

$$1. \quad 100/5 = 20 \quad T = 20 + 12 = 32$$

$$96/8 = 12$$

$$2. \quad 5 \times 4 \times 3 = 60 \quad 5! / 2! = 80$$

$$3. \quad 3 \times 2 \times 1 = 6$$

$$4. \quad \frac{52!}{4!(52-4)!} = \frac{52!}{4! \cdot 48!} = 290725$$

$$5. \quad \frac{8!}{4! \cdot 3! \cdot 1!} = \frac{90320}{24 \cdot 6} = 280$$

$$6. \quad 4! = 24 \quad 4! \cdot 6! \cdot 2! \cdot 3! = 207360$$

$$6! = 720$$

$$2! = 2$$

$$3! = 6$$

$$\bullet \quad 4! = 24 \quad 4! \cdot 7! = 120960$$

$$7! = 5040$$

$$7. \quad C = \frac{15!}{3!(15-3)!} + \frac{15!}{4!(15-4)!} + \frac{15!}{5!(15-5)!} + \dots$$

$$\sum C(15, k) = 32697$$

$$8. \quad C = \frac{18!}{12!(18-12)!} = \frac{18!}{12! \cdot 6!} = 18561$$

$$9. \quad C = \frac{9!}{4!(9-4)!} = \frac{9!}{4! \cdot 5!} = 126$$

$$10. \quad C = \frac{7!}{3!(7-3)!} = \frac{7!}{3! \cdot 4!} = 35$$

$$C = \frac{5!}{2!(5-2)!} = \frac{5!}{2! \cdot 3!} = 10$$

$$35 \cdot 10 = 350$$

Ejercicios del 11 al 20

11. a Tenemos que seleccionar 2 technoaarquitectos de un grupo de 5, y 3 arquitectos mágicos de un grupo de 7

$$\binom{5}{2} = \frac{5!}{2!(5-2)!} = \frac{5 \times 4}{2 \times 1} = 10 \text{ technoaarquitectos}$$

Para los arquitectos mágicos:

$$\binom{7}{3} = \frac{7!}{3!(7-3)!} = \frac{7 \times 6 \times 5}{3 \times 2 \times 1} = 35 \text{ arq. mágicos}$$

$$10 \times 35 = 350$$

b. Para los techoaarquitectos

$$\binom{5}{2} = 10$$

Para los arquitectos mágicos de los 6 restantes, elegimos 2:

$$\binom{6}{2} = \frac{6 \times 5}{2 \times 1} = 15 \quad \left\{ \begin{array}{l} \text{(numero total } 10 \times 15 = 150) \\ \end{array} \right.$$

c. technoaarquitectos } arquitectos mágicos

$$\binom{3}{2} = \frac{3 \times 2}{2 \times 1} = 3$$

$$\binom{7}{3} = 35$$

$$\text{(numero total } 3 \times 35 = 105)$$

Q2) Consonantes

7 consonantes

5 vocales

Para elegir 4 consonantes de los 7

$$\binom{7}{4} = \frac{7!}{4!(7-4)!} = \frac{7 \times 6 \times 5 \times 4}{4 \times 3 \times 2 \times 1} = 35$$

Para elegir 3 vocales de los 5 disponibles

$$\binom{5}{3} = \frac{5!}{3!(5-3)!} = \frac{5 \times 4 \times 3}{3 \times 2 \times 1} = 10$$

Ordenar consonantes y vocales

$$7! = 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 5040$$

Calcular numero total de palabras

$$\binom{7}{4} \times \binom{5}{3} \times 7! = 35 \times 10 \times 5040 = 1.769.000$$

73. Cuantas permutaciones se pueden hacer

$$n = 40 \quad y \quad k = 4$$

$$P(40, 4) = \frac{40!}{(40-4)!} = \frac{40!}{36!}$$

Toca calcular los primeros cuatro términos de 40

$$P(40, 4) = 40 \times 39 \times 38 \times 37$$

$$40 \times 39 = 1560$$

$$1560 \times 38 = 59.280$$

$$59,280 \times 37 = \underline{\underline{2.193.360}} \text{ Permutaciones}$$

Combinaciones

$$n = 40 \quad k = 4$$

$$C(40, 4) = \frac{40!}{4!(40-4)!} = \frac{40 \times 39 \times 38 \times 37}{4 \times 3 \times 2 \times 1} = \frac{2.193.360}{24}$$

$$C(40, 4) = \frac{2.193.360}{24} = \underline{\underline{97.390}} \text{ combinaciones}$$

74. Permutación

$$n = 3 \quad k = 2$$

$$P(3,2) = \frac{3!}{(3-2)!} = \frac{3!}{1!} = \frac{3 \times 2 \times 1}{1} = 6$$

Estas 6 maneras serían:

- (Libro₁, Libro₂)
- (Libro₂, Libro₁)
- (Libro₁, Libro₃)
- (Libro₃, Libro₁)
- (Libro₂, Libro₃)
- (Libro₃, Libro₂)

15. Combinaciones

$$n = 5 \quad k = 3$$

$$C(5,3) = \frac{5!}{3!(5-3)!} = \frac{5 \times 4}{2 \times 1} = 10$$

16. Combinaciones

$$n = 8 \quad k = 4$$

$$C(8,4) = \frac{8!}{4!(8-4)!} = \frac{8 \times 7 \times 6 \times 5}{4 \times 3 \times 2 \times 1} = \frac{1680}{24} = 70$$

77. Combinaciones

4 interruptores buenos de un grupo de 20

$$C(20, 4) = \frac{20!}{4!(20-4)!} = \frac{20 \times 19 \times 18 \times 17}{4 \times 3 \times 2 \times 1} = 11620$$

2 interruptores buenos de un grupo de 5

$$C(5, 2) = \frac{5!}{2!(5-2)!} = \frac{5 \times 4}{2 \times 1} = 10$$

numero total = $4845 \times 10 = 48450$

78. Permutaciones con repetición

3 canicas amarillas

2 canicas azules ntotal = $3+2+1 = 6$

4 canicas verdes

$$\frac{6!}{3! \times 2! \times 1!} = 6 = 720$$

$$2! = 2$$

$$4! = 24$$

$$\frac{720}{6 \times 2 \times 1} = \frac{720}{12} = 60$$

(19). Permutaciones

$$n = 10 \quad k = 3$$

$$P(10, 3) = \frac{10!}{(10-3)!} = \frac{10!}{7!}$$

$$P(10, 3) = 10 \times 9 \times 8 = \underline{\underline{720}}$$

(20). Verdadera o falso

a. $9! = 9 \times 8 \times 7 \times 6!$ Verdadera

b. $5! \cdot 4! = 20!$ Falsa

c. $5! + 5! = 70!$ Falsa

d. $8! = 9!/9$ Verdadera

e. $5! = 70!/12!$ Falsa

f. $3/4 + 1/4 = 1!$ Verdadera

g. $3! \times 2! = 6!$ Falsa

h. $8! = 6! \cdot 56$ Verdadera

21.

Parte a

$$P(10,3) = \frac{10!}{(10-3)!} = \frac{10!}{7!}$$

Calculamos factorial

$$10! = 10 \times 9 \times 8 \times 7!$$

$7!$ - Se cancela en numerador y denominador

$$\Rightarrow P(10,3) = 10 \times 9 \times 8 = 720$$

Parte b

$$C(10,3) = \frac{10!}{3!(10-3)!} = \frac{10!}{3! 7!}$$

$$\begin{aligned} &= \frac{10 \times 9 \times 8}{3!} = \frac{720}{6} \\ &= 120 \end{aligned}$$

Día

Mes

Año

Lun	Mar	Mie	Jue	Vie	Sab	Dom
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22.

$$C(15,3) = \frac{15!}{3!(15-3)!} = \frac{15!}{3! \cdot 12!}$$

 \Rightarrow

$$C(15,3) = \frac{15 \times 14 \times 13 \times 12!}{3! \times 12!}$$

$$= \frac{15 \times 14 \times 13}{6}$$

$$= \frac{2730}{6}$$

$$= 455 //$$

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23.

$$P(6) = 6!$$

 \Rightarrow

$$6! = 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 720,$$

24,

Paso 1

$$C(n, k) = \frac{n!}{k(n-k)!}$$

$$C(25, 4) = \frac{25!}{4! 21!}$$
$$= 12.650$$

Paso 2

$$C(12, 3) = \frac{12!}{3! 9!}$$
$$\approx 220$$

Paso 3

$$12.650 \times 220 = 2.783.000$$

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25.

Parte a)

$$C(11, 2) = \frac{11!}{2! 9!}$$

$$11! = 11 \times 10 \times 9! = 55,$$

Parte b)

$$C(11, 1) = \frac{11!}{1! (11-1)!} = 11,$$

26.

Parte a

$$C(10,3) = \frac{10!}{3! \cdot 7!}$$

$$10! = \frac{10 \times 9 \times 8}{6} = 120 //$$
$$\downarrow 3!$$

Parte b

$$C(10,2) = \frac{10!}{2! \cdot 8!}$$
$$= \frac{10 \times 9}{2} = 45 //$$

Parte c

$$C(10,1) = \frac{10!}{1! \cdot 9!}$$
$$= 10 //$$

Día

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Año

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27.

$$C(7,3) = 7! = 7 \times 6 \times 5 \times 4! \\ = 35$$

$$\begin{array}{r} 3! = 6 \\ \hline \end{array} \quad \begin{array}{r} 35 \times 6 = 210 \\ \hline \end{array}$$

28.

$$C(15,4) = \frac{15!}{4! \cdot 11!}$$

$$\frac{15 \times 14 \times 13 \times 12}{24} = 1,365$$

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29.

Paso 1

$$C(6,2) = \frac{6!}{2! \cdot 4!}$$

$$C(6,2) = 15,$$

Paso 2

$$C(4,2) = \frac{4 \times 3}{2 \times 1} = 6_{11}$$

Paso 3 =

$$C(3,1) = \frac{3}{1! \cdot 2!} = 3_{11}$$

Paso 4

$$15 \times 6 \times 3 = 270_{11}$$

Dia

Mes

Año



30.

$$C(3,2) = \frac{3!}{2! \cdot 1!} = 3$$