

14.1 $4 \cdot 6 = 24$

14.2 a) $4^4 = 256$ b) $4 \cdot 3 \cdot 2 \cdot 1 = 24$

14.3 a) $\begin{array}{cccccc} & \text{dernier chiffre} & & \text{premier chiffre (+0)} & & \\ \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} \\ 5 & 8 & 8 & 7 & 6 & = 13440 \end{array}$

b) $\begin{array}{cccccc} & \text{1er (+0)} & & & & \\ \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} \\ 4 & 4 & 8 & 7 & 6 & = 5376 \end{array}$

14.4 $3^{11} = 177147$

14.5 $\begin{array}{ccccccccc} & \text{7} & & \text{7} & & \text{7} & & \text{7} & & \text{7} \\ \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} \\ 5 & 4 & 4 & 3 & 3 & 2 & 2 & 1 & 1 & = 5! \cdot 4! = 2880 \end{array}$

14.6 a) $\begin{array}{ccccccccc} \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} \\ 26 & 9 & 10 & 10 & 10 & 10 & = 2340000 \end{array}$

b) $24 \cdot 8 \cdot 10^4 = 1920000$

14.7 a) On choisit les gens : $\begin{array}{ccccccccc} & & & & & & & & & \\ \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} \\ 8 & 7 & 6 & 6 & 5 & 4 & 6! & = 40320 \end{array}$
 on choisit la place de la nanée

b) $\begin{array}{ccccccccc} & \text{7} & & \text{7} & & \text{7} & & \text{7} & & \text{7} \\ \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} \\ 6 & 5 & 8 & 7 & 6 & 5 & = 50400 \end{array}$

c) On choisit la place du capitaine : 6, on les ordonne 2
puis on place les autres : $6 \cdot 2 \cdot 8 \cdot 7 \cdot 6 \cdot 5 = 16800$

14.8

a) $6^4 = 1296$ b) 1) $6 \cdot 5 \cdot 4 \cdot 3 = 360$

b) 2) On place le 6 : 4 puis on choisit les autres chiffres :

$\begin{array}{cccc} & 6 & & \\ \underline{\quad} & \underline{\quad} & \underline{\quad} & \underline{\quad} \\ 5 & 4 & 3 & \Rightarrow 4 \cdot 5 \cdot 4 \cdot 3 = 240 \end{array}$

14.9

On place A : 6 $\Rightarrow$ pas le choix de B : 1

On place C, D, E, F : $4 \cdot 3 \cdot 2 \cdot 1 \rightarrow 6 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 144$

14.10 $10^3 \cdot 10^3 = 10^6$

14.11

$6! = 720$

14.12

$$P_{11}(4, 4, 2, 1) = \frac{11!}{4! \cdot 4! \cdot 2!} = 34650$$

$$\underbrace{\text{reste } 4I, 2S, 2P, 1M}_{\text{reste } 4I, 2S, 2P, 1M} \rightarrow P(4, 2, 2, 1)$$

$$= \frac{9!}{4! \cdot 2! \cdot 2!} = 3780$$

14.13

$$\underbrace{3 \cdot 2 \cdot 1}_{\text{reste } 20, 24, 1E} \cdot P_5(2, 2, 1) = \frac{5!}{2! \cdot 2!} = 30$$

$$\text{Au total : } 30 \cdot 3 \cdot 2 \cdot 1 = 180$$

14.14

$4! = 24$

14.15

$4! = 24$

14.16

On choisit le chiffre qui est 2 fois : 3

$$\text{Puis on a } P_4(2, 1, 1) = \frac{4!}{2} = 12 \rightarrow 3 \cdot 12 = 36$$

14.17

a) $P_7(2, 3, 2) = \frac{7!}{2 \cdot 3! \cdot 2} = 210$

b) $\underbrace{1 \cdot 2}_{\text{Cas 1,1}} \cdot \dots$

Cas 1,1 : $P_5(3, 2) = \frac{5!}{3! \cdot 2!} = 10$

Cas 1,2 : $P_5(1, 2, 2) = \frac{5!}{2 \cdot 2} = 30$

$$\left. \begin{array}{l} \text{Au total :} \\ 30 + 10 = 40 \end{array} \right\}$$

14.18

$A_4^{10} = 5040$

14.19

a) $26^5 = 11\,881\,376$

b) $26 \cdot 25 \cdot 24 \cdot 23 \cdot 22 = A_5^{26} = 7893\,600$

14.20

a) $A_5^8 = 6720$
 $\hookrightarrow$ on choisit les personnes

b) $A_5^8 = 6720$
 $\hookrightarrow$ on choisit les places

c) on se place soit à côté des personnes, soit des places

14.21

a) $26 \cdot 26 = A_2^2 = 676$ b) 677

14.22

a) $3 \cdot 2 = 6$ b) 2 : 52 et 72

14.23

$5^4 = 625$ (chape sans a 5 choix)

14.24

$A_4^{10} = 8040$

14.25

$C_2^{12} = \frac{12 \cdot 11}{2} = 66$

14.26

$C_2^9 = \frac{9 \cdot 8}{2} = 36$

14.27

$C_3^{31} = 4495$

14.28

$C_5^{10} \cdot C_2^6 = 252 \cdot 15 = 3780$

14.29

a) $C_4^4 \cdot C_1^{32} = 32$

b) $C_2^4 \cdot C_2^4 \cdot C_1^{28} = 36 \cdot 28 = 1008$

c) $C_8^{30} - C_5^{32} = 175 \cdot 616$

14.30

a) $C_5^{18} = 3003$

b) $C_3^7 \cdot C_2^8 = 35 \cdot 28 = 980$

14.31

a) $C_6^{45} = 8145060$

b) $C_6^{39} = 3262623$; $C_1^6 \cdot C_5^{39} = 3454542$;

$C_2^6 \cdot C_4^{39} = 1233765$; $C_3^6 \cdot C_3^{39} = 182780$;

$C_4^6 \cdot C_2^{39} = 11115$; $C_5^6 \cdot C_1^{39} = 234$; $C_6^6 = 1$

c) a) - e qu'il fail du b) ... (4 angle)

14.32

a) $A_3^{12} = 1320$

b) $C_3^{12} = 220$

14.33 a) $C_3^{12} = 220$ b) $A_3^{12} = 1320$ c) $12^3 = 1728$

14.34 6 chiffres : $6^3 = 216$
 ≤ 400 : $\underline{\quad} \underline{\quad} \underline{\quad}$ $\rightarrow 2 \cdot 6^2 = 72$
 $2 \cdot 6 \cdot 6$

pairs : $\underline{\quad} \underline{\quad} \underline{\quad}$ $\rightarrow 2 \cdot 6^2 = 72$ Multiple de 5 : $1 \cdot 6^2 = 36$
 $6 \cdot 6 \cdot 2$

14.35

a) $C_8^{10} = 45$ b) $C_5^7 = 21$ c) $C_4^5 \cdot C_4^5 = 25$

14.36 a) $10^5 = 100000$

b) $\underbrace{C_3^5}_{\text{place des 7}} \cdot \underbrace{9^2}_{\text{choix de 2 autres chiffres}} = 810$

14.37

a) $8! = 40320$

c) $4! \cdot 4! \cdot \frac{1}{2} = 1152$

b) $7! \cdot 2 = 10080$

14.38 $\frac{10!}{4!3!2!} = 12600$

14.39 $\frac{8!}{4!2!2!} = 420$

14.40 a) $C_3^{36} = 7140$ b) $C_1^4 \cdot C_7^4 = 24$ c) $C_3^{32} = 4960$

d) $C_3^{36} - C_3^{32} = 7140 - 4960 = 2180$ e) $C_1^4 \cdot C_2^{32} = 1984$

14.41

5 ingredients :

$C_1^5 + C_2^5 + C_3^5 + C_4^5 + C_5^5 = 31$

14.42

a) $A_8^{16} = 518918400$ b) $16! \approx 2,092 \cdot 10^{13}$

c) $C_8^{16} = 12870$

14.43

a) $5! \cdot 5! \cdot 2 = 28800$ choix de 1 lemon

b) $\underbrace{C_3^5}_{10} \cdot \underbrace{C_2^2}_1 \cdot \underbrace{C_2^5}_{10} \cdot \underbrace{C_3^3}_1 = 100$