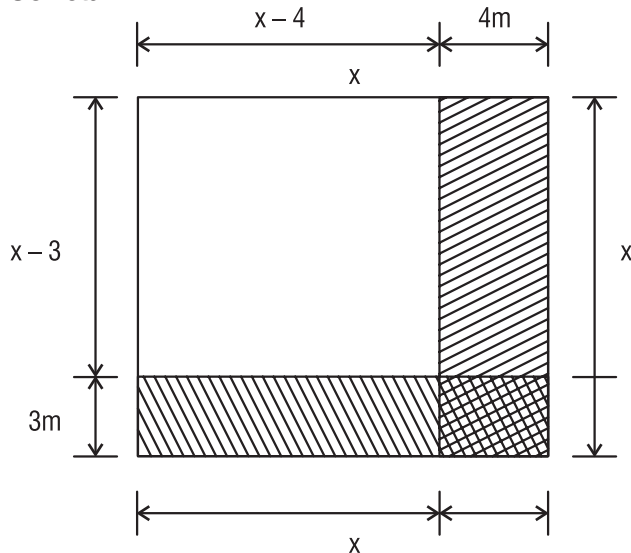


21) Resposta: 09

Resolução

01. Correta.



$$A_{\text{inicial}} = x^2$$

$$A_{\text{final}} = (x-3) \cdot (x-4)$$

Segundo o texto:

$$A_{\text{final}} = \frac{A_{\text{inicial}}}{2}$$

$$(x-3) \cdot (x-4) = \frac{x^2}{2}$$

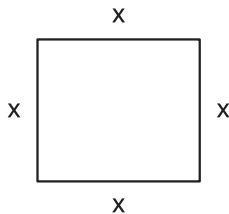
$$x^2 - 7x + 12 = \frac{x^2}{2}$$

$$2x^2 - 14x + 24 = x^2$$

$$x^2 - 14x + 24 = 0$$

$$x_1 = 12 \quad x_2 = 2 \text{ (não convém)}$$

Perímetro do terreno

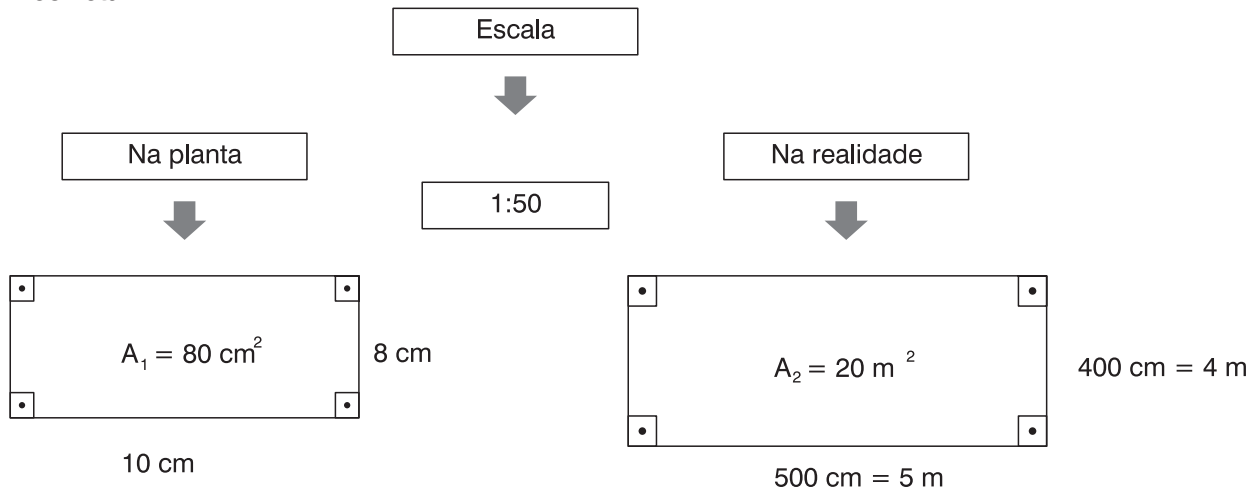


$$2p = 4x$$

$$2p = 4 \cdot 12$$

$$2p = 48 \text{ m}$$

02. Incorreta.



ou

$$\frac{A_{\text{planta}}}{A_{\text{real}}} = \left(\frac{1}{50}\right)^2$$

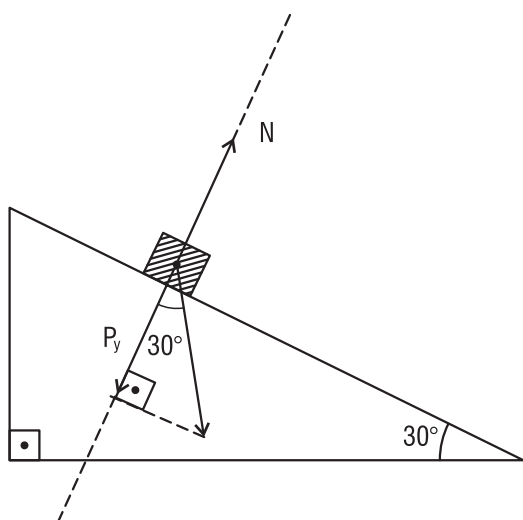
$$\frac{80}{A} = \frac{1}{2500}$$

$$A = 2500 \cdot 80$$

$$A = 200000 \text{ cm}^2$$

$$A = 20 \text{ m}^2$$

04. **Incorreta.**



$$\cos 30^\circ = \frac{P_y}{P}$$

$$\frac{\sqrt{3}}{2} = \frac{P_y}{P}$$

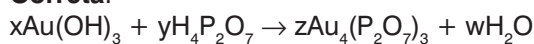
$$P_y = P \cdot \frac{\sqrt{3}}{2}$$

$$P_y = 80 \cdot \frac{\sqrt{3}}{2}$$

$$P_y = 40 \cdot \sqrt{3} \cdot N$$

$$P_y = N = 40 \cdot \sqrt{3} \cdot N$$

08. **Correta.**



Equações:

Ouro: $x = 4z$

Fósforo: $2y = 6z \Rightarrow y = 3z$

Oxigênio: $3x + 7y = 21z + w$

Hidrogênio: $3x + 4y = 2w$

Para $z = k$, temos:

$$x = 4k; y = 3k; z = k, w = 12k$$

$$S = \{(4k, 3k, k, 12k)\}$$

Menores inteiros que satisfazem a questão química.

$$k = 1$$

$$x = 4k \quad \left| \quad y = 3k \quad \left| \quad z = k \quad \left| \quad w = 12k \right. \right. \right.$$

$$x = 4 \cdot 1 \quad \left| \quad y = 3 \cdot 1 \quad \left| \quad z = 1 \quad \left| \quad w = 12 \right. \right. \right.$$

$$x = 4 \quad \left| \quad y = 3 \quad \left| \quad z = 1 \quad \left| \quad w = 12 \right. \right. \right.$$

$$S = \{(4, 3, 1, 12)\}$$

$$x + y + z + w = 20$$

22) **Resposta:** 18

Resolução

01. **Incorreta.**

$$180 \div (J, P) \frac{D, P}{(4, 5)}$$

$$\frac{J}{4} = \frac{P}{5} = k$$

$$J = 4k$$

$$P = 5k$$

$$J + P = 180$$

$$4k + 5k = 180$$

$$9k = 180$$

$$k = \frac{180}{9}$$

$$k = 20$$

$$J = 4k$$

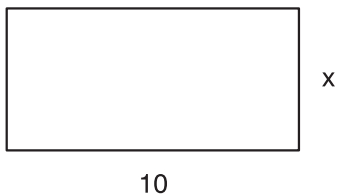
$$J = 4 \cdot 20$$

$$J = 80 \text{ latinhas}$$

$$P = 5k$$

$$P = 5 \cdot 20 = 100$$

02. Correta.



$$A = b \cdot h$$

$$A = 10x$$

$$P = 2b + 2h$$

$$P = 2 \cdot 10 + 2x$$

$$P = 20 + 2x$$

$$x = \frac{p - 20}{2}$$

$$A = 10 \cdot \left(\frac{p - 20}{2} \right)$$

$$A = 5P - 100$$

04. Incorreta.

$$y_A = 140 + 50x : A$$

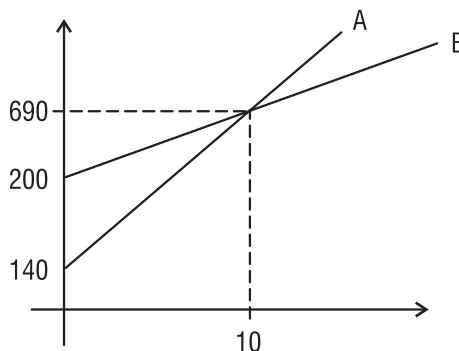
$$y_B = 200 + 44x : B$$

$$y_A = y_B$$

$$140 + 50x = 100 + 44x$$

$$60 = 6x$$

$$x = 10$$



08. Incorreta.

c: coroa
k: cara

ccc/cck/ckk/kkk/kck/kcc/ckc/kkc

16. Correta.

$$C = 2 \cdot 17 = 34 \text{ cm}$$

$$C = 2\pi R$$

$$34 = 2R \cdot 3,14 \text{ (D = 2R)}$$

$$D = \frac{34}{3,14} \cong 10,82$$

23) Resposta: 03

Resolução

01. Correta.

| | |
|-----|-------|
| Pol | cm |
| 29 | 73,66 |
| x | 30,48 |

$$x = \frac{29 \cdot 30,48}{73,66}$$

$$x = 12$$

02. Correta.

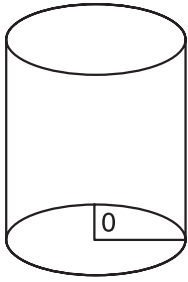
| | |
|------|-----|
| 30° | 60' |
| 142° | x |

$$x = 284'$$

$$x = 4h44'$$

$$15 + 4h44' = 1944'$$

04. **Incorreta.**



$$V = \pi R^2 h = \pi \cdot 10^2 \cdot 8 = 800\pi$$

$$V = \pi R^2 h = \pi \cdot 20^2 \cdot 16 = 6400\pi$$

$$800\pi \text{ _____ } 15$$

$$6400\pi \text{ _____ } x$$

$$x = 120$$

08. **Incorreta.**

$$a_n = a_1 + (n - 1)R$$

$$75 = 27 + (n - 1) \cdot 2$$

$$48 = (n - 1) \cdot 2$$

$$24 = n - 1$$

$$n = 25$$

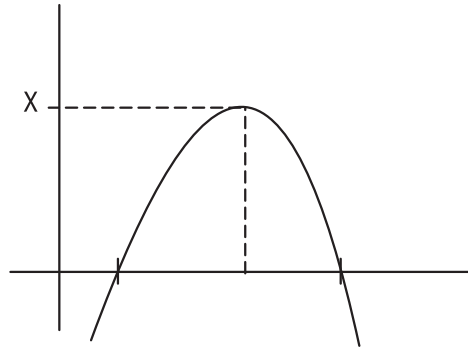
$$S_n = \frac{(a_1 + a_n)n}{2} = \frac{(27 + 75) \cdot 25}{2} = 1275$$

16. **Incorreta.**

$$L(x) = 4(3 - x) \cdot (x - 2)$$

$$L(x) = 4(3x - 6 - x^2 + 2x)$$

$$L(x) = -4x^2 + 20x - 24$$



$$x_v = -\frac{b}{2a} = -\frac{20}{2(-4)} = \frac{20}{8} = 2,5$$

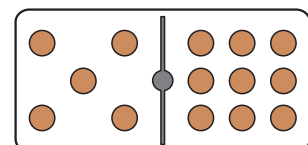
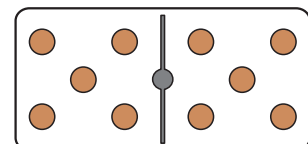
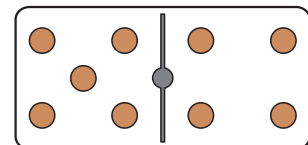
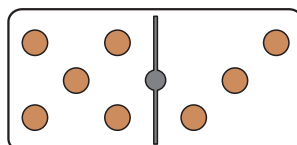
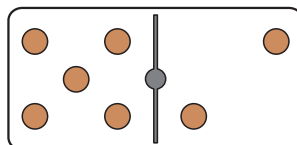
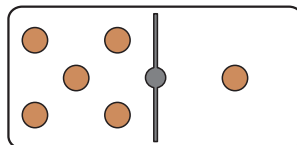
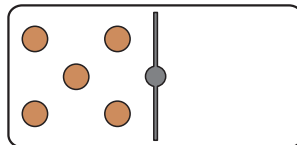
$$L_{\text{máx}} \Rightarrow x \text{ máximo} : 2,5$$

24) **Resposta:** 05

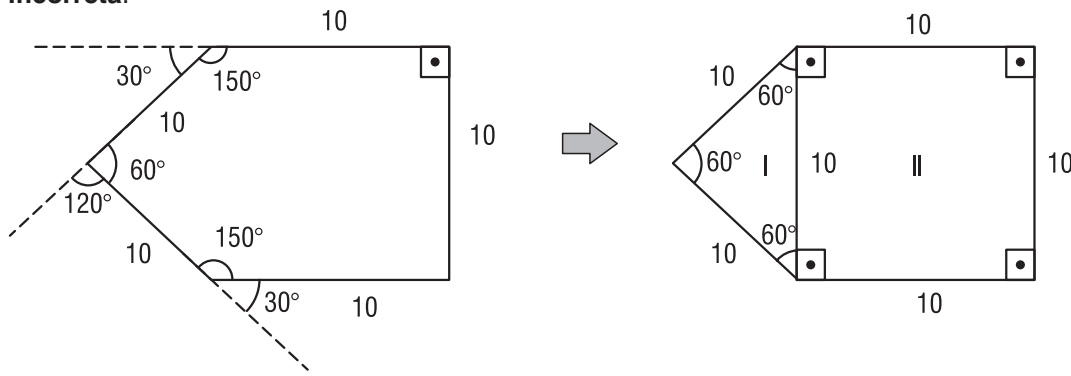
Resolução

01. **Correta.** No jogo de dominó, cada número (de 0 a 6) aparece 8 vezes*, permitindo que as pedras se "casem" duas a duas. Devido a isto, pode-se concluir que as 28 pedras do dominó formam uma trilha fechada. Assim, abrindo-se esta trilha em qualquer ponto, o início e o fim terão o mesmo número.

Exemplo: nº 5 aparece 8 vezes:

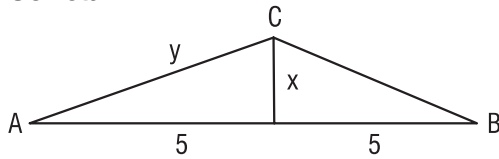


02. **Incorreta.**



$$\left. \begin{aligned} A_I &= \frac{(10)^2 \sqrt{3}}{4} = \frac{100\sqrt{3}}{4} = 25\sqrt{3} \text{ m}^2 \\ A_{II} &= 10^2 = 100 \text{ m}^2 \end{aligned} \right\} A = (25\sqrt{3} + 100) \text{ m}^2$$

04. **Correta.**



$$\begin{aligned} x &= \frac{40}{100} \cdot 5 = 2 \text{ m} \\ y^2 &= z^2 + 5^2 \\ y^2 &= 2^2 + 5^2 \\ y &= \sqrt{29} \text{ m} \end{aligned}$$

08. **Incorreta.**

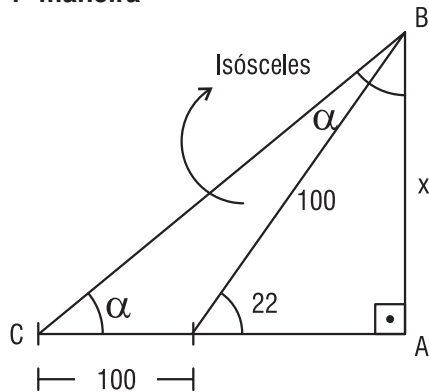
De 1 a 9 \Rightarrow 9 números de 1 algarismo $\Rightarrow 9 \cdot 1 = 9$ placas
 De 10 a 99 \Rightarrow 90 números de 2 algarismos $\Rightarrow 90 \cdot 2 = 180$ placas
 100 \Rightarrow 3 placas

Total de 192 placas

25) **Resposta:**

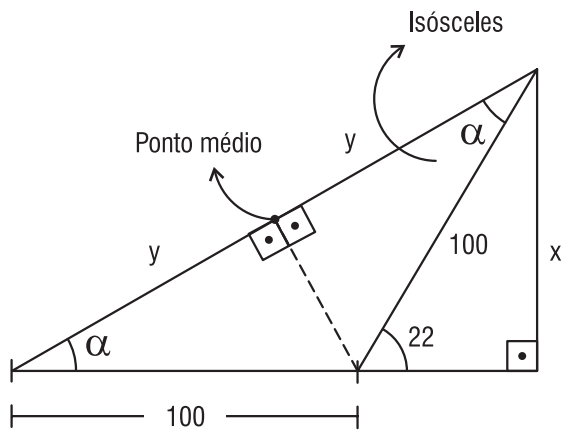
Resolução

1ª maneira



$$\begin{aligned} \sin \alpha = 0,6 = \frac{6}{10} = \frac{3}{5} &\rightarrow \sin^2 \alpha + \cos^2 \alpha = 1 \\ \left(\frac{3}{5}\right)^2 + \cos^2 \alpha &= 1 \\ \cos^2 \alpha &= 1 - \frac{9}{25} \\ \cos^2 \alpha &= \frac{16}{25} \\ \cos \alpha &= \frac{4}{5} \end{aligned}$$

$$\begin{aligned} \sin 2\alpha &= \frac{x}{100} \\ 2 \cdot \sin \alpha \cdot \cos \alpha &= \frac{x}{100} \\ 2 \cdot \frac{3}{5} \cdot \frac{4}{5} &= \frac{x}{100} \rightarrow \frac{24}{25} = \frac{x}{100} \rightarrow x = 24 \cdot 4 = 96 \end{aligned}$$



$$\begin{aligned} \sin \alpha = 0,6 = \frac{3}{5} &\rightarrow \sin^2 \alpha + \cos^2 \alpha = 1 \\ \cos^2 \alpha &= 1 - \frac{9}{25} \\ \cos \alpha &= \frac{4}{5} \end{aligned}$$

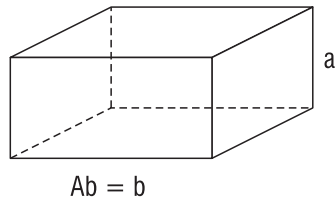
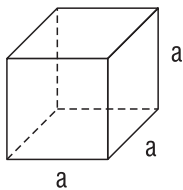
$$\cos \alpha = \frac{y}{100} = \frac{4}{5} \rightarrow y = 80$$

$$\sin \alpha = \frac{x}{160} = \frac{3}{5} \rightarrow \frac{24}{25} = x = 96$$

26) Resposta: 12

Resolução

01. Incorreta.



$$V_{\text{cubo}} = V_{\text{paralelepipedo}} - 4$$

$$a^3 = 6 \cdot a - 4$$

$$a^3 - 6 \cdot a + 4 = 0$$

$$\frac{T.I.}{a} = \frac{4}{1} = 4$$

{1, -1, 2, -2, 4, -4} (pesquisa raízes)

$$(2)^3 - 6 \cdot 2 + 4 = 0$$

$$8 - 12 + 4 = 0$$

$$0 = 0$$

2 é raiz

$$\begin{array}{r|rrrrr} 2 & 1 & 0 & -6 & 4 & \\ & & 1 & 2 & -2 & 0 \end{array}$$

$$1 \cdot a^2 + 2 \cdot a - 2 = 0$$

$$\Delta = b^2 - 4 \cdot a \cdot c$$

$$\Delta = 2^2 - 4 \cdot 1 \cdot (-2)$$

$$\Delta = 12$$

$$a = \frac{-b \pm \sqrt{\Delta}}{2 \cdot a}$$

$$a = \frac{-2 \pm \sqrt{12}}{2 \cdot 1}$$

$$a = \frac{-2 \pm 2\sqrt{3}}{2}$$

$$a = -1 \pm \sqrt{3}$$

$$a = (-1 \pm \sqrt{3}) m$$

Seria outra medida possível.

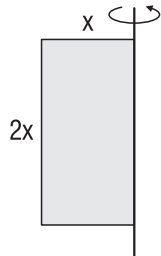
02. **Incorreta.**

- Tetraedro $\rightarrow 4 \cdot \triangle$
- Hexaedro $\rightarrow 6 \cdot \square$
- Octaedro $\rightarrow 8 \cdot \triangle$
- Dodecaedro $\rightarrow 12 \cdot \diamond$
- Icosaedro $\rightarrow 20 \cdot \triangle$

Não existe poliedro regular formado por 6 triângulos equiláteros.

04. **Correta.** As relações estão corretas dos sólidos e as suas planificações, porém, na figura 1 o sólido B está faltando aresta e no sólido C as linhas não estão obedecendo ao critério técnico entre estar cheia e pontilhada.

08. **Correta.**



$$\begin{aligned}
 V &= 432\pi \\
 \pi \cdot r^2 \cdot h &= 432 \cdot \pi \\
 x^2 \cdot (2x) &= 432 \\
 2 \cdot x^3 &= 432 \\
 x^3 &= 216 \\
 x &= 6
 \end{aligned}$$

$$\begin{aligned}
 A_{\text{retângulo}} &= x \cdot 2x \\
 A &= 6 \cdot 12 \\
 A &= 72 \text{ cm}^2
 \end{aligned}$$

27) **Resposta:** 06

Resolução

01. **Incorreta.**

$$\begin{aligned}
 f(t) &= 2 \cdot \text{sen} \left(3t + \frac{\pi}{3} \right) \\
 f(0) &= 2 \cdot \text{sen} \left(3 \cdot 0 + \frac{\pi}{3} \right) \\
 f(0) &= 2 \cdot \text{sen} \left(\frac{\pi}{3} \right) \\
 f(0) &= 2 \cdot \frac{\sqrt{3}}{2} \Rightarrow f(0) = \sqrt{3}
 \end{aligned}$$

Pelo gráfico, $f(0)$ é negativo.

02. **Correta.**

$$\begin{aligned}
 n(t) &= n_0 \cdot 4^{-t/5} \\
 \text{Para } n(t) &= \frac{1}{8} \cdot n_0 \text{ temos:} \\
 \frac{1}{8} \cdot n_0 &= n_0 \cdot 4^{-t/5} \\
 2^{-3} &= 2^{-2t/5} \\
 -3 &= -\frac{2t}{5} \\
 t &= 7,5 \text{ anos}
 \end{aligned}$$

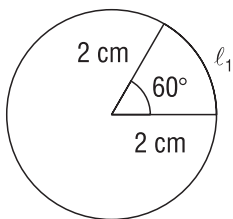
04. **Correta.**

| HOJE | MÊS: 1 | MÊS: 2 | ... | MÊS: t |
|------|--------------------|----------------------|-----|----------------------|
| 100 | $(1,03) \cdot 100$ | $(1,03)^2 \cdot 100$ | ... | $(1,03)^t \cdot 100$ |

P.G. de razão 1,03

08. Incorreta.

Circunferência 1

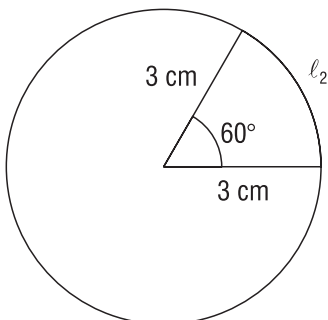


$$l_1 = \alpha \cdot r_1$$

$$l_1 = \frac{\pi}{3} \cdot 2$$

$$l_1 = \frac{2\pi}{3} \text{ cm}$$

Circunferência 2



$$l_2 = \alpha \cdot r_2$$

$$l_2 = \frac{\pi}{3} \cdot 3$$

$$l_2 = \pi \text{ cm}$$

16. Incorreta.

$$l = \frac{2}{3} \cdot \log \left(\frac{E}{E_0} \right)$$

$$\frac{3l}{2} = \log \left(\frac{E}{E_0} \right)$$

$$\frac{E}{E_0} = 10^{\frac{3l}{2}}$$

$$E = E_0 \cdot 10^{\frac{3l}{2}}$$

$$E = 10^{-3} \cdot 10^{\frac{3l}{2}}$$

$$E = 10^{\frac{3l}{2} - 3}$$

$$l + 1 = \frac{2}{3} \cdot \log \left(\frac{E_1}{E_0} \right)$$

$$\frac{3l + 3}{2} = \log \left(\frac{E_1}{E_0} \right)$$

$$\frac{E_1}{E_0} = 10^{\frac{3l + 3}{2}}$$

$$E_1 = E_0 \cdot 10^{\frac{3l}{2} + \frac{3}{2}}$$

$$E_1 = 10^{-3} \cdot 10^{\frac{3l}{2} + \frac{3}{2}}$$

$$E_1 = 10^{\frac{3l}{2} - 3} \cdot 10^{\frac{3}{2}}$$

$$E_1 = E \cdot \sqrt{1000}$$

$$E_1 = 10 \cdot \sqrt{10} \cdot E$$

28) Resposta: 24

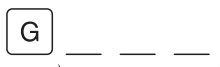
Resolução

01. Incorreta. 5 médicos e 10 enfermeiros



$$C_{5,1} \cdot C_{10,4} = 5 \cdot 210 = 1050 \text{ equipes}$$

02. Incorreta. ÁGUA



$$P_3^2 = \frac{3!}{2!} = \frac{6}{2} = 3$$

04. Incorreta.

$$C_{12,3} = \frac{12!}{3! 9!} = 220 \text{ triângulos}$$

08. **Correta.** Espaço amostral

| | | | | | |
|----|----|----|----|----|----|
| 11 | 21 | 31 | 41 | 51 | 61 |
| 12 | 22 | 32 | 42 | 52 | 62 |
| 13 | 23 | 33 | 43 | 53 | 63 |
| 14 | 24 | 34 | 44 | 54 | 64 |
| 15 | 25 | 35 | 45 | 55 | 65 |
| 16 | 26 | 36 | 46 | 56 | 66 |

16. **Correta.**

1, 2, 2, 5, 5, 5, 6

___ ___ ___ ___ ___ ___ $\boxed{2} \rightarrow P_6^3 = \frac{6!}{3!} = 120$

___ ___ ___ ___ ___ ___ $\boxed{6} \rightarrow P_6^{2,3} = \frac{6!}{2!3!} = 60$

Resposta: 180 números

29) **Resposta:** 09

Resolução

01. **Correta.**

Função linear: $f(t) = at$

$$f(100) = 5,8 \Rightarrow a \cdot 100 = 5,8$$

$$a = 0,058$$

$$f(t) = 0,058 \cdot t$$

$$\begin{aligned} \text{Daqui há 34,4 anos: } f(34,4) &= 0,058 \cdot 34,4 \\ &= 1,9952 \\ &\cong 2 \text{ anos} \end{aligned}$$

02. **Incorreta.**

Círculo de centro (6, 0) e raio = 5

$$(x - 6)^2 + (y - 0)^2 \leq 5^2$$

$$x^2 - 12x + 36 + y^2 - 25 \leq 0$$

$$x^2 + y^2 - 12x + 11 \leq 0$$

04. **Incorreta.**

$$\begin{cases} x = t + 5 \\ y = 3t + 6 \end{cases}$$

$$\text{Para } t = 0 \Rightarrow \begin{cases} x = 5 \\ y = 6 \end{cases} \left. \vphantom{\begin{cases} x = 5 \\ y = 6 \end{cases}} \right\} A(5, 6)$$

$$d_{A,B} = \sqrt{(10 - 5)^2 + (21 - 6)^2}$$

$$d_{A,B} = \sqrt{25 + 225}$$

$$d_{A,B} = \sqrt{250} = 5\sqrt{10} \text{ m}$$

$$\text{Para } t = 5 \Rightarrow \begin{cases} x = 10 \\ y = 21 \end{cases} \left. \vphantom{\begin{cases} x = 10 \\ y = 21 \end{cases}} \right\} B(10, 21)$$

08. **Correta.**

Cubo de aresta $x \Rightarrow V = x^3$

Como um cubo tem 8 vértices e de cada um retirou-se um cubo de aresta 1, temos:

$$V_{\text{bloco}} = x^3 - 8$$

Como $x = 2$ é raiz de $x^3 - 3$, temos:

$$V_{\text{bloco}} = (x - 2) \cdot Q(x)$$

Encontrado $Q(x)$ por ruffini:

$$\begin{array}{r|rrrr} 2 & 1 & 0 & 0 & -8 \\ & & 2 & 4 & 0 \\ \hline & 1 & 2 & 4 & 0 \end{array}$$

$$Q(x) = x^2 + 2x + 4$$

$$\text{Assim, } V_{\text{bloco}} = (x - 2) \cdot (x^2 + 2x + 4)$$

30) Resposta: 17

Resolução

01. Correta.

$$a_{ij} = (-1)^{i+j} \cdot \frac{2i}{j}$$

$$a_{64} = (-1)^{6+4} \cdot \frac{2 \cdot 6}{4}$$

$$a_{64} = (-1)^{10} \cdot \frac{12}{4}$$

$$a_{64} = 3$$

02. Incorreta.

$$A = \frac{1}{2} |D|$$

$$D = \begin{vmatrix} 0 & 0 & 1 \\ 0 & 2 & 1 \\ 10 & 20 & 1 \\ 0 & 0 & 1 \\ 0 & 2 & 1 \end{vmatrix} = -20$$

$$A = \frac{1}{2} |-10| = 10$$

04. Incorreta.

$$(AB)^t = B^t A^t$$

$$A^t B^t = (AB)^t \text{ somente se } A_n = B_n$$

08. Incorreta.

$$A = \begin{pmatrix} 1 & 2 \\ -5 & 1 \end{pmatrix} \Rightarrow A^{-1} = \begin{pmatrix} 1 & -2 \\ 5 & 1 \\ 11 & 11 \end{pmatrix}$$

$$\det A = 1 + 10$$

$$\det A = 11$$

$$\det A \neq 0$$

16. Correta.

$$a_{32} = b_{23}$$

$$a_{32} = 2i + j$$

$$a_{32} = 2 \cdot 3 + 2$$

$$a_{32} = b_{23} = 8$$