### **Factorial and its Properties Questions**



MCQ Question 1	View this Question Online >
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:

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

### CALCULATION:

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

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

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

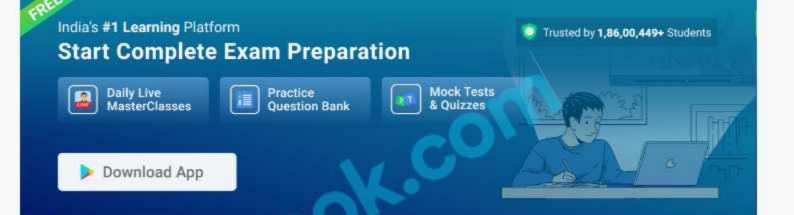
$$\Rightarrow$$
 (n + 2) × (n + 1) × n = 60

$$\Rightarrow$$
 (n + 2) × (n + 1) × n = 5 × 4 × 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.



### MCQ Question 2

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Find n if  $(n + 2)! = 30 \times n!$ ?

- 2. 4
- 3. 8
- 4. None of these

### Answer (Detailed Solution Below)

Option 2:4

## Here, we have to find the value of n such that $(n + 2)! = 30 \times n!$ $\Rightarrow (n + 2) \times (n + 1) \times n! = 30 \times n!$ $\Rightarrow n^2 + 3n + 2 = 30$ $\Rightarrow n^2 + 3n - 28 - n$

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

$$\Rightarrow$$
 n<sup>2</sup> + 3n + 2 = 30

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

$$\Rightarrow$$
 n<sup>2</sup> + 7n - 4n - 28 = 0

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

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

 $\Rightarrow$  n = 4 or - 7

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

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:

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

### 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<sup>2</sup> + 3n + 2 = 2550

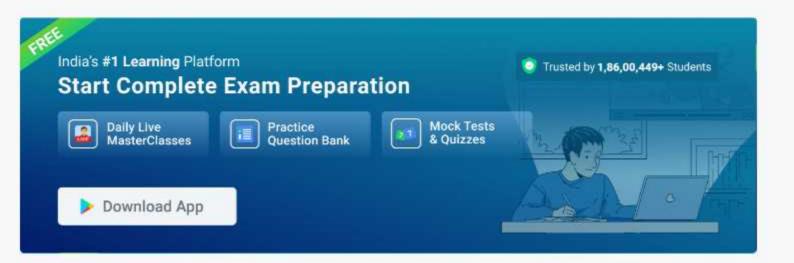
$$\Rightarrow$$
 n<sup>2</sup> + 3n - 2548 = 0

$$\Rightarrow$$
 n<sup>2</sup> + 52n - 49n - 2548 = 0

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

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

Hence, option B is the correct



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### MCQ Question 4

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

### Factorial and its Properties MCQ Question 4 Detailed Solution

### CONCEPT:

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

### CALCULATION:

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

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

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

$$\Rightarrow$$
 n × (n + 1) = 12

$$\Rightarrow$$
 n<sup>2</sup> + n - 12 = 0

$$\Rightarrow$$
 n<sup>2</sup> + 4n - 3n - 12 = 0

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

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

$$\Rightarrow$$
 n = 3 or -4

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

Hence, option B is the correct answer.



### 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:

AP 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 ×  $\frac{n!}{5!(n-5)!}$  =  $\frac{n!}{4!(n-4)!}$  +  $\frac{n!}{6!(n-6)!}$ 

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

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

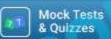
$$\Rightarrow$$
 6(2n - 13) = n<sup>2</sup> + 20 - 9n

$$\Rightarrow$$
 n<sup>2</sup> - 21n + 98 = 0

.. The value of n is 7.









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### MCQ Question 6

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Find x if 5

- 1. 100
- 2. 36
- 3. 49
- 4. 64

### Answer (Detailed Solution Below)

Option 3:49

### lesilo oli alla Factorial and its Properties MCQ Question 6 Detailed Solution

### CONCEPT:

### CALCULATION:

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

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

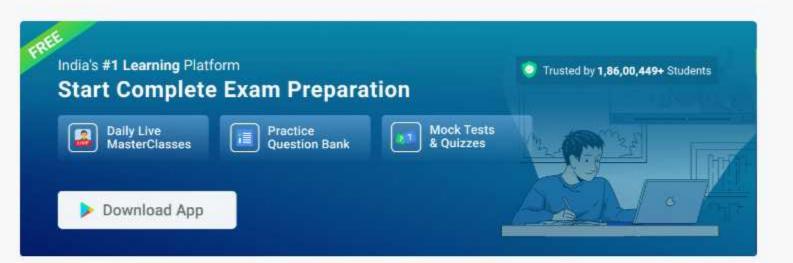
$$\Rightarrow \frac{1}{5!} + \frac{1}{6 \times 5!} = \frac{x}{7 \times 6 \times 5!}$$

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

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

$$\Rightarrow x = 49$$

Hence, option C is the correct answer.



### View this Question Online > MCQ Question 7 If $(n + 1)! = 12 \times (n - 1)!$ , then the value of n is? 1. 1 2. 2 3. 3

### 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 × 2 × 3 × ... × n. ook.com
- 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) × n = 12

$$\Rightarrow$$
 n<sup>2</sup> + n - 12 = 0n

$$\Rightarrow$$
 n<sup>2</sup> + 4n - 3n - 12 = 0

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

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

$$\Rightarrow$$
 n + 4 = 0 OR n - 3 = 0

$$\Rightarrow$$
 n = -4 OR n = 3.

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



# Find the value of <sup>n</sup>C<sub>n</sub> 1. 0 2. 1 3. n 4. n-1

### Answer (Detailed Solution Below)

Option 2:1

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### Concept:

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

$${}^{n}C_{r} = {}^{n}C_{n-r}$$

### Calculation

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

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



### MCQ Question 9

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

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

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

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.
- $n! = n \times (n 1) \times (n 2) \times ... \times 2 \times 1$

### Calculation:

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

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



### 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

Option 3:2

### Factorial and its Properties MCQ Question 10 Detailed Solution

### Concept:

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

### Calculation:

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

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

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

$$\tfrac{1}{n(n+1)}=\tfrac{1}{0}$$

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

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

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

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

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

 $:: n \in N$ 

### n = 2

Hence, option C is the correct answer.