In questions 1 to 33, out of the four options, only one is correct. Write the correct answer.

1. In 2^n, n is known as:
(a) Base (b) Constant (c) exponent (d) Variable
Solution:
(c) Exponent
Explanation: 2 is the rational number which is the base here and n is the power of 2.
Hence, it is an exponent.

2. For a fixed base, if the exponent decreases by 1, the number becomes:
(a) One-tenth of the previous number.
(b) Ten times of the previous number.
(c) Hundredth of the previous number.
(d) Hundred times of the previous number.
Solution:
(a) One-tenth of the previous number
Explanation: Suppose for 10^6, when the exponent is decreased by 1, it becomes 10^5.
Hence, $10^5/10^6 = 1/10$.

3. 3^{-2} can be written as:
(a) 3^2 (b) $1/3^2$ (c) $1/3^{-2}$ (d) -2/3
Solution:
(b) $1/3^2$
Explanation: By the law of exponent we know: $a^{-n} = 1/a^n$.
Hence, $3^{-2}=1/3^2$

4. The value of $1/(4)^{-2}$ is:
(a) 16 (b) 8 (c) 1/16 (d) 1/8
Solution:
(a) 16
Explanation: $1/(4)^{-2} = 1/(1/4^2) = 4^2 = 16$

5. The value of $3^5 \div 3^{-6}$ is:
(a) 3^5 (b) 3^{-6} (c) 3^{11} (d) 3^{-11}
Solution:
(c) 3^{11}
Explanation: By the law of exponents, we know,
$a^m/a^n=a^{m-n}$

Hence, $3^5 \div 3^{-6} = 3^{5-(-6)} = 3^{11}$

6. The value of $(2/5)^{-2}$ is:
(a) 4/5 (b) 4/25 (c) 25/4 (d) 5/2
Solution:
(c) 25/4
Explanation: By the law of exponent we know: $a^{-n} = 1/a^n$.
Hence, $(2/5)^{-2} = 1/(2/5)^2 = 1/(4/25) = 25/4$

7. The reciprocal of $(2/5)^{-1}$ is:
(a) 2/5 (b) 5/2 (c) –5/2 (d) –2/5
Solution:
(b) 5/2
Explanation: By the law of exponent we know: $a^{-n} = 1/a^n$.
Hence, $(2/5)^{-1}=1/(2/5)=5/2$

8. The multiplicative inverse of 10^{-100} is
(a) 10 (b) 100 (c) 10^{100} (d) 10^{-100}
Solution:
(c) 10^{100}
Explanation: By the law of exponent we know: $a^{-n} = 1/a^n$.
So, $10^{-100} = 1/10^{100}$
The multiplicative inverse for any integer a is 1/a, such that;
a x 1/a = 1
Hence, the multiplicative inverse for $1/10^{100}$ is 10^{100}
as, $1/10^{100} \times 10^{100} = 1$

9. The value of $(–2)^{2x3-1}$ is
(a) 32 (b) 64 (c) – 32 (d) – 64
Solution:
(c) – 32
Explanation: $(–2)^{2x3-1}=(-2)^{6-1}=(-2)^5=-32$

10. The value of $(-2/3)^4$ is equal to:
(a) 16/81 (b) 81/16 (c) -16/81 (d) 81/ −16
Solution:
(a) 16/81
Explanation: $(-2/3)^4 = (-2/3)(-2/3)(-2/3)(-2/3) = 16/81$

11. The multiplicative inverse of $(-5/9)^{-99}$ is:
(a) $(-5/9)^{99}$ (b) $(5/9)^{99}$ (c) $(9/-5)^{99}$ (d) $(9/5)^{99}$
Solution:
$(-5/9)^{99}$
Explanation: Take the reference of Q.8 mentioned above.

12. If x be any non-zero integer and m, n be negative integers, then $x^m \times x^n$ is equal to:
(a) x^m (b) x^{m+n} (c) x^n (d) x^{m-n}
Solution:
(b) x^{m+n} (By the law of exponents)

13. If y be any non-zero integer, then y^0 is equal to:
(a) 1 (b) 0 (c) – 1 (c) Not defined
Solution:
(a) 1 (By the law of exponent)

14. If x be any non-zero integer, then x^{-1} is equal to
(a) x (b) 1/x (c) – x (c) -1/x
Solution:
(b) 1/x (By the law of exponents)

15. If x be any integer different from zero and m be any positive integer, then x^{-m} is equal to:
(a) x^m (b) $–x^m$ (c) $1/x^m$ (d) $-1/x^m$
Solution:
(c) $1/x^m$ (By the law of exponents)

16. If x be any integer different from zero and m, n be any integers, then $(x^m)^n$ is equal to:
(a) x^{m+n} (b) x^{mn} (c) $x^{m/n}$ (d) x^{m-n}
Solution:
(b) x^{mn} (By the law of exponents)

17. Which of the following is equal to $(-3/4)^{-3}$?
(a) $(3/4)^{-3}$ (b) $– (3/4)^{-3}$ (c) $(4/3)^3$ (d) $(-4/3)^3$
Solution:
(d) $(-4/3)^3$
Explanation: $(-3/4)^{-3} = 1/(-3/4)^3 = (-4/3)^3$

(By the law of exponents: $a^{-n} = 1/a^n$)

18. $(-5/7)^{-5}$ is equal to:
(a) $(5/7)^{-5}$ (b) $(5/7)^5$ (c) $(7/5)^5$ (d) $(-7/5)^5$
Solution:
(d) $(-7/5)^5$
Explanation: $(-5/7)^{-5}=1/(-5/7)^5=(-7/5)^5$
(By the law of exponents: $a^{-n} = 1/a^n$)

19. $(-7/5)^{-1}$ is equal to:
(a) 5/7 (b) – 5/7 (c) 7/5 (d) -7/5
Solution:
(b) – 5/7
Explanation: $(-7/5)^{-1}= 1/(-7/5) = -5/7$

20. $(–9)^3 ÷ (–9)^8$ is equal to:
(a) $(9)^5$ (b) $(9)^{-5}$ (c) $(– 9)^5$ (d) $(– 9)^{-5}$
Solution:
(d) $(– 9)^{-5}$
Explanation: $(–9)^3 ÷ (–9)^8 = (-9)^{3-8} = (-9)^{-5}$
(By the law of exponents: $a^m ÷ a^n=a^{m-n}$)

21. For a non-zero integer x, $x^7 ÷ x^{12}$ is equal to:
(a) x^5 (b) x^{19} (c) x^{-5} (d) x^{-19}
Solution:
(c) x^{-5}
Explanation: $x^7 ÷ x^{12} = x^{7-12} = x^{-5}$
(By the law of exponents: $a^m ÷ a^n=a^{m-n}$)

22. For a non-zero integer x, $(x^4)^{-3}$ is equal to:
(a) x^{12} (b) x^{-12} (c) x^{64} (d) x^{-64}
Solution:
(b) x^{-12}
Explanation: $(x^4)^{-3} = x^{4\times(-3)} = x^{-12}$
(By the law of exponents: $(a^m)^n=a^{mn}$)

23. The value of $(7^{-1} – 8^{-1})^{-1} – (3^{-1} – 4^{-1})^{-1}$ is:
(a) 44 (b) 56 (c) 68 (d) 12
Solution:

(a) 44
Explanation: $(7^{-1} – 8^{-1})^{-1} – (3^{-1} – 4^{-1})^{-1}$
$= (1/7-1/8)^{-1} - (1/3-1/4)^{-1}$
$= (1/56)^{-1} – (1/12)^{-1}$
$= 56 – 12 = 44$

24. The standard form for 0.000064 is
(a) 64×10^4 (b) 64×10^{-4} (c) 6.4×10^5 (d) 6.4×10^{-5}
Solution:
(d) 6.4×10^{-5}

25. The standard form for 234000000 is
(a) 2.34×10^8 (b) 0.234×10^9 (c) 2.34×10^{-8} (d) 0.234×10^{-9}
Solution:
(a) 2.34×10^8
Explanation: $234000000 = 234 \times 10^6 = 2.34 \times 10^2 \times 10^6 = 2.34 \times 10^8$

26. The usual form for 2.03×10^{-5}
(a) 0.203 (b) 0.00203 (c) 203000 (d) 0.0000203
Solution:
(d) 0.0000203

27. $(1/10)^0$ is equal to
(a) 0 (b) 1/10 (c) 1 (d) 10
Solution:
(c) 1 Since, $a^0 = 1$ (by law of exponent)

28. $(3/4)^5 \div (5/3)^5$ is equal to
(a) $(3/4 \div 5/3)^5$ (b) $(3/4 \div 5/3)^1$ (c) $(3/4 \div 5/3)^0$ (d) $(3/4 \div 5/3)^{10}$
Solution:
(a) $(3/4 \div 5/3)^5$
(By law of exponent: $(a)^m \div (b)^m = (a \div b)^m$

29. For any two non-zero rational numbers x and y, $x^4 \div y^4$ is equal to
(a) $(x \div y)^0$ (b) $(x \div y)^1$ (c) $(x \div y)^4$ (d) $(x \div y)^8$
Solution:
(c) $(x \div y)^4$
(By law of exponent: $(a)^m \div (b)^m = (a \div b)^m$)

30. For a non-zero rational number p, $p^{13} \div p^8$ is equal to
(a) p^5 (b) p^{21} (c) p^{-5} (d) p^{-19}
Solution:
(a) p^5
(By law of exponent: $(a)^m \div (a)^n = (a)^{m-n}$)

31. For a non-zero rational number z, $(z^{-2})^3$ equal to
(a) z^6 (b) z^{-6} (c)z^1 (d) z^4
Solution:
(b) z^{-6}
(By the law of exponents: $(a^m)^n = a^{mn}$)

32. Cube of -1/2 is
(a) 1/8 (b) 1/16 (c) -1/8 (d) -1/16
Solution:
(c) -1/8
Explanation: Cube of -1/2 = $(-1/2)^3$
= (-1/2) × (-1/2) × (-1/2) = -1/8

33. Which of the following is not the reciprocal of $(2/3)^4$?
(a) $(3/2)^4$ (b) $(3/2)^{-4}$ (c) $(2/3)^{-4}$ (d) $3^4/2^4$
Solution:
(b) $(3/2)^{-4}$
Explanation: $(2/3)^4 = 1/(2/3)^{-4} = (3/2)^{-4}$

In questions 34 to 50, fill in the blanks to make the statements true.
34. The multiplicative inverse of 10^{10} is $\underline{10^{-10}}$

35. $a^3 \times a^{-10} = a^{3+(-10)} = a^{3-10} = \underline{a^{-7}}$

36. $5^0 = \underline{1}$

37. $5^5 \times 5^{-5} = 5^{5+(-5)} = 5^{5-5} = 5^0 = \underline{1}$

38. The value of $(1/2^3)^2$ equal to $\underline{(1/2^6).}$
Explanation: $(1/2^3)^2 = (1/2)^{3x2} = (1/2)^6$

39. The expression for 8^{-2} as a power with the base 2 is $\underline{(2)^{-6}}$
Explanation: $8^{-2} = (2 \times 2 \times 2)^{-2} = (2^3)^{-2}$

40. Very small numbers can be expressed in standard form by using negative exponents.

41. Very large numbers can be expressed in standard form by using positive exponents.

42. By multiplying $(10)^5$ by $(10)^{-10}$ we get 10^{-5}
Explanation: $(10)^5 \times (10)^{-10} = 10^{5+(-10)} = 10^{5-10} = 10^{-5}$

43. $[(2/13)^{-6} \div (2/13)^3]^3 \times (2/13)^{-9} = (2/13)^{-36}$
Explanation: $[(2/13)^{-6} \div (2/13)^3]^3 \times (2/13)^{-9}$
$= [(2/13)^{-6-3}]^3 \times (2/13)^{-9}$
$= [(2/13)^{-9}]^3 \times (2/13)^{-9}$
$= (2/13)^{-9\times3} \times (2/13)^{-9}$
$= (2/13)^{-27} \times (2/13)^{-9}$
$= (2/13)^{-27-9}$
$= (2/13)^{-36}$

44. Find the value $[4^{-1} + 3^{-1} + 6^{-2}]^{-1}$
Solution: $[4^{-1} + 3^{-1} + 6^{-2}]^{-1}$
$= (1/4+1/3+1/6^2)^{-1}$
$= [(9+12+1)/36]^{-1}$
$= (22/36)^{-1}$
$= (36/22)$

45. $[2^{-1} + 3^{-1} + 4^{-1}]^0 = 1$ (Using law of exponent, $a^0=1$)

46. The standard form of (1/100000000) is 1.0×10^{-8}
Explanation: $(1/100000000) = 1/1\times10^8 = 1.0 \times 10^{-8}$

47. The standard form of 12340000 is 1.234×10^7
Explanation: $12340000 = 1234 \times 10^4 = 1.234 \times 10^3 \times 10^4 = 1.234 \times 10^7$

48. The usual form of 3.41×10^6 is 3410000.
Explanation: $3.41 \times 10^6 = 3.41 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$
$= 341 \times 10 \times 10 \times 10 \times 10$
$= 3410000$

49. The usual form of 2.39461×10^6 is <u>2394610.</u>

<u>Explanation:</u> $2.39461 \times 10^6 = 2.39461 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$

$= 239461 \times 10$

$= 2394610$

50. If $36 = 6 \times 6 = 6^2$, then 1/36 expressed as a power with the base 6 is <u>6^{-2}.</u>

<u>Explanation:</u> $36 = 6 \times 6 = 6^2$

$1/36 = 1/6^2 = 6^{-2}$