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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,

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

$[(-3)^2]^3 = -3^{(2 \times 3)}$

$= -3^6$

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

so, $x^8 \div x^2$

$= x^8/x^2$

$= x^{8-2}$

$= x^6$

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,

The square of x = x^2

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,

$a^0 = 1$

So, $1^0 = 1$, $2^0 = 1$, $3^o = 1$

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,
$a^0 = 1$
So, $2^0 = 1$, $3^0 = 1$, $4^o = 1$
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. $(2/3)^3 \times (5/7)^3$ is equal to

(a) $((2/3) \times (5/7))^9$ **(b) $((2/3) \times (5/7))^6$**

(c) $((2/3) \times (5/7))^3$ **(d) $((2/3) \times (5/7))^0$**

Solution:-

(c) $((2/3) \times (5/7))^3$

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 × 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) 1/10000** **(c) $1/10^6$** **(d) $(1/10^6) \div 0.1$**

Solution:-

(a) 0.0001 and (b) 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, $(a/b)^m \div (a/b)^n$, where m>n, is equal to

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

Solution:-

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

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

Solution:-

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

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

Solution:-

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

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

Solution:-

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

We know that,
For any non-zero integers ‘a’ and ‘b’ and whole numbers m and n,
$a^m \times a^n = a^{m+n}$
Therefore, $(11/15)^4 \times (11/15)^5 = (11/15)^9$

26. $(-1/4)^3 \times (-1/4)$——— $= (-1/4)^{11}$
Solution:-
$(-1/4)^3 \times (-1/4)^{\underline{8}} = (-1/4)^{11}$
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,
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. $[(7/11)^3]^4 = (7/11)$——
Solution:-
$[(7/11)^3]^4 = (7/11)^{\underline{12}}$
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. $(6/13)^{10} \div [(6/13)^5]^2 = (6/13)$———
Solution:-
$(6/13)^{10} \div [(6/13)^5]^2 = (6/13)^{\underline{0}}$
In the given question first consider $[(6/13)^5]^2$
For any non-zero integers ‘a’ and ‘b’ and whole numbers m and n,
$(a^m)^n = a^{mn}$
$[(6/13)^5]^2 = (6/13)^{(5 \times 2)}$
$= (6/13)^{10}$
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:-

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

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

Solution:-

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

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

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:-

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

We know that,

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

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

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

$= a^{11}$

32. 1 lakh = 10——

Solution: -

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

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 lakh = 1,00,000

$= 10^5$

33. 1 million = 10————

Solution:-

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

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.

1 million = 10,00,000

= 10^6

34. 729 = 3————

Solution: -

$729 = 3^{\underline{6}}$

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

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

Therefore, factors of 729 are = 3 × 3 × 3 × 3 × 3 × 3

$729 = 3^6$

35. 432 = 2^4 × 3——

Solution:-

$432 = 2^4 \times 3^{\underline{3}}$

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

2	432
2	216
2	108
2	54
3	27
3	9
3	3
	1

Therefore, factors of 432 are = 2 × 2 × 2 × 2 × 3 × 3 × 3

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

36. 53700000 = —— × 10^7

Solution:-

$53700000 = \underline{5.37} \times 10^7$

$= (53700000/10000000) \times 10000000$

$= 5.37 \times 10^7$

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. 88880000000 = —— × 10^{10}

Solution:-

$88880000000 = \underline{8.888} \times 10^{10}$

$= (88880000000/10000000000) \times 10000000000$

$= 8.888 \times 10^{10}$

38. 27500000 = 2.75 × 10———

Solution:-

$27500000 = 2.75 \times 10^{\underline{7}}$

$= (27500000/10000000) \times 10000000$

$= 2.75 \times 10^7$

39. 340900000 = 3.409 × 10———

Solution:-

$340900000 = 3.409 \times 10^{\underline{8}}$

$= (340900000/100000000) \times 100000000$

$= 3.409 \times 10^8$

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

(a) 3^2 ______15

Solution:-

$3^2 \underline{<} 15$

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

Therefore, $9 < 15$

(b) 2^3 ______ 3^2

Solution:-

$2^3 \underline{<} 3^2$

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

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

Solution:-
False
$1^0 = 1$
$0^1 = 0$
So, $1 \times 0 = 0$

44. $(-3)^4 = -12$
Solution:-
False.
$(-3)^4 = -3 \times -3 \times -3 \times -3 = 81$
So, $81 \neq -12$

45. $3^4 > 4^3$
Solution:-
True.
$3^4 = 3 \times 3 \times 3 \times 3 = 81$
$4^3 = 4 \times 4 \times 4 = 64$
Therefore, $81 > 64$

46. $(-3/5)^{100} = (-3^{100}/-5^{100})$
Solution:-
True.
Consider the LHS = $(-3/5)^{100}$
-3 can be written as = (-1×3)
So, $((-1 \times 3)/5)^{100}$
$= (-1^{100} \times 3^{100})/5^{100}$
$= (1 \times 3^{100})/5^{100}$
$= 3^{100}/5^{100}$
Then, consider the RHS = $-3^{100}/-5^{100}$
$= 3^{100}/5^{100}$
By comparing LHS and RHS,
LHS = RHS
$3^{100}/5^{100} = 3^{100}/5^{100}$
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, $4^2 = 2^4$