

$$1. \frac{4! \cdot 5!}{4! + 4! \cdot 5} = \frac{4! \cdot 5!}{4!(1+5)} = \frac{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5}{6} = \frac{120}{6} = 20$$

Cevap: C

$$2. \frac{3!(5 \cdot 4 - 4 - 1)}{4! \cdot 3! \cdot 2!} = \frac{20 - 4 - 1}{24 \cdot 2} = \frac{15}{48} = \frac{5}{16}$$

Cevap: B

$$3. \begin{array}{c} 11 \\ \downarrow \\ 5 \\ \downarrow \\ 2 \\ \downarrow \\ 1 \end{array} + \begin{array}{c} 2 \\ \downarrow \\ 2 \\ \downarrow \\ 1 \end{array} + \begin{array}{c} 2 \\ \downarrow \\ 1 \end{array} = 8$$

Cevap: D

$$4. \frac{\frac{1}{3!} \cdot \left(\frac{1}{1} + \frac{1}{4}\right)}{\frac{1}{5!} \cdot \left(\frac{1}{1} - \frac{1}{6}\right)} = \frac{\frac{1}{3!} \cdot \left(\frac{5}{4}\right)}{\frac{1}{5!} \cdot \left(\frac{5}{6}\right)} = \frac{5!}{3!} \cdot \frac{5}{4} \cdot \frac{6}{5} = \frac{5 \cdot 4 \cdot 3!}{3!} \cdot \frac{6}{4} = 30$$

Cevap: E

$$5. \frac{17! \cdot 18 \cdot 19 \cdot 36!}{36! \cdot 37 \cdot 38 \cdot 17!} = \frac{18 \cdot 19}{37 \cdot 38} = \frac{9}{37}$$

Cevap: A

$$6. \frac{(n-1)! \cdot n \cdot (n+3)! \cdot (n+4)}{(n+3)! \cdot (n-1)!} = 45$$

$$n \cdot (n+4) = 45$$

$$\downarrow$$

$$5$$

$$n = 5$$

Cevap: B

$$7. \frac{\frac{1}{3!} \left(1 - \frac{1}{4}\right)}{\frac{45}{5!}} = \frac{\frac{1}{3!} \cdot \frac{3}{4}}{\frac{45}{5!}} = \frac{1}{3!} \cdot \frac{3}{4} \cdot \frac{5!}{45} = \frac{1 \cdot 3 \cdot 5 \cdot 4 \cdot 3!}{3! \cdot 4 \cdot 45} = \frac{1}{3}$$

Cevap: C

$$8. \frac{4!(6 \cdot 5 - 5) \cdot (5+1) \cdot 4!}{4! \cdot 4!} = 25 \cdot 6 = 150$$

Cevap: D

9.  $a, b \in \mathbb{Z}^+$

$$6! + 5! + 4! = 2^a \cdot b$$

$$4!(6 \cdot 5 + 5 + 1) = 2^a \cdot b$$

$$4! \cdot (30 + 5 + 1) = 2^a \cdot b$$

$$4! \cdot 36 = 2^a \cdot b$$

$$1 \cdot 2 \cdot 3 \cdot 4 \cdot (2 \cdot 3)^2 = 2^a \cdot b$$

$$1 \cdot 2 \cdot 3 \cdot 2^2 \cdot 2^2 \cdot 3^2 = 2^a \cdot b$$

$$2^5 \cdot 27 = 2^a \cdot b \Rightarrow a = 5 \text{ ve } b = 27$$

O halde  $a + b = 5 + 27 = 32$  bulunur.

Cevap: E

$$10. \frac{(8!)^2 - (7!)^2}{9! - 8! - 7!} = \frac{(8! - 7!)(8! + 7!)}{7!(9 \cdot 8 - 8 - 1)}$$

$$= \frac{7!(8 - 1) \cdot 7!(8 + 1)}{7! \cdot (72 - 8 - 1)} = \frac{7 \cdot 7! \cdot 9}{63}$$

$$= 7!$$

Cevap: B

$$11. \frac{(n-1)! + (n+1) \cdot n \cdot (n-1)!}{n^3 - 1} = 120$$

$$\frac{(n-1)!(1 + (n+1) \cdot n)}{(n-1) \cdot (n^2 + n + 1)} = 120$$

$$\frac{(n-1)!(\cancel{n^2 + n + 1})}{(n-1) \cdot (\cancel{n^2 + n + 1})} = 120$$

$$\frac{(\cancel{n-1}) \cdot (n-2)!}{(\cancel{n-1})} = 120$$

$$(n-2)! = 120 \Rightarrow n = 7 \text{ bulunur.}$$

Cevap: B

$$12. \frac{(10! + 9!) \cdot (10! - 9!)}{9!(11 \cdot 10 - 10 - 1)} = \frac{9!(10 + 1) \cdot 9!(10 - 1)}{9! \cdot 99}$$

$$= \frac{9! \cdot 11 \cdot 9}{99} = 9!$$

Cevap: A