

# CLASS 8 · HOTS · OLYMPIAD PREPARATION · SHORT NOTES

## Chapter 4: HOTS: Power Play (Class 8)

Topic-wise short notes with solved examples

Higher order thinking questions on exponents for Class 8: the laws of exponents, negative exponents, finding an unknown power and scientific notation, each with a full solution.

### 1 Solved HOTS questions

- Laws:  $a^m \times a^n = a^{m+n}$ ,  $\frac{a^m}{a^n} = a^{m-n}$ ,  $(a^m)^n = a^{mn}$ ,  $a^0 = 1$  and  $a^{-n} = \frac{1}{a^n}$ . To compare or combine powers, first write every base as a power of the same prime.

**Example 1.1** Simplify  $\frac{2^3 \times 2^5}{2^4}$ .

SOLUTION

$$2^{3+5-4} = 2^4.$$

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**Example 1.2** Find the value of  $\left(\frac{3}{4}\right)^{-2}$ .

SOLUTION

A negative exponent turns the fraction upside down:  $\left(\frac{4}{3}\right)^2$ .

$$\frac{16}{9}$$

**Example 1.3** Simplify  $4^3 \times 2^{-6}$ .

SOLUTION

$$4^3 = (2^2)^3 = 2^6.$$

$$2^6 \times 2^{-6} = 2^0.$$

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**Example 1.4** Find  $x$  if  $3^{x-1} = 81$ .

SOLUTION

$$81 = 3^4, \text{ so } x - 1 = 4.$$

$$x = 5$$

**Example 1.5** Write 0.00045 and 7 300 000 in scientific notation.

SOLUTION

$0.00045 = 4.5 \times 10^{-4}$  (the decimal point moves 4 places to the right).

$7\,300\,000 = 7.3 \times 10^6$  (the decimal point moves 6 places to the left).

$4.5 \times 10^{-4}$  and  $7.3 \times 10^6$

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