EXERCISE 13.1 PAGE: 252

1. Find the value of:

(i) 2^6

Solution:-

The above value can be written as,

= 2 × 2 × 2 × 2 × 2 × 2

= 64

(ii) 9^3

Solution:-

The above value can be written as,

= 9 × 9 × 9

= 729

(iii) 11^2

Solution:-

The above value can be written as,

= 11 × 11

= 121

(iv) 5^4

Solution:-

The above value can be written as,

= 5 × 5 × 5 × 5

= 625

2. Express the following in exponential form:

(i) 6 × 6 × 6 × 6

Solution:-

The given question can be expressed in the exponential form as 6^4.

(ii) t × t

Solution:-

The given question can be expressed in the exponential form as t^2.

(iii) b × b × b × b

Solution:-

The given question can be expressed in the exponential form as b^4.

(iv) 5 × 5× 7 × 7 × 7

Solution:-

The given question can be expressed in the exponential form as $5^2 \times 7^3$.

(v) 2 × 2 × a × a

Solution:-

The given question can be expressed in the exponential form as $2^2 \times a^2$.

(vi) a × a × a × c × c × c × c × d

Solution:-

The given question can be expressed in the exponential form as $a^3 \times c^4 \times d$.

3. Express each of the following numbers using the exponential notation:

(i) 512

Solution:-

The factors of 512 = 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2

So it can be expressed in the exponential form as 2^9.

(ii) 343

Solution:-

The factors of 343 = 7 × 7 × 7

So it can be expressed in the exponential form as 7^3.

(iii) 729

Solution:-

The factors of 729 = 3 × 3 × 3 × 3 × 3 × 3

So it can be expressed in the exponential form as 3^6.

(iv) 3125

Solution:-

The factors of 3125 = 5 × 5 × 5 × 5 × 5

So it can be expressed in the exponential form as 5^5.

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

(i) 4^3 or 3^4

Solution:-

The expansion of 4^3 = 4 × 4 × 4 = 64

The expansion of 3^4 = 3 × 3 × 3 × 3 = 81

Clearly,

64 < 81

So, $4^3 < 3^4$

Hence, 3^4 is the greater number.

(ii) 5^3 or 3^5

Solution:-

The expansion of 5^3 = 5 × 5 × 5 = 125

The expansion of 3^5 = 3 × 3 × 3 × 3 × 3= 243

Clearly,

125 < 243

So, $5^3 < 3^5$

Hence, 3^5 is the greater number.

(iii) 2^8 or 8^2

Solution:-

The expansion of $2^8 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 256$

The expansion of $8^2 = 8 \times 8 = 64$

Clearly,

$256 > 64$

So, $2^8 > 8^2$

Hence, 2^8 is the greater number.

(iv) 100^2 or 2^{100}

Solution:-

The expansion of $100^2 = 100 \times 100 = 10000$

The expansion of 2^{100}

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

Then,

$2^{100} = 1024 \times 1024 \times 1024 \times 1024 \times 1024 \times 1024 \times 1024 \times 1024 \times 1024 \times 1024 = (1024)^{10}$

Clearly,

$100^2 < 2^{100}$

Hence, 2^{100} is the greater number.

(v) 2^{10} or 10^2

Solution:-

The expansion of $2^{10} = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 1024$

The expansion of $10^2 = 10 \times 10 = 100$

Clearly,

$1024 > 100$

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

Hence, 2^{10} is the greater number.

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

(i) 648

Solution:-

Factors of 648 = 2 × 2 × 2 × 3 × 3 × 3 × 3

= $2^3 \times 3^4$

(ii) 405

Solution:-

Factors of 405 = 3 × 3 × 3 × 3 × 5

= $3^4 \times 5$

(iii) 540

Solution:-

Factors of 540 = 2 × 2 × 3 × 3 × 3 × 5

= $2^2 \times 3^3 \times 5$

(iv) 3,600

Solution:-

Factors of 3600 = 2 × 2 × 2 × 2 × 3 × 3 × 5 × 5

= $2^4 \times 3^2 \times 5^2$

6. Simplify:

(i) 2×10^3

Solution:-

The above question can be written as,

= 2 × 10 × 10 × 10

= 2 × 1000

= 2000

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

Solution:-

The above question can be written as,

= 7 × 7 × 2 × 2

= 49 × 4

= 196

(iii) $2^3 \times 5$

Solution:-

The above question can be written as,

= 2 × 2 × 2 × 5

= 8 × 5

= 40

(iv) 3×4^4

Solution:-

The above question can be written as,

= 3 × 4 × 4 × 4 × 4

= 3 × 256

= 768

(v) 0×10^2

Solution:-

The above question can be written as,

= 0 × 10 × 10

= 0 × 100

= 0

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

Solution:-

The above question can be written as,

= 5 × 5 × 3 × 3 × 3

= 25 × 27

= 675

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

Solution:-

The above question can be written as,

= 2 × 2 × 2 × 2 × 3 × 3

= 16 × 9

= 144

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

Solution:-

The above question can be written as,

= 3 × 3 × 10 × 10 × 10 × 10

= 9 × 10000

= 90000

7. Simplify:

(i) $(-4)^3$

Solution:-

The expansion of -4^3

= – 4 × – 4 × – 4

= – 64

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

Solution:-

The expansion of $(-3) \times (-2)^3$

= – 3 × – 2 × – 2 × – 2

= – 3 × – 8

= 24

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

Solution:-

The expansion of $(-3)^2 \times (-5)^2$

$= - 3 \times - 3 \times - 5 \times - 5$

$= 9 \times 25$

$= 225$

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

Solution:-

The expansion of $(-2)^3 \times (-10)^3$

$= - 2 \times - 2 \times - 2 \times - 10 \times - 10 \times - 10$

$= - 8 \times - 1000$

$= 8000$

8. Compare the following numbers:

(i) 2.7×10^{12} ; 1.5×10^8

Solution:-

By observing the question

Comparing the exponents of base 10,

Clearly,

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

(ii) 4×10^{14} ; 3×10^{17}

Solution:-

By observing the question

Comparing the exponents of base 10,

Clearly,

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