

Mathematics

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(Chapter – 13) (Exponents and Powers)

(Class – VII)

Exercise 13.1

Question 1:

Find the value of:

(i) 2^6

(ii) 9^3

(iii) 11^2

(iv) 5^4

Answer 1:

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

Question 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) $a \times a \times a \times c \times c \times c \times c \times d$

Answer 2:

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

Question 3:

Express each of the following numbers using exponential notation:

(i) 512

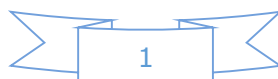
(ii) 343

(iii) 729

(iv) 3125

Answer 3:

(i) 512



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$$512 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 2^9$$

2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

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

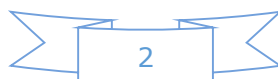
7	343
7	49
7	7
	1

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

3	729
3	243
3	81
3	27
3	9
3	3
	1

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

5	3125
5	625
5	125
5	25
5	5
	1



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Question 4:

Identify the greater number, wherever possible, in each of the following:

(i) 4^3 and 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

Answer 4:

(i) $4^3 = 4 \times 4 \times 4 = 64$

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

Since $64 < 81$

Thus, 3^4 is greater than 4^3 .

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

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

Since, $125 < 243$

Thus, 3^4 is greater than 5^3 .

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

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

Since, $256 > 64$

Thus, 2^8 is greater than 8^2 .

(iv) $100^2 = 100 \times 100 = 10,000$

$$2^{100} = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times \dots 14 \text{ times } \times \dots \times 2 = 16,384 \times \dots \times 2$$

Since, $10,000 < 16,384 \times \dots \times 2$

Thus, 2^{100} is greater than 100^2 .

(v) $2^{10} = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 1,024$

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

Since, $1,024 > 100$

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



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Question 5:

Express each of the following as product of powers of their prime factors:

(i) 648

(ii) 405

(iii) 540

(iv) 3,600

Answer 5:

(i) $648 = 2^3 \times 3^4$

2	648
2	324
2	162
3	81
3	27
3	9
3	3
	1

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



5	405
3	81
3	27
3	9
3	3
	1

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

2	540
2	270
3	135
3	45
3	15
5	5
	1



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(iv) $3,600 = 2^4 \times 3^2 \times 5^2$

2	3600
2	1800
2	900
2	450
3	225
3	75
5	25
5	5
	1

Question 6:

Simplify:

(i) 2×10^3

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

(iii) $2^3 \times 5$

(iv) 3×4^4

(v) 0×10^2

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

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

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

Answer 6:

(i) $2 \times 10^3 = 2 \times 10 \times 10 \times 10 = 2,000$

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

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

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

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

(vi) $5^3 \times 3^3 = 5 \times 5 \times 5 \times 3 \times 3 \times 3 = 675$

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

(viii) $3^2 \times 10^4 = 3 \times 3 \times 10 \times 10 \times 10 \times 10 = 90,000$

Question 7:

Simplify:

(i) $(-4)^3$

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

(iii) $(-3)^2 \times (-5)^2$

(iv) $(-2)^3 \times (-10)^3$

Answer 7:

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



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- (ii) $(-3) \times (-2)^3 = (-3) \times (-2) \times (-2) \times (-2) = 24$
- (iii) $(-3)^2 \times (-5)^2 = (-3) \times (-3) \times (-5) \times (-5) = 225$
- (iv) $(-2)^3 \times (-10)^3 = (-2) \times (-2) \times (-2) \times (-10) \times (-10) \times (-10)$

Question 8:

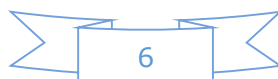
Compare the following numbers:

- (i) 2.7×10^{12} ; 1.5×10^8 (ii) 4×10^{14} ; 3×10^{17}



Answer 8:

- (i) 2.7×10^{12} and 1.5×10^8
On comparing the exponents of base 10,
 $2.7 \times 10^{12} > 1.5 \times 10^8$
- (ii) 4×10^{14} and 3×10^{17}
On comparing the exponents of base 10,
 $4 \times 10^{14} < 3 \times 10^{17}$



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