

Factorial and its Properties Questions

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MCQ Question 1

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Find n if $(n + 2)! = 60 \times (n - 1)!$?

1. 3

2. 5

3. 4

4. 6

Answer (Detailed Solution Below)

Option 1 : 3



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Factorial and its Properties MCQ Question 1 Detailed Solution

CONCEPT:

$$n! = n \times (n - 1) \times \dots \times 1$$

CALCULATION:

Here, we have to find the value of n such that $(n + 2)! = 60 \times (n - 1)!$

As we know that, $n! = n \times (n - 1) \times \dots \times 1$

$$\Rightarrow (n + 2) \times (n + 1) \times n \times (n - 1)! = 60 \times (n - 1)!$$

$$\Rightarrow (n + 2) \times (n + 1) \times n = 60$$

$$\Rightarrow (n + 2) \times (n + 1) \times n = 5 \times 4 \times 3$$

$$\Rightarrow (n + 2) \times (n + 1) \times n = (3 + 2) \times (3 + 1) \times n$$

$$\Rightarrow n = 3$$

Hence, **option A** is the correct answer.

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MCQ Question 2

[View this Question Online >](#)Find n if $(n + 2)! = 30 \times n!$?

1. 6
2. 4
3. 8
4. None of these

Answer (Detailed Solution Below)

Option 2 : 4

Factorial and its Properties MCQ Question 2 Detailed Solution**CONCEPT:**

$$n! = n \times (n - 1) \times \dots \times 1$$

CALCULATION:Here, we have to find the value of n such that $(n + 2)! = 30 \times n!$

$$\Rightarrow (n + 2) \times (n + 1) \times n! = 30 \times n!$$

$$\Rightarrow n^2 + 3n + 2 = 30$$

$$\Rightarrow n^2 + 3n - 28 = 0$$

$$\Rightarrow n^2 + 7n - 4n - 28 = 0$$

$$\Rightarrow n(n + 7) - 4(n + 7) = 0$$

$$\Rightarrow (n - 4) \times (n + 7) = 0$$

$$\Rightarrow n = 4 \text{ or } -7$$

$$\because n \in \mathbb{N} \Rightarrow n = 4$$

Hence, **option B** is the correct

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MCQ Question 3

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Find n , if $(n + 2)! = 2550 \times n!$?

1. 52
2. 49
3. 50
4. None of these

Answer (Detailed Solution Below)

Option 2 : 49

Factorial and its Properties MCQ Question 3 Detailed Solution

CONCEPT:

$$n! = n \times (n - 1) \times \dots \times 1$$

CALCULATION:

Here, we have to find the value of n such that $(n + 2)! = 2550 \times n!$

$$\Rightarrow (n+2) \times (n+1) \times n! = 2550 \times n!$$

$$\Rightarrow n^2 + 3n + 2 = 2550$$

$$\Rightarrow n^2 + 3n - 2548 = 0$$

$$\Rightarrow n^2 + 52n - 49n - 2548 = 0$$

$$\Rightarrow n(n+52) - 49 \times (n+52) = 0$$

$$\Rightarrow (n+52) \times (n-49) = 0$$

$$\Rightarrow n = -52 \text{ or } 49$$

$$\because n \in \mathbb{N} \Rightarrow n = 49$$

Hence, **option B** is the correct

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MCQ Question 4

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Find n if $(n+1)! = 12 \times (n-1)!$?

1. 3
2. 4
3. 5
4. None of these

Answer (Detailed Solution Below)

Option 1 : 3

CONCEPT:

$$n! = n \times (n-1) \times \dots \times 1$$

CALCULATION:

Here, we have to find the value of n such that $(n+1)! = 12 \times (n-1)!$

As we know that, $n! = n \times (n-1) \times \dots \times 1$

$$\Rightarrow (n+1) \times n \times (n-1)! = 12 \times (n-1)!$$

$$\Rightarrow n \times (n+1) = 12$$

$$\Rightarrow n^2 + n - 12 = 0$$

$$\Rightarrow n^2 + 4n - 3n - 12 = 0$$

$$\Rightarrow n(n+4) - 3(n+4) = 0$$

$$\Rightarrow (n-3) \times (n+4) = 0$$

$$\Rightarrow n = 3 \text{ or } -4$$

$$\therefore n \in \mathbb{N} \Rightarrow n = 3$$

Hence, **option B** is the correct answer.



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MCQ Question 5

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If $C(n, 4)$, $C(n, 5)$ and $C(n, 6)$ are in AP, then what is the value of n ?

1. 7

2. 8

3. 9

Answer (Detailed Solution Below)

Option 1 : 7

Factorial and its Properties MCQ Question 5 Detailed Solution**Formula used:**

- $C(n, r) = \frac{n!}{r!(n-r)!}$
- If a, b and c are in A.P then $2b = a + c$

Calculation:According to the question $C(n, 4)$, $C(n, 5)$ and $C(n, 6)$ are in AP

$$2 C(n, 5) = C(n, 4) + C(n, 6)$$

$$\Rightarrow 2 \times \frac{n!}{5!(n-5)!} = \frac{n!}{4!(n-4)!} + \frac{n!}{6!(n-6)!}$$

$$\Rightarrow \frac{1}{60(n-5)(n-6)!} = \frac{1}{24(n-4)(n-5)(n-6)!} + \frac{1}{720(n-6)!}$$

$$\Rightarrow \frac{1}{5} - \frac{1}{2(n-4)} = \frac{n-5}{-60}$$

$$\Rightarrow 6(2n - 13) = n^2 + 20 - 9n$$

$$\Rightarrow n^2 - 21n + 98 = 0$$

$$\Rightarrow n = 14, 7$$

 \therefore The value of n is 7.



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MCQ Question 6

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Find x if $\frac{1}{5!} + \frac{1}{6!} = \frac{x}{7!}$?

1. 100

2. 36

3. 49

4. 64

Answer (Detailed Solution Below)

Option 3 : 49

Factorial and its Properties MCQ Question 6 Detailed Solution

CONCEPT:

$$n! = n \times (n - 1) \times \dots \times 1$$

CALCULATION:

Given: $\frac{1}{5!} + \frac{1}{6!} = \frac{x}{7!}$

As we know that, $n! = n \times (n - 1) \times \dots \times 1$

$$\Rightarrow \frac{1}{5!} + \frac{1}{6 \times 5!} = \frac{x}{7 \times 6 \times 5!}$$

$$\Rightarrow \frac{1}{5!} \times \left(1 + \frac{1}{6}\right) = \frac{1}{5!} \times \frac{x}{42}$$

$$\Rightarrow 1 + \frac{1}{6} = \frac{x}{42}$$

$$\Rightarrow x = 49$$

Hence, **option C** is the correct answer.

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MCQ Question 7

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If $(n + 1)! = 12 \times (n - 1)!$, then the value of n is?

1. 1

2. 2

3. 3

4. 4

Answer (Detailed Solution Below)

Option 3 : 3

Factorial and its Properties MCQ Question 7 Detailed Solution

Concept:

- The factorial of a natural number n is defined as: $n! = 1 \times 2 \times 3 \times \dots \times n$.
- $0! = 1$.

Calculation:

We have:

$$(n + 1)! = 12 \times (n - 1)!$$

$$\Rightarrow (n + 1) \times n \times (n - 1)! = 12 \times (n - 1)!$$

$$\Rightarrow (n+1) \times n = 12$$

$$\Rightarrow n^2 + n - 12 = 0$$

$$\Rightarrow n^2 + 4n - 3n - 12 = 0$$

$$\Rightarrow n(n+4) - 3(n+4) = 0$$

$$\Rightarrow (n+4)(n-3) = 0$$

$$\Rightarrow n+4 = 0 \text{ OR } n-3 = 0$$

$$\Rightarrow n = -4 \text{ OR } n = 3.$$

Since, n has to be a natural number, $n = 3$.

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MCQ Question 8

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Find the value of nC_n

1. 0

2. 1

3. n

4. $n-1$

Answer (Detailed Solution Below)

Option 2 : 1

Concept:

$${}^nC_r = \frac{n!}{r!(n-r)!}$$

$${}^nC_r = {}^nC_{n-r}$$

Calculation

As we know ${}^nC_r = \frac{n!}{r!(n-r)!}$

So, ${}^nC_n = \frac{n!}{n!(n-n)!} = \frac{1}{0!} = 1$



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MCQ Question 9

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The value of $\frac{n!(n-1)!}{(n+1)!}$ is equal to:

1. $\frac{n(n+1)!}{(n-1)!}$

2. $n(n-1)!$

3. $(n!)^2$

4. $\frac{(n-1)!}{(n+1)!}$

Answer (Detailed Solution Below)

Answer (Detailed Solution Below)

Option 4 : $\frac{(n-1)!}{(n+1)!}$

Factorial and its Properties MCQ Question 9 Detailed Solution

Concept:

- The factorial ($n!$) is defined as the product of first n natural numbers.
- $n! = n \times (n-1) \times (n-2) \times \dots \times 2 \times 1$.

Calculation:

We know that $(n+1)! = (n+1) \times n \times (n-1) \times (n-2) \times \dots \times 2 \times 1 = (n+1) \times n!$.

$$\therefore \frac{n!(n-1)!}{(n+1)!} = \frac{n! \times (n-1)!}{(n+1) \times n!} = \frac{(n-1)!}{n+1}.$$

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MCQ Question 10

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Find the value of n such that $\frac{(n-1)!}{(n+1)!} = \frac{1}{6}$?

1. 4
2. 3
3. 2
4. None of these

Answer (Detailed Solution Below)

Option 3 : 2

Factorial and its Properties MCQ Question 10 Detailed Solution

Concept:

$$n! = n \times (n - 1) \times \dots \times 1$$

Calculation:

Here, we have to find the value of n such that $\frac{(n-1)!}{(n+1)!} = \frac{1}{6}$

As we know that, $n! = n \times (n - 1) \times \dots \times 1$

$$\frac{(n-1)!}{(n+1) \times n \times (n-1)!} = \frac{1}{6}$$

$$\frac{1}{n(n+1)} = \frac{1}{6}$$

$$n^2 + n - 6 = 0$$

$$n^2 + 3n - 2n - 6 = 0$$

$$n(n+3) - 2(n+3) = 0$$

$$(n+3) \times (n-2) = 0$$

$$n = -3 \text{ or } 2$$

$$\therefore n \in \mathbb{N}$$

$$\mathbf{n = 2}$$

Hence, **option C** is the correct answer.