

EXERCISE

In questions 1 to 22, there are four options, out of which one is correct. Write the correct one.

1. $[(-3)^2]^3$ is equal to

- (a) $(-3)^8$ (b) $(-3)^6$ (c) $(-3)^5$ (d) $(-3)^{23}$

Solution:-

(b) $(-3)^6$

For any non-zero integers 'a' and 'b' and whole numbers m and n,

$$(a^m)^n = a^{mn}$$

$$\begin{aligned} [(-3)^2]^3 &= -3^{(2 \times 3)} \\ &= -3^6 \end{aligned}$$

2. For a non-zero rational number x, $x^8 \div x^2$ is equal to

- (a) x^4 (b) x^6 (c) x^{10} (d) x^{16}

Solution:-

(b) x^6

For any non-zero integers 'a' and 'b' and whole numbers m and n,

$$a^m \div a^n = a^{m-n}, m > n$$

$$\begin{aligned} \text{so, } x^8 \div x^2 &= x^8/x^2 \\ &= x^{8-2} \\ &= x^6 \end{aligned}$$

3. x is a non-zero rational number. Product of the square of x with the cube of x is equal to the

- (a) second power of x (b) third power of x
(c) fifth power of x (d) sixth power of x

Solution:-

(c) fifth power of x

From the question, it is given that,

$$\text{The square of } x = x^2$$

$$\text{The cube of } x = x^3$$

As per the condition given in the question, $x^2 \times x^3$

For any non-zero integers 'a' and 'b' and whole numbers m and n,

$$a^m \times a^n = a^{m+n}$$

$$x^2 \times x^3 = x^{2+3}$$

$$= x^5$$

Therefore, fifth power of x.

4. For any two non-zero rational numbers x and y, $x^5 \div y^5$ is equal to

- (a) $(x \div y)^1$ (b) $(x \div y)^0$ (c) $(x \div y)^5$ (d) $(x \div y)^{10}$

Solution:-

(c) $(x \div y)^5$

For any non-zero integers 'a' and 'b' and whole numbers m and n,

$$a^m \div b^m = (a/b)^m$$

$$x^5 \div y^5 = (x/y)^5 = (x \div y)^5$$

5. $a^m \times a^n$ is equal to

- (a) $(a^2)^{mn}$ (b) a^{m-n} (c) a^{m+n} (d) a^{mn}

Solution:-

(c) a^{m+n}

$a^m \times a^n$ is equal to a^{m+n}

6. $(1^0 + 2^0 + 3^0)$ is equal to

- (a) 0 (b) 1 (c) 3 (d) 6

Solution:-

(c) 3

For any non-zero integers 'a' and 'b' and whole numbers m and n,

$$a^0 = 1$$

$$\text{So, } 1^0 = 1, 2^0 = 1, 3^0 = 1$$

$$\text{Then, } (1 + 1 + 1)$$

$$= 3$$

7. Value of $(10^{22} + 10^{20})/10^{20}$ is

- (a) 10 (b) 10^{42} (c) 101 (d) 10^{22}

Solution:-

(c) 101

By splitting, $(10^{22} + 10^{20})/10^{20}$ we get,

$$= (10^{22}/10^{20}) + (10^{20}/10^{20})$$

By using the rule $a^m \div a^n = a^{m-n}$, $m > n$

$$= 10^{(22-20)} + 1$$

$$= 10^2 + 1$$

$$= 100 + 1$$

$$= 101$$

8. The standard form of the number 12345 is

(a) 1234.5×10^1

(b) 123.45×10^2

(c) 12.345×10^3

(d) 1.2345×10^4

Solution:-

(d) 1.2345×10^4

Any number can be expressed as a decimal number between 1.0 and 10.0 (including 1.0) multiplied by a power of 10. Such form of a number is called its standard form or scientific notation.

9. If $2^{1998} - 2^{1997} - 2^{1996} + 2^{1995} = K2^{1995}$, then the value of K is

(a) 1

(b) 2

(c) 3

(d) 4

Solution:-

(c) 3

$$2^{1998} - 2^{1997} - 2^{1996} + 2^{1995} = K2^{1995}$$

By cross multiplication we get,

$$(2^{1998}/2^{1995}) - (2^{1997}/2^{1995}) - (2^{1996}/2^{1995}) + (2^{1995}/2^{1995}) = K$$

By the rule, $a^m \div a^n = a^{m-n}$, $m > n$

$$K = (2^{1998-1995}) - (2^{1997-1995}) - (2^{1996-1995}) + (2^{1995-1995})$$

$$K = 2^3 - 2^2 - 2^1 + 2^0$$

$$K = 8 - 4 - 2 + 1$$

$$K = 3$$

10. Which of the following is equal to 1?

(a) $2^0 + 3^0 + 4^0$

(b) $2^0 \times 3^0 \times 4^0$

(c) $(3^0 - 2^0) \times 4^0$

(d) $(3^0 - 2^0) \times (3^0 + 2^0)$

Solution:-

(b) $2^0 \times 3^0 \times 4^0$

For any non-zero integers 'a' and 'b' and whole numbers m and n,

$$a^0 = 1$$

$$\text{So, } 2^0 = 1, 3^0 = 1, 4^0 = 1$$

$$\text{Then, } (1 \times 1 \times 1)$$

$$= 1$$

11. In standard form, the number 72105.4 is written as 7.21054×10^n where n is equal to

(a) 2

(b) 3

(c) 4

(d) 5

Solution:-

(c) 4

Any number can be expressed as a decimal number between 1.0 and 10.0 (including 1.0) multiplied by a power of 10. Such form of a number is called its standard form or scientific notation.

72105.4 is written as 7.21054×10^4

12. Square of $(-2/3)$ is(a) $-2/3$ (b) $2/3$ (c) $-4/9$ (d) $4/9$ **Solution:-**(d) $4/9$

Square of $(-2/3)$ is $= -2^2/3^2$

$$= (-2 \times -2)/(3 \times 3)$$

$$= 4/9$$

13. cube of $(-1/4)$ is(a) $-1/12$ (b) $1/16$ (c) $-1/64$ (d) $1/64$ **Solution:-**(c) $-1/64$

Cube of $(-1/4)$ is $= -1^3/4^3$

$$= (-1 \times -1 \times -1)/(4 \times 4 \times 4)$$

$$= -1/64$$

14. Which of the following is not equal to $(-5/4)^4$?(a) $(-5)^4/4^4$ (b) $5^4/(-4)^4$ (c) $-(5^4/4^4)$ (d) $(-5/4) \times (-5/4) \times (-5/4) \times (-5/4)$ **Solution:-**(c) $-(5^4/4^4)$ **15. Which of the following is not equal to 1 ?**(a) $(2^3 \times 3^3)/(4 \times 18)$ (b) $[(-2)^3 \times (-2)^4] \div (-2)^2$ (c) $(3^0 \times 5^3)/(5 \times 25)$ (d) $2^4/(7^0 + 3^0)^3$ **Solution:-**(d) $2^4/(7^0 + 3^0)^3$

$$= 2^4/(1 + 1)^3$$

$$= 2^4/2^3$$

16. $(\frac{2}{3})^3 \times (\frac{5}{7})^3$ is equal to

(a) $((\frac{2}{3}) \times (\frac{5}{7}))^9$

(b) $((\frac{2}{3}) \times (\frac{5}{7}))^6$

(c) $((\frac{2}{3}) \times (\frac{5}{7}))^3$

(d) $((\frac{2}{3}) \times (\frac{5}{7}))^0$

Solution:-

(c) $((\frac{2}{3}) \times (\frac{5}{7}))^3$

For any non-zero integers 'a' and 'b' and whole numbers m and n.

$$a^m \times b^m = (ab)^m$$

17. In standard form, the number 829030000 is written as $K \times 10^8$ where K is equal to

(a) 82903

(b) 829.03

(c) 82.903

(d) 8.2903

Solution:-

(d) 8.2903

Any number can be expressed as a decimal number between 1.0 and 10.0 (including 1.0) multiplied by a power of 10. Such form of a number is called its standard form or scientific notation.

829030000 is written as 8.2903×10^8

18. Which of the following has the largest value?

(a) 0.0001

(b) $\frac{1}{10000}$

(c) $\frac{1}{10^6}$

(d) $(\frac{1}{10^6}) \div 0.1$

Solution:-

(a) 0.0001 and (b) $\frac{1}{10000} = 0.0001$

19. In standard form 72 crore is written as

(a) 72×10^7

(b) 72×10^8

(c) 7.2×10^8

(d) 7.2×10^7

Solution:-

(c) 7.2×10^8

Any number can be expressed as a decimal number between 1.0 and 10.0 (including 1.0) multiplied by a power of 10. Such form of a number is called its standard form or scientific notation.

72 crore is written as = 72,00,00,000 = 7.2×10^8

20. For non-zero numbers a and b, $(\frac{a}{b})^m \div (\frac{a}{b})^n$, where $m > n$, is equal to

(a) $(\frac{a}{b})^{mn}$

(b) $(\frac{a}{b})^{m+n}$

(c) $(\frac{a}{b})^{m-n}$

(d) $((\frac{a}{b})^m)^n$

Solution:-

(c) $(\frac{a}{b})^{m-n}$

For any non-zero integers 'a' and 'b' and whole numbers m and n,

$$a^m \div a^n = a^{m-n}, m > n$$

21. Which of the following is not true?

(a) $3^2 > 2^3$ (b) $4^3 = 2^6$ (c) $3^3 = 9$ (d) $25 > 5$

Solution:-

(c) $3^3 = 9$

$$3 \times 3 \times 3 = 27$$

Therefore, $27 > 9$

22. Which power of 8 is equal to 2^6 ?

(a) 3 (b) 2 (c) 1 (d) 4

Solution:-

(b) 2

$$2^6 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$$

$$= 64$$

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

In questions 23 to 39, fill in the blanks to make the statements true.

23. $(-2)^{31} \times (-2)^{13} = (-2)^{\underline{\hspace{1cm}}}$

Solution:-

$$(-2)^{31} \times (-2)^{13} = (-2)^{44}$$

For any non-zero integers 'a' and 'b' and whole numbers m and n,

$$a^m \times a^n = a^{m+n}$$

$$(-2)^{31} \times (-2)^{13} = (-2)^{31+13}$$

$$= -2^{44}$$

24. $(-3)^8 \div (-3)^5 = (-3)^{\underline{\hspace{1cm}}}$

Solution:-

$$(-3)^8 \div (-3)^5 = (-3)^3$$

For any non-zero integers 'a' and 'b' and whole numbers m and n,

$$a^m \div a^n = a^{m-n}, m > n$$

$$(-3)^8 \div (-3)^5 = (-3)^{8-5}$$

$$= -3^3$$

25. $(11/15)^4 \times (\underline{\hspace{1cm}})^5 = (11/15)^9$

Solution:-

$$(11/15)^4 \times (11/15)^5 = (11/15)^9$$

We know that,

For any non-zero integers 'a' and 'b' and whole numbers m and n,

$$a^m \times a^n = a^{m+n}$$

$$\text{Therefore, } (11/15)^4 \times (11/15)^5 = (11/15)^9$$

$$26. (-1/4)^3 \times (-1/4)^{\text{————}} = (-1/4)^{11}$$

Solution:-

$$(-1/4)^3 \times (-1/4)^8 = (-1/4)^{11}$$

We know that,

For any non-zero integers 'a' and 'b' and whole numbers m and n,

$$a^m \times a^n = a^{m+n}$$

Let us assume missing power be y,

$$\text{Then, } (-1/4)^3 \times (-1/4)^y = (-1/4)^{11}$$

$$(-1/4)^y = (-1/4)^{11} / (-1/4)^3$$

$$(-1/4)^y = (-1/4)^{11-3}$$

$$(-1/4)^y = (-1/4)^8$$

$$27. [(7/11)^3]^4 = (7/11)^{\text{————}}$$

Solution:-

$$[(7/11)^3]^4 = (7/11)^{12}$$

For any non-zero integers 'a' and 'b' and whole numbers m and n,

$$(a^m)^n = a^{mn}$$

$$[(7/11)^3]^4 = (7/11)^{(3 \times 4)}$$

$$= (7/11)^{12}$$

$$28. (6/13)^{10} \div [(6/13)^5]^2 = (6/13)^{\text{————}}$$

Solution:-

$$(6/13)^{10} \div [(6/13)^5]^2 = (6/13)^0$$

In the given question first consider $[(6/13)^5]^2$

For any non-zero integers 'a' and 'b' and whole numbers m and n,

$$(a^m)^n = a^{mn}$$

$$[(6/13)^5]^2 = (6/13)^{(5 \times 2)}$$

$$= (6/13)^{10}$$

$$\text{Then, } (6/13)^{10} \div (6/13)^{10}$$

For any non-zero integers 'a' and 'b' and whole numbers m and n,

$$a^m \div a^n = a^{m-n}, m > n$$

$$(6/13)^{10} \div (6/13)^{10} = (6/13)^{10-10}$$

$$= (6/13)^0$$

29. $[(-1/4)^{16}]^2 = (-1/4)$ —

Solution:-

$$[(-1/4)^{16}]^2 = (-1/4)^{32}$$

For any non-zero integers 'a' and 'b' and whole numbers m and n,

$$(a^m)^n = a^{mn}$$

$$[(-1/4)^{16}]^2 = (-1/4)^{(16 \times 2)}$$

$$= (-1/4)^{32}$$

30. $(13/14)^5 \div (\underline{\quad})^2 = (13/14)^3$

Solution:-

$$(13/14)^5 \div (13/14)^2 = (13/14)^3$$

We know that,

For any non-zero integers 'a' and 'b' and whole numbers m and n,

$$a^m \div a^n = a^{m-n}, m > n$$

$$\text{Therefore, } (13/14)^5 \div (13/14)^2 = (13/14)^{5-2}$$

$$= (13/14)^3$$

31. $a^6 \times a^5 \times a^0 = a$ —

Solution:-

$$a^6 \times a^5 \times a^0 = a^{11}$$

We know that,

For any non-zero integers 'a' and 'b' and whole numbers m and n,

$$a^m \times a^n \times a^0 = a^{m+n+0}$$

$$a^6 \times a^5 \times a^0 = a^{5+6+0}$$

$$= a^{11}$$

32. 1 lakh = 10 —

Solution: -

$$1 \text{ lakh} = 10^5$$

Any number can be expressed as a decimal number between 1.0 and 10.0 (including 1.0) multiplied by a power of 10. Such form of a number is called its standard form or scientific notation.

$$1 \text{ lakh} = 1,00,000$$

$$= 10^5$$

33. 1 million = 10 _____

Solution:-

$$1 \text{ million} = 10^6$$

Any number can be expressed as a decimal number between 1.0 and 10.0 (including 1.0) multiplied by a power of 10. Such form of a number is called its standard form or scientific notation.

$$\begin{aligned} 1 \text{ million} &= 10,00,000 \\ &= 10^6 \end{aligned}$$

34. 729 = 3 _____

Solution: -

$$729 = 3^6$$

Now, we have to find out the factors of 729.

$$\begin{array}{r} 3 \overline{)729} \\ \underline{3 \quad 243} \\ 3 \quad 81 \\ \underline{3 \quad 27} \\ 3 \quad 9 \\ \underline{3 \quad 3} \\ 1 \end{array}$$

Therefore, factors of 729 are = $3 \times 3 \times 3 \times 3 \times 3 \times 3$

$$729 = 3^6$$

35. 432 = 2⁴ × 3 _____

Solution:-

$$432 = 2^4 \times 3^3$$

Now, we have to find out the factors of 432.

$$\begin{array}{r} 2 \overline{)432} \\ \underline{2 \quad 216} \\ 2 \quad 108 \\ \underline{2 \quad 54} \\ 2 \quad 27 \\ \underline{3 \quad 27} \\ 3 \quad 9 \\ \underline{3 \quad 3} \\ 1 \end{array}$$

Therefore, factors of 432 are = $2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3$

$$432 = 2^4 \times 3^3$$

36. 53700000 = _____ $\times 10^7$

Solution:-

$$\begin{aligned}
 53700000 &= \underline{5.37} \times 10^7 \\
 &= (53700000/10000000) \times 10000000 \\
 &= 5.37 \times 10^7
 \end{aligned}$$

Any number can be expressed as a decimal number between 1.0 and 10.0 (including 1.0) multiplied by a power of 10. Such form of a number is called its standard form or scientific notation

$$37. \text{ 88880000000} = \text{---} \times 10^{10}$$

Solution:-

$$\begin{aligned}
 88880000000 &= \underline{8.888} \times 10^{10} \\
 &= (88880000000/10000000000) \times 10000000000 \\
 &= 8.888 \times 10^{10}
 \end{aligned}$$

$$38. \text{ 27500000} = \underline{2.75} \times 10\text{---}$$

Solution:-

$$\begin{aligned}
 27500000 &= \underline{2.75} \times 10^7 \\
 &= (27500000/10000000) \times 10000000 \\
 &= 2.75 \times 10^7
 \end{aligned}$$

$$39. \text{ 340900000} = \underline{3.409} \times 10\text{---}$$

Solution:-

$$\begin{aligned}
 340900000 &= \underline{3.409} \times 10^8 \\
 &= (340900000/100000000) \times 100000000 \\
 &= 3.409 \times 10^8
 \end{aligned}$$

40. Fill in the blanks with <, > or = sign.

$$(a) \text{ 3}^2 \text{---} 15$$

Solution:-

$$3^2 \leq 15$$

$$\text{Where, } 3^2 = 3 \times 3 = 9$$

$$\text{Therefore, } 9 < 15$$

$$(b) \text{ 2}^3 \text{---} \text{3}^2$$

Solution:-

$$2^3 \leq 3^2$$

$$\text{Where, } 2^3 = 2 \times 2 \times 2 = 8$$

$$3^2 = 3 \times 3 = 9$$

Therefore, $8 < 9$

(c) 7^4 _____ 5^4

Solution:-

$$7^4 \geq 5^4$$

Where, $7^4 = 7 \times 7 \times 7 \times 7 = 2401$

$$5 \times 5 \times 5 \times 5 = 625$$

Therefore, $2401 > 625$

(d) $10,000$ _____ 10^5

Solution:-

$$10,000 \leq 100000$$

Where, $10 \times 10 \times 10 \times 10 \times 10 = 100000$

Therefore, $10,000 < 100000$

(e) 6^3 _____ 4^4

Solution:-

$$6^3 \leq 4^4$$

Where, $6^3 = 6 \times 6 \times 6 = 216$

$$4^4 = 4 \times 4 \times 4 \times 4 = 256$$

Therefore, $216 < 256$

In questions 41 to 50, state whether the given statements are True or False.

41. One million = 10^7

Solution:-

False.

We know that, 1 million = 10,00,000
 $= 10^6$

42. One hour = 60^2 seconds

Solution:-

True.

We know that, 1 hour = 60 minutes

$$1 \text{ minutes} = 60 \text{ seconds}$$

Therefore, 1 hour = $60 \times 60 = 3600$ seconds

43. $1^0 \times 0^1 = 1$

Solution:-

False

$$1^0 = 1$$

$$0^1 = 0$$

$$\text{So, } 1 \times 0 = 0$$

44. $(-3)^4 = -12$

Solution:-

False.

$$(-3)^4 = -3 \times -3 \times -3 \times -3 = 81$$

$$\text{So, } 81 \neq -12$$

45. $3^4 > 4^3$

Solution:-

True.

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

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

$$\text{Therefore, } 81 > 64$$

46. $(-3/5)^{100} = (-3^{100}/-5^{100})$

Solution:-

True.

$$\text{Consider the LHS} = (-3/5)^{100}$$

$$-3 \text{ can be written as } = (-1 \times 3)$$

$$\text{So, } ((-1 \times 3)/5)^{100}$$

$$= (-1^{100} \times 3^{100})/5^{100}$$

$$= (1 \times 3^{100})/5^{100}$$

$$= 3^{100}/5^{100}$$

$$\text{Then, consider the RHS} = -3^{100}/-5^{100}$$

$$= 3^{100}/5^{100}$$

By comparing LHS and RHS,

$$\text{LHS} = \text{RHS}$$

$$3^{100}/5^{100} = 3^{100}/5^{100}$$

$$\text{Therefore, } (-3/5)^{100} = (-3^{100}/-5^{100})$$

47. $(10 + 10)^{10} = 10^{10} + 10^{10}$

Solution:-

False.

For any non-zero integers 'a' and 'b' and whole numbers m and n,

$$a^m \times a^n = a^{m+n}$$

48. $x^0 \times x^0 = x^0 \div x^0$ is true for all non-zero values of x.

Solution:-

True.

we know that, $x^0 = 1$

so, $x^0 \times x^0 = 1 \times 1 = 1$

$x^0 \div x^0 = 1 \div 1 = 1$

Therefore, $x^0 \times x^0 = x^0 \div x^0$

$$1 = 1$$

49. In the standard form, a large number can be expressed as a decimal number between 0 and 1, multiplied by a power of 10.

Solution:-

False

Any number can be expressed as a decimal number between 1.0 and 10.0 (including 1.0) multiplied by a power of 10. Such form of a number is called its standard form or scientific notation.

50. 4^2 is greater than 2^4 .

Solution:-

False.

$$4^2 = 4 \times 4 = 16$$

$$2^4 = 2 \times 2 \times 2 \times 2 = 16$$

Therefore, $4^2 = 2^4$