

Part I: Multiple Choice. Choose the correct answer.

1. Solve for n , where $n \in \mathbb{I}$.

- (A) 10
- (B) 19
- (C) 20
- (D) 39

$$2 \left(\frac{(n+1)!}{n!} \right) = 40$$

$$\frac{2 \cdot \cancel{(n+1)!}}{\cancel{n!}} = \frac{40}{2} \rightarrow n+1 = 20$$

$$\frac{(n+1)\cancel{n!}}{\cancel{n!}} = 20 \rightarrow n = 20 - 1$$

$$n = 19$$

2. Solve for n , where $n \in \mathbb{I}$.

- (A) 8
- (B) 16
- (C) 24
- (D) 32

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

$$\frac{n \cdot \cancel{(n-1)!}}{\cancel{(n-1)!}} = 4 \cdot 3 \cdot 2 \cdot 1$$

$$n = 24$$

3. Solve for n , where $n \in \mathbb{I}$.

- (A) 13
- (B) 15
- (C) 17
- (D) 18

$$\frac{(n-2)!}{(n-3)!} = 15$$

$$\frac{(n-2) \cdot \cancel{(n-3)!}}{\cancel{(n-3)!}} = 15$$

$$n-2 = 15$$

$$n = 15 + 2$$

$$n = 17$$

4. Solve for n , where $n \in \mathbb{I}$.

- (A) 3
- (B) 4
- (C) 5
- (D) 6

$$5 \left(\frac{(n+2)!}{n!} \right) = 100$$

$$\frac{5 \cdot \cancel{(n+2)!}}{\cancel{n!}} = \frac{100}{5}$$

$$\frac{(n+2)(n+1)\cancel{n!}}{\cancel{n!}} = 20$$

$$n^2 + 3n + 2 - 20 = 0$$

$$n^2 + 3n - 18 = 0$$

$$(n+6)(n-3) = 0$$

$$n = -6, n = 3$$

$$n = 3$$

5. Solve for n , where $n \in \mathbb{I}$.

- (A) 8
- (B) 9
- (C) 20
- (D) 11

$$\frac{n!}{2(n-2)!} = 45$$

$$\frac{\cancel{n!}}{2 \cdot \cancel{(n-2)!}} = 45 \cdot 2$$

$$\frac{n(n-1)\cancel{(n-2)!}}{2 \cdot \cancel{(n-2)!}} = 90$$

$$n^2 - n = 90$$

$$n - n - 90 = 0$$

$$(n-10)(n+9) = 0$$

$$n = 10, n = -9$$

Answers to multiple choice.

1. B 2. C 3. C 4. A 5. C

**Part II: Constructed Response. Answer each question in the space provided.
Show all workings.**

6. Solve for n , where $n \in \mathbb{I}$.

(A) $\frac{(n+10)!}{(n+9)!} = 20$

$$\frac{(n+10)\cancel{(n+9)!}}{\cancel{(n+9)!}} = 20$$

$$n+10 = 20$$

$$n = 20 - 10$$

$$n = 10$$

(B) $\frac{(n-1)!}{(n-2)!} = 12$

$$\frac{(n-1)\cancel{(n-2)!}}{\cancel{(n-2)!}} = 12$$

$$n-1 = 12$$

$$n = 12 + 1$$

$$n = 13$$

(C) $\frac{10n!}{(n+1)!} = 2$

$$= \frac{10\cancel{n!}}{\cancel{(n+1)!}} = 2$$

$$\frac{10}{n+1} = \frac{2}{1}$$

$$2(n+1) = 10$$

$$2n+2 = 10$$

$$2n = 10 - 2$$

$$2n = 8$$

$$\frac{2n}{2} = \frac{8}{2}$$

$$n = 4$$

(D) $\frac{(n+1)!}{2(n-1)!} = 6$

$$2 \cdot \frac{(n+1)(n)\cancel{(n-1)!}}{2\cancel{(n-1)!}} = 6 \cdot 2$$

$$n^2 + n = 12$$

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

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

$$\cancel{n = -4}, n = 3$$