

Q1. JEE Main 2026 (21 January Shift 2)

The largest $n \in \mathbb{N}$, for which 7^n divides $101!$, is :

- (1) 16 (2) 15 (3) 18 (4) 19

Q2. JEE Main 2026 (23 January Shift 1)

The number of 4 -letter words, with or without meaning, which can be formed using the letters PQR PQRSTUVP, is _____.

Q3. JEE Main 2026 (28 January Shift 2)

Three persons enter in a lift at the ground floor. The lift will go upto 10^{th} floor. The number of ways, in which the three persons can exit the lift at three different floors, if the lift does not stop at first, second and third floors, is equal to _____.

Q4. JEE Main 2026 (24 January Shift 2)

The largest value of n , for which 40^n divides $60!$, is

- (1) 11 (2) 12 (3) 14 (4) 13

Q5. JEE Main 2026 (24 January Shift 2)

The letters of the word "UDAYPUR" are written in all possible ways with or without meaning and these words are arranged as in a dictionary. The rank of the word "UDAYPUR" is

- (1) 1579 (2) 1581 (3) 1578 (4) 1580

Q6. JEE Main 2026 (22 January Shift 1)

Let ABC be a triangle. Consider four points p_1, p_2, p_3, p_4 on the side AB, five points p_5, p_6, p_7, p_8, p_9 on the side BC, and four points $p_{10}, p_{11}, p_{12}, p_{13}$ on the side AC. None of these points is a vertex of the triangle ABC. Then the total number of pentagons, that can be formed by taking all the vertices from the points $p_1, p_2, \dots, p_{13}$, is _____

Q7. JEE Main 2026 (23 January Shift 2)

The number of ways, in which 16 oranges can be distributed to four children such that each child gets at least one orange, is

- (1) 455 (2) 429 (3) 403 (4) 384

Q8. JEE Main 2026 (23 January Shift 2)

Let S denote the set of 4-digit numbers $abcd$ such that $a > b > c > d$ and P denote the set of 5-digit numbers having product of its digits equal to 20. Then $n(S) + n(P)$ is equal to _____

Q9. JEE Main 2026 (21 January Shift 1)

The number of strictly increasing functions f from the set $\{1, 2, 3, 4, 5, 6\}$ to the set $\{1, 2, 3, \dots, 9\}$ such that $f(i) \neq i$ for $1 \leq i \leq 6$, is equal to :

- (1) 27 (2) 22 (3) 21 (4) 28

Q10. JEE Main 2026 (21 January Shift 1)

Let $S = \{(m, n) : m, n \in \{1, 2, 3, \dots, 50\}\}$. If the number of elements (m, n) in S such that $6^m + 9^n$ is a multiple of 5 is p and the number of elements (m, n) in S such that $m + n$ is a square of a prime number is q , then $p + q$ is equal to _____.

Q11. JEE Main 2026 (28 January Shift 1)

Let $S = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$. Let x be the number of 9-digit numbers formed using the digits of the set S such that only one digit is repeated and it is repeated exactly twice. Let y be the number of 9-digit numbers formed using the digits of the set S such that only two digits are repeated and each of these is repeated exactly twice. Then,

- (1) $56x = 9y$ (2) $29x = 5y$ (3) $45x = 7y$ (4) $21x = 4y$

Q12. JEE Main 2026 (24 January Shift 1)

The number of numbers greater than 5000, less than 9000 and divisible by 3, that can be formed using the digits 0, 1, 2, 5, 9, if the repetition of the digits is allowed, is _____

ANSWERS AND SOLUTIONS

1. (1) 2. 1422 3. 210 4. (3) 5. (4) 6. 660 7. (1) 8. 260
9. (4) 10. 1333 11. (4) 12. 42

- (1)** Exponent of 7 in $101!$ is:

$$\left\lfloor \frac{101}{7} \right\rfloor + \left\lfloor \frac{101}{7^2} \right\rfloor + \left\lfloor \frac{101}{7^3} \right\rfloor + \dots = 14 + 2 = 16.$$
- (1422)** Letters: P(3), Q(2), R(2), S(1), T(1), U(1), V(1) — 7 distinct letters.
 All distinct: $\binom{7}{4} \times 4! = 840$.
 One pair + 2 distinct: choose repeating letter from $\{P, Q, R\}$ (3 ways), choose 2 from remaining 6 ($\binom{6}{2} = 15$),
 arrange $= 4!/2! = 12$. Total $= 3 \times 15 \times 12 = 540$.
 Two pairs: choose 2 from $\{P, Q, R\}$ ($\binom{3}{2} = 3$), arrange $= 4!/(2!2!) = 6$. Total $= 18$.
 One triple + 1 distinct: only P can repeat 3 times, choose 1 from 6, arrange $= 4!/3! = 4$. Total $= 24$.
 Answer $= 840 + 540 + 18 + 24 = 1422$.
- (210)** Three persons must exit at three different floors.
 The lift goes to the 10th floor and does not stop at floors 1, 2, and 3.
 Available floors for exit: 4, 5, 6, 7, 8, 9, 10 (7 floors total).
 The number of ways to assign 3 persons to 3 different floors from 7 available floors is a permutation problem:
 $P(7, 3) = 7 \times 6 \times 5 = 210$.
 Alternatively, choose 3 floors from 7 and arrange 3 persons: ${}^7P_3 = 35 \times 6 = 210$.
- (3)** $40^n = 2^{3n} \times 5^n$. We need the highest power of 40 dividing $60!$.
 Power of 5 in $60!$ $= \lfloor 60/5 \rfloor + \lfloor 60/25 \rfloor = 12 + 2 = 14$.
 Power of 2 in $60!$ $= \lfloor 60/2 \rfloor + \lfloor 60/4 \rfloor + \lfloor 60/8 \rfloor + \lfloor 60/16 \rfloor + \lfloor 60/32 \rfloor = 30 + 15 + 7 + 3 + 1 = 56$.
 We need $n \leq 14$ and $3n \leq 56$ (i.e., $n \leq 18$).
 The binding constraint is $n \leq 14$, so the largest value is $n = 14$.
- (4)** Letters of UDAYPUR: A, D, P, R, U, U, Y (U repeated twice).
 Words starting with a letter before U: letters A, D, P, R each give $\frac{6!}{2!} = 360$ arrangements $\Rightarrow 4 \times 360 = 1440$.
 Fix U at position 1. Remaining: A, D, P, R, U, Y (all distinct).
 Words starting with UA: $5! = 120$.
 Fix UD at positions 1-2. Remaining: A, P, R, U, Y. No letter before A, so fix UDA.
 Remaining: P, R, U, Y. Letters before Y: P, R, U give $3 \times 3! = 18$.
 Fix UDAY. Remaining: P, R, U. No letter before P, fix UDAYP.
 Remaining: R, U. Letter before U: R gives $1! = 1$.
 Fix UDAYPU, last letter R: the word itself.
 Rank $= 1440 + 120 + 18 + 1 + 1 = 1580$.

6. (660) Points: 4 on AB, 5 on BC, 4 on AC. For a valid pentagon, no 3 vertices can be collinear, so at most 2 points from each side.

Only valid distribution (a, b, c) with $a + b + c = 5$ and each ≤ 2 is permutations of $(1, 2, 2)$:

$$(1, 2, 2): \binom{4}{1} \binom{5}{2} \binom{4}{2} = 4 \cdot 10 \cdot 6 = 240$$

$$(2, 1, 2): \binom{4}{2} \binom{5}{1} \binom{4}{2} = 6 \cdot 5 \cdot 6 = 180$$

$$(2, 2, 1): \binom{4}{2} \binom{5}{2} \binom{4}{1} = 6 \cdot 10 \cdot 4 = 240$$

$$\text{Total} = 240 + 180 + 240 = 660.$$

7. (1) Distributing 16 identical oranges to 4 children with each getting at least 1.

Let $x_i \geq 1$ for $i = 1, 2, 3, 4$ and $x_1 + x_2 + x_3 + x_4 = 16$.

Substituting $y_i = x_i - 1 \geq 0$: $y_1 + y_2 + y_3 + y_4 = 12$.

By stars and bars, number of ways $= \binom{12+3}{3} = \binom{15}{3} = \frac{15 \times 14 \times 13}{6} = 455$.

8. (260) $n(S)$: Choose 4 distinct digits from $\{0, 1, \dots, 9\}$ and arrange in decreasing order. $n(S) = \binom{10}{4} = 210$.

$n(P)$: 5-digit numbers with digit product $= 20 = 2^2 \times 5$. All digits ≥ 1 (else product $= 0$). Must include exactly one 5, remaining 4 digits multiply to 4.

Case 1: $\{1, 1, 1, 4, 5\}$: $\frac{5!}{3!} = 20$ arrangements.

Case 2: $\{1, 1, 2, 2, 5\}$: $\frac{5!}{2! \cdot 2!} = 30$ arrangements.

$n(P) = 50$. Hence $n(S) + n(P) = 210 + 50 = 260$.

9. (4) For strictly increasing f , if we choose elements $a_1 < a_2 < \dots < a_6$, then $f(i) = a_i$.

Since $f(i) \geq i$ always, condition $f(i) \neq i$ means $f(i) \geq i + 1$ for all i .

Let $h(i) = f(i) - i$. Then $h(i) \geq 1$, $h(6) \leq 3$, and h is non-decreasing.

So $h(i) \in \{1, 2, 3\}$ for all i .

Number of non-decreasing sequences of length 6 from $\{1, 2, 3\} = \binom{8}{2} = 28$.

10. (1333) For $6^m + 9^n \equiv 0 \pmod{5}$:

$$6 \equiv 1 \pmod{5} \text{ and } 9 \equiv -1 \pmod{5}$$

$$\text{So } 6^m + 9^n \equiv 1 + (-1)^n \pmod{5}$$

This equals 0 only when n is odd.

Number of odd n in $\{1, \dots, 50\} = 25$, and m can be any of 50 values.

$$p = 50 \times 25 = 1250$$

For $m + n = \text{square of prime}$, possible values are 4, 9, 25, 49.

$$m + n = 4: 3 \text{ pairs}$$

$$m + n = 9: 8 \text{ pairs}$$

$$m + n = 25: 24 \text{ pairs}$$

$$m + n = 49: 48 \text{ pairs}$$

$$q = 3 + 8 + 24 + 48 = 83$$

$$p + q = 1250 + 83 = 1333$$

11. (4) x counts 9-digit numbers using $\{1, 2, 3, 4, 5, 6, 7, 8, 9\}$ with exactly one digit repeated twice (8 distinct digits, one twice, one absent).

Choose digit appearing twice: 9 ways.

Choose absent digit: 8 ways.

Arrange: $\frac{9!}{2!}$ ways.

$$x = 9 \times 8 \times \frac{9!}{2!} = 72 \times 181440 = 13043520.$$

y counts 9-digit numbers with exactly two digits each repeated twice (7 distinct digits, two appear twice, two absent).

Choose 2 digits for repetition: $\binom{9}{2}$ ways.

Choose 2 absent digits: $\binom{7}{2}$ ways.

Arrange: $\frac{9!}{2! \times 2!}$ ways.

$$y = 36 \times 21 \times \frac{9!}{4} = 756 \times \frac{9!}{4}.$$

$$\frac{x}{y} = \frac{72 \times 9! / 2}{756 \times 9! / 4} = \frac{72 \times 4}{756 \times 2} = \frac{288}{1512} = \frac{4}{21}.$$

$$\text{Therefore } 21x = 4y$$

12. (42) (1) all different

$$5, 0, 1, 9 \Rightarrow 4! = 24 \text{ ways}$$

- (2) 2 alike, 2 different

$$5, 0, 0, 1 \Rightarrow 3! = 6 \text{ ways}$$

$$5, 1, 1, 2 \Rightarrow 3! = 6 \text{ ways}$$

$$5, 2, 2, 0 \Rightarrow 3! = 6 \text{ ways}$$

$$5, 2, 2, 9 \Rightarrow 3! = 6 \text{ ways}$$

$$5, 5, 0, 2 \Rightarrow 4! = 24 \text{ ways}$$

$$5, 5, 2, 9 \Rightarrow 4! = 24 \text{ ways}$$

$$5, 1, 9, 9 \Rightarrow 3! = 6 \text{ ways}$$

- (3) 3 alike, 1 different

$$5, 5, 5, 0 \Rightarrow 4! = 24 \text{ ways}$$

$$5, 5, 5, 9 \Rightarrow 4! = 24 \text{ ways}$$

- (4) 2 alike, 2 other alike

$$5, 5, 1, 1 \Rightarrow 3! = 6 \text{ ways}$$

$$\text{Total ways} = 42$$