Solutions

Each answer shows the steps, then the **result**.

2.1

- ${}^{7}P_{3} = 7 \times 6 \times 5 = 210$

2.2

- ${}^{8}C_{2} = \dfrac{8 \times 7}{2} = 28$

2.3

- $5! = \mathbf{120}$

2.4

- ${}^{10}C_{3} = \dfrac{10!}{3!\,7!} = \mathbf{120}$

3.1 C

- BANANA has 6 letters with A×3, N×2: $\dfrac{6!}{3!\,2!} = \dfrac{720}{12} = 60$

3.2

(a)

- ${}^{12}C_{4} = \dfrac{12 \cdot 11 \cdot 10 \cdot 9}{24} = 495$

(b)

- ${}^{7}C_{2} \times {}^{5}C_{2} = 21 \times 10 = 210$

3.3

- treat (IUE) as one block
- 5 items arrange in $5! = 120$ ways; the vowels arrange among themselves in $3! = 6$ ways; total $= 120 \times 6 = 720$

3.4

(a)

- there are 2 Es and 2 Ts, so divide by $2!\,2!$: $\dfrac{6!}{2!\,2!} = \dfrac{720}{4}$
- number of arrangements = **180**

(b)

- fix a T at each end, leaving L, E, E, R in the middle: $\dfrac{4!}{2!}$
- number of arrangements = **12**

3.5

- all possible teams: ${}^{10}C_{5} = 252$
- teams with no girls (all boys): ${}^{6}C_{5} = 6$
- teams with at least one girl: $252 - 6 = \mathbf{246}$