

## NCERT SOLUTIONS FOR CLASS 7 MATHEMATICS

### EXPONENTS AND POWERS

#### Exercise 13.1

1. Find the value of:

i)  $2^6$

ii)  $9^3$

iii)  $11^2$

iv)  $5^4$

**Answer:**

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

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:**

i)  $6^4$

ii)  $t^2$

iii)  $b^4$

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

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

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

**3. Express each of the following numbers using exponential notations:**

i) 512

ii) 343

iii) 729

iv) 3125

**Answer:**

i)

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

Therefore,  $512 = 2^9$

|

$$\begin{array}{r}
 \text{ii) } 7 \ 343 \\
 \hline
 7 \ 49 \\
 \hline
 7 \ 7 \\
 \hline
 \hline
 1
 \end{array}$$

Therefore,  $343 = 7^3$

$$\begin{array}{r}
 \text{iii) } 3 \ | \ 729 \\
 \hline
 3 \ | \ 243 \\
 \hline
 3 \ | \ 81 \\
 \hline
 3 \ | \ 27 \\
 \hline
 3 \ | \ 9 \\
 \hline
 3 \ | \ 3 \\
 \hline
 \hline
 1
 \end{array}$$

Therefore,  $729 = 3^6$

$$\begin{array}{r}
 \text{iv) } 5 \ | \ 3125 \\
 \hline
 5 \ | \ 625 \\
 \hline
 5 \ | \ 125 \\
 \hline
 5 \ | \ 25 \\
 \hline
 5 \ | \ 5 \\
 \hline
 \hline
 1
 \end{array}$$

Therefore,  $3125 = 5^5$

**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  $10^2$

**Answer:**

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

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

$3^4$  is greater than  $4^3$ .

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

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

$3^5$  is greater than  $5^3$ .

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

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

$2^8$  is greater than  $8^2$ .

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

$2^{100} = 2 \times 2 \times 2 \times 2 \times 2 \dots \dots \dots 100 \text{ times} =$

$2^{100}$  is greater than  $100^2$

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

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

$2^{10}$  is greater than  $10^2$ .

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

i) 648

ii) 405

iii) 540

iv) 3600

**Answer:**

i)

2		648
<hr/>		
2		324
<hr/>		
2		162
<hr/>		
3		81
<hr/>		
3		27
<hr/>		
3		9
<hr/>		
3		3
<hr/>		
		1

Therefore,  $648 = 2^3 \times 3^4$

ii)

3		405
<hr/>		
3		135
<hr/>		
3		45
<hr/>		
3		15
<hr/>		
5		5
<hr/>		
		1

Therefore,  $405 = 3^4 \times 5$

iii)

2		540
<hr/>		

$$\begin{array}{r}
 2 \quad 270 \\
 \hline
 3 \quad 135 \\
 \hline
 3 \quad 45 \\
 \hline
 3 \quad 15 \\
 \hline
 5 \quad 5 \\
 \hline
 1
 \end{array}$$

Therefore,  $540 = 2^2 \times 3^3 \times 5$

iv)

$$\begin{array}{r|l}
 2 & 3600 \\
 \hline
 2 & 1800 \\
 \hline
 2 & 900 \\
 \hline
 2 & 450 \\
 \hline
 3 & 225 \\
 \hline
 3 & 75 \\
 \hline
 5 & 25 \\
 \hline
 5 & 5 \\
 \hline
 & 1
 \end{array}$$

Therefore,  $3600 = 2^4 \times 3^2 \times 5^2$

**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)  $3^2 \times 10^4$

**Answer:**

i)  $2 \times 10^3 = 2 \times 10 \times 10 \times 10 = 2000$

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)  $0 \times 10 \times 10 = 0$

vi)  $5^2 \times 3^3 = 5 \times 5 \times 3 \times 3 \times 3 = 675$

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

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

**7. Simplify:**

i)  $(-4)^3$

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

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

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

**Answer:**

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

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

iii)  $(-3) \times (-3) \times (-5) \times (-5) = 225$

iv)  $(-2) \times (-2) \times (-2) \times (-10) \times (-10) \times (-10) = 8000$

**8. Compare the following numbers:**

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

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

**Answer:**

i) On comparing the exponents of base 10,  $2.7 \times 10^{12} > 1.5 \times 10^8$

ii) On comparing the exponents of base 10,  $4 \times 10^{14} < 3 \times 10^{17}$

---