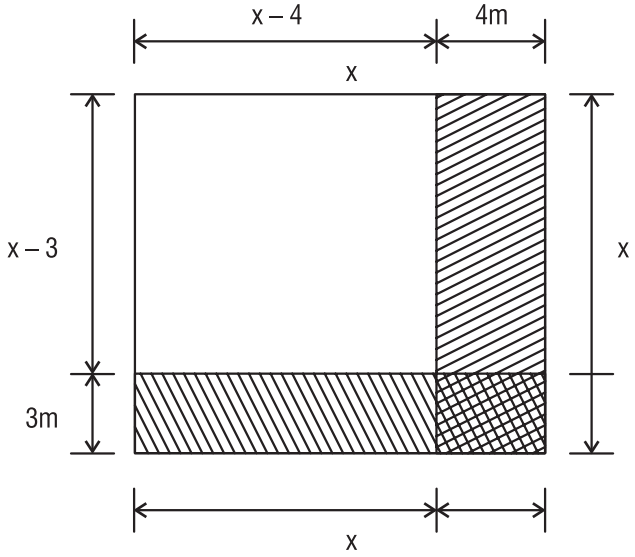
21) **Resposta**: 09

Resolução

01. **Correta**.



$A_{inicial} = x^2$
$A_{final} = (x - 3) \cdot (x - 4)$

Segundo o texto:

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

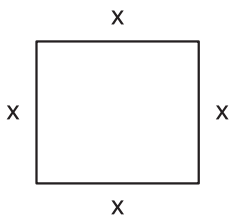
$$(x - 3) \cdot (x - 4) = \frac{x^2}{2}$$

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

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

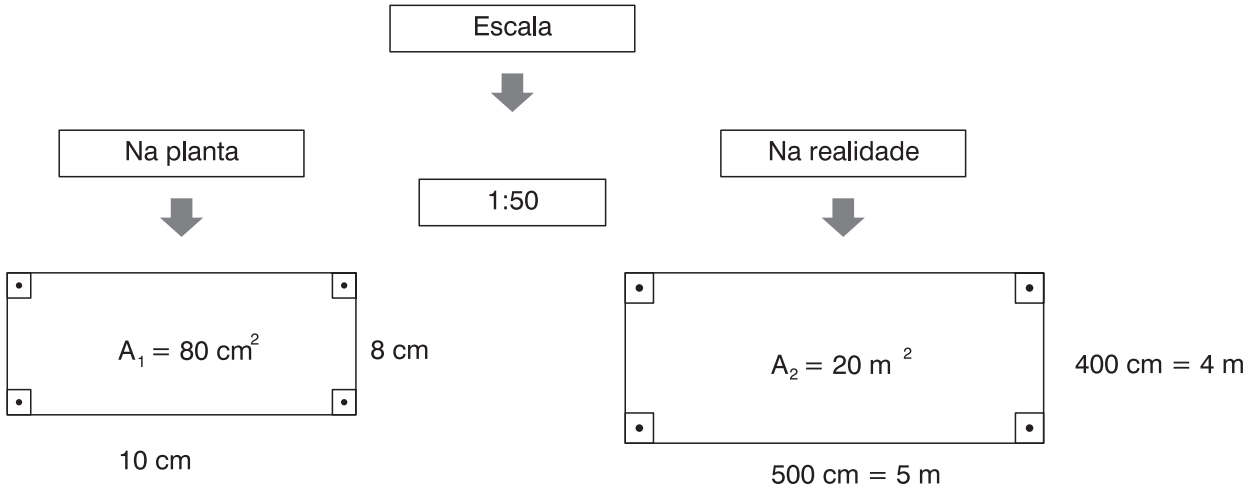
$x_1 = 12$ $\quad$ $x_2 = 2$ (não convém)

Perímetro do terreno



$2p = 4x$
$2p = 4 \cdot 12$
$2p = 48$ m

02. **Incorreta**.



ou

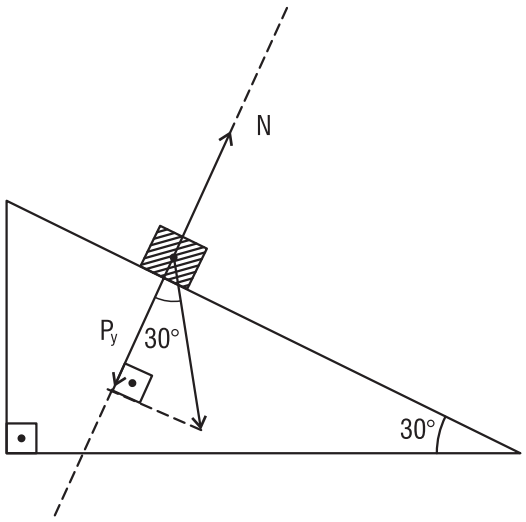
$$\frac{A_{planta}}{A_{real}} = \left(\frac{1}{50}\right)^2 \qquad \frac{80}{A} = \frac{1}{2500}$$

$A = 2500 \cdot 80$

$A = 200000\ cm^2$

$A = 20\ m^2$

04. **Incorreta**.



$$\cos 30o = \frac{Py}{P}$$

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

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

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

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

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

08. **Correta**.

$xAu(OH)_3 + yH_4P_2O_7 \rightarrow zAu_4(P_2O_7)_3 + wH_2O$

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.
$k = 1$

$x = 4k$	$y = 3k$	$z = k$	$w = 12k$
$x = 4 \cdot 1$	$y = 3 \cdot 1$	$z = 1$	$w = 12$
$x = 4$	$y = 3$		

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

$x + y + z + w = 20$

22) **Resposta**: 18

Resolução

01. **Incorreta**.

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

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

$J = 4k$
$P = 5k$

$J + P = 180$
$4k + 5k = 180$
$9k = 180$

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

$k = 20$

$J = 4k$
$J = 4 \cdot 20$
$J = 80$ latinhas

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

02. **Correta**.

$A = b \cdot h$
$A = 10x$

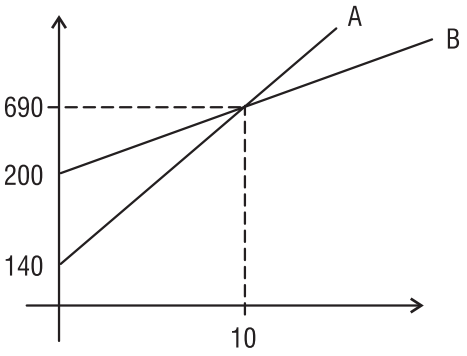
$P = 2b + 2h$
$P = 2 \cdot 10 + 2x$
$P = 20 + 2x$
$x = \frac{p - 20}{2}$

$A = 10^{5}\left(\frac{p - 20}{2}\right)$
$A = 5P - 100$

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**.
$C = 2 \cdot 17 = 34$ cm
$C = 2\pi R$
$34 = 2R \cdot 3{,}14$ $(D = 2R)$
$D = \frac{34}{3{,}14} \cong 10{,}82$

23) **Resposta**: 03

Resolução

01. **Correta**.

Pol	cm
29	73,66
x	30,48

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

$x = 12$

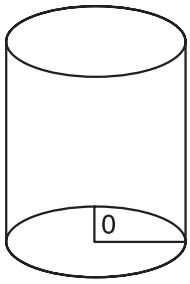
02. **Correta**.

30°	60'
142°	x

$x = 284'$
$x = 4h44'$

$15 + 4h44' = 1944'$

04. **Incorreta**.



$V = \pi R^2 h = \pi \cdot 10^2 \cdot 8 = 800\pi$
$V = \pi R^2 h = \pi \cdot 20^2 \cdot 16 = 6400\pi$

800π _____ 15
6400π ____ x

$x = 120$

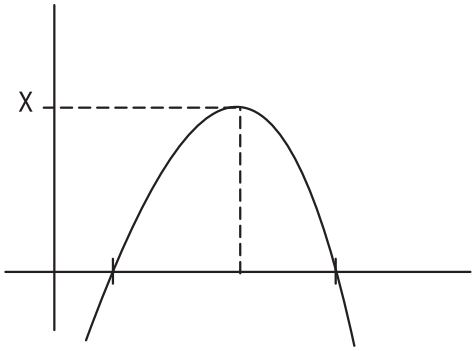
08. **Incorreta**.

$a_n = a_1 + (n-1)R$
$75 = 27 + (n-1) \cdot 2$
$48 = (n-1) \cdot 2$
$24 = n - 1$
$n = 25$

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

16. **Incorreta**.

$L(x) = 4(3 - x) \cdot (x - 2)$
$L(x) = 4(3x - 6 - x^2 + 2x)$
$L(x) = -4x^2 + 20x - 24$



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

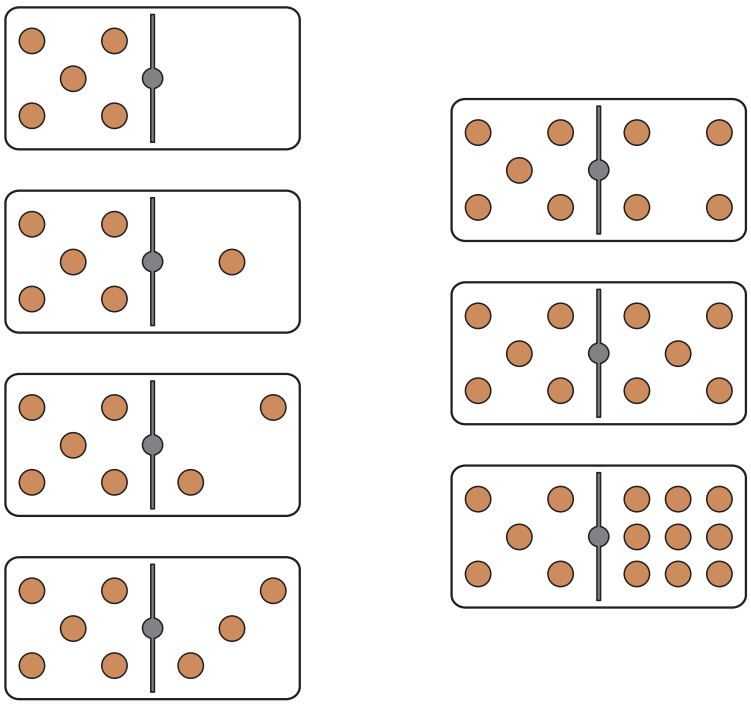
$L_{máx} \Rightarrow$ x máximo : 2,5

24) **Resposta**: 05

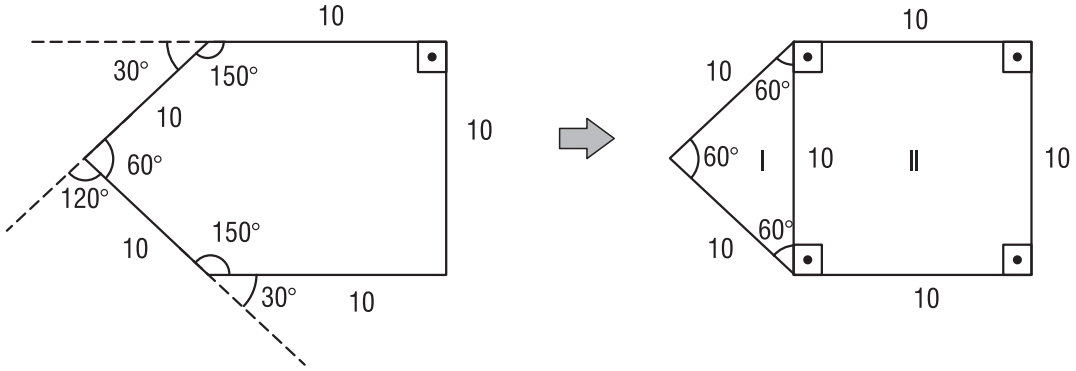
Resolução

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:

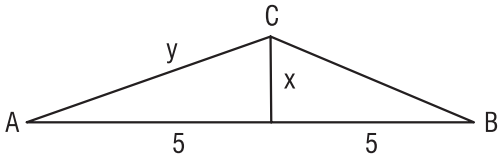


02. **Incorreta**.



$$\left.\begin{array}{l} A_I = \dfrac{(10)^2\sqrt{3}}{4} = \dfrac{100\sqrt{3}}{4} = 25\sqrt{3}\ m^2 \\ A_{II} = 10^2 = 100\ m^2 \end{array}\right\} A = (25\sqrt{3} + 100)\ m^2$$

04. **Correta**.



$$x = \frac{40}{100} \cdot 5 = 2\ m$$

$$y^2 = z^2 + 5^2$$
$$y^2 = 2^2 + 5^2$$
$$y = \sqrt{29}\ m$$

08. **Incorreta**.

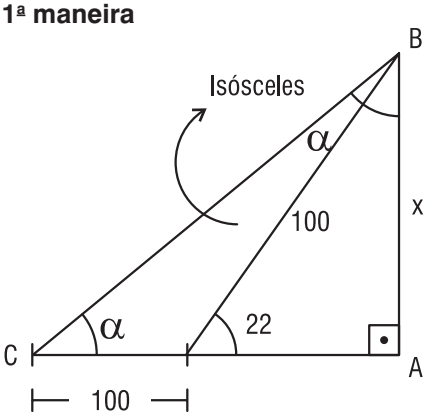
De 1 a 9 $\Rightarrow$ 9 números de 1 algarismo $\Rightarrow$ 9 . 1 = 9 placas
De 10 a 99 $\Rightarrow$ 90 números de 2 algarismos $\Rightarrow$ 90 . 2 = 180 placas
100 $\Rightarrow$ 3 placas

Total de 192 placas

25) **Resposta**:

Resolução

1ª maneira



$$\text{sen}\ \alpha = 0{,}6 = \frac{6}{10} = \frac{3}{5} \rightarrow \text{sen}^2\alpha + \cos^2\alpha = 1$$

$$\left(\frac{3}{5}\right)^2 + \cos^2\alpha = 1$$

$$\cos^2\alpha = 1 - \frac{9}{25}$$

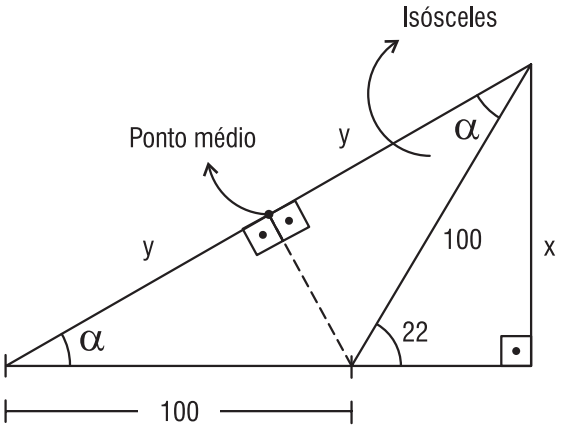
$$\cos^2\alpha = \frac{16}{25}$$

$$\cos\alpha = \frac{4}{5}$$

$$\text{sen}\ 2\alpha = \frac{x}{100}$$

$$2 \cdot \text{sen}\ \alpha \cdot \cos\alpha = \frac{x}{100}$$

$$2 \cdot \frac{3}{5} \cdot \frac{4}{5} = \frac{x}{100} \rightarrow \frac{24}{\cancel{25}_{1}} = \frac{x}{\cancel{100}_{4}} \rightarrow x = 24 \cdot 4 = 96$$



$\text{sen}\,\alpha = 0{,}6 = \frac{3}{5} \rightarrow \text{sen}^2\alpha + \cos^2\alpha = 1$

$\cos^2\alpha = 1 - \frac{9}{25}$

$\cos\alpha = \frac{4}{5}$

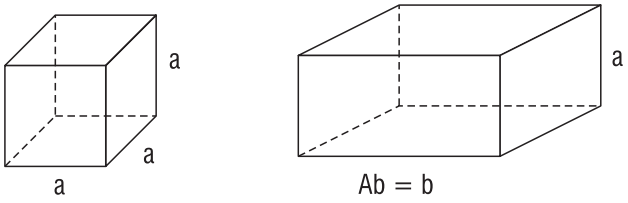
$\cos\alpha = \frac{y}{\cancel{100}_{20}} = \frac{4}{\cancel{5}} \rightarrow y = 80$

$\text{sen}\,\alpha = \frac{x}{\cancel{160}_{32}} = \frac{3}{\cancel{5}} \rightarrow \frac{24}{25} = x = 96$

26) **Resposta**: 12

Resolução

01. **Incorreta**.



$v_{cubo} = v_{paralelpípedo} - 4$

$a^3 = 6 \,.\, a - 4$

$a^3 - 6 \,.\, a + 4 = 0$

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

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

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

$8 - 12 + 4 = 0$

$0 = 0$

2 é raiz

2	1	0	–6	4
	1	2	–2	0

$1 \,.\, a^2 + 2 \,.\, a - 2 = 0$

$\Delta = b^2 - 4 \,.\, a \,.\, c$

$\Delta = 2^2 - 4 \,.\, 1 \,.\, (-2)$

$\Delta = 12$

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

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

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

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

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

Seria outra medida possível.

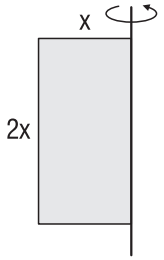
02. **Incorreta**.

Tetraedro $\longrightarrow$ 4 . △
Hexaedro $\longrightarrow$ 6 . □
Octaedro $\longrightarrow$ 8 . △
Dodecaedro $\longrightarrow$ 12 . ⬠
Icosaedro $\longrightarrow$ 20 . △

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**.



$V = 432\pi$
$\cancel{\pi} \cdot r^2 \cdot h = 432 \cdot \cancel{\pi}$
$x^2 \cdot (2x) = 432$
$2 \cdot x^3 = 432$
$x^3 = 216$
$x = 5$

$A_{retângulo} = x \cdot 2x$
$A = 6 \cdot 12$
$A = 72\ cm^2$

27) **Resposta**: 06

Resolução

01. **Incorreta**.

$$f(t) = 2 \cdot \operatorname{sen}\left(3t + \frac{\pi}{3}\right)$$

$$f(0) = 2 \cdot \operatorname{sen}\left(3 \cdot 0 + \frac{\pi}{3}\right)$$

$$f(0) = 2 \cdot \operatorname{sen}\left(\frac{\pi}{3}\right)$$

$$f(0) = 2 \cdot \frac{\sqrt{3}}{2} \Rightarrow f(0) = \sqrt{3}$$

Pelo gráfico, f(0) é negativo.

02. **Correta**.

$n(t) = n_0 \cdot 4^{-t/5}$

Para $n(t) = \frac{1}{8} \cdot n_0$ temos:

$\frac{1}{8} \cdot \cancel{n_0} = \cancel{n_0} \cdot 4^{-t/5}$

$2^{-3} = 2^{-2t/5}$

$-3 = -\frac{2t}{5}$

$t = 7{,}5$ anos

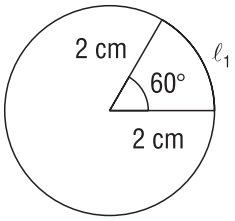
04. **Correta**.

HOJE	MÊS: 1	MÊS: 2	...	MÊS: t
100	(1,03) . 100	$(1{,}03)^2$. 100	...	$(1{,}03)^t$. 100

P.G. de razão 1,03

08. **Incorreta**.

Circunferência 1

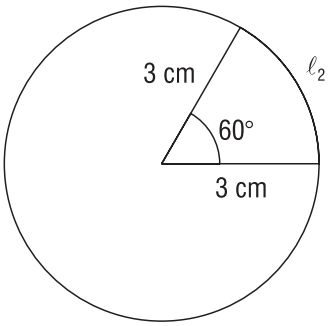


$\ell_1 = \alpha \cdot r_1$

$\ell_1 = \frac{\pi}{3} \cdot 2$

$\ell_1 = \frac{2\pi}{3}$ cm

Circunferência 2



$\ell_2 = \alpha \cdot r_2$

$\ell_2 = \frac{\pi}{3} \cdot 3$

$\ell_2 = \pi$ cm

16. **Incorreta**.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

28) **Resposta**: 24

Resolução

01. **Incorreta**. 5 médicos e 10 enfermeiros

$\underbrace{\boxed{M}}_{C_{5,1}} \underbrace{\boxed{E}\boxed{E}\boxed{E}\boxed{E}}_{C_{10,4}} = 5 \cdot 210 = 1050$ equipes

02. **Incorreta**. ÁGUA

$\boxed{G}\underbrace{\_\_\ \_\_\ \_\_}_{P_3^2 = \frac{3!}{2!} = \frac{6}{2} = 3}$

04. **Incorreta**.

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

$\_\_\ \_\_\ \_\_\ \_\_\ \_\_\ \_\_\ \boxed{2} \longrightarrow P_6^3 = \frac{6!}{3!} = 120$

$\_\_\ \_\_\ \_\_\ \_\_\ \_\_\ \_\_\ \boxed{6} \longrightarrow P_6^{2,3} = \frac{6!}{2!\,3!} = 60$

Resposta: 180 números

29) **Resposta**: 09

Resolução

01. **Correta**.
Função linear: $f(t) = at$

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

$a = 0{,}058$

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

Daqui há 34,4 anos: $f(34{,}4) = 0{,}058 \cdot 34{,}4$

$= 1{,}9952$

$\cong 2$ anos

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**.

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

Para $t = 0 \Rightarrow \begin{matrix} x = 5 \\ y = 6 \end{matrix}\Big\}$ A(5, 6)

Para $t = 5 \Rightarrow \begin{matrix} x = 10 \\ y = 21 \end{matrix}\Big\}$ B(10, 21)

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

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

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

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:
$V_{bloco} = x^3 - 8$

Como $x = 2$ é raiz de $x^3 - 3$, temos:
$V_{bloco} = (x - 2) \cdot Q(x)$

Encontrado Q(x) por ruffini:

2	1	0	0	–8
	1	2	4	0

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

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

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**.

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

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

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

04. **Incorreta**.

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

$A^tB^t = (AB)^t$ somente se $A_n = B_n$

08. **Incorreta**.

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

$\det A = 1 + 10$

$\det A = 11$

$\det A \neq 0$

16. **Correta**.

$a_{32} = b_{23}$

$a_{32} = 2i + j$

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

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