CHAPTER – 11 Exponents and Powers | CLASS 7TH MATHS IMPORTANT QUESTIONS

Important Questions

Question 1.
Express 343 as a power of 7.
Solution:
We have $343 = 7 \times 7 \times 7 = 7^3$
Thus, $343 = 7^3$

7	343
7	49
7	7
	1

Question 2.
Which is greater 3^2 or 2^3?
Solution:
We have $3^2 = 3 \times 3 = 9$
$2^3 = 2 \times 2 \times 2 = 8$
Since $9 > 8$
Thus, $3^2 > 2^3$

Question 3.
Express the following number as a powers of prime factors:
(i) 144
(ii) 225
Solution:
(i) We have
$144 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 = 2^4 \times 3^2$
Thus, $144 = 2^4 \times 3^2$

2	144
2	72
2	36
2	18
3	9
3	3
	1

(ii) We have
$225 = 3 \times 3 \times 5 \times 5 = 3^2 \times 5^2$
Thus, $225 = 3^2 \times 5^2$

3	225
3	75
5	25
5	5
	1

Question 4.
Find the value of:
(i) $(-1)^{1000}$
(ii) $(1)^{250}$
(iii) $(-1)^{121}$
(iv) $(10000)^0$
Solution:

(i) $(-1)^{1000} = 1$ [$\because (-1)^{\text{even number}} = 1$]
(ii) $(1)^{250} = 1$ [$\because (1)^{\text{even number}} = 1$]
(iii) $(-1)^{121} = -1$ [$\because (-1)^{\text{odd number}} = -1$]
(iv) $(10000)^0 = 1$ [$\because a^0 = 1$]

Question 5.
Express the following in exponential form:
(i) $5 \times 5 \times 5 \times 5 \times 5$
(ii) $4 \times 4 \times 4 \times 5 \times 5 \times 5$
(iii) $(-1) \times (-1) \times (-1) \times (-1) \times (-1)$
(iv) $a \times a \times a \times b \times c \times c \times c \times d \times d$
Solution:
(i) $5 \times 5 \times 5 \times 5 \times 5 = (5)^5$
(ii) $4 \times 4 \times 4 \times 5 \times 5 \times 5 = 4^3 \times 5^3$
(iii) $(-1) \times (-1) \times (-1) \times (-1) \times (-1) = (-1)^5$
(iv) $a \times a \times a \times b \times c \times c \times c \times d \times d = a^3b^1c^3d^2$

Question 6.
Express each of the following as product of powers of their prime factors:
(i) 405
(ii) 504
(iii) 500
Solution:
(i) We have
$405 = 3 \times 3 \times 3 \times 3 \times 5 = 3^4 \times 5^1$
Thus, $405 = 3^4 \times 5^1$

3	405
3	135
3	45
3	15
5	5
	1

(ii) We have
$504 = 2 \times 2 \times 2 \times 3 \times 3 \times 7 = 2^3 \times 3^2 \times 7^1$
Thus, $504 = 2^3 \times 3^2 \times 7^1$

2	504
2	252
2	126
3	63
3	21
7	7
	1

(iii) We have
$500 = 2 \times 2 \times 5 \times 5 \times 5 = 2^2 \times 5^3$
Thus, $500 = 2^2 \times 5^3$

2	500
2	250
5	125
5	25
5	5
	1

Question 7.
Simplify the following and write in exponential form:
(i) $(5^2)^3$
(ii) $(2^3)^3$
(iii) $(a^b)^c$
(iv) $[(5)^2]^2$
Solution:

(i) $(5^2)^3 = 5^{2\times3} = 5^6$
(ii) $(2^3)^3 = 2^{3\times3} = 2^9$
(iii) $(a^b)^c = a^{b\times c} = a^{bc}$
(iv) $[(5)^2]^2 = 5^{2\times2} = 5^4$

Question 8.
Verify the following:

$$(i)\ \left(-\frac{3}{4}\right)^3 = -\frac{27}{64} \quad (ii)\ \left(-\frac{2}{3}\right)^6 = \frac{64}{729}$$

Solution:

$$(i)\ \left(-\frac{3}{4}\right)^3 = \left(-\frac{3}{4}\right)\times\left(-\frac{3}{4}\right)\times\left(-\frac{3}{4}\right)$$
$$= -\frac{3\times3\times3}{4\times4\times4} = -\frac{27}{64}$$
$$(ii)\ \left(-\frac{2}{3}\right)^6 = \left(-\frac{2}{3}\right)\times\left(-\frac{2}{3}\right)\times\left(-\frac{2}{3}\right)\times\left(-\frac{2}{3}\right)\times\left(-\frac{2}{3}\right)\times\left(-\frac{2}{3}\right)$$
$$= \frac{64}{729}$$ Hence verified.

Question 9.
Simplify:

$$(i)\ \frac{2^2\times3^4\times2^5}{2^4\times9} \quad (ii)\ 2^3\times k^3\times5k^4$$

Solution:

$$(i)\ \frac{2^2\times3^4\times2^5}{2^4\times9} = \frac{2^{2+5}\times3^4}{2^4\times3^2} = \frac{2^7\times3^4}{2^4\times3^2}$$
$$= 2^{7-4}\times3^{4-2} = 2^4\times3^2$$
$$= 16\times9 = 144$$
$$(ii)\ 2^3\times k^3\times5k^4 = 8\times5\times k^{3+4} = 40k^7$$

Question 10.
Simplify and write in exponential form:

$$(i)\ \left(\frac{3^5}{3^2}\right)\times3^{10} \quad (ii)\ 8^2\div2^3$$

Solution:

$$(i)\ \left(\frac{3^5}{3^2}\right) \times 3^{10} = 3^{5-2} \times 3^{10} = 3^3 \times 3^{10} = 3^{3+10} = 3^{13}$$

$$(ii)\ 8^2 \div 2^3 = (2^3)^2 \div 2^3 = 2^{3\times 2} \div 2^3$$
$$= 2^6 \div 2^3 = 2^{6-3} = 2^3 = 8$$