

Exercises - 5A

Q. 1 **Answer :**

$$(i) \frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} = \left(\frac{5}{7}\right)^4$$

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

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

$$(iv) (-8) \times (-8) \times (-8) \times (-8) \times (-8) = (-8)^5$$

Q. 2 **Answer :**

$$(i) \frac{25}{36} = \frac{5^2}{6^2} \quad [\text{since } 25 = 5^2 \text{ and } 36 = 6^2]$$
$$= \left(\frac{5}{6}\right)^2$$

$$(ii) \frac{-27}{64} = \frac{(-3)^3}{4^3} \quad [\text{since } -27 = (-3)^3 \text{ and } 64 = 4^3]$$
$$= \left(\frac{-3}{4}\right)^3$$

$$(iii) \frac{-32}{243} = \frac{(-2)^5}{3^5} \quad [\text{since } -32 = (-2)^5 \text{ and } 243 = 3^5]$$
$$= \left(\frac{-2}{3}\right)^5$$

$$(iv) \frac{-1}{128} = \frac{(-1)^7}{2^7} \quad [\text{since } (-1)^7 = -1 \text{ and } 128 = 2^7]$$
$$= \left(\frac{-1}{2}\right)^7$$

Q. 3

Answer :

$$(i) \left(\frac{2}{3}\right)^5 = \frac{(2)^5}{(3)^5} = \frac{2 \times 2 \times 2 \times 2 \times 2}{3 \times 3 \times 3 \times 3 \times 3} = \frac{32}{243}$$

$$(ii) \left(\frac{-8}{5}\right)^3 = \frac{(-8)^3}{(5)^3} = \frac{(-8) \times (-8) \times (-8)}{5 \times 5 \times 5} = \frac{-512}{125}$$

$$(iii) \left(\frac{-13}{11}\right)^2 = \frac{(-13)^2}{(11)^2} = \frac{(-13) \times (-13)}{11 \times 11} = \frac{169}{121}$$

$$(iv) \left(\frac{1}{6}\right)^3 = \frac{(1)^3}{(6)^3} = \frac{1 \times 1 \times 1}{6 \times 6 \times 6} = \frac{1}{216}$$

$$(v) \left(\frac{-1}{2}\right)^5 = \frac{(-1)^5}{(2)^5} = \frac{(-1) \times (-1) \times (-1) \times (-1) \times (-1)}{2 \times 2 \times 2 \times 2 \times 2} = \frac{-1}{32}$$

$$(vi) \left(\frac{-3}{2}\right)^4 = \frac{(-3)^4}{(2)^4} = \frac{(-3) \times (-3) \times (-3) \times (-3)}{2 \times 2 \times 2 \times 2} = \frac{81}{16}$$

$$(vii) \left(\frac{-4}{7}\right)^3 = \frac{(-4)^3}{(7)^3} = \frac{(-4) \times (-4) \times (-4)}{7 \times 7 \times 7} = \frac{-64}{343}$$

$$(viii) (-1)^9 = -1 \quad [\text{Since } (-1)^{\text{an odd natural number}} = -1]$$

Q. 4

Answer :

$$(i) (4)^{-1} = \left(\frac{4}{1}\right)^{-1} = \left(\frac{1}{4}\right)^1 = \frac{1}{4} \quad \left[\text{since } \left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n\right]$$

$$(ii) (-6)^{-1} = \left(\frac{-6}{1}\right)^{-1} = \left(\frac{1}{-6}\right)^1 = \frac{-1}{6} \quad \left[\text{since } \left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n\right]$$

$$(iii) \left(\frac{1}{3}\right)^{-1} = \left(\frac{3}{1}\right)^1 = \frac{3}{1} \quad \left[\text{since } \left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n\right]$$

$$(iv) \left(\frac{-2}{3}\right)^{-1} = \left(\frac{3}{-2}\right)^1 = \frac{3}{-2} \quad \left[\text{since } \left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n\right]$$

Q. 5

Answer :

We know that the reciprocal of $\left(\frac{a}{b}\right)^m$ is $\left(\frac{b}{a}\right)^m$

$$(i) \text{ Reciprocal of } \left(\frac{3}{8}\right)^4 = \left(\frac{8}{3}\right)^4$$

$$(ii) \text{ Reciprocal of } \left(\frac{-5}{6}\right)^{11} = \left(\frac{-6}{5}\right)^{11}$$

$$(iii) \text{ Reciprocal of } 6^7 = \text{Reciprocal of } \left(\frac{6}{1}\right)^7 = \left(\frac{1}{6}\right)^7$$

$$(iv) \text{ Reciprocal of } (-4)^3 = \text{Reciprocal of } \left(\frac{-4}{1}\right)^3 = \left(\frac{-1}{4}\right)^3$$

Q. 6

Answer :

$$\begin{aligned}
 2^{n-7} \times 5^{n-4} &= 1250 \\
 \Rightarrow \frac{2^n}{2^7} \times \frac{5^n}{5^4} &= 2 \times 5^4 && [\text{since } 1250 = 2 \times 5^4] \\
 \Rightarrow \frac{2^n \times 5^n}{2^7 \times 5^4} &= 2 \times 5^4 \\
 \Rightarrow 2^n \times 5^n &= 2 \times 5^4 \times 2^7 \times 5^4 && [\text{using cross multiplication}] \\
 \Rightarrow 2^n \times 5^n &= 2^{1+7} \times 5^{4+4} && [\text{since } a^m \times a^n = a^{m+n}] \\
 \Rightarrow 2^n \times 5^n &= 2^8 \times 5^8 \\
 \Rightarrow (2 \times 5)^n &= (2 \times 5)^8 && [\text{since } a^n \times b^n = (a \times b)^n] \\
 \Rightarrow 10^n &= 10^8 \\
 \Rightarrow n &= 8
 \end{aligned}$$

Q. 7

Answer :

$$(i) \left(\frac{3}{2}\right)^4 \times \left(\frac{1}{5}\right)^2 = \frac{3^4}{2^4} \times \frac{1^2}{5^2} = \frac{81 \times 1}{16 \times 25} = \frac{81}{400}$$

$$\begin{aligned}
 (ii) \left(\frac{-2}{3}\right)^5 \times \left(\frac{-3}{7}\right)^3 &= \frac{(-2)^5}{(3)^5} \times \frac{(-3)^3}{(7)^3} \\
 &= \frac{(-2)^5}{(7)^3} \times \frac{(-1)(3)^3}{(3)^5} && \left[\text{since } 3^{-2} = \frac{1}{9} \right] \\
 &= \frac{-32 \times -1 \times 3^{3-5}}{343} \\
 &= \frac{-32 \times -1 \times 3^{-2}}{343} \\
 &= \frac{-32 \times -1 \times 1}{343 \times 9} \\
 &= \frac{32}{3087}
 \end{aligned}$$

$$\begin{aligned}
 (iii) \left(\frac{-1}{2}\right)^5 \times 2^3 \times \left(\frac{3}{4}\right)^2 &= \frac{(-1)^5}{2^5} \times 2^3 \times \frac{3^2}{4^2} \\
 &= \frac{(-1)^5}{2^5} \times 2^3 \times \frac{3^2}{(2^2)^2} \\
 &= \frac{-1 \times 2^3 \times 3^2}{2^5 \times 2^4} \\
 &= \frac{-1 \times 2^3 \times 3^2}{2^9} = -1 \times 2^{3-9} \times 3^2 = -9 \times 2^{-6} = \frac{-9}{2^6} = \frac{-9}{64}
 \end{aligned}$$

$$\left[\text{since } \left(\frac{a}{b}\right)^{-1} = \left(\frac{b}{a}\right)^1 \right]$$

$$\begin{aligned}
 (iv) \left(\frac{2}{3}\right)^2 \times \left(\frac{-3}{5}\right)^3 \times \left(\frac{7}{2}\right)^2 &= \frac{2^2}{3^2} \times \frac{(-3)^3}{5^3} \times \frac{7^2}{2^2} \\
 &= \frac{-1 \times 3^{3-2} \times 7^2}{5^3} = \frac{-1 \times 3^1 \times 7^2}{5^3} = \frac{-1 \times 3 \times 49}{125} = \frac{-147}{125}
 \end{aligned}$$

$$\begin{aligned}
 (v) \left\{ \left(\frac{-3}{4}\right)^3 - \left(\frac{-5}{2}\right)^3 \right\} \times 4^2 &= \left\{ \left(\frac{-3^3}{4^3}\right) - \left(\frac{-5^3}{2^3}\right) \right\} \times 4^2 \\
 &= \left\{ \left(\frac{-27}{64}\right) - \left(\frac{-125}{8}\right) \right\} \times 16 \\
 &= \left\{ \frac{-27}{64} + \frac{125}{8} \right\} \times 16 \\
 &= \left(\frac{-27+1000}{64} \right) \times 16 \\
 &= \left(\frac{973}{64} \times 16 \right) = \frac{973}{4}
 \end{aligned}$$

Q. 8 Answer :

$$(i) \left(\frac{4}{9}\right)^6 \times \left(\frac{4}{9}\right)^{-4} = \left(\frac{4}{9}\right)^{6+(-4)} \quad [\text{since } a^n \times a^m = a^{n+m}]$$

$$= \left(\frac{4}{9}\right)^2 = \frac{(4)^2}{(9)^2} = \frac{4 \times 4}{9 \times 9} = \frac{16}{81}$$

$$(ii) \left(\frac{-7}{8}\right)^{-3} \times \left(\frac{-7}{8}\right)^2 = \left(\frac{-7}{8}\right)^{(-3)+2} \quad [\text{since } a^n \times a^m = a^{n+m}]$$

$$= \left(\frac{-7}{8}\right)^{-1}$$

$$= \left(\frac{8}{-7}\right)^1 \quad \left[\text{since } \left(\frac{a}{b}\right)^{-1} = \left(\frac{b}{a}\right)^1\right]$$

$$= \left(\frac{8 \times -1}{-7 \times -1}\right) = \frac{-8}{7}$$

$$(iii) \left(\frac{4}{3}\right)^{-3} \times \left(\frac{4}{3}\right)^{-2} = \left(\frac{4}{3}\right)^{(-3)+(-2)} \quad [\text{since } a^n \times a^m = a^{n+m}]$$

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

$$= \left(\frac{3}{4}\right)^5 \quad \left[\text{since } \left(\frac{a}{b}\right)^{-1} = \left(\frac{b}{a}\right)^1\right]$$

$$= \frac{(3)^5}{(4)^5} = \frac{3 \times 3 \times 3 \times 3 \times 3}{4 \times 4 \times 4 \times 4 \times 4} = \frac{243}{1024}$$

Q. 9 Answer :

$$(i) 5^{-3} = \left(\frac{5}{1}\right)^{-3} = \left(\frac{1}{5}\right)^3 = \frac{(1)^3}{(5)^3} = \frac{1}{125}$$

$$(ii) (-2)^{-5} = \left(\frac{-2}{1}\right)^{-5} = \left(\frac{1}{-2}\right)^5 = \frac{(1)^5}{(-2)^5} = \frac{1 \times -1}{-32 \times -1} = \frac{-1}{32}$$

$$(iii) \left(\frac{1}{4}\right)^{-4} = \left(\frac{4}{1}\right)^4 = \frac{(4)^4}{(1)^4} = \frac{256}{1} = 256$$

$$(iv) \left(\frac{-3}{4}\right)^{-3} = \left(\frac{4}{-3}\right)^3 = \frac{(4)^3}{(-3)^3} = \frac{64}{-27} = \frac{64 \times -1}{-27 \times -1} = \frac{-64}{27}$$

$$(v) (-3)^{-1} \times \left(\frac{1}{3}\right)^{-1} = \left(\frac{1}{-3}\right)^1 \times \left(\frac{3}{1}\right)^1 = \left(\frac{1 \times 3}{-3 \times 1}\right)^1 = \left(\frac{3}{-3}\right)^1 = \frac{1}{-1} = \frac{1 \times -1}{-1 \times -1} = \frac{-1}{1} = -1$$

$$(vi) \left(\frac{5}{7}\right)^{-1} \times \left(\frac{7}{4}\right)^{-1} = \left(\frac{7}{5}\right)^1 \times \left(\frac{4}{7}\right)^1 = \left(\frac{7 \times 4}{5 \times 7}\right)^1 = \frac{4}{5}$$

$$(vii) \left(5^{-1} - 7^{-1}\right)^{-1} = \left(\frac{1}{5} - \frac{1}{7}\right)^{-1} = \left(\frac{7-5}{35}\right)^{-1}$$

$$= \left(\frac{2}{35}\right)^{-1} = \left(\frac{35}{2}\right)^1 = \frac{35}{2}$$

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

$$= \left(\frac{3-16}{4}\right)^{-1} = \left(\frac{-13}{4}\right)^{-1}$$

$$= \left(\frac{4}{-13}\right)^1 = \left(\frac{4 \times -1}{-13 \times -1}\right)$$

$$= \frac{-4}{13}$$

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

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

$$= \frac{-4}{15}$$

$$(x) \left(\frac{23}{25}\right)^0 = 1 \quad [\text{since } a^0 = 1 \text{ for every integer } a]$$

Q. 10

Answer :

(i)

$$\begin{aligned} \left[\left\{ \left(-\frac{1}{4} \right)^2 \right\}^{-2} \right]^{-1} &= \left[\left(-\frac{1}{4} \right)^{2 \times -2} \right]^{-1} && \left[\text{since } \left\{ \left(\frac{a}{b} \right)^m \right\}^n = \left(\frac{a}{b} \right)^{mn} \right] \\ &= \left[\left(-\frac{1}{4} \right)^{-4} \right]^{-1} \\ &= \left(-\frac{1}{4} \right)^{(-4) \times (-1)} \\ &= \left(-\frac{1}{4} \right)^4 = \frac{(-1)^4}{(4)^4} \\ &= \frac{1}{256} \end{aligned}$$

(ii)

$$\begin{aligned} \left\{ \left(\frac{-2}{3} \right)^2 \right\}^3 &= \left(\frac{-2}{3} \right)^{2 \times 3} && \left[\text{since } \left\{ \left(\frac{a}{b} \right)^m \right\}^n = \left(\frac{a}{b} \right)^{mn} \right] \\ &= \left(\frac{-2}{3} \right)^6 \\ &= \frac{(-2)^6}{(3)^6} = \frac{64}{729} && [\text{since } (-2)^6 = 64 \text{ and } (3)^6 = 729] \end{aligned}$$

(iii)

$$\begin{aligned} \left(\frac{-3}{2} \right)^3 \div \left(\frac{-3}{2} \right)^6 &= \left(\frac{-3}{2} \right)^{3-6} && [\text{since } a^m \div a^n = a^{m-n}] \\ &= \left(\frac{-3}{2} \right)^{-3} \\ &= \left(\frac{2}{-3} \right)^3 && \left[\text{since } \left(\frac{a}{b} \right)^{-1} = \left(\frac{b}{a} \right)^1 \right] \\ &= \left(\frac{2 \times -1}{-3 \times -1} \right)^3 = \left(\frac{-2}{3} \right)^3 \\ &= \frac{(-2)^3}{(3)^3} = \frac{-8}{27} \end{aligned}$$

(iv)

$$\begin{aligned} \left(\frac{-2}{3} \right)^7 \div \left(\frac{-2}{3} \right)^4 &= \left(\frac{-2}{3} \right)^{7-4} && [\text{since } a^m \div a^n = a^{m-n}] \\ &= \left(\frac{-2}{3} \right)^3 \\ &= \frac{(-2)^3}{(3)^3} = \frac{-8}{27} \end{aligned}$$

Q. 11

Answer :

Let the required number be x .

$$(-5)^{-1} \times x = (8)^{-1}$$

$$\Rightarrow \frac{1}{-5} \times x = \frac{1}{8}$$

$$\therefore x = \frac{1}{8} \times (-5) = \frac{-5}{8}$$

Hence, the required number is $\frac{-5}{8}$.

Q. 12

Answer :

Let the required number be x .

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

$$\Rightarrow \frac{1}{3^3} \times x = 4$$

$$\Rightarrow \frac{1}{27} \times x = 4$$

$$\therefore x = 4 \times 27 = 108$$

Hence, the required number is 108.

Q. 13

Answer :

Let the required number be x .

$$(-30)^{-1} \div x = 6^{-1}$$

$$\Rightarrow \frac{1}{(-30)} \times \frac{1}{x} = \frac{1}{6}$$

$$\Rightarrow \frac{1}{(-30x)} = \frac{1}{6}$$

$$\therefore x = \frac{6}{(-30)} = \frac{-1}{5}$$

Hence, the required number is $\frac{-1}{5}$.

Exercises – 5 B

Q. 1

Answer :

- (i) $538 = 5.38 \times 10^2$ [since the decimal point is moved 2 places to the left]
 (ii) $6428000 = 6.428 \times 10^6$ [since the decimal point is moved 6 places to the left]
 (iii) $82934000000 = 8.2934 \times 10^{10}$ [since the decimal point is moved 10 places to the left]
 (iv) $940000000000 = 9.4 \times 10^{11}$ [since the decimal point is moved 11 places to the left]
 (v) $230000000 = 2.3 \times 10^7$ [since the decimal point is moved 7 places to the left]

Q. 2

Answer :

- (i) Diameter of the Earth = 1.2756×10^7 m
 [since the decimal point is moved 7 places to the left]
 (ii) Distance between the Earth and the Moon = 3.84×10^8 m
 [since the decimal point is moved 8 places to the left]
 (iii) Population of India in March 2001 = 1.027×10^9
 [since the decimal point is moved 9 places to the left]
 (iv) Number of stars in a galaxy = 1.0×10^{11}
 [since the decimal point is moved 11 places to the left]
 (v) Present age of the universe = 1.2×10^{10} years
 [since the decimal point is moved 10 places to the left]

Q. 3

Answer :

- (i) $684502 = 6 \times 10^5 + 8 \times 10^4 + 4 \times 10^3 + 5 \times 10^2 + 0 \times 10^1 + 2 \times 10^0$
 (ii) $4007185 = 4 \times 10^6 + 0 \times 10^5 + 0 \times 10^4 + 7 \times 10^3 + 1 \times 10^2 + 8 \times 10^1 + 5 \times 10^0$
 (iii) $5807294 = 5 \times 10^6 + 8 \times 10^5 + 0 \times 10^4 + 7 \times 10^3 + 2 \times 10^2 + 9 \times 10^1 + 4 \times 10^0$
 (iv) $50074 = 5 \times 10^4 + 0 \times 10^3 + 0 \times 10^2 + 7 \times 10^1 + 4 \times 10^0$

Note: $a^0 = 1$

Q. 4

Answer :

- (i) $6 \times 10^4 + 3 \times 10^3 + 0 \times 10^2 + 7 \times 10^1 + 8 \times 10^0$
 $= 6 \times 10000 + 3 \times 1000 + 0 \times 100 + 7 \times 10 + 8 \times 1 = 63078$
 (ii) $9 \times 10^6 + 7 \times 10^5 + 0 \times 10^4 + 3 \times 10^3 + 4 \times 10^2 + 6 \times 10^1 + 2 \times 10^0$
 $= 9 \times 1000000 + 7 \times 100000 + 0 \times 10000 + 3 \times 1000 + 4 \times 100 + 6 \times 10 + 2 \times 1 = 9703462$
 (iii) $8 \times 10^5 + 6 \times 10^4 + 4 \times 10^3 + 2 \times 10^2 + 9 \times 10^1 + 6 \times 10^0$
 $= 8 \times 100000 + 6 \times 10000 + 4 \times 1000 + 2 \times 100 + 9 \times 10 + 6 \times 1 = 864296$

Exercises – 5 C

Q. 1

Answer :

(d) 24

$$\begin{aligned} (6^{-1} - 8^{-1})^{-1} &= \left(\frac{1}{6} - \frac{1}{8}\right)^{-1} \\ &= \left(\frac{4-3}{24}\right)^{-1} \quad [\text{since L.C.M. of 6 and 8 is 24}] \\ &= \left(\frac{1}{24}\right)^{-1} \\ &= \left(\frac{24}{1}\right)^1 = 24 \quad \left[\text{since } \left(\frac{a}{b}\right)^{-1} = \left(\frac{b}{a}\right)^1\right] \end{aligned}$$

Q. 2

Answer :

(c) 15

We have:

$$\begin{aligned} (5^{-1} \times 3^{-1})^{-1} &= \left(\frac{1}{5} \times \frac{1}{3}\right)^{-1} \\ &= \left(\frac{1}{15}\right)^{-1} \\ &= \left(\frac{15}{1}\right)^1 = 15 \quad \left[\text{since } \left(\frac{a}{b}\right)^{-1} = \left(\frac{b}{a}\right)^1\right] \end{aligned}$$

Q. 3

Answer :

(c) $\frac{1}{16}$

We have:

$$\begin{aligned} (2^{-1} - 4^{-1})^2 &= \left(\frac{1}{2} - \frac{1}{4}\right)^2 \\ &= \left(\frac{2-1}{4}\right)^2 \quad [\text{since L.C.M. of 2 and 4 is 4}] \\ &= \left(\frac{1}{4}\right)^2 \\ &= \left(\frac{1}{4} \times \frac{1}{4}\right) = \frac{1}{16} \end{aligned}$$

Q. 4

Answer :

(b) 29

We have:

$$\begin{aligned} \left(\frac{1}{2}\right)^{-2} + \left(\frac{1}{3}\right)^{-2} + \left(\frac{1}{4}\right)^{-2} &= \left(\frac{2}{1}\right)^2 + \left(\frac{3}{1}\right)^2 + \left(\frac{4}{1}\right)^2 \quad \left[\text{since } \left(\frac{a}{b}\right)^{-1} = \left(\frac{b}{a}\right)^1\right] \\ &= (2^2 + 3^2 + 4^2) \\ &= (4 + 9 + 16) \\ &= 29 \end{aligned}$$

Q. 5

Answer :

(c) $\frac{6}{5}$

We have:

$$\begin{aligned} \left\{6^{-1} + \left(\frac{3}{2}\right)^{-1}\right\}^{-1} &= \left(\frac{1}{6} + \frac{2}{3}\right)^{-1} \\ &= \left(\frac{1+4}{6}\right)^{-1} \quad [\text{since L.C.M. of 3 and 6 is 6}] \\ &= \left(\frac{5}{6}\right)^{-1} \\ &= \left(\frac{6}{5}\right)^1 = \left(\frac{6}{5}\right) \quad \left[\text{since } \left(\frac{a}{b}\right)^{-1} = \left(\frac{b}{a}\right)^1\right] \end{aligned}$$

Q. 6

Answer :

(b) 64

We have:

$$\begin{aligned} \left(\frac{-1}{2}\right)^{-6} &= \left(\frac{2}{-1}\right)^6 \quad \left[\text{since } \left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n\right] \\ &= (-2)^6 \\ &= (-2) \times (-2) \times (-2) \times (-2) \times (-2) \times (-2) \\ &= 64 \end{aligned}$$

Q. 7

Answer :

(b) $-\frac{3}{8}$

$$\begin{aligned} \left\{\left(\frac{3}{4}\right)^{-1} - \left(\frac{1}{4}\right)^{-1}\right\}^{-1} &= \left(\frac{4}{3} - \frac{4}{1}\right)^{-1} \\ &= \left(\frac{4-12}{3}\right)^{-1} \quad [\text{since L.C.M. of 1 and 3 is 3}] \\ &= \left(\frac{-8}{3}\right)^{-1} \\ &= \left(\frac{3}{-8}\right)^1 \quad \left[\text{since } \left(\frac{a}{b}\right)^{-1} = \left(\frac{b}{a}\right)^1\right] \\ &= \left(\frac{3 \times -1}{-8 \times 1}\right) = -\frac{3}{8} \end{aligned}$$

Q. 8

Answer :

(a) $\frac{1}{16}$

$$\left[\left\{ \left(-\frac{1}{2} \right)^2 \right\}^{-2} \right]^{-1} = \left[\left(-\frac{1}{2} \right)^{2 \times -2} \right]^{-1} \quad \left[\text{since } \left\{ \left(\frac{a}{b} \right)^m \right\}^n = \left(\frac{a}{b} \right)^{mn} \right]$$

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

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

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

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

Q. 9

Answer :

(c) 1

(a)⁰ = 1
 $\therefore \left(\frac{5}{6} \right)^0 = 1$

Q. 10

Answer :

(b) $\frac{243}{32}$

$$\left(\frac{2}{3} \right)^{-5} = \left(\frac{3}{2} \right)^5 \quad \left[\text{since } \left(\frac{a}{b} \right)^{-n} = \left(\frac{b}{a} \right)^n \right]$$

$$= \frac{3^5}{2^5} = \frac{3 \times 3 \times 3 \times 3 \times 3}{2 \times 2 \times 2 \times 2 \times 2} = \frac{243}{32}$$

Q. 11

Answer :

(b) $\left(\frac{1}{3} \right)^8$

$$\left\{ \left(\frac{1}{3} \right)^2 \right\}^4 = \left(\frac{1}{3} \right)^{2 \times 4} = \left(\frac{1}{3} \right)^8 \quad \left[\text{since } \left\{ \left(\frac{a}{b} \right)^m \right\}^n = \left(\frac{a}{b} \right)^{mn} \right]$$

Q. 12

Answer :

(b) $-\frac{2}{3}$

We have:

$$\left(-\frac{3}{2} \right)^{-1} = \left(\frac{2}{-3} \right)^1 \quad \left[\text{since } \left(\frac{a}{b} \right)^{-n} = \left(\frac{b}{a} \right)^n \right]$$

$$= -\frac{2}{3}$$

Q. 13

Answer :

(d) $\frac{135}{8}$

$$(3^2 - 2^2) \times \left(\frac{2}{3} \right)^{-3} = (9 - 4) \times \left(\frac{3}{2} \right)^3 \quad \left[\text{since } \left(\frac{a}{b} \right)^{-1} = \left(\frac{b}{a} \right)^1 \right]$$

$$= 5 \times \frac{3^3}{2^3} = 5 \times \frac{27}{8} = \frac{135}{8}$$

Q. 14

Answer :

(a) $\frac{19}{64}$

We have:

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

$$\left[\text{since } \left(\frac{a}{b} \right)^{-1} = \left(\frac{b}{a} \right)^1 \right]$$

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

$$= (27 - 8) \div 64$$

$$= 19 \div 64$$

$$= 19 \times \frac{1}{64} = \frac{19}{64}$$

Q. 15

Answer :

(c) $(-5)^5$

We have:

$$\left(-\frac{1}{5} \right)^3 \div \left(-\frac{1}{5} \right)^8 = \left(-\frac{1}{5} \right)^{3-8} \quad \left[\text{since } a^m \div a^n = a^{m-n} \right]$$

$$= \left(-\frac{1}{5} \right)^{-5}$$

$$= \left(\frac{5}{-1} \right)^5 \quad \left[\text{Since } \left(\frac{a}{b} \right)^{-1} = \left(\frac{b}{a} \right)^1 \right]$$

$$= \left(\frac{5 \times -1}{-1 \times -1} \right)^5 = \left(-\frac{5}{1} \right)^5 = (-5)^5$$