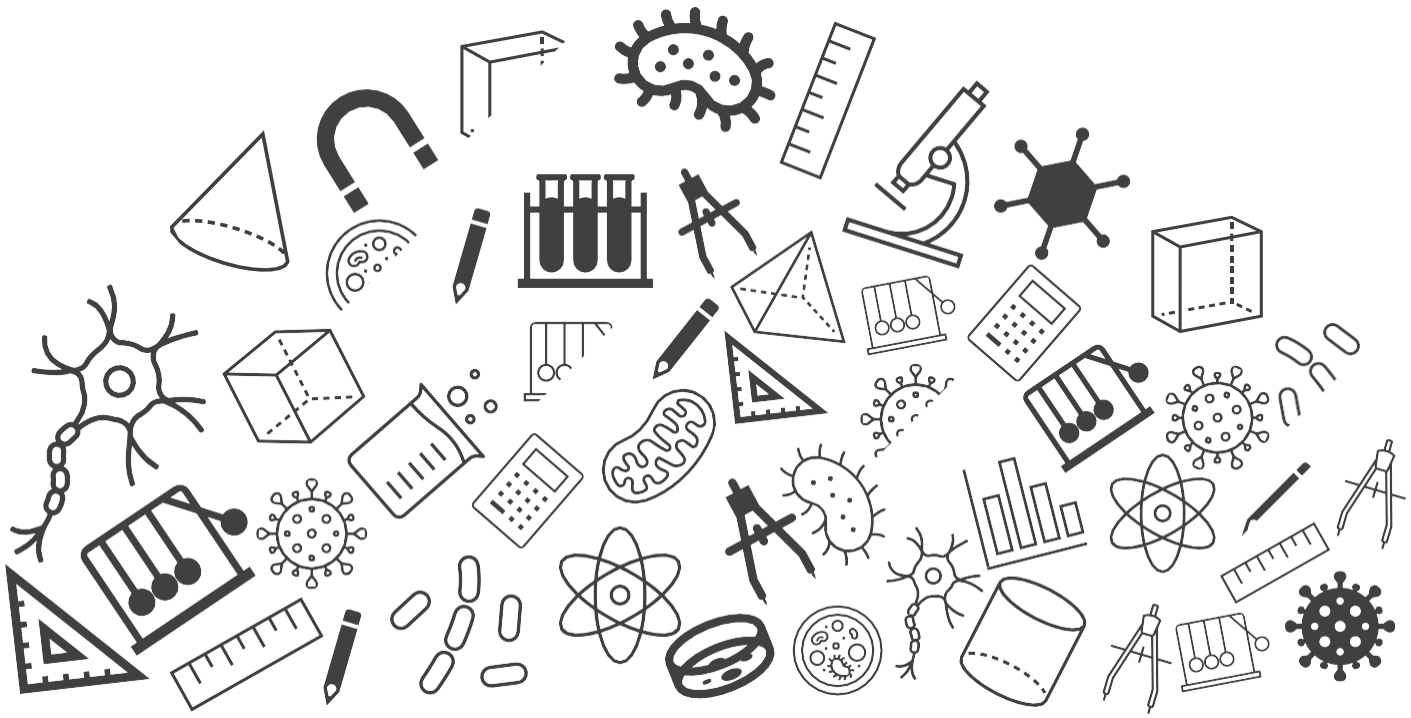
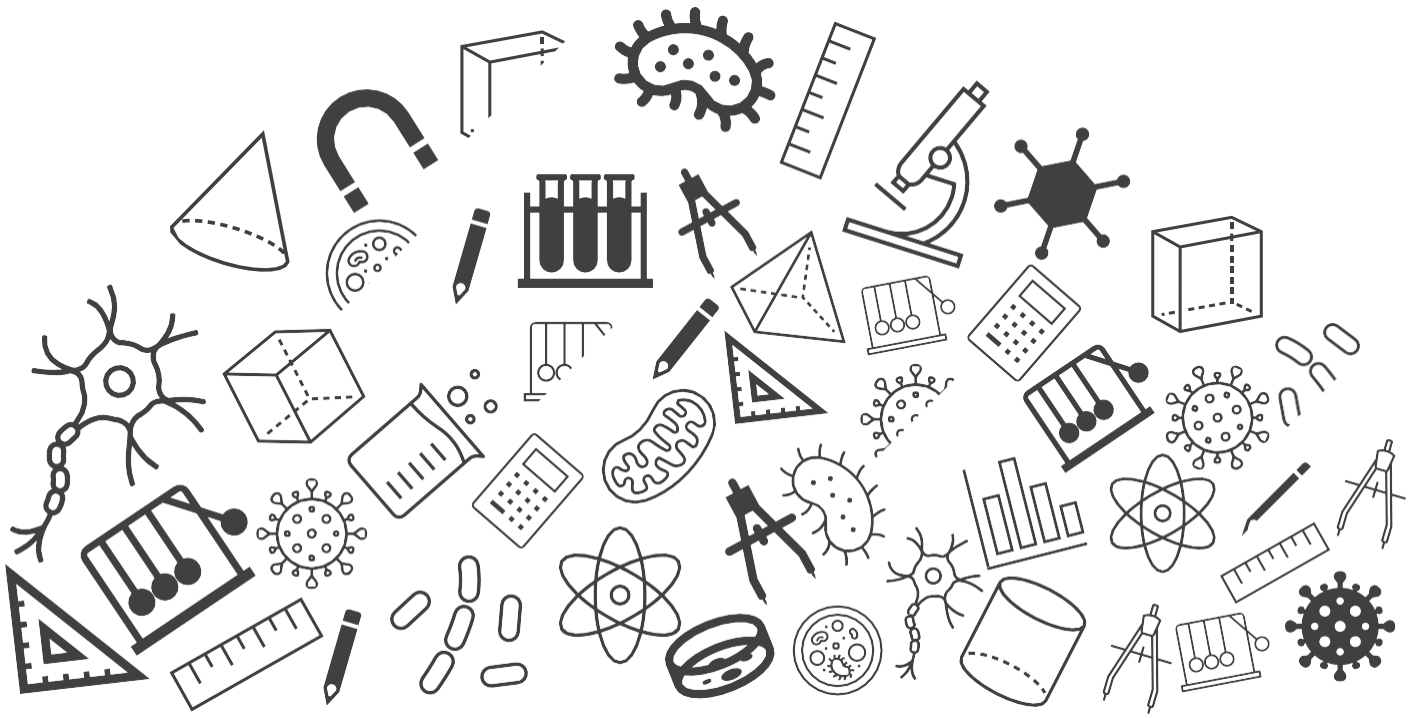
Grade 08: Maths
Exam Important Questions



Exponents and Powers



Exponents and Powers

1. The multiplicative inverse of $\left(-\frac{5}{9}\right)^{-99}$ is:

[1 mark]

[NCERT Exemplar]

[Powers with Negative Exponents]

- ✔ **A.** $\left(-\frac{5}{9}\right)^{99}$
- ✘ **B.** $\left(\frac{5}{9}\right)^{99}$
- ✘ **C.** $\left(\frac{9}{-5}\right)^{99}$
- ✘ **D.** $\left(\frac{9}{5}\right)^{99}$

Solution:

We know that, a^m and a^{-m} are multiplicative inverse of each other because $a^m \times a^{-m} = 1$.

$\Longrightarrow$ Multiplicative inverse of $\left(-\frac{5}{9}\right)^{-99}$ will be $\left(-\frac{5}{9}\right)^{99}$.

[1 mark]

2. The speed of light is $3 \times 10^8\ m/s$ and the speed of sound is $3.43 \times 10^2\ m/s$. Then the speed of light is almost _____ times greater than that of sound.

A. 10^{10}

B. 10^3

C. 10^8

D. 10^6

Given:

Speed of light $= 3 \times 10^8\ m/s$

Speed of sound $= 3.43 \times 10^2\ m/s$

$\frac{speed\ of\ light}{speed\ of\ sound}$

$= \frac{3 \times 10^8}{3.43 \times 10^2}$

$= \frac{3 \times 10^6}{3.43} \quad \left[\because \frac{a^m}{a^n} = a^{m-n}\right]$

Therefore, the speed of light is almost 10^6 times greater than that of sound.

3. Simplify: $2.5p - 1.5q)^2 - (1.5p - 2.5q)^2$
[2 Marks]
[NCERT-9.5, Q4(v)]

✗ **A.** $4p^2 - 6.5q^2$

✗ **B.** $-15p^2 - 4q^2$

✗ **C.** $6.5p^2 - 6.5q^2$

✓ **D.** $4p^2 - 4q^2$

Solution:

By applying the algebraic identity: $(a - b)^2 = a^2 - 2ab + b^2$

$2.5p - 1.5q)^2 - (1.5p - 2.5q)^2$
$= [6.25p^2 - 2 \times 2.5p \times 1.5q + 2.25q^2] - [2.25p^2 - 2 \times 2.5p \times 1.5q + 6.25q^2]$
[1 mark]
$= 6.25p^2 - 2 \times 2.5p \times 1.5q + 2.25q^2 - 2.25p^2 + 2 \times 2.5p \times 1.5q - 6.25q^2$
$= 4p^2 - 4q^2$
[1 mark]

4. Scientific notation of 156,600,000,000 m is given as:

A. 1.566 × 10^{11} m

B. 1.566 × 10^{8} m

C. 15.66 × 10^{8} m

D. 15.66 × 10^{11} m

In scientific notation, any number is expressed in powers of 10 and the decimal number must be in between 1 and 10.

Given number is, 156,600,000,000 m

$= 1566 \times 10^{8}$

$= 1.566 \times 10^{3} \times 10^{8}$

$= 1.566 \times 10^{11}$ m

Exponents and Powers

5. Simplify: $\frac{25 \times t^{-4}}{5^{-3} \times 10 \times t^{-8}}$

[3 marks]

[NCERT - Ex 12.1, Q7 (i)]

[Laws of Exponents]

Solution:

$\frac{25 \times t^{-4}}{5^{-3} \times 10 \times t^{-8}}$

$\Rightarrow \frac{5^2 \times t^{-4}}{5^{-3} \times 5 \times 2 \times t^{-8}}$

[$\because$ 10 = 5 $\times$2 and $25 = 5^2$]

[1 mark]

$\Rightarrow \frac{5^2 \times t^{-4}}{5^{-3+1} \times 2 \times t^{-8}}$ [$\because a^m \times a^n = a^{m+n}$]

$\Rightarrow \frac{5^2 \times t^{-4}}{5^{-2} \times 2 \times t^{-8}}$

[1 mark]

$\Rightarrow \frac{5^{(2+2)} \times t^{(-4+8)}}{2}$ [$\because a^m \div a^n = a^{m-n}$]

$\Rightarrow \frac{5^4 \times t^4}{2}$

[1 mark]

6. If $3^x = \frac{1}{243}$, find the value of x.

[2 marks]

[DAV 2019-2020]

[Powers with Negative Exponents]

Solution:

$3^x = \frac{1}{243} = \frac{1}{3 \times 3 \times 3 \times 3 \times 3} = \frac{1}{3^5}$

$\implies 3^x = 3^{-5} \qquad \left[\because a^m = \frac{1}{a^{-m}}\right]$

[1.5 marks]

Since, base is same on the both sides so exponents must be same.

$x = -5$

[0.5 mark]

7. By what number should $\left(\frac{-3}{2}\right)^{-3}$ be divided so that the quotient may be $\left(\frac{4}{27}\right)^{-2}$? [3 Mark]

Let $\left(\frac{-3}{2}\right)^{-3}$ be divided by x to get $\left(\frac{4}{27}\right)^{-2}$ as quotient,

Then $\left(\frac{-3}{2}\right)^{-3} \div x = \left(\frac{4}{27}\right)^{-2}$...(0.5 marks)

$\Rightarrow x = \left(\frac{-3}{2}\right)^{-3} \div \left(\frac{2^2}{3^3}\right)^{-2}$...(0.5 marks)

$= \frac{(-3)^{-3}}{2^{-3}} \div \frac{2^{-4}}{3^{-6}}$ $\left[\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m} \; and \; (a^m)^n = a^{mn}\right]$...(0.5 marks)

$= -\frac{3^{-3}}{2^{-3}} \times \frac{3^{-6}}{2^{-4}}$ $[(-3)^{-3} = -3^{-3}]$...(0.5 marks)

$= -\frac{3^{-3} \times 3^{-6}}{2^{-3} \times 2^{-4}}$

$= -\frac{3^{-3+(-6)}}{2^{-3+(-4)}}$ $[a^m \times a^n = a^{m+n}]$...(0.5 marks)

$= -\frac{3^{-3-6}}{2^{-3-4}}$

$= -\frac{3^{-9}}{2^{-7}}$

$= -\frac{2^7}{3^9}$...(0.5 marks)

8. Express the following number in usual form: 3.02×10^{-6}
[1 mark]
[NCERT – Ex 12.2, Q2(i)]

A. 0.0000302

B. 0.000302

C. 0.000000302

D. 0.00000302

$3.02 \times 10^{-6} = \frac{3.02}{10^6} = \frac{3.02}{1000000} = 0.00000302$
[1 mark]