

$$\begin{aligned}
 1 \quad 8! + 6! - 3! &= 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 + 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 - 3 \cdot 2 \cdot 1 \\
 &= 40320 + 720 - 6 \\
 &= 41034 \quad \#
 \end{aligned}$$

$$\begin{aligned}
 2 \quad 9! - 5! + 4! &= 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 - 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 + 4 \cdot 3 \cdot 2 \cdot 1 \\
 &= 362880 - 120 + 24 \\
 &= 362784 \quad \#
 \end{aligned}$$

$$\begin{aligned}
 3 \quad 4! \times 3! &= 4 \cdot 3 \cdot 2 \cdot 1 \times 3 \cdot 2 \cdot 1 \\
 &= 24 \times 6 = 144 \quad \#
 \end{aligned}$$

$$\begin{aligned}
 4 \quad (7-2)! &= 5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 \\
 &= 120 \quad \#
 \end{aligned}$$

$$\begin{aligned}
 5 \quad (3! \times 3)! &= (3 \cdot 2 \cdot 1 \times 3)! \\
 &= 18! \\
 &= 6,402,373,705,728,000 \quad \#
 \end{aligned}$$

$$\begin{aligned}
 6 \quad (2 \times 3)! &= 6! \\
 &= 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 \\
 &= 720 \quad \#
 \end{aligned}$$

$$\begin{aligned}
 7 \quad \frac{8!0!}{4!2!} &= \frac{8 \cdot 7 \cdot 6 \cdot 5 \cdot 4! \cdot 1}{4! \cdot 2 \cdot 1} \\
 &= 4 \cdot 7 \cdot 6 \cdot 5 = 840 \quad \#
 \end{aligned}$$

$$\begin{aligned}
 8 \quad \frac{9!2!}{6!3!0!} &= \frac{\overset{3}{9} \cdot 8 \cdot 7 \cdot \cancel{6} \cdot \cancel{2} \cdot 1}{\cancel{6} \cdot \cancel{2} \cdot \cancel{2} \cdot 1} \\
 &= 3 \cdot 8 \cdot 7 \\
 &= 168 \#
 \end{aligned}$$

$$\begin{aligned}
 9 \quad \frac{(n-3)!}{(n-4)!} &= \frac{(10-3)!}{(10-4)!} \\
 &= \frac{7!}{6!} \\
 &= \frac{\cancel{7} \cdot \cancel{6}!}{\cancel{6}!} \\
 &= 7 \#
 \end{aligned}$$

$$\begin{aligned}
 10 \quad \frac{(n+2)!}{(n-3)!} &= \frac{(7+2)!}{(7-3)!} \\
 &= \frac{9!}{4!} \\
 &= \frac{9 \cdot 8 \cdot 7 \cdot 6 \cdot \cancel{5} \cdot \cancel{4}!}{\cancel{4}!} \\
 &= 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \\
 &= 15120 \#
 \end{aligned}$$

$$\underline{11} \quad P(n, r) = \frac{n!}{(n-r)!}$$

$$\begin{aligned} P(5, 3) &= \frac{5!}{2!} \\ &= \frac{5 \cdot 4 \cdot 3 \cdot \cancel{2!}}{\cancel{2!}} \\ &= 5 \cdot 4 \cdot 3 \\ &= 60 \# \end{aligned}$$

$$\underline{12} \quad P(7, 4) = \frac{7!}{3!}$$
$$\begin{aligned} &= \frac{7 \cdot 6 \cdot 5 \cdot 4 \cdot \cancel{3!}}{\cancel{3!}} \\ &= 7 \cdot 6 \cdot 5 \cdot 4 \\ &= 840 \# \end{aligned}$$

$$\underline{13.} \quad \frac{P(6, 2)}{2} = \frac{6!}{4! \cdot 2}$$
$$\begin{aligned} &= \frac{6 \cdot 5 \cdot \cancel{4!}}{\cancel{4!} \cdot 2} \\ &= 3 \cdot 5 \\ &= 15 \# \end{aligned}$$

$$\begin{aligned}
 \cancel{14} \quad \frac{P(9,5)}{5} &= \frac{9!}{4!5} \\
 &= \frac{9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot \cancel{4!}}{\cancel{4!} \cdot 5} \\
 &= 9 \cdot 8 \cdot 7 \cdot 6 \\
 &= \#
 \end{aligned}$$

$$\begin{aligned}
 \cancel{15} \quad C(n,r) &= \frac{n!}{r!(n-r)!} \\
 C(8,4) &= \frac{8!}{4!4!} \\
 &= \frac{\cancel{8} \cdot 7 \cdot 6 \cdot 5 \cdot \cancel{4!}}{\cancel{4!} \cdot 4 \cdot 3 \cdot 2 \cdot 1 \cdot \cancel{4!}} \\
 &= 7 \cdot 2 \cdot 5 \\
 &= 70 \quad \#
 \end{aligned}$$

$$\begin{aligned}
 \cancel{16} \quad C(9,6) &= \frac{9!}{6!3!} \\
 &= \frac{\overset{3}{9} \cdot \overset{8}{8} \cdot 7 \cdot 6!}{\cancel{6!} \cdot 3 \cdot 2 \cdot 1} \\
 &= 3 \cdot 4 \cdot 7 \\
 &= 84 \quad \#
 \end{aligned}$$

$$\begin{aligned}
 17 \quad 3! \times C(5,3) &= \frac{3! \cdot 5!}{3! \cdot 2!} \\
 &= \frac{5 \cdot 4 \cdot 3 \cdot 2!}{2!} \\
 &= 5 \cdot 4 \cdot 3 \\
 &= 60 \#
 \end{aligned}$$

$$\begin{aligned}
 18 \quad C(7,5) \times P(5,2) &= \frac{7! \cdot 5!}{5! \cdot 2! \cdot 3!} \\
 &= \frac{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3!}{2 \cdot 1 \cdot 3!} \\
 &= 7 \cdot 6 \cdot 5 \cdot 2 \\
 &= 420 \#
 \end{aligned}$$

$$\begin{aligned}
 19 \quad \frac{n!}{(n-2)!} &= 72 \\
 \frac{n(n-1) \cancel{(n-2)!}}{\cancel{(n-2)!}} &= 72 \\
 n(n-1) &= 9 \times 8 \\
 n &= 9 \#
 \end{aligned}$$

$$\begin{aligned}
 20 \quad P(n,2) &= 56 \\
 \frac{n!}{(n-2)!} &= 56 \\
 \frac{n(n-1) \cancel{(n-2)!}}{\cancel{(n-2)!}} &= 56 \\
 n(n-1) &= 8 \cdot 7 \\
 n &= 8 \#
 \end{aligned}$$