

## Class 7-Mathematics

Instructions for students: The notes provided must be copied to the Maths copy and then do the homework in the same copy.

### Chapter 4

### EXPONENTS

#### LAWS OF EXPONENTS:

1. If 'a' is any natural number and 'm' and 'n' are natural numbers, then

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

e.g.  $3^6 \times 3^4 = 3^{6+4} = 3^{10}$

2. If 'a' is any (non- zero) natural number and 'm' and 'n' are natural numbers, then

$$\frac{a^m}{a^n} = a^{m-n}$$

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

3. If 'a' is any (non- zero) natural number then

$$a^0 = 1$$

e.g.  $4^0 = 1$

4. If 'a' is any (non- zero) natural number and 'm' and 'n' are natural numbers, then

$$(a^m)^n = a^{m \times n}$$

e.g.  $(3^2)^3 = 3^{2 \times 3} = 3^6$

5. If a and b are rational numbers and n is a natural number, then

$$a^n \times b^n = (ab)^n$$

e.g.  $2^5 \times 3^5 = (2 \times 3)^5 = 6^5$

6. If a and b are rational numbers and n is a natural number, then

$$\frac{a^n}{b^n} = \left(\frac{a}{b}\right)^n$$

e. g.  $\frac{2^5}{3^5} = \left(\frac{2}{3}\right)^5$

7. If 'a' is any (non- zero) natural number and 'n' is a natural number, then

$$a^{-n} = \frac{1}{a^n}$$

e.g.  $3^{-5} = \frac{1}{3^5}$

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

$$\frac{a^m}{a^n} = a^{m-n}$$

$$a^0 = 1$$

$$(a^m)^n = a^{m \times n}$$

$$a^n \times b^n = (ab)^n$$

$$\frac{a^n}{b^n} = \left(\frac{a}{b}\right)^n$$

$$a^{-n} = \frac{1}{a^n}$$

#### Exercise 4.2

4. iii) Simplify and write in the exponential form:

$$[(6^2)^3 \div 6^3] \times 6^3 = [6^{2 \times 3} \div 6^3] \times 6^3 \quad ((a^m)^n = a^{m \times n})$$

$$= [6^6 \div 6^3] \times 6^3$$

$$= [6^{6-3}] \times 6^3 \quad \left(\frac{a^m}{a^n} = a^{m-n}\right)$$

$$= 6^3 \times 6^3$$

$$= 6^{3+3}$$

$$(a^m \times a^n = a^{m+n})$$

$$= 6^6$$

$$6. \text{ ii) } \frac{(3^2)^3 \times (-2)^5}{(-2)^3} = \frac{(3)^{2 \times 3} \times (-2)^5}{(-2)^3}$$

$$= \frac{(3)^6 \times (-2)^5}{(-2)^3}$$

$$= (3)^6 \times (-2)^{5-3}$$

$$= (3)^6 \times (-2)^2$$

$$= (3)^6 \times 2^2$$

$$\text{v) } (2^0 + 3^0) 4^0 = (1+1) \times 1 \quad (a^0 = 1)$$

$$= 2 \times 1 = 2$$

7. iii) Express  $-\frac{343}{729}$  in the exponential form.

$$\begin{aligned} -\frac{343}{729} &= -\frac{7^3}{9^3} \\ &= \left(-\frac{7}{9}\right)^3 \end{aligned}$$

8. i) Simplify:  $\frac{(2^5)^2 \times 7^3}{8^3 \times 7}$

$$\begin{aligned} \frac{(2^5)^2 \times 7^3}{8^3 \times 7} &= \frac{2^{5 \times 2} \times 7^3}{(2^3)^3 \times 7} \\ &= \frac{2^{5 \times 2} \times 7^3}{2^{3 \times 3} \times 7} \\ &= \frac{2^{10} \times 7^3}{2^9 \times 7} \\ &= 2^{10-9} \times 7^{3-1} \\ &= 2^1 \times 7^2 \\ &= 2 \times 14 \\ &= 98 \end{aligned}$$

Complete **Exercise 4.2 Questions 1 to 8** in the Maths copy.