Chapter : 2. EXPONENTS

Exercise : 2A

Question: 1

Evaluate:

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Solution:

Some basic formulas are: $a^{-n} = \frac{1}{a^n}$ $(\frac{a}{b})^n = \frac{a^n}{b^n}$ Now,(i) $4^{-3} = (\frac{1}{4})^3 = \frac{1}{64}$ (ii) $\left(\frac{1}{2}\right)^{-5} = 2^5 = 32$

(iii) $\left(\frac{4}{3}\right)^{-3} = \left(\frac{3}{4}\right)^3 = \frac{3^3}{4^3} = \frac{27}{64}$ (iv) $(-3)^{-4} = (-3)^{-4} = \left(\frac{1}{-3}\right)^4 = \left(\frac{-1^4}{3^4}\right) = \frac{1}{81}$

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

Question: 2

Evaluate:

Solution:

As we know from the rule of exponents that powers of the same base adds up to acquire new power.

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

$= \frac{5^4}{3^4} = \frac{625}{81}$

(ii) $\left(\frac{5}{6}\right)^6 \times \left(\frac{5}{6}\right)^{-4} = \left(\frac{5}{6}\right)^{(6+(-4))}$

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

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

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

(iv) $\left(\frac{9}{8}\right)^{-3} \times \left(\frac{9}{8}\right)^2 = \left(\frac{9}{8}\right)^{-3+2} = \left(\frac{9}{8}\right)^{-1} = \frac{8}{9}$

Question: 3

Evaluate:

Solution:

(i) $\left(\frac{5}{9}\right)^{-2} \times \left(\frac{3}{5}\right)^{-3} \times \left(\frac{3}{5}\right)^0$

First we add the power of the same base,

$= \left(\frac{5}{9}\right)^{-2} \times \left(\frac{3}{5}\right)^{-3+0}$

Convert the powers in to positive numbers,

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

$= \frac{9^2}{5^2} \times \frac{5^3}{3^3}$

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

By cross multiplying we get,

$= \frac{3^4}{5^2} \times \frac{5^3}{3^3}$

$= (3^{(4-3)}) \times (5^{(3-2)}) = 3 \times 15 = 15$

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

$= \frac{5^4}{-3^4} \times \frac{-2^2}{5^2}$

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

$= 25 \times \frac{4}{81} = \frac{100}{81}$

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

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

$= \frac{3^{(3+2)}}{-2^{(3+2)}} = \frac{3^5}{-2^5} = \frac{-243}{32}$

Question: 4

Evaluate:

Solution:

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

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

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

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

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

(iii) $\left\{\left(\frac{3}{2}\right)^{-2}\right\}^{2} = \left(\frac{3}{2}\right)^{-2\times2}$

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

Question: 5

Evaluate

Solution:

Consider $\left\{\left(\frac{1}{3}\right)^{-3}-\left(\frac{1}{2}\right)^{-3}\right\}\div\left(\frac{1}{4}\right)^{-3}$ *,As we know,* $a^{-m}=\frac{1}{a^m}$ $=\left\{\left(\frac{1}{3}\right)^{-3}\times-\left(\frac{1}{2}\right)^{-3}\right\}\div\left(\frac{1}{4}\right)^{-3}$

$=\{3^3-2^3\}\div4^3$

$=\{27-8\}\div64=\frac{19}{64}$

Question: 6

Evaluate

Solution:

Consider $\left\{\left(\frac{4}{3}\right)^{-1}-\left(\frac{1}{4}\right)^{-1}\right\}^{-1}$ *,As we know,* $a^{-m}=\frac{1}{a^m}$

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

Now take the LCM of 4 and 1 which is 4.

$\therefore\left\{\left(\frac{3\times1}{4\times1}\right)-\left(\frac{4\times4}{1\times4}\right)\right\}^{-1}=\left\{\frac{3}{4}-\frac{16}{4}\right\}^{-1}$

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

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

Question: 7

Evaluate [(

Solution:

For any number a ≠ 0 $a^{-1} = 1/a$ *So,* $[(5^{-1} \times 3^{-1})^{-1} \div 6^{-1}]$

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

$=\left[\left(\frac{1}{15}\right)^{-1}\div\frac{1}{6}\right]$

= [15 × 6]

= 90

Question: 8

Find the value of

Solution:

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

As we know that by the rule $a^0 = 1$

So,

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

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

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

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

= 4 × $3^{(2-1)}$ = 4 × 3 = 12 Ans. (ii) (2^{-1} × 3^{-1}) ÷ 2^{-3}

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

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

$= \frac{1}{6} \times 8 = \frac{8}{6} = \frac{4}{3}$

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

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

= 2^2 + 3^2 + 4^2

= 4 + 9 + 16 = 29 Ans.

Question: 9

Find the value of

Solution:

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

Consider the left side;

$\left(\frac{5}{3}\right)^{-4} \times \left(\frac{5}{3}\right)^{-5} = \left(\frac{5}{3}\right)^{(-4+(-5))} = \left(\frac{5}{3}\right)^{-9}$

Given:

$\left(\frac{5}{3}\right)^{-9} = \left(\frac{5}{3}\right)^{3x}$

Comparing the powers;

-9 = 3x

$= x = \frac{-9}{3}$

x = -3

Question: 10

Find the value of

Solution:

Given,

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

$\therefore \left(\frac{4}{9}\right)^{(4-7)} = \left(\frac{4}{9}\right)^{-3} = \left(\frac{4}{9}\right)^{2x-1}$

= 2x – 1 = -3

2x = -3 + 1 = -2

= x = -1

Question: 11

By what number sh

Solution:

Let take that number be x;

$(x) \times (-6)^{-1} = 9^{-1}$

$x \times \frac{1}{-6} = \frac{1}{9} = \frac{x}{-6} = \frac{1}{9}$ *or* $x = \frac{-6}{9}$

The greatest common divisor for the numerator and denominator is 3.

$$\therefore x = \frac{-6}{9} = \frac{(-6) \div 3}{9 \div 3} = \frac{-2}{3}$$

Question: 12

By what number sh

Solution:

Let the number be x,

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

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

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

$$\Rightarrow \left(\frac{-3}{2}\right)^{3} \times \frac{1}{x} = \left(\frac{27}{4}\right)^{2}$$

$$\Rightarrow \frac{-3^3}{2^3} \times \frac{1}{x} = \frac{27^2}{4^2}$$

$$\Rightarrow \frac{27}{8} \times \frac{1}{x} = \frac{27^2}{4^2} = \frac{27 \times 27}{4 \times 4} = \frac{27 \times 27}{4 \times 2 \times 2} = \frac{27 \times 27}{8 \times 2}$$

$$\therefore \frac{1}{x} = \frac{\left(\frac{27 \times 27}{8 \times 2}\right)}{\left(\frac{-27}{8}\right)}$$

$$\Rightarrow x = \frac{\left(\frac{-27}{8}\right)}{\left(\frac{27 \times 27}{8 \times 2}\right)} = \left(\frac{-27}{8}\right) \times \left(\frac{8 \times 2}{27 \times 27}\right) = \frac{-2}{27}$$

Question: 13

If

Solution:

Given,

$5^{2x+1} \div 25 = 125$

We know that,

$25 = 5 \times 5 = 5^2$

$125 = 5 \times 5 \times 5 = 5^3$

$\therefore \frac{5^{2x+1}}{5^2} = 5^3 = 5^{[(2x+1)\ -2]} = 5^3$

$5^{[(2x+1)-2]} = 5^{[2x-1]} = 5^3$

$= 2x - 1 = 3$

$2x = 3 + 1 = 4$

$x = \frac{4}{2} = 2$

$\therefore x = 2$

Exercise : 2B

Question: 1

Write each of the

Solution:

(i) $57.36 = 5.736 \times 10$

(ii) $3500000 = 35 \times 10^5 = 3.5 \times 10^6$

(iii) $273000 = 273 \times 10^3 = 2.73 \times 10^5$

(iv) $168000000 = 168 \times 10^6 = 1.68 \times 10^8$

(v) $4630000000000 = 463 \times 10^{10} = 4.63 \times 10^{12}$

(vi) $345 \times 10^5 = 34500000 = 3.45 \times 10^7$

Question: 2

Write each of the

Solution:

(i) $3.74 \times 10^5 = \frac{374}{100} \times 10^5 = \frac{374 \times 10^5}{10^2} = 374 \times 10^{(5-2)} = 374 \times 10^3 = 374000$

(ii) $6.912 \times 10^8 = \frac{6912}{1000} \times 10^8 = \frac{6912 \times 10^8}{10^3} = 6912 \times 10^{(8-3)} = 6912 \times 10^5 = 691200000$

(iii) $4.1253 \times 10^7 = \frac{41253}{10000} \times 10^7 = \frac{41253 \times 10^7}{10^4} = 41253 \times 10^{(7-4)} = 41253 \times 10^3 = 41253000$

(iv) $2.5 \times 10^4 = \frac{25}{10} \times 10^4 = \frac{25 \times 10^4}{10} = 25 \times 10^{(4-1)} = 25 \times 10^3 = 25000$

(v) $5.17 \times 10^6 = \frac{517}{100} \times 10^6 = \frac{517 \times 10^6}{10^2} = 517 \times 10^{(6-2)} = 517 \times 10^4 = 5170000$

(vi) $1.679 \times 10^9 = \frac{1679}{1000} \times 10^9 = \frac{1679 \times 10^9}{10^3} = 1679 \times 10^{(9-3)} = 1679 \times 10^6 = 1679000000$

Question: 3 A

The height of Mou

Solution:

Height of the Mount Everest = 8848m

If we wrights it in standard form we have,

$8848 = 8.848 \times 1000m = 8.848 \times 10^3$ m.

Question: 3 B

The speed of ligh

Solution:

Speed of the light = 300000000 m/sec

In standard for we will get,

$300000000 = 3 \times 100000000$ m/sec $= 3 \times 10^8$ m/sec

Question: 3 C

The distance from

Solution:

Distance from earth to sun = 149600000000 m

In standard form we have,

$149600000000 = 1496 \times 100000000$

$= 1.496 \times 1000 \times 100000000$

$= 1.496 \times 10^3 \times 10^8 = 1.496 \times 10^{11}$ m.

Question: 4

Mass of earth is

Solution:

Given,

Mass of the earth $= 5.97 \times 10^{24}$ kg

Mass of the moon $= 7.35 \times 10^{22}$ kg

Now,

Mass of the earth $= 5.97 \times 10^{24} = 5.97 \times 10^{(2+22)} = 5.97 \times 10^2 \times 10^{22} = 597 \times 10^{22}$

So,

We can also Wright the mass of the earth as 597×10^{22} kg

Sum of the masses of the earth and the moon;

$= (597 \times 10^{22}) + (7.35 \times 10^{22}) = (597+7.35) \times 10^{22} = 604.35 \times 10^{22}$ kg

$= 6.0435 \times 100 \times 10^{22} = 6.0435 \times 10^2 \times 10^{22} = 6.0435 \times 10^{(2+22)} = 6.0435 \times 10^{24}$ kg

Question: 5

Write each of the

Solution:

(i) $0.0006 = \frac{6}{10^4} = 6 \times 10^{-4}$

(ii) $0.00000083 = \frac{83}{10^8} = \frac{8.3 \times 10}{10^8} = 8.3 \times 10^{(1-8)} = 8.3 \times 10^{-7}$

(iii) $0.0000000534 = \frac{534}{10^{10}} = \frac{5.34 \times 10^2}{10^{10}} = 5.34 \times 10^{(2-10)} = 5.34 \times 10^{-8}$

(iv) $0.0027 = \frac{27}{10^4} = \frac{27 \times 10}{10^4} = 2.7 \times 10^{(1-4)} = 2.7 \times 10^{-3}$

(v) $0.00000165 = \frac{165}{10^8} = \frac{1.65 \times 10^2}{10^8} = 1.65 \times 10^{(2-8)} = 1.65 \times 10^{-6}$

(vi) $0.00000000689 = \frac{689}{10^{11}} = \frac{6.89 \times 10^2}{10^{11}} = 6.89 \times 10^{(2-11)} = 6.89 \times 10^{-9}$

Question: 6 A

1 micron =

Solution:

1 micron $= \frac{1}{1000000} m = 1 \times 10^{-6}$ m.

Question: 6 B

Size of a bacteri

Solution:

Size of the bacteria = 0.0000004 m = $\frac{4}{10^7}m$ *= (4 × 10^{-7})m*

Question: 6 C

Thickness of a pa

Solution:

Thickness of paper = 0.03 mm = $\frac{1}{10^2}\ mm$ *= (3 × 10^{-2}) mm*

Question: 7

Write each of the

Solution:

(i) 2.06 × 10^{-5} = $\frac{206}{100} \times \frac{1}{10^5}$

$= \frac{206}{10^2 \times 10^5}$

$= \frac{206}{10^{(5+2)}}$

$= \frac{206}{10^7}$

$= \frac{206}{10000000} = 0.0000206$

(ii) 5 × 10^{-7} = $\frac{5}{10^7}$

$= \frac{5}{10000000} = 0.0000005$

(iii) 6.82 × 10^{-6} = $\frac{682}{100} \times \frac{1}{10^6}$

$= \frac{682}{10^2 \times 10^6}$

$= \frac{682}{10^{(2+6)}} = \frac{682}{10^8}$

$= \frac{682}{100000000} = 0.00000682$

(iv) 5.673 × 10^{-4} = $\frac{5673}{1000} \times \frac{1}{10^4}$

$= \frac{5673}{10^3 \times 10^4} = \frac{5673}{10^{(3+4)}}$

$= \frac{5673}{10^7} = \frac{5673}{10000000} = 0.0005673$

(v) 1.8 × 10^{-2} = $\frac{18}{10} \times \frac{1}{10^2}$

$= \frac{18}{10 \times 10^2} = \frac{18}{10^{(1+2)}}$

$= \frac{18}{10^3} = \frac{18}{1000} = 0.018$

(vi) $4.129 \times 10^{-3} = \frac{4129}{1000} \times \frac{1}{10^3}$

$= \frac{4129}{10^3 \times 10^3} = \frac{4129}{10^{(3+3)}}$

$= \frac{4129}{10^6} = \frac{4129}{1000000} = 0.004129$

Exercise : 2C

Question: 1

The value of

Solution:

$$\left(\frac{2}{5}\right)^{-3} = \left(\frac{5}{2}\right)^{3} = \frac{5^3}{2^3} = \frac{125}{8}$$

Question: 2

The value of

Solution:

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

Question: 3

The value of

Solution:

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

Question: 4

The value o

Solution:

Consider $(2^{-5} \div 2^{-2})$*,We know,For any non zero number "a"* $a^{-1} = \frac{1}{a}$ *So,*

$$(2^{-5} \div 2^{-2}) = \left(\frac{1}{2^5} \div \frac{1}{2^2}\right) = \left(\frac{1}{32} \div \frac{1}{4}\right) = \left(\frac{1}{32} \times 4\right) = \frac{4}{32} = \frac{1}{8}$$

Question: 5

The value of

Solution:

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

$$= \left(\frac{4+3}{12}\right)^{-1} \div \frac{1}{5} = \left(\frac{7}{12}\right)^{-1} \div \frac{1}{5}$$

$$= \left(\frac{12}{7}\right) \div \frac{1}{5} = \frac{12}{7} \times 5 = \frac{60}{7}$$

Question: 6

Choose the

Solution:

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

$= 2^2+3^2+4^2$

$= 4+9+16$

$= 29$

Question: 7

Choose the

Solution:

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

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

$$=\{27-8\}\div 64$$

$$=19\div 64=\frac{19}{64}$$

Question: 8

Choose the

Solution:

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

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

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

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

Question: 9

The value of x fo

Solution:

$$\left(\frac{7}{12}\right)^{-4}\times\left(\frac{7}{12}\right)^{3x}=\left(\frac{7}{12}\right)^5$$

$$\Rightarrow\left(\frac{7}{12}\right)^{-4+3x}=\left(\frac{7}{12}\right)^5$$

$\Rightarrow 3x\text{-}4 = 5$

$3x = 9$

$x=\frac{9}{3}=3$

Question: 10

If

Solution:

$$(2^{3x-1}+10)\ \div 7=6$$

$$=\frac{(2^{3x-1}+10)}{7}=\frac{6}{1}$$

Now by cross multiplying,

$(2^{3x-1} + 10) \times 1 = 6 \times 7 = 42$

$2^{3x-1} = 42-10$

$2^{3x-1} = 32$

$2^{3x-1} = 2^5$

$3x-1 = 5$

$3x = 6$

$x = \frac{6}{3} = 2$

Therefore x = 2

Question: 11

Choose the

Solution:

By using the law of exponents $\left(\frac{a}{b}\right)^0 = 1$

$\therefore \left(\frac{2}{3}\right)^0 = 1$

Question: 12

Choose the

Solution:

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

Question: 13

Choose the

Solution:

$\left(-\frac{1}{2}\right)^3 = -\frac{1}{2} \times -\frac{1}{2} \times -\frac{1}{2} = -\frac{1}{8}$

Question: 14

Choose the

Solution:

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

Question: 15

3670000 in standa

Solution:

$3670000 = 367 \times 10^4$

The standard form is written as one decimal number with any integer power.Therefore, $3670000 = 367 \times 10^4$

$= 36.7 \times 10^5$

$= 3.67 \times 10^6$

Thus, 3.67×10^6 *is the standard form.*

Question: 16

0.0000463 in stan

Solution:

0.0000463 in standard form is written as:

0.0000463

$= 0.463 \times 10^{-4}$

$= 4.63 \times 10^{-5}$

Question: 17

0.000367 × 1

Solution:

The usual form of 0.000367 × 10^4 *is written as:*

0.000367×10^4

$= 0.00367 \times 10^3$

$=0.0367 \times 10^2$

$= 0.367 \times 10^1$

$= 3.67$

Exercise : CCE TEST PAPER-2

Question: 1

Evaluate

<

Solution:

(i) $3^{-4} = \frac{1}{3^4} = \frac{1}{81}$

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

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

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

(v) Using the property $\left(\frac{a}{b}\right)^0 = 1$ *we will get,*

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

Question: 2

Evaluate: <

Solution:

Consider $\left\{\left(\frac{-2}{3}\right)^3\right\}^{-2}$ *As we know* $(a^m)^n = a^{mn}$ $\left\{\left(\frac{-2}{3}\right)^3\right\}^{-2} = \left(\frac{-2}{3}\right)^{-6} = \left(\frac{3}{-2}\right)^6 = \frac{3^6}{2^6} = \frac{729}{64}$

Question: 3

Simplify: <

Solution:

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

$$=\left(\left[\frac{1\times 2}{3\times 2}\right]+\left[\frac{1\times 1}{6\times 1}\right]\right)\div\left(\frac{4}{3}\right)$$

$$=\left(\frac{2+1}{6}\right)\div\left(\frac{4}{3}\right)$$

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

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

$$=\left(\frac{1}{2}\right)\times\left(\frac{3}{4}\right)=\frac{3}{8}$$

Question: 4

By what number sh

Solution:

Suppose the number is x

So we have,

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

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

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

$$\Rightarrow\frac{\frac{3^3}{-2^3}}{x}=\frac{9^2}{4^2}$$

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

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

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

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

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

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

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

Question: 5

By what number sh

Solution:

Let's suppose the number is x

$(-3)^{-1} \times (x) = (6)^{-1}$

$$\Rightarrow \frac{1}{-3} \times x = \frac{1}{6}$$

$$\Rightarrow \frac{1 \times -1}{-3 \times -1} \times x = \frac{1}{6}$$

$$\therefore \frac{x}{3} = \frac{1}{6}$$

On cross multiplying:

$(-x) \times 6 = 1 \times 3$

$-6x = 3$

$6x = -3$

$$\therefore x = \frac{-3}{6} = \frac{-1}{2}$$

Question: 6

Express each of t

Solution:

(i) $345 = 3.45 \times 100 = 3.45 \times 10^2$

(ii) $180000 = 18 \times 1000 = 18 \times 10^4 = 1.8 \times 10 \times 10^4 = 1.8 \times 10^{(1+4)} = 1.8 \times 10^5$

(iii) $0.000003 = \frac{3}{1000000} = 3 \times 10^{-6}$

(iv) $0.000027 = \frac{27}{1000000} = \frac{27}{10^6} = \frac{2.7 \times 10}{10^6} = 2.7 \times 10^{(1-6)} = 2.7 \times 10^{-5}$

Question: 7

The value of

Solution:

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

Question: 8

The value of

Solution:

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

Question: 9

Choose the

Solution:

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

$$= \frac{1}{3^6} \times \frac{1}{3^4} = \frac{1}{3^{(6+4)}}$$

$= \frac{1}{3^{10}} = 3^{-10}$

Question: 10

If

Solution:

$$\left(\frac{5}{12}\right)^{-4} \times \left(\frac{5}{12}\right)^{3x} = \left(\frac{5}{12}\right)^{5}$$

$$\Rightarrow \left(\frac{5}{12}\right)^{-4+3x} = \left(\frac{5}{12}\right)^{5}$$

$\Rightarrow -4 + 3x = 5$

$\Rightarrow 3x = 5 + 4 = 9$

$\Rightarrow x = \frac{9}{3} = 3$

Question: 11

Choose the

Solution:

By the law of exponents $\left(\frac{a}{b}\right)^{0} = 1$

We will get,

$$\left(\frac{3}{5}\right)^{0} = 1$$

Question: 12

Choose the

Solution:

$$\left(\frac{-6}{5}\right)^{-1} = \left(\frac{5}{-6}\right)^{1} = \frac{5}{-6} = \frac{5 \times -1}{-6 \times -1} = \frac{-5}{6}$$

Question: 13

Choose the

Solution:

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

Question: 14

Fill in the blank

Solution:

(i) 360000 written in standard form is 3.6×10^{5}

$360000 = 36 \times 10^{4} = 3.6 \times 10 \times 10^{4} = 3.6 \times 10^{(1+4)} = 3.6 \times 10^{5}$

(ii) 0.0000123 written in standard form is 1.23×10^{-5}

$0.0000123 = \frac{123}{10000000} = \frac{123}{10^{7}}$

$= \frac{1.23 \times 100}{10^{7}} = \frac{1.23 \times 10^{2}}{10^{7}}$

$= 1.23 \times 10^{(2-7)} = 1.23 \times 10^{-5}$

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

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

(iv) 3×10^{-3} *in usual form is 0.003*

$3 \times 10^{-3} = \frac{3}{10^3} = \frac{3}{1000} = 0.003$

(v) 5.32×10^{-4} *in usual form is 0.000532*

$5.32 \times 10^{-4} = \frac{5.32}{10^4} = \frac{5.32}{10000} = 0.000532$