Chapter 2: Exponents

Exercise: 2A

Page Number: 33

Question 1.

(i)

Solution: $4^{-3} = \frac{1}{4^3} = \frac{1}{64}$

(ii)

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

(iii)

Solution: $\left(\frac{4}{3}\right)^{-3} = \left(\frac{3}{4}\right)^{3} = \left(\frac{27}{64}\right)$

(iv)

Solution: $(-3)^{-4} = (-1\times 3)^{-4} = (-1)^{-4}\times(3)^{-4} = 1\times\frac{1}{3^4} = \frac{1}{81}$

(v)

Solution: $\left(\frac{-2}{3}\right)^{5} = \left(-1\times\frac{2}{3}\right)^{5} = (-1)^5\times\left(\frac{2}{3}\right)^{5} = -1\times\left(\frac{2}{3}\right)^{5} = \frac{-32}{243}$

Question 2.

(i)

Solution: $\left(\frac{5}{3}\right)^{2}\times\left(\frac{5}{3}\right)^{2} = \frac{25}{9}\times\frac{25}{9} = \frac{625}{81}$

(ii)

Solution: $\left(\frac{5}{6}\right)^{6}\times\left(\frac{5}{6}\right)^{-4} = \left(\frac{5}{6}\right)^{6}\times\left(\frac{6}{5}\right)^{4} = \left(\frac{5}{6}\right)^{6}\times\left(\frac{6}{5}\right)^{4} = \left(\frac{5}{6}\right)^{2} = \frac{25}{36}$

(iii)

Solution: $\left(\frac{2}{3}\right)^{-3}\times\left(\frac{2}{3}\right)^{-2} = \left(\frac{3}{2}\right)^{3}\times\left(\frac{3}{2}\right)^{2} = \frac{27}{8}\times\frac{9}{4} = \frac{243}{32}$

(iv)

Solution: $\left(\frac{9}{8}\right)^{-3}\times\left(\frac{9}{8}\right)^{2} = \left(\frac{8}{9}\right)^{3}\times\left(\frac{9}{8}\right)^{2} = \frac{8}{9}$

Question 3.

(i)

Solution: $\left(\frac{5}{9}\right)^{2}\times\left(\frac{3}{5}\right)^{-3}\times\left(\frac{3}{5}\right)^{0}=\left(\frac{5}{9}\right)^{2}\times\left(\frac{3}{5}\right)^{-3}\times 1=\left(\frac{5}{9}\right)^{2}\times\left(\frac{5}{3}\right)^{3}=\frac{25}{81}\times\frac{125}{27}=\frac{3125}{2187}$

(ii)

Solution:

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

$$\Rightarrow\left(\frac{4}{3}\right)^{4}\times\left(\frac{2}{5}\right)^{2}=\frac{256}{81}\times\frac{4}{25}=\frac{1024}{2025}$$

(iii)

Solution:

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

$$\Rightarrow\left(\frac{3}{2}\right)^{3}\times\left(\frac{3}{2}\right)^{2}=\frac{27}{8}\times\frac{9}{4}=\frac{243}{32}$$

Question 4.

(i)

Solution:

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

$$\Rightarrow\left\{\frac{4}{9}\right\}^{-2}=\left\{\frac{9}{4}\right\}^{2}=\frac{81}{16}$$

(ii)

Solution:

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

$$\Rightarrow\left[\left\{\left(\frac{1}{3}\right)^{2}\right\}^{-2}\right]^{-1}=\left[\left\{\frac{1}{9}\right\}^{-2}\right]^{-1}=\left[\{9\}^{2}\right]^{-1}=[81]^{-1}=\frac{1}{81}$$

(iii)

Solution:

$$\left\{\left(\frac{3}{2}\right)^{-2}\right\}^{2}=\left\{\left(\frac{2}{3}\right)^{2}\right\}^{2}=\left\{\frac{4}{9}\right\}^{2}=\frac{16}{81}$$

Question 5.

Solution:

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

$$\Rightarrow\{27-8\}\div(4)^{3}=19\div64=\frac{19}{64}$$

Question 6.

Solution:

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

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

Question 7.

Solution:

$$\left[\left(5^{-1}\times3^{-1}\right)^{-1}\div6^{-1}\right]=\left[\left(\frac{1}{5}\times\frac{1}{3}\right)^{-1}\div6^{-1}\right]=\left[\left(\frac{1}{15}\right)^{-1}\div6^{-1}\right]=\left[15\div\frac{1}{6}\right]=[15\times6]=90$$

Question 8.

(i)

Solution:

$$\left(2^{0}+3^{1}\right)\times3^{2}=(1+3)\times3^{2}=4\times9=36$$

(ii)

Solution:

$$\left(2^{-1}\times3^{-1}\right)\div2^{-3}=\left(\frac{1}{2}\times\frac{1}{3}\right)\div2^{-3}=\left(\frac{1}{6}\right)\div2^{-3}$$

$$\Rightarrow\left(\frac{1}{6}\right)\div\frac{1}{2^{3}}=\left(\frac{1}{6}\right)\div\frac{1}{8}=\frac{1}{6}\times8=\frac{4}{3}$$

(iii)

Solution:

$$\left(\frac{1}{2}\right)^{-2}+\left(\frac{1}{3}\right)^{-2}+\left(\frac{1}{4}\right)^{-2}=2^2+3^2+4^2=4+9+16=29$$

Question 9.

Solution:

Since the base of the terms is same in equation

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

Equation can be written as

$$-4+(-5)=3x\Rightarrow -9=3x\Rightarrow -3=x$$

Therefore,

$$x=-3$$

Question 10.

Solution:

Since the base of the terms is same in equation

$$\left(\frac{4}{9}\right)^{4}\times\left(\frac{4}{9}\right)^{-7}=\left(\frac{4}{9}\right)^{2x-1}$$

Equation can be written as

$$4+(-7)=2x-1\Rightarrow 4-7=2x-1\Rightarrow -3=2x-1\Rightarrow -3+1=2x\Rightarrow -2=2x\Rightarrow -1=x$$

Therefore,

$$x=-1$$

Question 11.

Solution:

Let the required number be x,

Therefore,

$$(-6)^{-1}\times x=9^{-1}\Rightarrow -\frac{1}{6}\times x=\frac{1}{9}\Rightarrow x=\frac{1}{9}\times(-6)\Rightarrow x=-\frac{6}{9}\Rightarrow x=-\frac{2}{3}$$

Hence,

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

Question 12.

Solution:

Let the required number be x,

Therefore,

$$\frac{\left(\frac{-2}{3}\right)^{-3}}{x} = \left(\frac{4}{27}\right)^{-2} \Rightarrow \frac{\left(\frac{-3}{2}\right)^{3}}{x} = \left(\frac{27}{4}\right)^{2} \Rightarrow \frac{\left(\frac{-2}{3}\right)^{-3}}{\left(\frac{4}{27}\right)^{-2}} = x \Rightarrow x = \left(\frac{-2}{3}\right)^{-3} \times \left(\frac{4}{27}\right)^{-2}$$

$$\Rightarrow x = \left(\frac{-3}{2}\right)^{3} \times \left(\frac{27}{4}\right)^{2} \Rightarrow x = \frac{-27}{8} \times \frac{729}{16} \Rightarrow x = \frac{-19683}{128}$$

Question 13.

Solution: $5^{2x+1} \div 25 = 125 \Rightarrow 5^{2x+1} \div 5^2 = 5^3$

Since the base of the terms is same in equation

$5^{2x+1} \div 5^2 = 5^3$

Equation can be written as

$2x+1-2=3 \Rightarrow 2x-1=3 \Rightarrow 2x=4 \Rightarrow x=2$

Hence,

$x = 2$

Chapter: Exponents

Exercise: 2B

Page Number: 36

Question 1.

(i)

Solution: 5.736×10^3

(ii)

Solution: 3.5×10^{6}

(iii)

Solution: 2.73×10^{5}

(iv)

Solution: 1.68×10^{8}

(v)

Solution: 4.63×10^{12}

(vi)

Solution: 3.45×10^{7}

Question 2.

(i)

Solution: 374000

(ii)

Solution: 691200000

(iii)

Solution: 41253000

(iv)

Solution: 25000

(v)

Solution: 5170000

(vi)

Solution: 1679000000

Question 3.

(i)

Solution: 8.848×10^{3}

(ii)

Solution: 3×10^{8}

(iii)

Solution: 1.496×10^{11}

Question 4.

Solution:

Total mass = $5.97\times10^{24}+7.35\times10^{22}=597\times10^{22}+7.35\times10^{22}$

$\Rightarrow(597+7.35)\times10^{22}=(604.35)\times10^{22}=(6.0435)\times10^{24}\,kg$

Question 5.

(i)

Solution: $0.0006=\dfrac{6}{10000}=6\times10^{-4}$

(ii)

Solution: $0.00000083=\dfrac{8.3}{10000000}=8.3\times10^{-7}$

(iii)

Solution: $0.0000000534=\dfrac{5.34}{100000000}=5.34\times10^{-9}$

(iv)

Solution: $0.0027=\dfrac{2.7}{1000}=2.7\times10^{-3}$

(v)

Solution: $0.00000165=\dfrac{1.65}{100000}=1.65\times10^{-5}$

(vi)

Solution: $0.00000000689=\dfrac{689}{100000000000}=689\times10^{-10}$

Question 6.

(i)

Solution: $1micron=\dfrac{1}{1000000}\,m=1\times10^{-6}\,m$

(ii)

Solution: $0.0000004m=\dfrac{4}{1000000}\,m=4\times10^{-6}\,m$

(iii)

Solution: $0.03mm=\dfrac{3}{100}\,mm=3\times10^{-2}\,mm$

Question 7.

(i)

Solution: $2.06\times10^{-5}=\frac{2.06}{10^5}=\frac{206}{10^5\times10^2}=0.0000206$

(ii)

Solution: $5\times10^{-7}=\frac{5}{10^7}=0.0000005$

(iii)

Solution: $6.82\times10^{-6}=\frac{6.82}{10^6}=\frac{683}{10^6\times10^2}=0.00000683$

(iv)

Solution: $5.673\times10^{-4}=\frac{5.673}{10^4}=\frac{5673}{10^4\times10^3}=0.0005673$

(v)

Solution: $1.8\times10^{-2}=\frac{1.8}{10^2}=\frac{18}{10^2\times10}=0.018$

(vi)

Solution: $4.129\times10^{-3}=\frac{4.129}{10^3}=\frac{4129}{10^3\times10^3}=0.0004129$

Chapter: Exponents

Exercise: 2C

Page Number: 37

Objective questions

Question 1.

(a) $-\frac{8}{125}$

(b) $\frac{25}{4}$

(c) $\frac{125}{8}$

(d) $-\frac{2}{5}$

Solution: (c)

Question 2.

(a) 12

(b) 81

(c) $-\frac{1}{12}$

(d) $\frac{1}{81}$

Solution: (d)

Question 3.

(a) -32

(b) $\frac{-1}{32}$

(c) 32

(d) $\frac{1}{32}$

Solution: (b)

Question 4.

(a) $\frac{1}{128}$

(b) $-\frac{1}{128}$

(c) $-\frac{1}{8}$

(d) $\frac{1}{8}$

Solution: (d)

Question 5.

(a) $\frac{7}{10}$

(b) $\frac{60}{7}$

(c) $\frac{7}{5}$

(d) $\frac{7}{15}$

Solution: (b)

Question 6.

(a) $\frac{61}{144}$

(b) $\frac{144}{61}$

(c) 29

(d) $\frac{1}{29}$

Solution: (c)

Question 7.

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

(b) $\frac{27}{16}$

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

(d) $\frac{16}{25}$

Solution: (a)

Question 8.

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

(b) 16

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

(d) -16

Solution: (a)

Question 9.

(a)-1

(b) 1

(c) 2

(d) 3

Solution: (d)

Question 10.

(a)-1

(b) 1

(c) 2

(d) 3

Solution: (d)

Question 11.

(a) $\frac{2}{3}$

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

(c) 1

(d) 0

Solution: (c)

Question 12.

(a) $\frac{5}{3}$

(b) $\frac{3}{5}$

(c) $-\frac{3}{5}$

(d) None of the above

Solution: (c)

Question 13.

Solution: (d)

Question 14.

Solution: (b)

Question 15.

Solution: (c)

Question 16.

Solution: (b)

Question 17.

Solution: (a)

Chapter: Exponents

Exercise: Test Paper-2

Page Number: 39

A.

Question 1. Evaluate:

(i)

Solution: $3^{-4} = \frac{1}{3^4} = \frac{1}{81}$

(ii)

Solution: $(-4)^3 = (-1)^3 \times (4)^3 = -1 \times (4)^3 = -64$

(iii)

Solution: $\left(\frac{3}{4}\right)^{-2} = \left(\frac{4}{3}\right)^2 = \frac{16}{9}$

(iv)

Solution: $\left(\frac{-2}{3}\right)^{-5} = \left(-\frac{3}{2}\right)^5 = -1 \times \left(\frac{3}{2}\right)^5 = -\frac{243}{32}$

(v)

Solution: $\left(\frac{5}{7}\right)^0 = 1$

Question 2.

Solution: $\left\{\left(\frac{-2}{3}\right)^3\right\}^{-2} = \left\{-\frac{8}{27}\right\}^{-2} = \left\{\frac{8}{27}\right\}^{-2} = \left\{\frac{27}{8}\right\}^{2} = \frac{729}{64}$

Question 3.

Solution: $\left(3^{-1}+6^{-1}\right)\div\left(\frac{3}{4}\right)^{-1} = \left(\frac{1}{3}+\frac{1}{6}\right)\div\frac{4}{3} = \left(\frac{2+1}{6}\right)\times\frac{3}{4} = \left(\frac{3}{6}\right)\times\frac{3}{4} = \frac{1}{2}\times\frac{3}{4} = \frac{3}{8}$

Question 4.

Solution: Let the required number be x,

Therefore

$$\frac{\left(\frac{-2}{3}\right)^{-3}}{x} = \left(\frac{4}{9}\right)^{-2} \Rightarrow \frac{\left(\frac{-3}{2}\right)^{3}}{x} = \left(\frac{9}{4}\right)^{2} \Rightarrow \frac{\left(\frac{-2}{3}\right)^{-3}}{\left(\frac{4}{9}\right)^{-2}} = x \Rightarrow x = \left(\frac{-2}{3}\right)^{-3}\times\left(\frac{4}{9}\right)^{-2}$$

,

$$\Rightarrow x = \left(\frac{-3}{2}\right)^{3}\times\left(\frac{9}{4}\right)^{2} \Rightarrow x = \frac{-27}{8}\times\frac{81}{16} \Rightarrow x = \frac{-2187}{128}$$

Question 5.

Solution: Let the number be x

Therefore, $(-3)^{-1}\times x = 6^{-1} \Rightarrow \frac{-1}{3}\times x = \frac{1}{6} \Rightarrow x = \frac{-3}{6} \Rightarrow x = \frac{-1}{2}$

Question 6.

(i)

Solution: 3.45×10^{2}

(ii)

Solution: 1.8×10^{5}

(iii)

Solution: 3×10^{-6}

(iv)

Solution: 2.7×10^{6}

B.

Question 7.

Solution: (c)

Question 8.

Solution: (b)

Question 9.

Solution: (c)

Question 10.

Solution: (d)

Question 11.

Solution: (c)

Question 12.

Solution: (d)

Question 13.

Solution: (c)

Question 14.

(i)

Solution: 3.6×10^{5}

(ii)

Solution: 1.23×10^{-5}

(iii)

Solution: $\frac{9}{4}$

(iv)

Solution: 0.003

(v)

Solution: 0.000532