Solution

Class 08 - Mathematics

MATHEMATICS

Section A

1. **(a)** $\frac{12}{13}$

   Explanation: The answer is $\frac{12}{13}$ as any number multiplied by 1 gives the same number as product as 1 is the multiplicative identity of rational numbers

2. **(b)** 0

   Explanation: $\frac{13}{19}$ + (—$\frac{13}{19}$)

   =$\frac{13}{19}$—$\frac{13}{19}$

   = 0

3. **(c)** 2025

   Explanation: 2025 is a perfect square as it ends with 5 at unit's place whereas the other numbers 2657, 2688, and 2673 ends with 7, 8 and 3 at unit's place and a perfect square never ends with 2, 3,7 and 8 at unit's place

4. **(d)** 1

   Explanation: 29^2 have 9 in unit's place so on squaring 9 we get 81 which has 1 in unit's place. So, 29^2 has 1 in its unit's place

5. **(b)** -51

   Explanation: -132651 = (3) $\times$ (3) $\times$ (3) $\times$ (-17) $\times$ (-17) $\times$ (-17)

   $\sqrt[3]{-132651} = \sqrt[3]{3^{\ 3} \times (-17)^{\ 3}}$

   $\sqrt[3]{-132651} = 3 \times (-17)$

   $\sqrt[3]{-132651} = -51$

6. **(c)** $8x^3$

   Explanation: Double of x = 2x

   Cube of double of x = $(2x)^3$

   = $8x^3$

7. **(c)** (x + 2), (x - 2)

   Explanation: We have,

   $x^2 - 4 = x^2 - 2^2 = (x + 2)(x - 2)$ [$\because$ $a^2 - b^2 = (a + b)(a - b)$]

   Hence, (x + 2), (x - 2) are factors of $x^2 - 4$.

8. **(c)** $-p^2q + \ 5pq^2$

   Explanation: 2pq (p + q) - 3pq (p - q)

   Open the brackets we get,

   $2p^2q + 2pq^2 - 3p^2q + 3pq^2$

   solving like terms we get,

   $2p^2q - 3p^2q + 2pq^2 + 3pq^2$

   $-p^2q + 5pq^2$

9. **(b)** $\frac{1}{-8}$

   Explanation: Cube of a is$(a)^3$ = a $\times$ a $\times$ a

   Similarly, $\left(-\frac{1}{2}\right)^3 = \left(\frac{-1}{2}\right) \times \left(\frac{-1}{2}\right) \times \left(\frac{-1}{2}\right) = \left(-\frac{1}{8}\right)$ [if m is odd, then $(-a)^m$ is negative]

10. **(a)** 343

    Explanation: 7^3

    7 x 7 x 7

    = 49 x 7

    = 343

11. Additive inverse of $\frac{-5}{9}$ is $\frac{5}{9}$.
12. We have $\frac{4}{7} \times \frac{14}{3} \div \frac{2}{3}$
$=\frac{4}{7} \times \left(\frac{14}{3} \times \frac{3}{2}\right)$
$= \frac{4}{7} \times 7$
= 4
13. As per the question, we have to find the sum of first five odd natural numbers.
Therefore, 1 + 3 + 5 + 7 + 9 = 5^2 = 25
14. 32 = 30 + 2
Therefore, $32^2 = (30 + 2)^2$
= 900 + 2$\times$60 + 4
= 1024
15. $(0.3)^3 = 0.3 \times 0.3 \times 0.3 = 0.027$.
16. 45.
In the prime factorization of any perfect cube, all the prime factors appear as triplets. In the given prime factorization, to make the factors as triplets, it should be divided by 3 x 3 x 5 = 45.
17. $983^2 - 17^2 = (983 + 17)(983 - 17)$
[Using identity $a^2 - b^2 = (a + b)(a - b)$]
= 1000 $\times$ 966 = 966000
18. $(a^2 + 2b^2) \times (5a – 3b) = a^2(5a – 3b) + 2b^2(5a – 3b)$
$= 5a^3 – 3a^2b + 10ab^2 – 6b^3$
19. We have, $4 = 2 \times 2 = 2^2$
Therefore, $(4)^{-3} = (2^2)^{-3} = 2^{2 \times (-3)}$ [because $(a^m)^n = a^{n \times m}$]
$= 2^{-6}$
20. 3.61492×10^6
= 3.61492 $\times$ 1000000
= 3614920

Section B

21. a. $\frac{5}{8} - \frac{3}{8}$
$= \frac{2}{8}$
$= \frac{1}{4}$
b. $\frac{-7}{22} - \left(\frac{-8}{33}\right)$
$= \frac{-21-(-16)}{66}$
$= \frac{-21+16}{66}$
$= \frac{-5}{66}$
22. $\frac{-5}{8} \times \frac{-3}{7} = \frac{(-5)\times(-3)}{8\times7} = \frac{15}{56}$
Therefore, the multiplicative inverse of
$\frac{-5}{8} \times \frac{-3}{7}$ is $\frac{56}{15}$
23. We have,

	38
3	1500
	9
68	600
	544
	56

We observe that $38^2 < 1500 < 39^2$
Hence, the number to be added = 39^2 - 1500
= 1521 - 1500
= 21

Therefore, the perfect square is 1500 + 21 = 1521

$\sqrt{1521}$ = 39

Therefore, the required number is 21 and the square root is 39.

24. The prime factorisation of 9604 is

9604 = 2 $\times$ 2 $\times$ 7 $\times$ 7 $\times$ 7 $\times$ 7

By pairing the prime factors, we get

$$\begin{array}{r|r} 2 & 9604 \\ \hline 2 & 4802 \\ \hline 7 & 2401 \\ \hline 7 & 343 \\ \hline 7 & 49 \\ \hline & 7 \end{array}$$

9604 = $\underline{2 \times 2} \times \underline{7 \times 7} \times \underline{7 \times 7}$

So, $\sqrt{9604}$ = 2 $\times$ 7 $\times$ 7 = 98

25.
$$\begin{array}{r|r} 2 & 10648 \\ \hline 2 & 5324 \\ \hline 2 & 2662 \\ \hline 11 & 1331 \\ \hline 11 & 121 \\ \hline & 11 \end{array}$$

By prime factorisation,

10648 = $\underline{2 \times 2 \times 2} \times \underline{11 \times 11 \times 11}$ [grouping the factors in triplets]

= $2^3 \times 11^3$ [by laws of exponents]

= $(2 \times 11)^3$

= 22^3 which is a perfect cube.

Therefore, 10648 is a perfect cube.

26. Let the number be a .

If it is doubled, it becomes 2a .

Its cube = $(2a)^3$ = 2a × 2a × 2a = 8 a^3 .

That is, 8 times the cube of a.

27. We have, Area of a circle = $\pi x^2 + 6\pi x + 9\pi = \pi(x^2 + 6x + 9)$

$\Rightarrow r^2 = \pi(x^2 + 3x + 3x + 9)$ [$\because$ area of a circle = πr^2, where r is the radius]

$\Rightarrow r^2 = \pi[x(x + 3) + 3(x + 3)] = \pi(x + 3)(x + 3) = \pi(x + 3)^2$

$\Rightarrow \pi r^2 = \pi(x + 3)^2$

On comparing both sides, $r^2 = (x + 3)^2 \Rightarrow r = x + 3$

Hence, the radius of circle is x + 3

28. We have, $5a^2b^2c^2$ from $-7a^2b^2c^2$

The required difference is given by $- 7a^2b^2c^2 - 5a^2b^2c^2$

$= (- 7 - 5)\, a^2b^2c^2 = - 12a^2b^2c^2$

29. Given, $\left(\frac{2}{9}\right)^3 \times \left(\frac{2}{9}\right)^{-6} = \left(\frac{2}{9}\right)^{2x-1}$

Using law of exponents, $a^m \times a^n = (a)^{m + n}$ [$\because$ a is non-zero integer]

Then, $\left(\frac{2}{9}\right)^{3-6} = \left(\frac{2}{9}\right)^{2x-1}$

$\Rightarrow \quad \left(\frac{2}{9}\right)^{-3} = \left(\frac{2}{9}\right)^{2x-1}$

On comparing, we get -3 = 2x - 1

$\Rightarrow$ -2 =2x

$\Rightarrow$ x = -1

30. $(-2)^{-3} \times (-2)^{-4}$

$= (-2)^{(-3) + (-4)}$

$= (-2)^{-7}$

Section C

31. We have, $\frac{1}{25}, \frac{1}{32}, \frac{1}{40}, \frac{1}{20}$

At first, we convert the numbers as like denominators.

2	25, 32, 40, 20
2	25, 16, 20, 10
2	25, 8, 10, 5
5	25, 4, 5 5
	5, 4, 1 1

Taking LCM of 25, 32, 40 and 20 = 2 × 2 × 2 × 5 × 5 × 4 = 800

we get,

$\frac{1}{25} = \frac{1\times32}{25\times32} = \frac{32}{800}, \frac{1}{32} = \frac{1\times25}{32\times25} = \frac{25}{800}; \frac{1}{40} = \frac{1\times20}{40\times20} = \frac{20}{800}$ and $\frac{1}{20} = \frac{1\times40}{20\times40} = \frac{40}{800}$

a. Soni hop more than Nancy $= \frac{40}{800} - \frac{25}{800} = \frac{40-25}{800} = \frac{15}{800} = \frac{3}{160}$

b. Total distance covered by Seema and Megha $= \frac{32}{800} + \frac{20}{800} = \frac{32+20}{800} = \frac{52}{800} = \frac{13}{200}$

c. It is clear that Nancy walked farther than Megha.

32. Let the cost of cloth per meter be x.

According to question

$2\frac{1}{3}x = 75\frac{1}{4}$

$\frac{7}{3}x = \frac{301}{4}$

$x = \frac{(3\times301)}{(7\times4)}$

= ₹ 32.55

33. Let the number of rows be x

Then the number of columns in x

So, the number of plants is x × x = x^2

which is a perfect square.

Let us find out the square root of 500 by division method.

$$\begin{array}{r|l} & 22 \\ \hline 2 & \overline{5}\ \overline{00} \\ & -4 \\ \hline 42 & 100 \\ & -84 \\ \hline & 16 \end{array}$$

We get the remainder 16. It shows that 22^2 is less than 500 by 16.

This means that 16 children would be left out in this arrangement.

34.
$$\begin{array}{r|l} & 15 \\ \hline 1 & \overline{2}\,\overline{52} \\ & -1 \\ \hline 25 & 1\,52 \\ & -1\,25 \\ \hline & 27 \end{array}$$

This shows that $15^2 < 252$

Next perfect square is $16^2 = 256$

Hence, the number to be added is $16^2 - 252 = 256 - 252 = 4$

Therefore, the perfect square so obtained is 252 + 4 = 256

Hence, $\sqrt{256}$ = 16.

35.
$$\begin{array}{rrrrr} & p^3 & & & -1 \\ + & p^3 & & +p & +2 \\ + & & p^2 & -2p & +1 \\ \hline & 2p^3 & +p^2 & -p & +2 \end{array}$$

36. $(4x^2 - 3x + 2) + (3x^2 + 4x - 8) = 4x^2 - 3x + 2 + 3x^2 + 4x - 8$

$= 4x^2 + 3x^2 + 4x - 3x + 2 - 8$

$= (4 + 3)x^2 + (4 - 3)x + (2 - 8)$

$= 7x^2 + x - 6$

37. $\left\{\left(\frac{-2}{3}\right)^{-2}\right\}^2$

$= \left(\frac{-2}{3}\right)^{(-2)\times 2}$

$= \left(\frac{-2}{3}\right)^{-4}$

$= \frac{(-2)^{-4}}{(3)^{-4}}$

$= \frac{3^4}{(-2)^4}$

$= \frac{3\times3\times3\times3}{(-2)\times(-2)\times(-2)\times(-2)}$

$= \frac{81}{16}$

$= 5\frac{1}{16}$

38. In machine

a. $(\times 100^2)$ = 10000stretch. Since it is two times the base machine.

b. $(\times 7^5)$ = 16807 stretch. Since it is five times the base machine.

c. $(\times 5^7)$ = 78125 stretch. Since it is 7 times the base machine.

Section D

39. We have,

Let the number of students who study in school be x

Number of students come by car = $\frac{2}{5} \times x$

$= \frac{2}{5}x$

Number of students come by bus = $\frac{1}{4} \times x$

$= \frac{1}{4}x$

Remaining students walk to school = x - $\left(\frac{2}{5}x + \frac{1}{4}x\right)$

$= x - \left(\frac{8x+5x}{20}\right)$

$= x - \frac{13x}{20}$

$= \frac{20x-13x}{20}$

$= \frac{7x}{20}$

Now, the number of students walk to school on their own = $\frac{1}{3}$ of $\frac{7x}{20}$

$= \frac{7x}{60}$

Since, 224 students come to school on their own.

According to the question,

$\frac{7x}{60} = 224$

$\Rightarrow x = \frac{224\times60}{7}$

$= 32 \times 60$

$= 1920$

Therefore, 1920 students study in that school.

40. The prime factorisation of 768 is 768 = $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3$

As the prime factor 3 has no pair, 768 is not a perfect square.

If 3 gets a pair, then the number will be a perfect square. So, we multiply 768 by 3 to get

2	768
2	384
2	192
2	96
2	48
2	24
2	12
2	6
	3

$768 \times 3 = \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{3 \times 3}$

Now each prime factor has a pair. Therefore, $768 \times 3 = 2304$ is a perfect square. Thus the required smallest number is 3.

Thus, $\sqrt{2304} = 48$.

41. The prime factorisation of 180 is $180 = 2 \times 2 \times 3 \times 3 \times 5$

As the prime factor 5 has no pair, 180 is not a perfect square.

If 5 gets a pair, then the number will be a perfect square. So, we multiply 180 by 5 to get

2	180
2	90
3	45
3	15
	5

$180 \times 5 = \underline{2 \times 2} \times \underline{3 \times 3} \times \underline{5 \times 5}$

No each prime factor has a pair. Therefore, $180 \times 5 = 900$ is a perfect square. Thus the required smallest number is 5.

Thus, $\sqrt{900} = 2 \times 3 \times 5 = 30$.

42. 26244 is not a perfect cube. By prime factorization, we have,

$26244 = 2 \times 2 \times 3 \times 3 \times 9 \times 9 \times 9 = 2^2 \times 3^2 \times 9^3$.

As 2^2 and 3^2 does not appear in triplets, 26244 is not a perfect cube.

To make it a perfect cube, 26244 should be divided by $2^2 \times 3^2 = 4 \times 9 = 36$.

Therefore it becomes, $26244 \div 36 = 729$, which is a perfect cube.

$729 = 9^3$

i.e., $\sqrt[3]{729} = 9$

43. Let the number = x

6 times the number x = 6x

When x subtracted from 6x = 6x - x = 5x

Cube of the difference = $(5x)^3 = 625$

$= 125x^3 = 625$

$x^3 = \frac{625}{125} = 5.$

44. $(9.7)^2 = (10 – 0.3)^2 = (10)^2 – 2 \times 10 \times 0.3 + (0.3)^2$

$= 100 – 6 + 0.09 = 94.09$

45. $(a + b)(2a – 3b + c) – (2a – 3b)c$

$= a(2a – 3b + c) + b(2a – 3b + c) – (2ac – 3bc)$

$= 2a^2 – 3ab + ac + 2ab – 3b^2 + bc – 2ac + 3bc$

$= 2a^2 – ab – 3b^2 + (bc + 3bc) + (ac – 2ac)$

$= 2a^2 – 3b^2 – ab + 4bc – ac$

46. $\left(3^{-5} \times 10^{-5} \times 125\right) \div \left(5^{-7} \times 6^{-5}\right)$

$= \left(3^{-5} \times 5^{-5} \times 2^{-5} \times 5^{3}\right) \div \left(5^{-7} \times 6^{-5}\right)$

$= \left(3^{-5} \times 5^{-5+3} \times 2^{-5}\right) \div \left(5^{-7} \times 6^{-5}\right)$

$= \left(3^{-5} \times 5^{-2} \times 2^{-5}\right) \div \left(5^{-7} \times 3^{-5} \times 2^{-5}\right)$

$= \left(3^{-5+5} \times 5^{-2+7} \times 2^{-5+5}\right)$

$= \left(3^{0} \times 5^{5} \times 2^{0}\right)$

$= 3125$

47. $\frac{25\times t^{-4}}{5^{-3}\times 10\times t^{-8}}(t\neq 0)$

$$\frac{25\times t^{-4}}{5^{-3}\times 10\times t^{-8}}$$
$$=\frac{25\times\frac{1}{t^4}}{\frac{1}{5^3}\times 10\times\frac{1}{t^8}}$$
$$=\frac{\frac{25}{t^4}}{\frac{1}{125}\times 10\times\frac{1}{t^8}}$$
$$=\frac{\frac{25}{t^4}}{\frac{25}{25t^8}}$$
$$=\frac{25}{t^4}\times\frac{25t^8}{2}$$
$$=\frac{625t^{8-4}}{2}$$
$$=\frac{625}{2}t^4$$