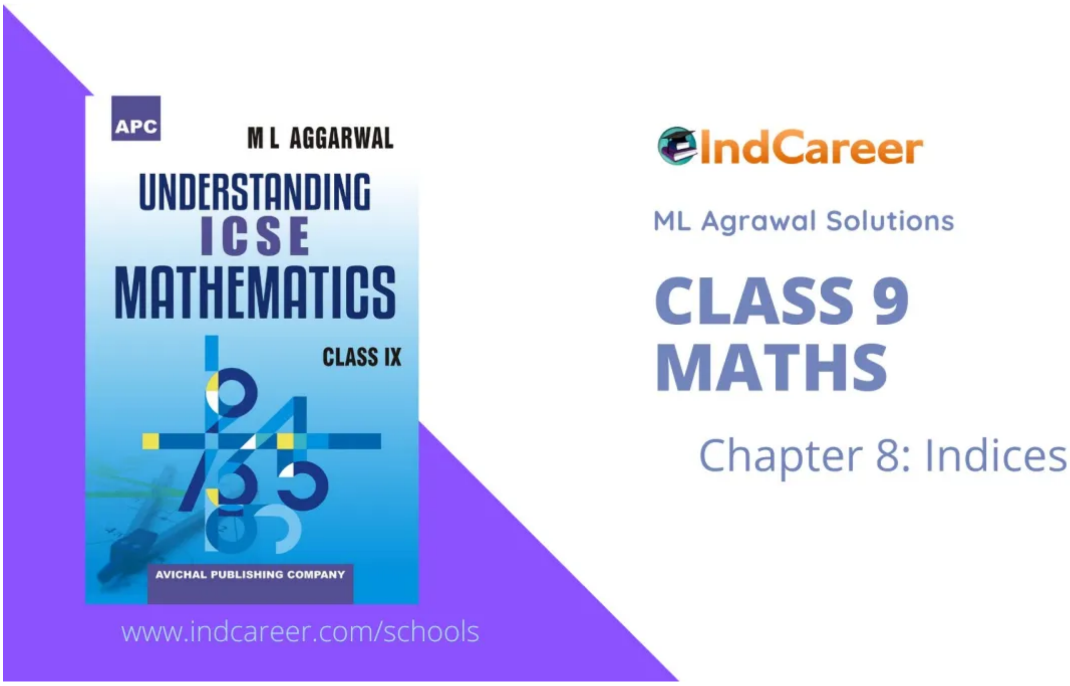
ML Aggarwal Solutions for Class 9 Maths Chapter 8- Indices



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ML Aggarwal Solutions for Class 9 Maths Chapter 8- Indices

ML Aggarwal 9th Maths Chapter 8, Class 9 Maths Chapter 8 solutions

Exercise 8

Simplify the following (1 to 20):

1. (i) $(81/16)^{-3/4}$

Solution:

$(81/16)^{-3/4}$

$= [(3^4/2^4)]^{-3/4}$

$= [(3/2)^4]^{-3/4}$

$= (3/2)^{-3/4 \times 4}$

$= (3/2)^{-3}$

$= (2/3)^3$

$= 2^3/3^3$

$= (2 \times 2 \times 2)/(3 \times 3 \times 3)$

$= 8/27$

(ii) $\left(1\frac{61}{64}\right)^{-\frac{2}{3}}$

Solution:

$$(1\tfrac{61}{64})^{-\frac{2}{3}} = (\frac{125}{64})^{-\frac{2}{3}} = (\frac{5^3}{4^3})^{-\frac{2}{3}}$$

= $(5/4)^{3 \times -2/3}$

= $(5/4)^{-2}$

= $(4/5)^2$

= 16/25

2. (i) $(2a^{-3}b^2)^3$

Solution:

$(2a^{-3}b^2)^3$

= $2^3\ a^{-3\times3}\ b^{2\times3}$

= $8a^{-1}b^6$

(ii) $(a^{-1} + b^{-1})/(ab)^{-1}$

Solution:

$$\frac{a^{-1}+b^{-1}}{(ab)^{-1}} = \frac{\frac{1}{a}+\frac{1}{b}}{\frac{1}{ab}} = \frac{a+b}{ab} \times \frac{ab}{1} = a+b$$

3. (i) $(x^{-1}\ y^{-1})/(x^{-1} + y^{-1})$

Solution:

$$\frac{x^{-1}y^{-1}}{x^{-1}+y^{-1}}=\frac{(xy)^{-1}}{\frac{1}{x}+\frac{1}{y}}$$
$$=\frac{\frac{1}{xy}}{\frac{xy}{x+y}}=\frac{1}{xy}\times\frac{xy}{x+y}$$
$$=\frac{1}{x+y}$$

(ii) (4 x 10^{7}) (6 x 10^{-5})/(8 x 10^{10})

Solution:

$$\frac{(4\times10^{7})(6\times10^{-5})}{8\times10^{10}}$$
$$=\frac{4\times6\times10^{7}\times10^{-5}}{8\times10^{10}}$$
$$=\frac{24\times10^{7+(-5)}}{8\times10^{10}}$$
$$=3\times\frac{10^{2}}{10^{10}}=3\times10^{2-10}=3\times10^{-8}$$

4. (i) 3a/b^{-1} + 2b/a^{-1}

Solution:

3a/b^{-1} + 2b/a^{-1}

= 3a/(1/b) + 2b/(1/a)

= (3a x b)/1 + (2b x a)/1

= 3ab + 2ab = 5ab

(ii) $5^0 \times 4^{-1} + 8^{1/3}$

Solution:

$5^0 \times 4^{-1} + 8^{1/3}$

$= 1 \times (1/4) + (2)^{3 \times 1/3}$

$= ¼ + 2$

$= (1 + 8)/4$

$= 9/4 = 2¼$

5. (i) $(8/125)^{-1/3}$

Solution:

$(8/125)^{-1/3}$

$= [(2 \times 2 \times 2)/(5 \times 5 \times 5)]^{-1/3}$

$= (2^3/5^3)^{-1/3}$

$= (2/5)^{3 \times -1/3}$

$= (2/5)^{-1}$

$= 5/2 = 2½$

(ii) $(0.027)^{-1/3}$

Solution:

$(0.027)^{-1/3}$

$= (27/1000)^{-1/3}$

$= [(3 \times 3 \times 3)/(10 \times 10 \times 10)]^{-1/3}$

$= (3^3/10^3)^{-1/3}$

$= (3/10)^{3 \times -1/3}$

$= (3/10)^{-1}$

$= 10/3$

6. (i) $(-1/27)^{-2/3}$

Solution:

$(-1/27)^{-2/3}$

$= (-1/3^3)^{-2/3}$

$= (-1/3)^{3 \times -2/3}$

$= (-1/3)^{-2}$

$= (-3)^2$

= 9

(ii) $(64)^{-2/3} \div 9^{-3/2}$

Solution:

$(64)^{-2/3} \div 9^{-3/2}$

We can write it as

$= (4^3)^{-2/3} \div (3^2)^{-3/2}$

By further calculation

$= 4^{3 \times -2/3} \div 3^{2 \times -3/2}$

So we get

$= 4^{-2} \div 3^{-3}$

$= 4^{-2} / 3^{-3}$

It can be written as

$= 1/4^2 / 1/3^3$

$= 3^3/4^2$

We get

= 27/16

= 1 11/16

$$7.(i)\frac{(27)^{\frac{2n}{3}}\times(8)^{\frac{-n}{6}}}{(18)^{\frac{-n}{2}}}$$

$$(ii)\frac{5.(25)^{n+1}-25.(5)^{2n}}{5.(5)^{2n+3}-(25)^{n+1}}.$$

Solution:

$$(i)\frac{(27)^{\frac{2n}{3}}\times(8)^{\frac{-n}{6}}}{(18)^{\frac{-n}{2}}}$$

$We\ can\ write\ it\ as$

$$=\frac{(3\times3\times3)^{\frac{2n}{3}}\times(2\times2\times2)^{\frac{-n}{6}}}{(2\times3\times3)^{\frac{-n}{2}}}$$

$By\ further\ calculation$

$$=\frac{(3)^{3\times\frac{2n}{3}}\times(2)^{3\times\frac{-n}{6}}}{(2\times3^2)^{\frac{-n}{2}}}$$

$$=\frac{(3)^{2n}\times(2)^{\frac{-n}{2}}}{(2)^{\frac{-n}{2}}\times(3)^{2\times\frac{-n}{2}}}$$

$So\ we\ get$

$$=\frac{(3)^{2n}\times1}{1\times3^{-n}}$$

It can be written as

$= (3)^{2n} \times (3)^{n}$

$= 3^{2n+n}$

$= 3^{3n}$

$$(ii)\frac{5.(25)^{n+1}-25.(5)^{2n}}{5.(5)^{2n+3}-(25)^{n+1}}$$

$We\ can\ write\ it\ as$

$$=\frac{5.(5\times 5)^{n+1}-(5\times 5).(5)^{2n}}{5.(5)^{2n+3}-(5\times 5)^{n+1}}$$

$$=\frac{5.(5)^{2(n+1)}-(5)^{2}.(5)^{2n}}{5^{3}.(5)^{2n+3}-(5)^{2(n+1)}}$$

$By\ further\ calculation$

$$=\frac{(5)^{2(n+1)+1}-(5)^{2\times 2n}}{(5)^{2n+3+1}-(5)^{2n+2}}$$

$$=\frac{(5)^{2n+3}-(5)^{2n+2}}{(5)^{2n+4}-(5)^{2n+2}}$$

$On\ further\ simplification$

$$=\frac{(5)^{2n}.(5)^{3}-(5)^{2n}.(5)^{2}}{(5)^{2n}.(5)^{4}-(5)^{2n}.(5)^{2}}$$

$Taking\ out\ the\ common\ terms$

$$=\frac{(5)^{2n}[(5)^{3}-(5)^{2}]}{(5)^{2n}[(5)^{4}-(5)^{2}]}$$

$So\ we\ get$

$$=\frac{125-25}{625-25}$$

= 100/600

= 1/6

$$\mathbf{8.(i)[8^{\frac{-4}{3}}\div 2^{-2}]^{\frac{1}{2}}}$$

$$\mathbf{(ii)(\frac{27}{3})^{2/3}-(\frac{1}{4})^{-2}+5^{0}.}$$

Solution:

$$(i)[8^{\frac{-4}{3}} \div 2^{-2}]^{\frac{1}{2}}$$

It can be written as

$$= [(2 \times 2 \times 2)^{\frac{-4}{3}} \div (2)^{-2}]^{\frac{1}{2}}$$

By further calculation

$$= [(2)^{3\times\frac{-4}{3}} \div \frac{1}{(2)^2}]^{\frac{1}{2}}$$

$$= [(2)^{-4} \div \frac{1}{4}]^{\frac{1}{2}}$$

On further simplification

$$= [\frac{1}{(2)^4} \div \frac{1}{4}]^{\frac{1}{2}}$$

$$= [\frac{1}{2 \times 2 \times 2 \times 2} \times \frac{4}{1}]^{\frac{1}{2}}$$

So we get

$$= [\frac{4}{16}]^{\frac{1}{2}}$$

$$= [\frac{1}{4}]^{\frac{1}{2}}$$

We can write it as

$$= [\frac{1}{2} \times \frac{1}{2}]^{\frac{1}{2}}$$

$$= [\frac{1}{2}]^{2\times\frac{1}{2}}$$

$= (1/2)^1$

= ½

$$(ii)\left(\frac{27}{8}\right)^{2/3}-\left(\frac{1}{4}\right)^{-2}+5^{0}$$

We can write it as

$$=\left(\frac{3\times3\times3}{2\times2\times2}\right)^{2/3}-\left(\frac{1\times1}{2\times2}\right)^{-2}+1$$
$$=\left(\frac{3}{2}\times\frac{3}{2}\times\frac{3}{2}\right)^{2/3}-\left(\frac{1}{2}\times\frac{1}{2}\right)^{-2}+1$$

By further calculation

$$=\left[\left(\frac{3}{2}\right)^{3}\right]^{2/3}-\left[\left(\frac{1}{2}\right)^{2}\right]^{-2}+1$$
$$=\left(\frac{3}{2}\right)^{3\times\frac{2}{3}}-\left(\frac{1}{2}\right)^{2\times-2}+1$$

So we get

$$=\left(\frac{3}{2}\right)^{2}-\left(\frac{1}{2}\right)^{-4}+1$$

It can be written as

$$=\frac{3}{2}\times\frac{3}{2}-\frac{1}{(\frac{1}{2})^{4}}+1$$
$$=\frac{9}{4}-\frac{1}{\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}}+1$$

We get

$$=\frac{9}{4}-\frac{1}{(\frac{1}{16})}+1$$
$$=\frac{9}{4}-\frac{1\times16}{1}+1$$

By further calculation

$$=\frac{9}{4}-16+1$$
$$=\frac{9}{4}-15$$

Taking LCM

$$=\frac{9-60}{4}$$
$$=\frac{-51}{4}$$
$$=-12\frac{3}{4}$$

9. (i) $(3x^2)^{-3} \times (x^9)^{2/3}$

(ii) $(8x^4)^{1/3} \div x^{1/3}$.

Solution:

(i) $(3x^2)^{-3} \times (x^9)^{2/3}$

We can write it as

$$= \frac{1}{(3x^2)^3} \times (x^9)^{\frac{2}{3}}$$
$$= \frac{1}{(3)^3(x^2)^3} \times (x)^{3\times 2}$$
$$By\ further\ calculation$$
$$= \frac{1}{(3\times 3\times 3)\times (x)^{2\times 3}} \times x^6$$
$$So\ we\ get$$
$$= \frac{1}{27x^6} \times x^6$$
$$= \frac{x^6}{27x^6}$$
$$= \frac{1}{27}$$

(ii) $(8x^4)^{1/3} \div x^{1/3}$

We can write it as

$$= (8)^{\frac{1}{3}}(x^4)^{\frac{1}{3}} \div (x)^{\frac{1}{3}}$$
$$= \frac{(2\times 2\times 2)^{\frac{1}{3}}(x^4)^{\frac{1}{3}}}{x^{\frac{1}{3}}}$$
$$By\ further\ calculation$$
$$= \frac{(2)^{3\times\frac{1}{3}}(x)^{\frac{4}{3}}}{x^{\frac{1}{3}}}$$
$$= (2)^1(x)^{\frac{4}{3}-\frac{1}{3}}$$
$$Taking\ LCM$$
$$= (2)^1 \times x^{(\frac{4-1}{3})}$$

= 2 × $x^{3/3}$

So we get

$= 2 \times x^1$

$= 2 \times x$

$= 2x$

10. (i) $(3^2)^0 + 3^{-4} \times 3^6 + (1/3)^{-2}$

(ii) $9^{5/2} – 3.(5)^0 – (1/81)^{-1/2}$

Solution:

(i) $(3^2)^0 + 3^{-4} \times 3^6 + (1/3)^{-2}$

We can write it as

$$= (3)^{2\times 0} + (3)^{-4+6} + \frac{1}{(\frac{1}{3})^2}$$
$$= (3)^0 + (3)^2 + \frac{1}{\frac{1}{3} \times \frac{1}{3}}$$
$$By\ further\ calculation$$
$$= 1 + 9 + \frac{1}{\frac{1}{9}}$$
$$= 1 + 9 + \frac{9 \times 1}{1}$$

So we get

= 1 + 9 + 9

= 19

(ii) $9^{5/2} – 3.(5)^0 – (1/81)^{-1/2}$

We can write it as

$$= (3 \times 3)^{\frac{5}{2}} - 3 \times 1 - \frac{1}{(\frac{1}{81})^{1/2}}$$

$$By\ further\ calculation$$

$$= (3)^{2 \times \frac{5}{2}} - 3 - \frac{1}{(\frac{1}{9} \times \frac{1}{9})^{1/2}}$$

$$= (3)^{5} - 3 - \frac{1}{(\frac{1}{9})^{2 \times \frac{1}{2}}}$$

$$So\ we\ get$$

$$= (3)^{5} - 3 - \frac{1}{(\frac{1}{9})^{1}}$$

$$= (3 \times 3 \times 3 \times 3 \times 3) - 3 - \frac{1}{(\frac{1}{9})}$$

Here

= 243 – 3 – (9 × 1)/1

= 240 – 9

= 231

11. (i) $16^{3/4}$ + 2 $(1/2)^{-1}$ $(3)^0$

(ii) $(81)^{3/4}$ – $(1/32)^{-2/5}$ + $(8)^{1/3}$ $(1/2)^{-1}$ $(2)^0$.

Solution:

(i) $16^{3/4}$ + 2 $(1/2)^{-1}$ $(3)^0$

We can write it as

$$= (2 \times 2 \times 2 \times 2)^{\frac{3}{4}} + 2 \times \frac{1}{(\frac{1}{2})^{1}} \times 1$$

$$By\ further\ calculation$$

$$= (2)^{4 \times \frac{3}{4}} + 2 \times \frac{2}{1} \times 1$$

So we get

= $(2)^3 + 4$

= 2 × 2 × 2 + 4

= 8 + 4

= 12

(ii) $(81)^{3/4} - (1/32)^{-2/5} + (8)^{1/3} (1/2)^{-1} (2)^0$

We can write it as

$$= (3 \times 3 \times 3 \times 3)^{\frac{3}{4}} - (\frac{1}{2 \times 2 \times 2 \times 2 \times 2})^{\frac{-2}{5}} + (2 \times 2 \times 2)^{\frac{1}{3}} \times \frac{1}{(\frac{1}{2})^1} \times 1$$

$$By\ further\ calculation$$

$$= (3)^{4 \times \frac{3}{4}} - (\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2})^{\frac{-2}{5}} + (2)^{3 \times \frac{1}{3}} \times \frac{1 \times 2}{1} \times 1$$

$$= (3)^3 - (\frac{1}{2})^{5 \times \frac{-2}{5}} + 2 \times 2 \times 1$$

$$So\ we\ get$$

$$= (3 \times 3 \times 3) - (\frac{1}{2})^{-2} + 4$$

$$= 27 - \frac{1}{(\frac{1}{2})^2} + 4$$

$$= 27 - \frac{1}{\frac{1}{2} \times \frac{1}{2}} + 4$$

$$Here$$

$$= 27 - \frac{1}{\frac{1}{4}} + 4$$

$$= 27 - \frac{4 \times 1}{1} + 4$$

= 27 – 4 + 4

= 27

$$12.(i)\left(\frac{64}{125}\right)^{\frac{-2}{3}} \div \frac{1}{\left(\frac{256}{625}\right)^{\frac{1}{4}}} + \left(\frac{\sqrt{25}}{\sqrt[3]{64}}\right)^{0}$$

$$(ii)\frac{5^{n+3} - 6 \times 5^{n+1}}{9 \times 5^{n} - 2^{2} \times 5^{n}}.$$

Solution:

$$(i)\left(\frac{64}{125}\right)^{\frac{-2}{3}} \div \frac{1}{\left(\frac{256}{625}\right)^{\frac{1}{4}}} + \left(\frac{\sqrt{25}}{\sqrt[3]{64}}\right)^{0}$$

We can write it as

$$= \left(\frac{4 \times 4 \times 4}{5 \times 5 \times 5}\right)^{\frac{-2}{3}} \div \frac{1}{\left(\frac{4\times4\times4\times4}{5\times5\times5\times5}\right)^{\frac{1}{4}}} + 1$$

$$= \left(\frac{4 \times 4 \times 4}{5 \times 5 \times 5}\right)^{\frac{-2}{3}} \div \frac{1}{\left(\frac{4}{5} \times \frac{4}{5} \times \frac{4}{5} \times \frac{4}{5}\right)^{\frac{1}{4}}} + 1$$

By further calculation

$$= \left(\frac{4}{5}\right)^{3\times\frac{-2}{3}} \div \frac{1}{\left(\frac{4}{5}\right)^{4\times\frac{1}{4}}} + 1$$

$$= \left(\frac{4}{5}\right)^{-2} \div \frac{1}{\frac{4}{5}} + 1$$

So we get

$$= \frac{1}{\left(\frac{4}{5}\right)^{2}} \div \frac{5 \times 1}{4} + 1$$

$$= \frac{1}{\frac{4}{5} \times \frac{4}{5}} \div \frac{5}{4} + 1$$

On further simplification

$$= \frac{1}{\frac{16}{25}} \times \frac{4}{5} + 1$$

$$= \frac{25 \times 1}{16} \times \frac{4}{5} + 1$$

We get

$$= \frac{5}{4} + 1$$

Taking LCM

$$= \frac{5+4}{4}$$

= 9/4

= 2 ¼

$$(ii)\frac{5.(25)^{n+1}-25.(5)^{2n}}{5.(5)^{2n+3}-(25)^{n+1}}$$

$We\ can\ write\ it\ as$

$$=\frac{5^n.5^3-6\times 5^n.5}{9\times 5^n-4.5^n}$$

$Taking\ 5^n\ as\ common$

$$=\frac{5^n(5^3-6\times 5)}{5^n(9-4)}$$

$By\ further\ calculation$

$$=\frac{5^3-30}{5}$$

$$=\frac{125-30}{5}$$

$So\ we\ get$

$$=\frac{95}{5}$$

= 19

13. (i) $[(64)^{-2/3}\ 2^{-2} + 8^0]^{-1/2}$

(ii) $3^n \times 9^{n+1} \div (3^{n-1} \times 9^{n-1})$.

Solution:

(i) $[(64)^{-2/3}\ 2^{-2} + 8^0]^{-1/2}$

We can write it as

$$= [(4 \times 4 \times 4)^{\frac{2}{3}} \times \frac{1}{(2)^2} \div 1]^{\frac{-1}{2}}$$

By further calculation

$$= [(4)^{3\times\frac{2}{3}} \times \frac{1}{2 \times 2} \div 1]^{\frac{-1}{2}}$$

$$= [(4)^2 \times \frac{1}{4} \div 1]^{\frac{-1}{2}}$$

So we get

$$= [4 \times 4 \times \frac{1}{4} \times 1]^{\frac{-1}{2}}$$

$= [4 \times 1 \times 1]^{-1/2}$

$= (4)^{-1/2}$

Here

$= (2 \times 2)^{-1/2}$

$= (2)^{2 \times -1/2}$

$= (2)^{-1}$

$= 1/(2)^1$

= ½

(ii) $3^n \times 9^{n+1} \div (3^{n-1} \times 9^{n-1})$

We can write it as

$= 3^n \times (3 \times 3)^{n+1} \div (3^{n-1} \times (3 \times 3)^{n-1})$

By further calculation

$= 3^n \times (3)^{2 \times (n+1)} \div (3^{n-1} \times (3)^{2(n-1)}])$

$= 3^n \times (3)^{2n+2} \div (3^{n-1} \times (3)^{2n-2})$

So we get

$= (3)^{n+2n+2} \div (3)^{n-1+2n-2}$

= $(3)^{3n + 2} \div (3)^{3n - 3}$

Here

= $(3)^{3n + 2 - 3n + 3}$

= $(3)^5$

We get

= 3 × 3 × 3 × 3 × 3

= 243

$$\mathbf{14.(i)}\ \frac{\sqrt{2^2} \times \sqrt[4]{256}}{\sqrt[3]{64}} - \left(\frac{1}{2}\right)^{-2}$$

$$\mathbf{(ii)}\ \frac{3^{-\frac{6}{7}} \times 4^{-\frac{3}{7}} \times 9^{\frac{3}{7}} \times 2^{\frac{6}{7}}}{2^2 + 2^0 + 2^{-2}}.$$

Solution:

$$(i) \frac{\sqrt{2^2} \times \sqrt[4]{256}}{\sqrt[3]{64}} - (\frac{1}{2})^{-2}$$

$We\ can\ write\ it\ as$

$$= \frac{(2^2)^{\frac{1}{2}} \times (256)^{\frac{1}{4}}}{(64)^{\frac{1}{3}}} - (\frac{1}{2})^{-2}$$

$By\ further\ calculation$

$$= \frac{(2)^{2\times\frac{1}{2}} \times (4 \times 4 \times 4 \times 4)^{\frac{1}{4}}}{(4 \times 4 \times 4)^{\frac{1}{3}}} - (\frac{1}{2})^{-2}$$

$$= \frac{(2)^1 \times (4)^{4\times\frac{1}{4}}}{(4)^{3\times\frac{1}{3}}} - \frac{1}{(\frac{1}{2})^2}$$

$So\ we\ get$

$$= \frac{2 \times (4)^1}{(4)^1} - \frac{1}{\frac{1}{2} \times \frac{1}{2}}$$

$$= \frac{2 \times 1}{1} - \frac{1}{\frac{1}{4}}$$

$Here$

$$= 2 - \frac{1 \times 4}{1}$$

= 2 – 4

= – 2

$$(ii)\ \frac{3^{-\frac{6}{7}} \times 4^{-\frac{3}{7}} \times 9^{\frac{3}{7}} \times 2^{\frac{6}{7}}}{2^2 + 2^0 + 2^{-2}}$$

We can write it as

$$= \frac{(3)^{-\frac{6}{7}} \times (2 \times 2)^{-\frac{3}{7}} \times (3 \times 3)^{\frac{3}{7}} \times (2)^{\frac{6}{7}}}{(2 \times 2) + 1 + \frac{1}{(2)^2}}$$

By further calculation

$$= \frac{(3)^{-\frac{6}{7}} \times (2)^{2\times-\frac{3}{7}} \times (3)^{2\times\frac{3}{7}} \times (2)^{\frac{6}{7}}}{4 + 1 + \frac{1}{(2\times2)}}$$

$$= \frac{(3)^{-\frac{6}{7}} \times (2)^{-\frac{6}{7}} \times (3)^{\frac{6}{7}} \times (2)^{\frac{6}{7}}}{5 + \frac{1}{(4)}}$$

So we get

$$= \frac{(3)^{\frac{6}{7}+\frac{6}{7}} \times (2)^{\frac{-6}{7}+\frac{6}{7}}}{\frac{5\times4+1}{4}}$$

$$= \frac{(3)^0 \times (2)^0}{\frac{21}{4}}$$

Here

$$= \frac{1 \times 1}{\frac{21}{4}}$$

$$= \frac{1 \times 1 \times 4}{21}$$

$$= \frac{4}{21}$$

15. $(\mathbf{i})\ \dfrac{(32)^{\frac{2}{5}} \times (4)^{-\frac{1}{2}} \times (8)^{\frac{1}{3}}}{2^{-2} \div (64)^{-1/3}}$

$(\mathbf{ii})\ \dfrac{5^{2(x+6)} \times (25)^{-7+2x}}{(125)^{2x}}$.

Solution:

$$(i)\frac{(32)^{\frac{2}{5}} \times (4)^{-\frac{1}{2}} \times (8)^{\frac{1}{3}}}{2^{-2} \div (64)^{-1/3}}$$

$We\ can\ write\ it\ as$

$$= \frac{(2\times2\times2\times2\times2)^{\frac{2}{5}} \times (2\times2)^{-\frac{1}{2}} \times (2\times2\times2)^{\frac{1}{3}}}{\frac{1}{(2)^2} \div \frac{1}{(64)^{1/3}}}$$

$By\ further\ calculation$

$$= \frac{(2)^{5\times\frac{2}{5}} \times (2)^{2\times-\frac{1}{2}} \times (2)^{3\times\frac{1}{3}}}{\frac{1}{2\times2} \div \frac{1}{(4\times4\times4)^{\frac{1}{3}}}}$$

$$= \frac{(2)^2 \times (2)^{-1} \times (2)^1}{\frac{1}{4} \div \frac{1}{(4)^{3\times\frac{1}{3}}}}$$

$On\ further\ simplification$

$$= \frac{4 \times \frac{1}{(2)^1} \times 2}{\frac{1}{4} \div \frac{1}{(4)^1}}$$

$So\ we\ get$

$$= \frac{4 \times \frac{1}{1} \times 1}{\frac{1}{4} \times 4}$$

$$= \frac{4}{1}$$

= 4

$$(ii)\frac{5^{2(x+6)} \times (25)^{-7+2x}}{(125)^{2x}}$$

$We\ can\ write\ it\ as$

$$= \frac{5^{2(x+6)} \times (5 \times 5)^{-7+2x}}{(5 \times 5 \times 5)^{2x}}$$

$By\ further\ calculation$

$$= \frac{(5)^{2x+12} \times (5)^{2(-7+2x)}}{[(5)^3]^{2x}}$$

$$= \frac{(5)^{2x+12} \times (5)^{-14+4x}}{(5)^{6x}}$$

$On\ further\ simplification$

$$= \frac{(5)^{2x+12+(-14+4x)}}{(5)^{6x}}$$

$$= \frac{(5)^{2x+12-14+4x}}{(5)^{6x}}$$

$So\ we\ get \qquad = \frac{(5)^{6x-2}}{(5)^{6x}}$

$= 5^{6x-2-6x}$

$= 5^{-2}$

$= 1/(5)^2$

= 1/25

$$\mathbf{16. (i)} \frac{7^{2n+3} - (49)^{n+2}}{((343)^{n+1})^{2/3}}$$

$$\mathbf{(ii)} (27)^{\frac{4}{3}} + (32)^{0.8} + (0.8)^{-1}.$$

Solution:

$$(i)\ \frac{7^{2n+3}-(49)^{n+2}}{((343)^{n+1})^{2/3}}$$

$We\ can\ write\ it\ as$

$$=\frac{7^{2n+3}-(7\times 7)^{n+2}}{((7\times 7\times 7)^{n+1})^{2/3}}$$

$By\ further\ calculation$

$$=\frac{(7)^{2n}.(7)^{3}-[(7)^{2}]^{n+2}}{((7)^{3(n+1)})^{\frac{2}{3}}}$$

$$=\frac{(7)^{2n}.(7)^{3}-(7)^{2(n+2)}}{(7)^{3(n+1)\times\frac{2}{3}}}$$

$On\ further\ simplfication$

$$=\frac{(7)^{2n}.(7)^{3}-(7)^{2n}.(7)^{4}}{(7)^{2(n+1)}}$$

$$=\frac{(7)^{2n}[(7)^{3}-(7)^{4}]}{(7)^{2n}.(7)^{2}}$$

$So\ we\ get$

$$=\frac{(7)^{3}-(7)^{4}}{(7)^{2}}$$

$It\ can\ be\ written\ as$

$$=\frac{7\times 7\times 7-7\times 7\times 7\times 7}{7\times 7}$$

$$=\frac{7\times 7(7-7\times 7)}{7\times 7}$$

$So\ we\ get$

$$=\frac{1\times(7-7\times 7)}{1}$$

= 7 – 7 × 7

= 7 – 49

= – 42

(ii) $(27)^{4/3} + (32)^{0.8} + (0.8)^{-1}$

We can write it as

$$= (3 \times 3 \times 3)^{\frac{4}{3}} + (2 \times 2 \times 2 \times 2 \times 2)^{0.8} + \frac{1}{(0.8)^1}$$

$By\ further\ calculation$

$$= (3)^{3 \times \frac{4}{3}} + (2)^{5 \times 0.8} + \frac{1}{0.8}$$

$$= (3)^4 + (2)^{4.0} + \frac{10}{8}$$

$So\ we\ get$

$$= (3 \times 3 \times 3 \times 3) + (2 \times 2 \times 2 \times 2) + \frac{5}{4}$$

$$= 81 + 16 + \frac{5}{4}$$

$On\ further\ simplification$

$$= \frac{97}{1} + \frac{5}{4}$$

$Taking\ LCM$

$$= \frac{97 \times 4 + 5 \times 1}{4}$$

$$= \frac{388 + 5}{4}$$

$$= \frac{393}{4}$$

= 98.25

$\mathbf{17.(i)(\sqrt{32} - \sqrt{5})^{\frac{1}{3}}(\sqrt{32} + \sqrt{5})^{\frac{1}{3}}}$

$\mathbf{(ii)(x^{\frac{1}{3}} - x^{-\frac{1}{3}})(x^{\frac{2}{3}} + 1 + x^{-\frac{2}{3}})}.$

Solution:

$(i)(\sqrt{32}-\sqrt{5})^{\frac{1}{3}}(\sqrt{32}+\sqrt{5})^{\frac{1}{3}}$

$We\ can\ write\ it\ as$

$=[(\sqrt{32}-\sqrt{5})(\sqrt{32}+\sqrt{5})]^{\frac{1}{3}}$

$=[(\sqrt{32})^2-(\sqrt{5})^2]^{\frac{1}{3}}$

$By\ further\ calculation$

$=(32-5)^{\frac{1}{3}}$

$=(27)^{\frac{1}{3}}$

$So\ we\ get$

$=(3\times 3\times 3)^{\frac{1}{3}}$

$=(3)^{3\times\frac{1}{3}}$

= $(3)^1$

= 3

$(ii)(x^{\frac{1}{3}}-x^{-\frac{1}{3}})(x^{\frac{2}{3}}+1+x^{-\frac{2}{3}})$

$We\ can\ write\ it\ as$

$=(x^{\frac{1}{3}}-x^{-\frac{1}{3}})[(x^{\frac{1}{3}})^2+x^{\frac{1}{3}}\times x^{-\frac{1}{3}}+(x^{-\frac{1}{3}})^2]$

$By\ further\ calculation$

$=(x^{\frac{1}{3}})^3-(x^{-\frac{1}{3}})^3$

$=x^{3\times\frac{1}{3}}-x^{3\times-\frac{1}{3}}$

$So\ we\ get$

$=x-\frac{1}{(x)^1}$

$=x-\frac{1}{x}$

$\mathbf{18.(i)}(\frac{x^m}{x^n})^1.(\frac{x^n}{x^1})^m.(\frac{x^1}{x^m})^n$

$\mathbf{(ii)}(\frac{x^{a+b}}{x^c})^{a-b}.(\frac{x^{b+c}}{x^a})^{b-c}.(\frac{x^{c+a}}{x^b})^{c-a}.$

Solution:

$$(i)\left(\frac{x^m}{x^n}\right)^1 . \left(\frac{x^n}{x^1}\right)^m . \left(\frac{x^1}{x^m}\right)^n$$

We can write it as

= $(x^{m-n})^l. (x^{n-1})^m. (x^{1-m})^n$

By further calculation

= $(x)^{(m-n)l}. (x)^{(n-1)m}. (x)^{(l-m)n}$

= $x^{ml-nl}. x^{nm-lm}. x^{ln-mn}$

So we get

= $x^{ml-nl+nm-lm+ln-mn}$

= x^0

= 1

$$(ii)\left(\frac{x^{a+b}}{x^c}\right)^{a-b} . \left(\frac{x^{b+c}}{x^a}\right)^{b-c} . \left(\frac{x^{c+a}}{x^b}\right)^{c-a} .$$

We can write it as

= $(x^{a+b-c})^{a-b}. (x^{b+c-a})^{b-c}. (x^{c+a-b})^{c-a}$

By further calculation

= $x^{(a+b-c)(a-b)}. x^{(b+c-a)(b-c)}. x^{(c+a-b)(c-a)}$

So we get $= x^{a^2-b^2-ac+bc+b^2-c^2-ab+ac+c^2-a^2-bc+ab}$

= x^0

= 1

19. (i) $\sqrt[lm]{\frac{x^l}{x^m}} . \sqrt[mn]{\frac{x^m}{x^n}} . \sqrt[nl]{\frac{x^n}{x^l}}$

(ii) $\left(\frac{x^a}{x^b}\right)^{a^2+ab+b^2} . \left(\frac{x^b}{x^c}\right)^{b^2+bc+c^2} . \left(\frac{x^c}{x^a}\right)^{c^2+ac+a^2}$

(iii) $\left(\frac{x^a}{x^{-b}}\right)^{a^2-ab+b^2} . \left(\frac{x^b}{x^{-c}}\right)^{b^2-bc+c^2} . \left(\frac{x^c}{x^a}\right)^{c^2-ca+a^2}$.

Solution:

$(i)\ \sqrt[lm]{\frac{x^l}{x^m}} . \sqrt[mn]{\frac{x^m}{x^n}} . \sqrt[nl]{\frac{x^n}{x^l}}$

$We\ can\ write\ it\ as$

$= \sqrt[lm]{x^{l-m}} . \sqrt[mn]{x^{m-n}} . \sqrt[nl]{x^{n-l}}$

$By\ further\ calculation$

$= x^{\frac{l-m}{lm}} . x^{\frac{m-n}{mn}} . x^{\frac{n-l}{nl}}$

$= x^{\frac{l-m}{lm} + \frac{m-n}{mn} + \frac{n-l}{nl}}$

$So\ we\ get$

$= x^{\frac{nl-mn+lm-nl+mn-lm}{lmn}}$

= x^0

= 1

$$(ii)(\frac{x^a}{x^b})^{a^2+ab+b^2}.(\frac{x^b}{x^c})^{b^2+bc+c^2}.(\frac{x^c}{x^a})^{c^2+ac+a^2}$$

$We\ can\ write\ it\ as$

$$= (x^{a-b})^{a^2+ab+b^2}.(x^{b-c})^{b^2+bc+c^2}.(x^{c-a})^{c^2+ac+a^2}$$

$By\ further\ calculation$

$$= x^{(a-b)(a^2+ab+b^2)}.x^{(b-c)(b^2+bc+c^2)}.x^{(c-a)(c^2+ac+a^2)}$$

$$= x^{a^3-b^3}.x^{b^3-c^3}.x^{c^3-a^3}$$

$So\ we\ get$

$$= x^{a^3-b^3+b^3-c^3+c^3-a^3}$$

= x^0

= 1

$$(iii)(\frac{x^a}{x^{-b}})^{a^2-ab+b^2}.(\frac{x^b}{x^{-c}})^{b^2-bc+c^2}.(\frac{x^c}{x^{-a}})^{c^2-ca+a^2}$$

$We\ can\ write\ it\ as$

$$= (x^{a+b})^{a^2-ab+b^2}.(x^{b+c})^{b^2-bc+c^2}.(x^{c+a})^{c^2-ca+a^2}$$

$By\ further\ calculation$

$$= x^{(a+b)(a^2-ab+b^2)}.x^{(b+c)(b^2-bc+c^2)}.x^{(c+a)(c^2-ca+a^2)}$$

$$= x^{a^3+b^3}.x^{b^3+c^3}.x^{c^3+a^3}$$

$So\ we\ get$

$$= x^{a^3+b^3+b^3+c^3+c^3+a^3}$$

$$= x^{2a^3+2b^3+2x^3}$$

$$= x^{2(a^3+b^3+c^3)}$$

20. (i) $(a^{-1} + b^{-1}) \div (a^{-2} - b^{-2})$

$$\text{(ii)} \frac{1}{1 + a^{m-n}} + \frac{1}{1 + a^{n-m}}.$$

Solution:

(i) $(a^{-1} + b^{-1}) \div (a^{-2} - b^{-2})$

We can write it as

$$= (\frac{1}{a} + \frac{1}{b}) \div (\frac{1}{a^2} - \frac{1}{b^2})$$

$Taking\ LCM$

$$= (\frac{b+a}{ab}) \div (\frac{b^2 - a^2}{a^2 b^2})$$

$By\ further\ calculation$

$$= \frac{b+a}{ab} \times \frac{a^2 b^2}{b^2 - a^2}$$

$$= \frac{b+a}{ab} \times \frac{(ab)(ab)}{(b-a)(b+a)}$$

$So\ we\ get$

$$= \frac{1}{1} \times \frac{ab \times 1}{(b-a) \times 1}$$

$$= \frac{ab}{b-a}$$

$$(ii) \frac{1}{1 + a^{m-n}} + \frac{1}{1 + a^{n-m}}$$

$We\ can\ write\ it\ as$

$$= \frac{1}{a^0 + a^{m-n}} + \frac{1}{a^0 + a^{n-m}}$$

$$= \frac{1}{a^{m-m} + a^{m-n}} + \frac{1}{a^{n-n} + a^{n-m}}$$

$Taking\ out\ the\ common\ terms$

$$= \frac{1}{a^m (a^{-m} + a^{-n})} + \frac{1}{a^n (a^{-n} + a^{-m})}$$

$By\ further\ calculation$

$$= \frac{1}{a^m (\frac{1}{a^m} + \frac{1}{a^n})} + \frac{1}{a^n (\frac{1}{a^n} + \frac{1}{a^m})}$$

$Taking\ LCM$

$$= \frac{1}{a^m (\frac{a^n + a^m}{a^{m+n}})} + \frac{1}{a^n (\frac{a^m + a^n}{a^{m+n}})}$$

$$= \frac{a^{m+n}}{a^m (a^n + a^m)} + \frac{a^{m+n}}{a^n (a^m + a^n)}$$

$On\ further\ simplification$

$$= \frac{a^n}{(a^n + a^m)} + \frac{a^m}{(a^m + a^n)}$$

$So\ we\ get$

$$= \frac{a^n + a^m}{a^m + a^n} = \frac{a^m + a^n}{a^m + a^n}$$

= 1

21. Prove the following:

(i) (a + b)$^{-1}$ (a^{-1} + b^{-1}) = 1/ab

$$(\mathbf{ii})\frac{\mathbf{x+y+z}}{\mathbf{x^{-1}y^{-1}+y^{-1}z^{-1}+z^{-1}x^{-1}}}=\mathbf{xyz}.$$

Solution:

(i) (a + b)$^{-1}$ (a^{-1} + b^{-1}) = 1/ab

Here

LHS = (a + b)$^{-1}$ (a^{-1} + b^{-1})

We can write it as

$$=(a+b)^{-1}(\frac{1}{a}+\frac{1}{b})$$

$$Taking\ LCM$$

$$=\frac{1}{(a+b)^{1}}(\frac{b+a}{ab})$$

$$By\ further\ calculation$$

$$=\frac{1}{a+b}.\frac{a+b}{ab}$$

$$=\frac{1}{ab}$$

= RHS

Hence, proved.

$$(ii)\ \frac{x+y+z}{x^{-1}y^{-1}+y^{-1}z^{-1}+z^{-1}x^{-1}} = xyz$$

Here

$$LHS = \frac{x+y+z}{x^{-1}y^{-1}+y^{-1}z^{-1}+z^{-1}x^{-1}}$$

We can write it as

$$= \frac{x+y+z}{\frac{1}{x}\frac{1}{y}+\frac{1}{y}\frac{1}{z}+\frac{1}{z}\frac{1}{x}}$$

$$= \frac{x+y+z}{\frac{1}{xy}+\frac{1}{yz}+\frac{1}{zx}}$$

Taking LCM

$$= \frac{x+y+z}{\frac{z+x+y}{xyz}}$$

By further calculation

$$= \frac{(x+y+z)\times xyz}{(z+x+y)}$$

$$= \frac{(x+y+z)\times xyz}{(x+y+z)}$$

So we get

$$= \frac{1\times xyz}{1}$$

= xyz

= RHS

Hence, proved.

22. If a = c^z, b = a^x and c = b^y, prove that xyz = 1.

Solution:

It is given that

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

We can write it as

a = $(b^y)^z$ where c = b^y

So we get

a = b^{yz}

Here

a = $(a^x)^{yz}$

$a^1 = a^{xyz}$

By comparing both

xyz = 1

Therefore, it is proved.

23. If $a = xy^{p-1}$, $b = xy^{q-1}$ and $c = xy^{r-1}$, prove that

$a^{q-r}. b^{r-p}. c^{p-q} = 1$.

Solution:

It is given that

$a = xy^{p-1}$

Here

$a^{q-r} = (xy^{b-1})^{q-r} = x^{q-r}. y^{(q-r)(p-1)}$

$b = xy^{q-1}$

Here

$b^{r-p} = (xy^{q-1})^{r-p} = x^{r-p}. y^{(q-1)(r-p)}$

$c = xy^{r-1}$

Here

$c^{p-q} = (xy^{r-1})^{p-q} = x^{p-q}. y^{(r-1)(p-q)}$

Consider

LHS = $a^{q-r}. b^{r-p}. c^{p-q}$

Substituting the values

$= x^{q-r}. y^{(q-r)(p-1)}. x^{r-p}. y^{(q-1)(r-p)}. x^{p-q}. y^{(r-1)(p-q)}$

By further calculation

$= x^{q-r+r-p-q}. y^{(p-1)(q-r)+(q-1)(r-p)+(r-1)(p-q)}$

So we get

$= x^0. y^{pq-pr-q+r+qr-pr-r+p+rp-qr-p+q}$

$= x^0. y^0$

$= 1 \times 1$

$= 1$

= RHS

24. If $2^x = 3^y = 6^{-z}$, prove that $1/x + 1/y + 1/z = 0$.

Solution:

Consider

$2^x = 3^y = 6^{-z} = k$

Here

$2^x = k$

We can write it as

$2 = (k)^{1/x}$

$3^y = k$

We can write it as

$3 = (k)^{1/y}$

$6^{-z} = k$

We can write it as

$6 = (k)^{-1/z}$

So we get

$2 \times 3 = 6$

$(k)^{1/x} \times (k)^{1/y} = (k)^{-1/z}$

By further calculation

$(k)^{1/x + 1/y} = (k)^{-1/z}$

We get

$1/x + 1/y = -1/z$

$1/x + 1/y + 1/z = 0$

Therefore, it is proved.

25. If $2^x = 3^y = 12^z$, prove that x = 2yz/y – z.

Solution:

It is given that

$2^x = 3^y = 12^z$

Consider

$2^x = 3^y = 12^z = k$

Here

$2^x = k$ where $2 = (k)^{1/x}$

$3^y = k$ where $3 = (k)^{1/y}$

$12^z = k$ where $12 = (k)^{-1/z}$

We know that

$12 = 2 \times 2 \times 3$

$$(k)^{\frac{1}{z}} = (k)^{\frac{1}{x}} \times (k)^{\frac{1}{x}} \times (k)^{\frac{1}{y}}$$

By further calculation

$$(k)^{\frac{1}{z}} = (k)^{\frac{1}{x}+\frac{1}{x}+\frac{1}{y}}$$

$$(k)^{\frac{1}{z}} = (k)^{\frac{2}{x}+\frac{1}{y}}$$

So we get

$$\frac{1}{z} = \frac{2}{x} + \frac{1}{y}$$

$$\frac{1}{z} - \frac{1}{y} = \frac{2}{x}$$

By taking LCM

$$\frac{y-z}{yz} = \frac{2}{x}$$

By cross multiplication

$$x(y-z) = 2yz$$

$$x = \frac{2yz}{y-z}$$

Therefore, it is proved.

26. Simplify and express with positive exponents:

$(3x^2)^0$, $(xy)^{-2}$, $(-27a^9)^{2/3}$.

Solution:

We know that

$(3x^2)^0 = 1$

$$(xy)^{-2} = \frac{1}{(xy)^2} = \frac{1}{x^2y^2}$$

$$(-27a^9)^{\frac{2}{3}} = [(-3) \times (-3) \times (-3)]^{\frac{2}{3}} \times (a^9)^{\frac{2}{3}}$$

$By\ further\ calculation$

$$= (-3)^{3\times\frac{2}{3}} \times a^{9\times\frac{2}{3}}$$

$So\ we\ get$

$$= (-3)^2 \times a^{3\times 2}$$

$$= (-3) \times (-3) \times a^6$$

$$= 9a^6$$

27. If a = 3 and b = – 2, find the values of:

(i) $a^a + b^b$

(ii) $a^b + b^a$.

Solution:

It is given that

a = 3 and b = – 2

(i) $a^a + b^b = (3)^3 + (-2)^{-2}$

We can write it as

$$= 3 \times 3 \times 3 + \frac{1}{(-2)^2}$$

$$By\ further\ calculation$$

$$= 27 + \frac{1}{4}$$

$$Taking\ LCM$$

$$= \frac{27 \times 4 + 1}{4}$$

$$= \frac{108 + 1}{4}$$

$$= \frac{109}{4}$$

$$= 27\frac{1}{4}$$

(ii) $a^b + b^a = (3)^{-2} + (-2)^3$

We can write it as

$$= \frac{1}{(-3)^2} + (-2) \times (-2) \times (-2)$$

$$By\, further\, calculation$$

$$= \frac{1}{9} + (-8)$$

$$= \frac{1}{9} - 8$$

$$Taking\, LCM$$

$$= \frac{1 - 8 \times 9}{9}$$

$$= \frac{1 - 72}{9}$$

$$= \frac{-71}{9}$$

$$= -7\frac{8}{9}$$

28. If x = 10^3 × 0.0099, y = 10^{-2} × 110, find the value of

Solution:

It is given that

x = 10^3 × 0.0099, y = 10^{-2} × 110

We know that

$$\sqrt{\frac{x}{y}} = \sqrt{\frac{10^3 \times 0.0099}{10^{-2} \times 110}}$$

$By\ further\ calculation$

$$= \frac{10^3 \times 10^2 \times 0.0099}{110}$$

$$= \frac{10^5 \times 0.0099}{110}$$

$So\ we\ get$

$$= \sqrt{\frac{100000 \times 0.0099}{110}}$$

$$= \sqrt{\frac{990}{110}}$$

= √9

= √(3 × 3)

= 3

29. Evaluate $x^{1/2}$. y^{-1}. $z^{2/3}$ when x = 9, y = 2 and z = 8.

Solution:

It is given that

x = 9, y = 2 and z = 8

We know that

$x^{1/2}$. y^{-1}. $z^{2/3}$ = $(9)^{1/2}$. $(2)^{-1}$. $(8)^{2/3}$

It can be written as

$$= (3 \times 3)^{\frac{1}{2}} . \frac{1}{(2)^1} . (2 \times 2 \times 2)^{\frac{2}{3}}$$

By further calculation

$$= (3)^{2 \times \frac{1}{2}} . \frac{1}{2} . (2)^{3 \times \frac{2}{3}}$$

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

So we get

$$= 3 \times \frac{1}{2} \times 2 \times 2$$

$$= 3 \times \frac{1}{1} \times 1 \times 2$$

$$= \frac{6}{1}$$

= 6

30. If $x^4y^2z^3 = 49392$, find the values of x, y and z, where x, y and z are different positive primes.

Solution:

It is given that

$x^4y^2z^3 = 49392$

We can write it as

$x^4y^2z^3 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 7 \times 7 \times 7$

$x^4y^2z^3 = (2)^4 (3)^2 (7)^3$ ……. (1)

2	49392
2	24696
2	12348
2	6174
3	3087
3	1029
7	343
7	49
7	7
	1

Now compare the powers of 4, 2 and 3 on both sides of equation (1)

x = 2, y = 3 and z = 7

31. If , find x and y, where a, b are different positive primes.

Solution:

It is given that

$$(a^6b^{-4})^{\frac{1}{3}} = a^x.b^{2y}$$

$$By\ further\ calculation$$

$$\sqrt[3]{a^6b^{-4}} = a^x.b^{2y} \qquad (a)^{6\times\frac{1}{3}}.(b)^{-4\times\frac{1}{3}} = a^x.b^{2y}$$

$$We\ can\ write\ it\ as \quad (a)^2.(b)^{-\frac{4}{3}} = a^x.b^{2y}$$

By comparing the base on both sides

2 = x

x = 2

– 4/3 = 2y

2y = – 4/3

By further calculation

y = – 4/3 × ½ = – 2/3

32. If $(p + q)^{-1} (p^{-1} + q^{-1}) = p^aq^b$, prove that a + b + 2 = 0, where p and q are different positive primes.

Solution:

It is given that

$(p + q)^{-1} (p^{-1} + q^{-1}) = p^aq^b$

We can write it as

$$\frac{1}{p+q}(\frac{1}{p}+\frac{1}{q})=p^aq^b$$

$$Taking\ LCM$$

$$\frac{1}{p+q}\times(\frac{q+p}{pq})=p^aq^b$$

$$\frac{1}{pq}=p^aq^b$$

By cross multiplication

$p^{-1}q^{-1} = p^aq^b$

By comparing the powers

a = – 1 and b = – 1

Here

LHS = a + b + 2

Substituting the values

= – 1 – 1 + 2

= 0

= RHS

ML Aggarwal Solutions Class 9 Maths

About ML Aggarwal

M. L. Aggarwal, is an Indian mechanical engineer, educator. His achievements include research in solutions of industrial problems related to fatigue design. Recipient Best Paper award, Manipal Institute of Technology, 2004. Member of TSTE.

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