\frac{c^2}{a-b}}\right)^{\frac{1}{c-a}}$

i) $\dfrac{\left(x+\frac{1}{y}\right)^x \times \left(\frac{1}{y}-x\right)^x}{\left(y+\frac{1}{x}\right)^y \times \left(\frac{1}{x}-y\right)^y}$

j) $\dfrac{\left(a^2-\frac{1}{b^2}\right)^a \times \left(a-\frac{1}{b}\right)^{b-a}}{\left(b^2-\frac{1}{a^2}\right)^b \times \left(b+\frac{1}{a}\right)^{-b}}$

10. **Simplify:**

a) $\sqrt[pq]{\dfrac{a^r}{a^s}} \times \sqrt[qx]{\dfrac{a^s}{a^t}} \times \sqrt[xp]{\dfrac{a^t}{a^r}}$

b) $\sqrt[pq]{\dfrac{x^{r-p}}{x^{s-q}}} \times \sqrt[qr]{\dfrac{x^{s-r}}{x^{t-p}}} \times \sqrt[rp]{\dfrac{x^{t-q}}{x^{r-s}}}$

c) $\sqrt[x+y]{\dfrac{a^{x^2}}{a^{y^2}}} \times \sqrt[y+z]{\dfrac{a^{y^2}}{a^{z^2}}} \times \sqrt[z+x]{\dfrac{a^{z^2}}{a^{x^2}}}$

d) $\left(\dfrac{x^b}{x^c}\right)^{\frac{1}{bc}} \times \left(\dfrac{x^c}{x^a}\right)^{\frac{1}{ca}} \times \left(\dfrac{x^a}{x^b}\right)^{\frac{1}{ab}}$

e) $\dfrac{1}{1+x^{a-b}+x^{c-b}} + \dfrac{1}{1+x^{b-c}+x^{a-c}} + \dfrac{1}{1+x^{c-a}+x^{b-a}}$

f) $\dfrac{1}{1+a^{x-y}+a^{x-z}} + \dfrac{1}{1+a^{y-z}+a^{y-x}} + \dfrac{1}{1+a^{z-x}+a^{z-y}}$

11. a) If $a^3+b^3+c^3=0$, prove that $(x^{a+b})^{a^2-ab+b^2} \times (x^{b+c})^{b^2-bc+c^2} \times (x^{c+a})^{c^2-ca+a^2} = 1$

b) If $a = x^{q+r}.y^p$, $b = x^{r+p}.y^q$ and $c = x^{p+q}.y^r$, prove that $a^{q-r} \times b^{r-p} \times c^{p-q} = 1$

c) If $xyz = 1$, prove that: $\dfrac{1}{1+x+y^{-1}} + \dfrac{1}{1+y+z^{-1}} + \dfrac{1}{1+z+x^{-1}} = 1.$

d) If $a+b+c=0$, prove that: $\dfrac{1}{1+x^a+x^{-b}} + \dfrac{1}{1+x^b+x^{-c}} + \dfrac{1}{1+x^c+x^{-a}} = 1.$

12. a) If $x = 2^{\frac{1}{3}} + 2^{-\frac{1}{3}}$, prove that: $2x^3 - 6x = 5$.

b) If $a = p^{\frac{1}{3}} - p^{-\frac{1}{3}}$, prove that: $a^3 + 3a = p - \dfrac{1}{p}$.

c) If $x - 2 = 3^{\frac{1}{3}} + 3^{\frac{2}{3}}$, show that: $x(x^2 - 6x + 3) = 2$.

7.3 Exponential equation

Let's take any two equations: $2x = 4$ and $2^x = 4$.

In the equation $2x = 4$, variable x is a base. It is a linear equation. However, in $2^x = 4$, variable x is an exponent of the base 2. Such an equation in which variable appears as an exponent of a base is known as **exponential equation**.

To solve an exponential equation, we need to have equations with the same base on either side of the 'equal' sign. Then we compare the powers of equal base and solve the equation.

Let's study, the following axioms which are used in solving the exponential equation.

(i) If $a^x = a^b$, then $x = b$ **(ii) If $a^x = 1$, then $a^x = a^0$ and $x = 0$**

In this way, while solving an exponential equation, we should simplify the equation till the equation is obtained in the form $a^x = a^b$ or $a^x = 1$.

Worked-out examples

Example 1: ***Solve a) $2^x = 32$*** ***b) $5^{2x} = \frac{1}{25}$*** ***c) $7^{x-2} = 1$***

Solution:

a) $2^x = 32$
or, $2^x = 2^5$
$\therefore$ $x = 5$

b) $5^{2x} = \frac{1}{25}$
or, $5^{2x} = \frac{1}{5^2}$
or, $5^{2x} = 5^{-2}$
or, $2x = -2$
or, $x = -1$

c) $7^{x-2} = 1$
or, $7^{x-2} = 7^0$
or, $x - 2 = 0$
$\therefore$ $x = 2$

Example 2: ***Solve a) $(\sqrt{2})^{x-3} = (\sqrt[4]{2})^{x+1}$*** ***b) $3^x + 3^{x+2} = 10$***

Solution:

a) $(\sqrt{2})^{x-3} = (\sqrt[4]{2})^{x+1}$
or, $2^{\frac{x-3}{2}} = 2^{\frac{x+1}{4}}$
or, $\frac{x-3}{2} = \frac{x+1}{4}$
or, $4x - 12 = 2x + 2$
or, $2x = 14$
or, $x = 7$

b) $3^x + 3^{x+2} = 10$
or, $3^x + 3^x \times 3^2 = 10$
or, $3^x (1 + 9) = 10$
or, $3^x = \frac{10}{10} = 1$
or, $3^x = 3^0$
or, $x = 0$

Example 3: ***Solve a) $2^{x+1} \times 3^{x-2} = 48$*** ***b) $9^{y+1} = 3^{2y+1} + 54$***

Solution:

a) $2^{x+1} \times 3^{x-2} = 48$
or, $2^x \times 2^1 \times 3^x \times 3^{-2} = 48$
or, $2^x \times 3^x \times \frac{2}{3^2} = 48$
or, $(2 \times 3)^x = 216$
or, $6^x = 6^3$
$\therefore$ $x = 3$

b) $9^{y+1} = 3^{2y+1} + 54$
or, $3^{2y+2} - 3^{2y+1} = 54$
or, $3^{2y} \times 3^2 - 3^{2y} \times 3 = 54$
or, $3^{2y} (3^2 - 3) = 54$
or, $3^{2y} = 9$
or, $3^{2y} = 3^2$
or, $2y = 2$
$\therefore$ $y = 1$

Example 4: ***If $a^x = b$, $b^y = c$ and $c^z = a$, prove that $xyz = 1$.***

Solution:

Here, $a^x = b$, $b^y = c$ and $c^z = a$

Now, $a^x = b$

or, $c^{xy} = b$ [By putting $a = c^y$ in $a^x = b$]

or, $b^{xyz} = b$ [Putting $c = b^x$ in $c^{xy} = b$]

or, $xyz = 1$ proved.

Another process:

$b^y = c$

or, $a^{xy} = c$ [putting $b = a^x$ in $b^y = c$]

or, $c^{xyz} = c$ [putting $a = c^y$ in $a^{xy} = c$]

or, $xyz = 1$

Example 5: ***If $4^p = 5^q = 20^r$, show that $\frac{1}{p} = \frac{1}{q} + \frac{1}{r} = 0$.***

Solution:

Let, $4^p = 5^q = 20^r = k$

Then, $4^p = k \quad \therefore 4 = k^{\frac{1}{p}}$

$5^q = k \quad \therefore 5 = k^{\frac{1}{q}}$

and $20^r = k \quad \therefore 20 = k^{\frac{1}{r}}$

Now, $4 \times 5 = 20$

or, $k^{\frac{1}{p}} \times k^{\frac{1}{q}} = k^{\frac{1}{r}}$

or, $k^{\frac{1}{p} + \frac{1}{q}} = k^{\frac{1}{r}}$

$\frac{1}{p} + \frac{1}{q} = \frac{1}{r}$

$\frac{1}{p} + \frac{1}{q} + \frac{1}{r} = 0$ Proved

Another process:

$4^p = 5^q$, i.e. $4 = 5^{\frac{q}{p}}$

$20^r = 5^q$, i.e. $20 = 5^{\frac{q}{r}}$

Now, $4 \times 5 = 20$

or, $5^{\frac{q}{p}} \times 5 = 5^{\frac{q}{r}}$

or, $5^{\frac{q}{p}+1} = 5^{\frac{q}{r}}$

or, $\frac{q}{p} + 1 = \frac{q}{r}$

or, $\frac{q}{p} + 1 + \frac{q}{r} = 0$

or, $q(\frac{1}{p} + \frac{1}{q} + \frac{1}{r}) = 0$

or, $\frac{1}{p} + \frac{1}{q} + \frac{1}{r} = 0$

Example 6: ***Solve: $2^x + \frac{1}{2^x} = 8\frac{1}{8}$.***

Solution:

Here, $2^x + \frac{1}{2^x} = 8\frac{1}{8}$

or, $2^x + \frac{1}{2^x} = \frac{65}{8}$

Let $2^x = a$, then equation becomes $a + \frac{1}{a} = \frac{65}{8}$

Now, $a + \frac{1}{a} = \frac{65}{8}$

or, $\frac{a^2 + 1}{a} = \frac{65}{8}$

or, $8a^2 + 8 = 65a$

or, $8a^2 - 65a + 8 = 0$

or, $8a^2 - 64a - a + 8 = 0$

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

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

Either $a - 8 = 0$ i.e. $a = 8$ or, $2^x = 2^3 \quad \therefore x = 3$

or, $8a - 1 = 0$ i.e. $a = \frac{1}{8}$ or, $2^x = \frac{1}{2^3} = 2^{-3} \quad \therefore x = -3$

Hence, $x = \pm 3$.

EXERCISE 7.2

General section

1. a) If $(a^p \times a^q) \div a^r = a^x$ then express x in terms of p, q and r.
   b) If $(b^m \div b^n) \times b^p = b^y$ then express y in terms of m, n and p.
   c) If $(x^m)^n = x^m \times x^n$, express m in terms of n.
   d) If $a^x = \sqrt{a}$, find the value of x.
   e) If $a^m = 1$, is the value of m?
   f) If $x^x = 4$, what is the value of x?

2. **Solve.**
   a) $2^x = 4$
   b) $2^{3x} = 8$
   c) $3^{\frac{x}{2}} = \frac{1}{9}$
   d) $5^x = \frac{1}{125}$
   e) $m^{x-1} = m^3$
   f) $5^{2x+3} = 1$
   g) $\frac{1}{4^{3x}} = 64$
   h) $\frac{1}{7^{x+3}} = 1$
   i) $\left(\frac{2}{3}\right)^{\frac{3}{x}} = \frac{8}{27}$
   j) $\left(\frac{4}{5}\right)^{2x} = \left(\frac{16}{25}\right)^{-2}$
   k) $2^{2x+1} = 2^{3x-1}$
   l) $3^{2x+1} = 9$
   m) $\frac{3}{3^x} = \frac{3^x}{3}$
   n) $2^{x-2} = 2 \times 8^2$
   o) $3^{3x-2} = 27 \times 9^2$
   p) $5^{3x+1} = 25$
   q) $4^{2x-1} - 2^{x+1} = 0$
   r) $9^{x+1} = \frac{1}{27^x}$
   s) $25^{2x-3} = \frac{1}{625}$
   t) $49^{x+1} = 7$

3. a) If $p^x \div p^4 = 1$, find the value of x.
   b) If $3^m \div 3^4 = 27$, find the value of
   c) If $5^t = 0.04$, find the value of t.
   d) If $10^w = \frac{1}{0.001}$, find the value of

Creative section - A

4. **Solve.**
   a) $\sqrt{2^{x+3}} = 16$
   b) $(\sqrt[3]{5})^{x-1} = 25$
   c) $(\sqrt{2})^{2x-1} = (\sqrt{4})^{x-2}$
   d) $(\sqrt{9})^{x-3} =$
   e) $(0.5)^{\frac{1}{2}} = 0.25$
   f) $(0.3)^{\frac{3y}{2}} = 0.027$
   g) $\frac{1}{2 \times 2^x} = 2^x$
   h) $\frac{1}{9 \times 3^x} = 27$

5. **Solve.**
   a) $2^{x+1} - 2^x = 8$
   b) $3^{x+1} - 3^x = 54$
   c) $2^x + 2^{x+1} = 3$
   d) $7^x + 7^{x+1} = 56$
   e) $11^{x+1} + 11^x = 12$
   f) $3^{x+2} + 3^{x+1} =$
   g) $2^x + 2^{x-1} = 3$
   h) $3^x - 3^{x-2} = 8$
   i) $3^{x+3} = 3^{x+1} +$
   j) $2^{x-2} + \frac{2^{x+3}}{2} = 1$
   k) $3^{x+3} + \frac{3^{x+4}}{3} = 162$
   l) $5^x + 5^{x+1} + 5^{x+}$
   m) $3^{2x+3} - 2.9^{x+1} = \frac{1}{9}$
   n) $9^{x-2} + 2 \times 3^{2x-3} = 63$
   o) $2^{3x-1} + 3 \times 8^{x-}$

Solve.

a) $2^{x+3} \times 3^{x+4} = 18$
b) $2^{x+3} \times 3^{x+2} = 432$
c) $2^{x-5} \times 5^{x-4} = 5$
d) $7^{2x+1} \times 5^{2x-1} = \frac{7}{5}$
e) $2^{2x-1} \times a^{x-2} = 2^{x-2} \times a^{1-x}$
f) $7^{3x-4} \times a^{4x-3} = 7^{2x-3} \times a^{x-}$

Subject- Computer

1) **Answer the following questions:**
   a) What is hyperlink in HTML? List the two types of links.
   b) What is the use of <TABLE> tag in HTML? List its attributes.
   c) What is the use of <MARQUEE> tag in HTML? List its attributes.
2) **Write full form of the following:**
   a) DNS b) TCP/IP c) HTTP d) WWW e) VOIP f) FTP
3) **Convert the numbers as indicated:**
   a) $(2AB)_{16} = (?)_{10}$ b) $(275)_8 = (?)_2$
4) **Perform the binary calculation:**
   a) 11100 - 11001 b) 11101 + 10111

Subject-HPE

Homework will be given in Google classroom.

Subject- Science

1. Define mechanical advantage and efficiency of a simple machine. What factor affects MA of a machine?
2. State law of moment of force. Define Clockwise and anticlockwise moment.
3. What should be done to lift the same load by applying less effort on an incline plane?
4. A man is riding bicycle, whose paddle is at a distance of 20cm from the fulcrum. The man can exert the force of 40N. What is the moment produced on the crank of the bicycle when the paddle makes the angle of (i) 90^0 (ii) 45^0 and (iii) 30^0 with the line of action of force?

The End.