EXERCISE 2(A)

Question 1. Evaluate:

(i) $(3^{-1} \times 9^{-1}) \div 3^{-2}$

Solution:

$= \left(\frac{1}{3} \times \frac{1}{9}\right) \div \frac{1}{3} \times \frac{1}{3}$

$= \frac{1}{27} \div \frac{1}{9}$

(Expressing the equation in fractional form)

$= \frac{1}{27} \times \frac{9}{1} = \frac{1}{3}$

(ii) $(3^{-1} \times 4^{-1}) \div 6^{-1}$

Solution:

$= \left(\frac{1}{3} \times \frac{1}{4}\right) \div \frac{1}{6}$

$= \frac{1}{12} \div \frac{1}{6}$

(Expressing the equation in fractional form)

$= \frac{1}{12} \times \frac{6}{1} = \frac{1}{2}$

(iii) $(2^{-1} + 3^{-1})^3$

Solution:

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

$= \left(\frac{3+2}{6}\right)^3 = \left(\frac{5}{6}\right)^3$

(Expressing the equation in fractional form)

$= \frac{5\times5\times5}{6\times6\times6} = \frac{125}{216}$

(iv) $(3^{-1} \div 4^{-1})^2$

Solution:

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

(Expressing the equation in fractional form)

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

(Expressing the equation in mixed fraction)

$= \frac{16}{9} = 1\frac{7}{9}$

(v) $(2^2 + 3^2) \times (1/2)^2$

Solution:
= (2 × 2) + (3 × 3) × (½ × ½)
= 4 + 9 × ¼ = 13/4 = 3¼ (Simplifying the given equation)

(vi) $(5^2 - 3^2) \times (2/3)^{-3}$
Solution:

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

$$= 25 - 9 \times \left(\frac{3}{2} \times \frac{3}{2} \times \frac{3}{2}\right) \text{ (Simplifying the given equation)}$$

$$= 16 \times \frac{27}{8} = 54$$

(vii)

$$\left[\left(\frac{1}{4}\right)^{-3} - \left(\frac{1}{3}\right)^{-3}\right] + \left(\frac{1}{6}\right)^{-3}$$

Solution:

$$= \left[\left(\frac{4}{1}\right)^3 - \left(\frac{3}{1}\right)^3\right] \div \left(\frac{6}{1}\right)^3$$

$$= \left(\frac{4}{1} \times \frac{4}{1} \times \frac{4}{1} - \frac{3}{1} \times \frac{3}{1} \times \frac{3}{1}\right) \div \left(\frac{6}{1}\right)^3$$

$$= 64 - 27 \times \left(\frac{1}{6} \times \frac{1}{6} \times \frac{1}{6}\right) \text{ (Simplifying the given equation)}$$

$$= 37 \times \frac{1}{216} = \frac{37}{216}$$

(viii)

$$\left[\left(-\frac{3}{4}\right)^{-2}\right]^2$$

Solution:

$$\left[\left(-\frac{3}{4}\right)^{-2}\right]^2 = \left(-\frac{3}{4}\right)^{-2\times2} = \left(-\frac{3}{4}\right)^{-4}$$

$$= \left(\frac{4}{3}\right)^4 = \frac{4\times4\times4\times4}{3\times3\times3\times3}$$

$$= \frac{256}{81} = 3\frac{13}{81}$$

(Simplifying the given equation)

(ix)

$$\left(\left(\frac{3}{5}\right)^{-2}\right)^{-2}$$

Solution:

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

$$= \frac{3\times3\times3\times3}{5\times5\times5\times5} = \frac{81}{625} \text{ (Simplifying the given equation)}$$

(x) $(5^{-1} \times 3^{-1}) + 6^{-1}$
Solution:

$$= \left(\frac{1}{5} \times \frac{1}{3}\right) + \frac{1}{6}$$

$$= \frac{1}{15} \div \frac{1}{6} \text{ (Simplifying the given equation)}$$

$$= \frac{1}{15} \times \frac{6}{1} = \frac{2}{5}$$

Question 2. $1125 = 3^m \times 5^n$; find m and n
Solution:
$1125 = 3^2 \times 5^3$
The factors of 1125 are $3 \times 3 \times 5 \times 5 \times 5$

3	1125
3	375
5	125
5	25
5	5
	1

Therefore $1125 = 3 \times 3 \times 5 \times 5 \times 5$
Now comparing, $3^2 \times 5^3 = 3^m \times 5^n$
Therefore m=2, n=3

Question 3. Find x, if $9 \times 3^x = (27)^{2x-3}$
Solution:
$9 \times 3^x = (27)^{2x-3}$
$3^2 \times 3^x = (3 \times 3 \times 3)^{2x-3}$
(Simplifying the given equation)
$\Rightarrow 3^{x+2} = (3)^{3(2x-3)}$
$\Rightarrow 3^{x+2} = (3)^{6x-9}$
Since bases are same, compare them,
$x + 2 = 6x - 9$
$6x - x = 9 + 2$
$\Rightarrow 5x = 11$
$\Rightarrow x = 11/2$
(Shifting the terms)
$\Rightarrow x = 2\frac{1}{5}$