MATHEMATICS

Class-VII

Topic-07

EXPONENTS

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CHAPTER 07

EXPONENTS

TERMINOLOGIES

Base, Exponents , Surds , Radicand , Radical sign , Order

INTRODUCTION

Do you know what is the mass of earth ?
It is 5970000000000000000000 kg! Distance between sun and saturn is 1433500,000,000m. These large numbers are difficult to read, understand, and compare, hence to make them easier we study exponents.

7.1 EXPONENTS

If a is a non-zero rational number and n is a natural number, then the product a × a × a × ... up to n times is denoted by a^n and is read as 'a raised to the power n'. Rational number **'a'** is called the **base** and natural number **'n'** is known as the **exponent**. Also, a^n is known as the exponential form of

a × a × a × ... up to n times.

For any non-zero rational number, we have :

$a^0 = 1$ and $a^1 = a$.

(a) Laws of Exponents

If a and b are non-zero rational numbers and m and n are natural numbers, then following are the laws of exponents :

(i) $a^m \times a^n = a^{m+n}$ **(ii)** $\frac{a^m}{a^n} = a^{m-n}$, where m > n **(iii)** $(a^m)^n = a^{mn} = (a^n)^m$

(iv) $(a \times b)^n = a^n b^n$ **(v)** $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$ **(vi)** $a^{-m} = \frac{1}{a^m}$

Illustration 7.1

Find the value of each of the following :

(i) 9^3 **(ii)** 2^5

Sol. **(i)** We have,

$9^3 = 9 \times 9 \times 9$
$= (9 \times 9) \times 9$
$= 81 \times 9$
$= 729$

(ii) $2^5 = 2 \times 2 \times 2 \times 2 \times 2$
$= (2 \times 2) \times 2 \times 2 \times 2$
$= (4 \times 2) \times 2 \times 2$
$= 8 \times 2 \times 2$
$= (8 \times 2) \times 2$
$= 16 \times 2$
$= 32.$

Illustration 7.2

Simplify :

(i) $7^2 \times 2^2$ **(ii)** $2^3 \times 5$

Sol. **(i)** We have, $7^2 \times 2^2 = 49 \times 4 = 196$

(ii) We have, $2^3 \times 5 = 8 \times 5 = 40$

Illustration 7.3

Which one is greater in the following questions :

(i) 4^3 or 3^4 **(ii)** 5^3 or 3^5 **(iii)** 2^8 or 8^2

(iv) 2^{10} or 10^2 **(v)** 2^{100} or 100^2

Sol. **(i)** We have,

$4^3 = 4 \times 4 \times 4 = 64$ and $3^4 = 3 \times 3 \times 3 \times 3 = 81$

$\because$ $81 > 64$

$\therefore$ $3^4 > 4^3$

(ii) We have

$5^3 = 5 \times 5 \times 5 = 125$ and $3^5 = 3 \times 3 \times 3 \times 3 \times 3 = 243$

$\because$ $243 > 125$

$\therefore$ $3^5 > 5^3$

(iii) We have

$2^8 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$

$= (2 \times 2) \times (2 \times 2) \times (2 \times 2) \times (2 \times 2)$

$= 4 \times 4 \times 4 \times 4$

$= 16 \times 16$

$= 256$

and $8^2 = 8 \times 8 = 64$

$\because$ $256 > 64$

$\therefore$ $2^8 > 8^2$

(iv) We have

$2^{10} = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$

$= (2 \times 2) \times (2 \times 2) \times (2 \times 2) \times (2 \times 2) \times (2 \times 2)$

$= 4 \times 4 \times 4 \times 4 \times 4$

$= (4 \times 4) \times (4 \times 4) \times 4$

$= 16 \times 16 \times 4$

$= 256 \times 4 = 1024$

and $10^2 = 10 \times 10 = 100$

$\because$ $1024 > 100$

$\therefore$ $2^{10} > 10^2$.

(v) In (iii) and (iv), we have seen that

$2^8 > 8^2$ and $2^{10} > 10^2$

Similarly, it can be seen that

$2^{15} > 15^2$, $2^{20} > 20^2$, $2^{50} > 50^2$ and $2^{100} > 100^2$.

Illustration 7.4

Simplify & write the answer in exponential form :

(i) $5^2 \times 5^3$ **(ii)** $3^2 \times 3^4 \times 3^8$ **(iii)** $7^x \times 7^2$

(iv) $\left(\frac{3}{2}\right)^2 \times \left(\frac{3}{2}\right)^5$ **(v)** $\left(\frac{-2}{3}\right)^3 \times \left(\frac{-2}{3}\right)^2$ **(vi)** $x^5 \times x^7$

Sol. We have,

(i) $5^2 \times 5^3 = 5^{2+3} = 5^5$ **(ii)** $3^2 \times 3^4 \times 3^8 = 3^{2+4+8} = 3^{14}$

(iii) $7^x \times 7^2 = 7^{x+2}$ **(iv)** $\left(\frac{3}{2}\right)^2 \times \left(\frac{3}{2}\right)^5 = \left(\frac{3}{2}\right)^{2+5} = \left(\frac{3}{2}\right)^7$

(v) $\left(\frac{-2}{3}\right)^3 \times \left(\frac{-2}{3}\right)^2 = \left(\frac{-2}{3}\right)^{3+2} = \left(\frac{-2}{3}\right)^5$ **(vi)** $x^5 \times x^7 = x^{5+7} = x^{12}$.

Illustration 7.5

Simplify and write each of the following in exponential form :

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

Sol. **(i)** $\left((-3)^5\right)^3 = (-3)^{5\times 3} = (-3)^{15}$ **(ii)** $\left\{\left(\frac{2}{3}\right)^2\right\}^5 = \left(\frac{2}{3}\right)^{2\times 5} = \left(\frac{2}{3}\right)^{10}$

Illustration 7.6

Simplify : $(6^{-1} - 8^{-1})^{-1} + (2^{-1} - 3^{-1})^{-1}$.

Sol. We have

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

$$= \left(\frac{4-3}{24}\right)^{-1} + \left(\frac{3-2}{6}\right)^{-1} = \left(\frac{1}{24}\right)^{-1} + \left(\frac{1}{6}\right)^{-1} = 24 + 6 = 30.$$

Illustration 7.7

By what number should we multiply $(-8)^{-1}$ to obtain a product equal to 10^{-1} ?

Sol. Let the required no. be x .Then $(-8)^{-1} \times x = (10)^{-1}$

$$\Rightarrow \quad \frac{1}{-8} \times x = \frac{1}{10} \qquad \Rightarrow \quad x = \frac{1}{10} \times (-8) \qquad \Rightarrow \quad x = \frac{-4}{5}.$$

Illustration 7.8

Find the value of x if $\left(\frac{2}{3}\right)^5 \times \left(\frac{3}{2}\right)^7 = \left(\frac{2}{3}\right)^{4x}$.

Sol. $\left(\frac{2}{3}\right)^5 \times \left(\frac{3}{2}\right)^7 = \left(\frac{2}{3}\right)^{4x} \Rightarrow \left(\frac{2}{3}\right)^5 \times \left(\frac{2}{3}\right)^{-7} = \left(\frac{2}{3}\right)^{4x}$

$$\Rightarrow \quad \left(\frac{2}{3}\right)^{5-7} = \left(\frac{2}{3}\right)^{4x} \qquad \Rightarrow \quad \left(\frac{2}{3}\right)^{-2} = \left(\frac{2}{3}\right)^{4x}$$

$$\Rightarrow \quad -2 = 4x \qquad \Rightarrow \quad x = \frac{-2}{4} = \frac{-1}{2}.$$

Ask yourself

1. Simplify: $\left\{\left(\frac{-2}{3}\right)^2\right\}^3$

2. By what number should 3^{-3} be multiplied to obtain 5

3. Find the value of x for which $2^{x+4} - 2^{x+2} = 3$.

4. The value of $\frac{3^{(12+n)} \times 9^{(2n-7)}}{3^{5n}}$

5. Find the simplified value of the expression $x^{a(b-c)}.\ x^{b(c-a)}.x^{c(a-b)}$

Answers

1. $\frac{64}{729}$ **2.** 135 **3.** – 2 **4.** $\frac{1}{9}$ **5.** 1

Add your knowledge

Since now we are all aware of irrational numbers , so lets deal with surds.

An irrational number of the form $\sqrt[n]{a}$ is given a special name **Surd**, where **'a'** is called **radicand** and it should always be a rational number. Also the symbol $\sqrt[n]{\ }$ is called the **radical sign** and the index **n** is called **order** of the surd. $\sqrt[n]{a}$ is read as **'n^{th} root of a'** and can also be written as $a^{\frac{1}{n}}$.

Some Important results on surds and their applications

(i) $\left(\sqrt[n]{a}\right)^n = \sqrt[n]{a^n} = a$ **(ii)** $\sqrt[n]{a} = \sqrt[n\times p]{a^p}$ or $\sqrt[n]{a^m} = \sqrt[n\times p]{a^{m\times p}}$,

1. Simplify :

(a) $\sqrt[3]{27}$ **(b)** $\sqrt[3]{64}$

Sol. **(a)** $3^{3\times\frac{1}{3}} = 3$ **(b)** $4^{4\times\frac{1}{4}} = 4$

2. Which is greater : $\sqrt[3]{6}$ and $\sqrt[5]{8}$

Sol. $\sqrt[3]{6}$ and $\sqrt[5]{8}$

L.C.M. of 3 and 5 is 15.

$\sqrt[3]{6} = \sqrt[3\times5]{6^5} = \sqrt[15]{7776}$ $\Rightarrow$ $\sqrt[5]{8} = \sqrt[3\times5]{8^3} = \sqrt[15]{512}$

$\therefore$ $\sqrt[15]{7776} > \sqrt[15]{512}$ $\Rightarrow$ $\sqrt[3]{6} > \sqrt[5]{8}$

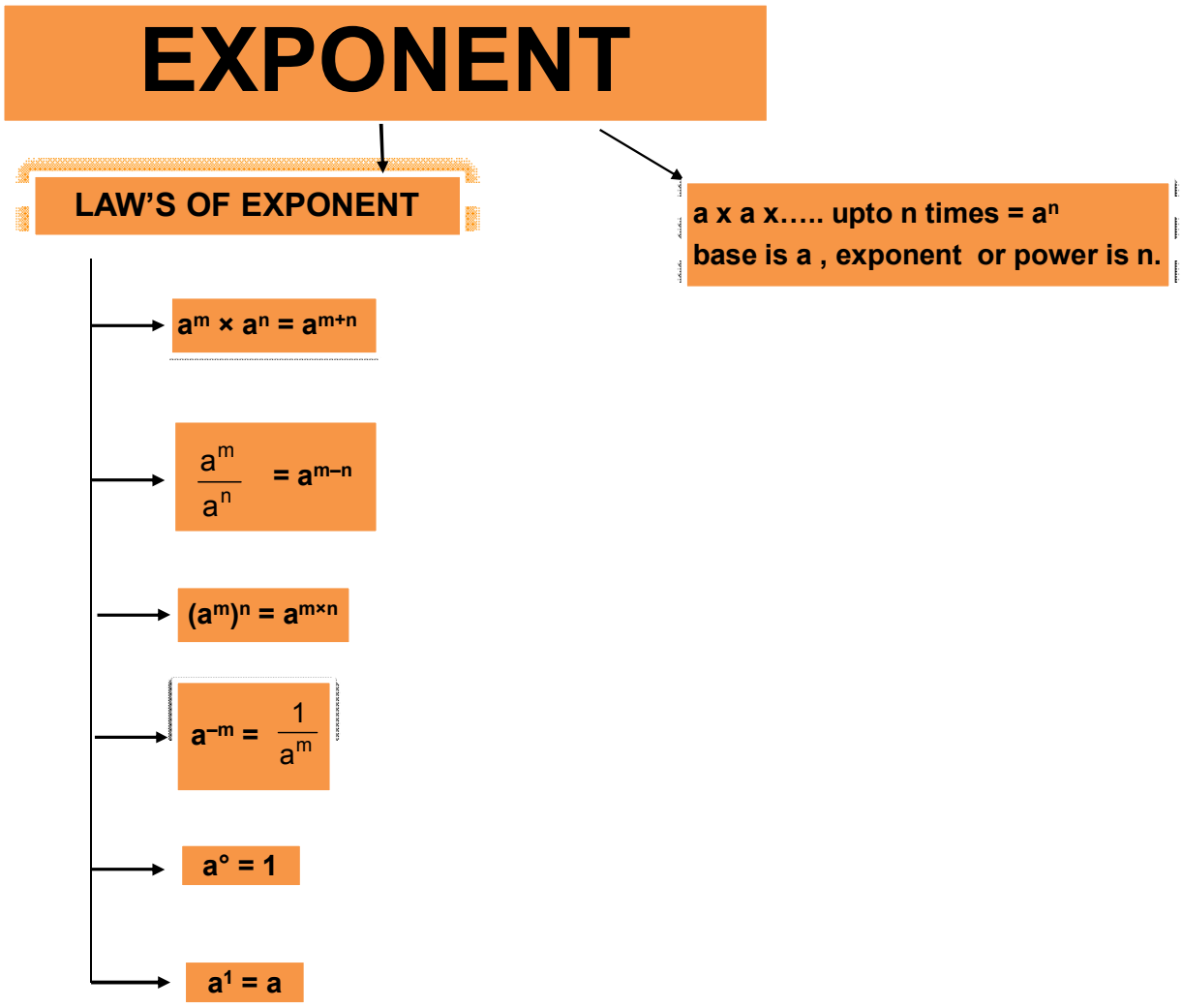
3. Solve : $\sqrt[4]{81} + \sqrt[3]{125} + \sqrt{25}$

Sol. $\sqrt[4]{81} + \sqrt[3]{125} + \sqrt{25}$, $3^{4\times\frac{1}{4}} + 5^{3\times\frac{1}{3}} + 5^{2\times\frac{1}{2}} = 13$

4. Solve : $\sqrt[4]{625} + \sqrt[3]{125} + \sqrt[3]{343}$

Sol. $5^{4\times\frac{1}{4}} + 5^{3\times\frac{1}{3}} + 7^{3\times\frac{1}{3}} = 17$

Concept Map


EXPONENT
LAW'S OF EXPONENT
a x a x….. upto n times = a^n
base is a , exponent or power is n.
$a^m \times a^n = a^{m+n}$
$\frac{a^m}{a^n} = a^{m-n}$
$(a^m)^n = a^{m \times n}$
$a^{-m} = \frac{1}{a^m}$
$a^\circ = 1$
$a^1 = a$

Summary

1. Exponents are used to express large numbers in shorter form to make them easy to read, understand, compare and operate upon.

2. $a \times a \times a \times a = a^4$ where a is the base and 4 is the exponent and a^4 is called the exponential form .

3. Laws of exponent :

(i) $a^m \times a^n = a^{m+n}$ **(ii)** $\frac{a^m}{a^n} = a^{m-n}$, where m > n

(iii) $(a^m)^n = a^{mn} = (a^n)^m$ **(iv)** $(a \times b)^n = a^n b^n$

(v) $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$ **(vi)** $a^{-m} = \frac{1}{a^m}$

(vii) $a^0 = 1$ **(viii)** $a^1 = a$

EXERCISE 01

SECTION -A (FIXED RESPONSE TYPE)

MULTIPLE CHOICE QUESTIONS

1. If $\left(\frac{5}{3}\right)^{-5} \times \left(\frac{5}{3}\right)^{-11} = \left(\frac{5}{3}\right)^{8x}$, then x = ?

(A) $\frac{-1}{2}$ (B) – 2 (C) 2 (D) $\frac{1}{2}$

2. If $\frac{p}{q} = \left(\frac{2}{3}\right)^2 \div \left(\frac{6}{7}\right)^0$. Find the value of $\left(\frac{q}{p}\right)^2$.

(A) $\frac{4}{9}$ (B) $\frac{16}{81}$ (C) $\frac{9}{16}$ (D) $\frac{81}{16}$

3. $\left[6^{-1} + \left(\frac{3}{2}\right)^{-1}\right]^{-1}$ = ?

(A) $\frac{2}{3}$ (B) $\frac{5}{6}$ (C) $\frac{6}{5}$ (D) None of these

4. The value of $\left(\frac{a^{-2} \times b^{-3}}{a^{-3} \times b^{-4}}\right)$ is _____.

(A) $a^{-1} \times b$ (B) $a \times b^{-1}$ (C) $(ab)^{-1}$ (D) ab

5. Find the value of x, if $2^x + 2^x + 2^x = 192$.

(A) 6 (B) 5 (C) 8 (D) 3

6. Find the value of 'm' so that $(-3)^{m+1} \times (-3)^5 = (-3)^7$

(A) 0 (B) –1 (C) 1 (D) 2

7. If $3^n = 27$, then 3^{n-2} is :

(A) $\frac{1}{9}$ (B) $\frac{1}{3}$ (C) 3 (D) 9

8. The value of $\left(\frac{32}{243}\right)^{-3/5}$ is _____

(A) $\frac{27}{8}$ (B) $\frac{8}{27}$ (C) $\frac{16}{27}$ (D) $\frac{27}{16}$

9. The value of $(2^5)^{10}$ is :

(A) 2^{50} (B) 2^{15} (C) 2^{10} (D) None of these

10. Value of $(13^2 - 5^2)^{3/2}$ is :

(A) 1782 (B) 1728 (C) 1872 (D) 2718

11. If $8 \times 2^{n+2} = 32$, find the value of 'n'.
(A) 0 (B) – 1 (C) 1 (D) 2

12. $(49)^8 \div (7^2)^6$ is equal to
(A) 7 (B) 49 (C) 6 (D) none of these

13. The mass of an oxygen atom is 2.66×10^{-23} gram. The approximate mass of one billion of such oxygen atom is :
(A) 2.66×10^{-20} (B) 2.66×10^{-17} (C) 2.66×10^{-14} (D) 2.66×10^{11}

14. $\left(\frac{12}{35}\right)^4$ is equal to :
(A) $\frac{2^8 \times 3^4}{5^4 \times 7^4}$ (B) $\frac{2^2 \times 3^1}{5 \times 7}$ (C) $\frac{12^4}{7 \times 5}$ (D) $\frac{4^2 \times 3^2}{7^2 \times 5^2}$

15. Evaluate : $(14)^2 \times (21)^3 \div 7^5$.
(A) 108 (B) 180 (C) 118 (D) 1.8

16. $\left[\left\{\left(\frac{3}{2}\right)^2\right\}^3\right]^0 =$
(A) 0 (B) 1 (C) $\frac{729}{128}$ (D) $\frac{243}{64}$

17. $\frac{2^0 + 3^0 + 5^0}{2 \times 3 \times 5} =$
(A) 3 (B) $\frac{1}{10}$ (C) $\frac{1}{30}$ (D) $\frac{1}{3}$

FILL IN THE BLANKS

1. If $x^k = 1$, $(x \neq 1)$ then k = _____.

2. $(7^o + 5^o) \times 2^o$ = _____.

3. If $x^{-n} = \frac{1}{p}$, then p = _____.

4. $(xy)^n = x^n \times$ _____.

5. $\frac{x^{m+n}}{x^n} =$ _____.

TRUE / FALSE

1. $x^5 + x^2 = x^7$

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

3. If $4^{x+2} = 256$, then x is equal to 2

4. $\left(\frac{2^5}{2^8}\right)^5 .2^{-5} = 2^{-20}$

5. $\left(\frac{1}{2}\right)^m \times (2)^{-n} = 2^{m-n}$

MATCH THE COLUMN

1.

	Column – I		Column – II
(A)	$\left(\frac{ap}{qr}\right)^m \times \left(\frac{bq}{as}\right)^m$	(p)	$\frac{a^6}{b^6}$
(B)	$\left(\frac{b/a}{c/d}\right)^m \times \left(\frac{bd}{ac}\right)^n$	(q)	$\left(\frac{rq}{ps}\right)^m$
(C)	$\frac{(a^2)^3}{(b^3)^2}$	(r)	$\left(\frac{bp}{rs}\right)^m$
(D)	$\left(\frac{p/q}{r/s}\right)^{-m}$	(s)	$\left(\frac{bd}{ac}\right)^{m+n}$

2.

	Column – I		Column – II
(A)	0.0000463 in standard form is	(p)	$\frac{1}{4}$
(B)	345×10^5 in standard form is	(q)	4.63×10^{-5}
(C)	$\left(\frac{1}{2}\right)^{-2} + \left(\frac{1}{3}\right)^{-2} + \left(\frac{1}{4}\right)^{-2}$	(r)	3.45×10^7
(D)	$\left(4^{-1} + 8^{-1}\right) \div \left(\frac{2}{3}\right)^{-1}$	(s)	29

SECTION -B (FREE RESPONSE TYPE)

VERY SHORT ANSWER TYPE

1. Simplify:

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

(iii) $\left(\frac{-3}{2}\right)^3 \div \left(\frac{-3}{2}\right)^6$ **(iv)** $\left(\frac{-2}{3}\right)^7 \div \left(\frac{-2}{3}\right)^4$

2. By what number should $(-5)^{-1}$ be multiplied so that the product is $(8)^{-1}$

3. By what number should we multiply 3^{-3} so that the product is 4 ?

4. By what number should $(-30)^{-1}$ be divided so that the quotient is $(6)^{-1}$?

5. $\left(\frac{2^5}{2^8}\right)^5 .2^{-5} = ?$

SHORT ANSWER TYPE

6. Find the value of x for which $2^{x+4} - 2^{x+2} = 3$

7. Simplify : $\left(\frac{1}{2}\right)^3 \times \left(\frac{2}{3}\right)^3 \times \left(\frac{3}{4}\right)^3 \times 2^6$.

8. Find value of $20 + (27)^{-1/3}$.

9. Solve : $5^{x-1} = 1$

10. If $\left(\frac{a}{b}\right)^{x-1} = \left(\frac{b}{a}\right)^{x-3}$ then find the value of x

11. $\left[\left[\frac{2}{5}\right]^{-2} + \left[\frac{7}{2}\right]^{2}\right]^{-1}$ solve it.

LONG ANSWER TYPE

12. The value of $(27^{-2/3})^{1/2} \times (64^{1/3})^2 \times (81^{-3/2})^{1/6}$

13. Find x so that $\left(\frac{3}{5}\right)^3 \times \left(\frac{3}{5}\right)^{-6} = \left(\frac{3}{5}\right)^{2x-1}$.

14. Obtain the value of $2^3 \times \left(\frac{1}{2}\right)^5 \times 2^{-6} \times \left(\frac{1}{2}\right)^{-3}$

15. Simplify : $\left[\left(-\frac{1}{3}\right)^{-2}\right]^{-2} \times \left[\left(\frac{2}{3}\right)^2\right]^{-2} \div \left[\left(\frac{3}{2}\right)^{-1}\right]^{-2}$

16. $\frac{5t^4 \times 3p^3}{\left(27t^9\right)^{1/3}\left(625p^4\right)^{1/4}}$

EXERCISE 02

SECTION -A (COMPETITIVE EXAMINATION QUESTION)

MULTIPLE CHOICE QUESTIONS

1. The expression $x^{a(b-c)}.\ x^{b(c-a)}.x^{c(a-b)}$ simplifies to :

(A) – 1 (B) 0 (C) 1 (D) 2

2. Simplify $(9^{4/3} \div 27^{2/3}) \times 3^{3/2}$

(A) $3^{9/5}$ (B) $3^{13/6}$ (C) $3^{37/6}$ (D) None of these

3. If $2^n - 2^{n-1} = 4$, then the value of n^n will be –

(A) 1 (B) (C) 2 (D) 27

4. If $\left(\frac{1}{5}\right)^{3y} = 0.008$, then $(0.25)^y$ will be _____.

(A) 1 (B) 0.25 (C) 0.0625 (D) 0.125

5. If $3^x = 500$, then the value of 3^{x-2} is _____

(A) $\frac{100}{9}$ (B) $\frac{1000}{9}$ (C) $\frac{500}{9}$ (D) $\frac{500}{3}$

6. The value of x in $\left(\frac{3}{5}\right)^3 \times \left(\frac{3}{5}\right)^{-6} = \left(\frac{5}{3}\right)^{1-2x}$ is _____

(A) 0 (B) 1 (C) – 1 (D) 2

7. $\left(\frac{1}{2}\right)^3 \times \left(\frac{-3}{5}\right)^3 \times \left(\frac{-4}{9}\right)^2 =$

(A) $\frac{-2}{375}$ (B) $\frac{2}{375}$ (C) $\frac{-6}{375}$ (D) $\frac{6}{375}$

8. The value of $\left[\left(\frac{-1}{3}\right)^{-2}\right]^{-2} \times \left[\left(\frac{2}{3}\right)^2\right]^{-2} \div \left[\left(\frac{3}{2}\right)^{-1}\right]^{-2}$ is :

(A) 81 (B) 36 (C) $\frac{1}{81}$ (D) $\frac{1}{36}$

9. Solve for x : $3^{2x} \times 3^{x+3} \times 3^{4-x} = \left(\sqrt{3}\right)^{10}$

(A) –1 (B) 1 (C) 3 (D) –3

10. $5^{2x/3} \times 5^{x+2} \times 5^{x-5} = \left(\sqrt{5}\right)^{7/3}$ Find the value of $\sqrt{x}$.

(A) $\frac{5}{4}$ (B) 1 (C) $\frac{4}{5}$ (D) –1

11. $(49)^a = (7)^{a+5}$, $(64)^b = (2)^{4b+2}$. Find value of $2^{a+b} \Rightarrow$?

(A) 8 (B) 16 (C) 32 (D) 64

SECTION -B (TECHIE STUFF)

12. Find the biggest among the following $2^{1/2}$, $3^{1/3}$, $6^{1/6}$, $8^{1/8}$

(A) $2^{1/2}$ (B) $3^{1/3}$ (C) $6^{1/6}$ (D) $8^{1/8}$

13. If $2 \times (\sqrt{2})^5 \times (\sqrt{2})^{-2/3} = (\sqrt{2})^{x+1}$, then the value of x is :

(A) $\frac{2}{3}$ (B) $1\frac{1}{3}$ (C) $4\frac{1}{3}$ (D) $5\frac{1}{3}$

14. $\sqrt{3\sqrt{3\sqrt{3\sqrt{3}}}} =$

(A) $3^{\frac{15}{8}}$ (B) $3^{\frac{15}{16}}$ (C) $3^{\frac{16}{15}}$ (D) $3^{\frac{8}{15}}$

15. $\frac{\sqrt{32}+\sqrt{48}}{\sqrt{8}+\sqrt{12}}$

(A) 2 (B) $\sqrt{2}$ (C) $\sqrt{3}$ (D) 1

EXERCISE 03

(PREVIOUS YEAR EXAMINATION QUESTIONS)

1. Which one of the following statements is true ? **[NSTSE 2010]**

(A) $4^{3^2} = (4^3)^2$ (B) $4^{3^2} > (4^3)^2$

(C) $4^{3^2} < (4^3)^2$ (D) they cannot be compared

2. Which of the following statements is false ? **[NSTSE 2010]**

(A) $(-1)^n = -1$, if n is an odd integer (B) For any rational number a, $a^0 = 1$

(C) if $4 \times 8^m = 2^5$,then m = 1 (D) None of these

3. What is the value of the expression given below? **[IMO-2010]**

$5 + 5(9 \div 3)^2$

(A) 35 (B) 90 (C) 50 (D) 230

4. Ashwin used the rule listed below to rewrite the expression $10^2 \times 10^5 = 10^7$.

$10^m \times 10^n = 10^{m+n}$

Based on this rule, which of the following is equivalent to the expression $8^{-4} \times 8^6$?

[IMO-2010]

(A) 8^{-10}, because $8^{-4} \times 8^6 = 8^{-4-6}$ (B) 8^{1° because $8^{-4} \times 8^6 = 8^{4+6}$

(C) 8^{-2}, because $8^{-4} \times 8^6 = 8^{4-6}$ (D) 8^2, because $8^{-4} \times 8^6 = 8^{-4+6}$

5. A mistake was made in simplifying the expression given below.

Simplify : $5 + 2(6 + 4) - 2^3$, Step 1 : $5 + 2(10) - 2^3$, Step 2 : $7(10) - 2^3$, Step 3 : $70 - 2^3$, Step 4: $70 - 8$, Step 5 : 62.

In which step did the first mistake appear? **[IMO-2010]**

(A) Step 1 (B) Step 2 (C) Step 3 (D) Step 4

6. For what positive integer 'n' does $n^2 \times 1995^2 \times 1996^2 \times 1997^2 = 3990^2 \times 3992^2 \times 3994^2$? **[NSTSE 2011]**

(A)2 (B) 4 (C) 5 (D) 8

7. In simplest form, the value of the quotient $\frac{19^{98} + (342)(19)^{97}}{19^{99}}$ **[NSTSE 2011]**

(A) 0 (B) 1 (C) 19 (D) 100

8. Simplify : $\frac{5x^7y^5 \times \left(10a^3x^2\right)^{-3}}{\left(2x^5y^3\right) \times \left(6a^2y\right)^{-2}}$ **[IMO-2013]**

(A) $\frac{25}{6}xy^4$ (B) $\frac{25}{4}x^2y^3$ (C) $\frac{9}{100}a^2xy$ (D) $\frac{9}{100a} \times \left(\frac{y}{xa}\right)^4$

9. The value of $\frac{\left((243)^{\frac{1}{5}}\right)^4}{\left((32)^{\frac{1}{5}}\right)^4} = ?$ **[IMO-2014]**

(A) $\frac{3}{2}$ (B) $\left(\frac{3}{2}\right)^{-4}$ (C) $\frac{1}{2^{-4} \times 3^{-4}}$ (D) $\frac{1}{2^4 \times 3^{-4}}$

ANSWER KEY

EXERCISE 01

SECTION -A (FIXED RESPONSE TYPE)

MULTIPLE CHOICE QUESTIONS

Ques.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	B	D	C	D	A	C	C	A	A	B	A	D	C	A	A
Ques.	16	17													
Ans.	B	B													

FILL IN THE BLANKS

1. 0 **2.** 2 **3.** x^n **4.** y^n **5.** x^m

TRUE / FALSE

1. False **2.** True **3.** True **4.** True **5.** False

MATCH THE COLUMN

1. (A) – (r), (B) – (s), (C) – (p), (D) – (q) **2.** (A) – (q), (B) – (r), (C) – (s), (D) – (p)

SECTION -B (FREE RESPONSE TYPE)

VERY SHORT ANSWER TYPE

1. **(i)** $\frac{1}{256}$ **(ii)** $\frac{64}{729}$ **(iii)** $\frac{-8}{27}$ **(iv)** $\frac{-8}{27}$

2. $\frac{-5}{8}$ **3.** 108 **4.** $\frac{-1}{5}$ **5.** 2^{-20}

SHORT ANSWER TYPE

6. –2 **7.** 1 **8.** $20\frac{1}{3}$ **9.** 1 **10.** 2

11. $\frac{2}{37}$

LONG ANSWER TYPE

12. $\frac{16}{9}$ **13.** – 1 **14.** $\frac{1}{32}$ **15.** $\frac{1}{36}$ **16.** tp^2

EXERCISE 02

SECTION -A (COMPETITIVE EXAMINATION QUESTION)

MULTIPLE CHOICE QUESTIONS

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	C	B	D	B	C	C	A	D	A	A	D

SECTION -B (TECHIE STUFF)

Ques.	12	13	14	15
Ans.	B	D	B	A

EXERCISE 03

(PREVIOUS YEAR EXAMINATION QUESTIONS)

Ques.	1	2	3	4	5	6	7	8	9
Ans.	B	B	C	D	B	D	B	D	D