

FACTORIALS

①

Class: VII, Mathematics

SOLUTIONS

(F⁺)

TEACHING TASK

01. $\frac{4!}{0!} = \frac{24}{1} = 24$

Ans: C

02. $\frac{(n+2)!}{n!} = \frac{(n+2)(n+1)n!}{n!} = (n+1)(n+2)$

Ans: A

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

Ans: B

04. $(n+1)! = 6n!$

$\Rightarrow (n+1)n! = 6n!$

$\Rightarrow n+1 = 6 \Rightarrow n = 5$

Ans: B

05. $x^2 - 4x + 4 = 0$
 $\Rightarrow (x-2)^2 = 0$
 $\Rightarrow x = 2$
 $\therefore x = 2!$

Ans: C

06. $|3! - 5!| = |6 - 120| = |-114| = 114$

Ans: C

07. $4! + 5! = 24 + 120 = 144$

Ans: C

08. $x + 0! = 5!$

$\Rightarrow x + 1 = 120 \Rightarrow x = 119$

Ans: A

09. $1! + 2! + 3! + \dots + 100!$
 $= 1 + 2 + 6 + 24 + 120 + \dots + 100!$
 $= 33 + \underbrace{120 + 720 + \dots + 100!}_{\text{These numbers are divisible by 120}}$

Remainder = 0

$\therefore \text{Hence} = 33 + 0$

Hence Remainder = 33
Ans: D



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$$152! = 2^\alpha + 5^\beta + 7^\gamma + \dots$$

(2)

$$\beta = \left\lfloor \frac{152}{5} \right\rfloor + \left\lfloor \frac{152}{25} \right\rfloor + \left\lfloor \frac{152}{125} \right\rfloor$$

$$= 30 + 6 + 1$$

$$= 37$$

here $[\cdot]$ is the greatest integer function

Ans: B

11.

$$576 = \cancel{16 \times 16} \quad 4! \times 4! = (4!)^2$$

Ans: A, B

12.

Statement I: Conceptual (True)

Statement II: Conceptual (True)

Ans: A

13.

$$\frac{6!}{4!} = \frac{6 \times 120}{24} = 30$$

Ans: A

14.

$$\frac{4!}{3! (4-3)!} = 4$$

Ans: 4

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a) $2! \times 3! = 2 \times 6 = 12$

b) $6! = 1$

c) $|3! - 4!| = |6 - 24| = 18$

d) $\frac{16!}{8! \times 8!} = 90$

Ans: A, C, D

LEARNER'S TASK

CUB'S

01. $n! = 1 \times 2 \times 3 \times \dots \times n$

Ans: A

02. Conceptual

Ans: C

03. Conceptual

Ans: C

04. $4! = 4 \times 3 \times 2 \times 1 = 24$

Ans: C

$$05. \quad 3! \times 0! = 6 \times 1 = 6$$

(3)
Ans: C

$$06. \quad \frac{n!}{(n-1)!} = \frac{n(n-1)!}{(n-1)!} = n$$

Ans: A

$$08. \quad \frac{10!}{6!} = \frac{10 \times 9 \times 8 \times 7 \times 6!}{6!} = 5040$$

Ans: B

$$07. \quad 5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$$

Ans: B

$$09. \quad \frac{(n+1)!}{(n-1)!} = n(n+1)$$

Ans: A

Ans: A

10. Conceptual

JEE MAINS LEVEL

$$1. \quad (n+1)! = 5n! \\ \Rightarrow (n+1)n! = 5n! \\ \Rightarrow n+1 = 5 \\ \Rightarrow n = 4$$

Ans: D

$$02. \quad \frac{9! \times 8!}{7! \times 6!} = \frac{9 \times 8 \times 7! \times 8 \times 6 \times 7 \times 6!}{7! \times 6!} = 4032$$

Ans: B

$$03. \quad \frac{9!}{(9-2)! \cdot 8!} = 9$$

Ans: C

$$04. \quad n! = 24 \Rightarrow 4! = 24 \Rightarrow n = 4$$

Ans: C

$$05. \quad x^2 - 36 = 0 \Rightarrow x = 6 = 3!$$

Ans: B

$$06. \quad \frac{7!}{0! \times 4!} = \frac{7 \times 6 \times 5 \times 4!}{1 \times 4!} = 210$$

Ans: B

07. $4! + 6! = 744$

Ans: C

08. $1! + 2! + 3! + \dots + 95!$

$= \underbrace{1 + 2 + 6 + 24 + 120}_{\text{Not divisible by 9}} + \underbrace{720 + 5040 + \dots + 95!}_{\text{Each no. is divisible by 9}}$

Sum = $1 + 2 + 6 + 24 + 120 = 153$

153 is divisible by 9

Hence, remainder is = 0

Ans: A

09. $6! \div 4! = 30$

Ans: D

10. $100! = 2^\alpha \cdot 5^\beta \cdot 7^\gamma \cdot 11^\delta \dots$

$\beta = \left\lfloor \frac{100}{5} \right\rfloor + \left\lfloor \frac{100}{25} \right\rfloor + \left\lfloor \frac{100}{125} \right\rfloor$

$= 20 + 4 + 0$

$= 24$

Ans: A

11. $x^2 - 12x + 36 = 0$

$\Rightarrow (x-6)^2 = 0$

$\Rightarrow x = 6 \text{ or } 3!$

Ans: C, D

12. Statement I: Conceptual (True)

Statement II: (Conceptual) False.

Ans: C

13. $8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3! = 8!$

Ans: C

14. $2! \times 5 - 10 = 2 \times 5 - 10 = 0$

Ans: 0

15. a) $\frac{55!}{53!} = 2970$ b) $\frac{(2+3)!}{0!} = \frac{5!}{0!} = 120$

c) $\frac{10!}{8! \cdot 2!} = 45$

d) $(3!)^2 = 36$

Ans: a, b, c, d

$\Rightarrow$ THE END $\Leftarrow$