

Board – CBSE

Class – 7th

Topic – Exponents and Powers 13.1

**Q.1** Find the value of:

(i)  $2^6$       (ii)  $9^3$       (iii)  $11^2$       (iv)  $5^4$

**Sol:** (i)  $2^6 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 64$

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

(iii)  $11^2 = 11 \times 11 = 121$

(iv)  $5^4 = 5 \times 5 \times 5 \times 5 = 625$

**Q.2** Express the following in exponential form:

(i)  $6 \times 6 \times 6 \times 6$       (ii)  $t \times t$       (iii)  $b \times b \times b \times b$       (iv)  $5 \times 5 \times 7 \times 7 \times 7$

(v)  $2 \times 2 \times a \times a$       (vi)  $a \times a \times a \times c \times c \times c \times c \times d$

**Sol:** (i)  $6 \times 6 \times 6 \times 6 = 6^4$

(ii)  $t \times t = t^2$

(iii)  $b \times b \times b \times b = b^4$

(iv)  $5 \times 5 \times 7 \times 7 \times 7 = 5^2 \times 7^3$

(v)  $2 \times 2 \times a \times a = 2^2 \times a^2$

(vi)  $a \times a \times a \times c \times c \times c \times c \times d = a^3 c^4 d$

**Q.3** Express the following numbers using exponential notation:

(i) 512      (ii) 343      (iii) 729      (iv) 3125

**Sol:** (i)  $512 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 2^9$

(ii)  $343 = 7 \times 7 \times 7 = 7^3$

(iii)  $729 = 3 \times 3 \times 3 \times 3 \times 3 \times 3 = 3^6$

(iv)  $3125 = 5 \times 5 \times 5 \times 5 \times 5 = 5^5$

**Q.4** Identify the greater number, wherever possible, in each of the following?

(i)  $4^3$  or  $3^4$       (ii)  $5^3$  or  $3^5$       (iii)  $2^8$  or  $8^2$       (iv)  $100^2$  or  $2^{100}$       (v)  $2^{10}$  or  $10^2$

**Sol:** (i)  $4^3 = 4 \times 4 \times 4 = 64$

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

Therefore,  $3^4 > 4^3$

$$(ii) 5^3 = 5 \times 5 \times 5 = 125$$

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

Therefore,  $3^5 > 5^3$

$$(iii) 2^8 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 256$$

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

Therefore,  $2^8 > 8^2$

$$(iv) 100^2 \text{ or } 2^{100}$$

$$2^{10} = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 1024$$

$$2^{100} = 1024 \times 1024 \times 1024 \times 1024 \times 1024 \times 1024 \times 1024 \times 1024 \times 1024 \times 1024$$

$$100^2 = 100 \times 100 = 10000$$

Therefore,  $2^{100} > 100^2$

$$(v) 2^{10} \text{ and } 10^2$$

$$2^{10} = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 1024$$

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

Therefore,  $2^{10} > 10^2$

**Q.5** Express each of the following as product of powers of their prime factors:

(i) 648

(ii) 405

(iii) 540

(iv) 3,600

**Sol:** (i)  $648 = 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 = 2^3 \cdot 3^4$

(ii)  $405 = 3 \times 3 \times 3 \times 3 \times 5 = 3^4 \cdot 5$

(iii)  $540 = 2 \times 2 \times 3 \times 3 \times 3 \times 5 = 2^2 \cdot 3^3 \cdot 5$

(iv)  $3600 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 5 = 2^4 \cdot 3^2 \cdot 5^2$

**Q.6** Simplify:

(i)  $2 \times 10^3$

(ii)  $7^2 \times 2^2$

(iii)  $2^3 \times 5$

(iv)  $3 \times 4^4$

(v)  $0 \times 10^2$

(vi)  $5^2 \times 3^3$

(vii)  $2^4 \times 3^2$

(viii)  $3^2 \times 10^4$

**Sol:** (i)  $2 \times 10^3 = 2 \times 10 \times 10 \times 10 = 2 \times 1000 = 2000$

(ii)  $7^2 \times 2^2 = 7 \times 7 \times 2 \times 2 = 49 \times 4 = 196$

(iii)  $2^3 \times 5 = 2 \times 2 \times 2 \times 5 = 8 \times 5 = 40$

(iv)  $3 \times 4^4 = 3 \times 4 \times 4 \times 4 \times 4 = 3 \times 256 = 768$

$$(v) 0 \times 10^2 = 0 \times 10 \times 10 = 0$$

$$(vi) 5^2 \times 3^3 = 5 \times 5 \times 3 \times 3 \times 3 = 25 \times 27 = 675$$

$$(vii) 2^4 \times 3^2 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 = 16 \times 9 = 144$$

$$(viii) 3^2 \times 10^4 = 3 \times 3 \times 10 \times 10 \times 10 \times 10 = 9 \times 10000 = 90000$$

**Q.7** Identify like terms in the following:

Simplify:

$$(i) (-4)^3 \quad (ii) (-3) \times (-2)^3 \quad (iii) (-3)^2 \times (-5)^2 \quad (iv) (-2)^3 \times (-10)^3$$

**Sol:** (i)  $(-4)^3 = (-4) \times (-4) \times (-4) = -64$

$$(ii) (-3) \times (-2)^3 = (-3) \times (-2) \times (-2) \times (-2) = 24$$

$$(iii) (-3)^2 \times (-5)^2 = (-3) \times (-3) \times (-5) \times (-5) = 9 \times 25 = 225$$

$$(iv) (-2)^3 \times (-10)^3 = (-2) \times (-2) \times (-2) \times (-10) \times (-10) \times (-10) = (-8) \times (-1000) = 8000$$

**Q.8** Compare the following numbers:

$$(i) 2.7 \times 10^{12}; 1.5 \times 10^8$$

$$(ii) 4 \times 10^{14}; 3 \times 10^{17}$$

**Sol:** (i)  $2.7 \times 10^{12}; 1.5 \times 10^8$

$$2.7 \times 10^{12} > 1.5 \times 10^8$$

$$(ii) 4 \times 10^{14}; 3 \times 10^{17}$$

$$3 \times 10^{17} > 4 \times 10^{14}$$