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Matemática IV

COINF 2026  
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Lista - Prova 2º Bimestre

### 1 Exercícios Introdutórios

1. a)  $8 \cdot 4 = 32 \text{ cm}^2$

1. a)  $32 \text{ cm}^2$

b)  $\sin 30^\circ = \frac{ca}{12} \rightarrow \frac{1}{2} \cdot 12 = ca \rightarrow ca = 6 \text{ cm}$

$\cos 30^\circ = \frac{ca}{12} \rightarrow \frac{\sqrt{3}}{2} \cdot 12 = ca \rightarrow ca = 6\sqrt{3} \text{ cm}$

$A_{\square} = 6 \cdot 6\sqrt{3} = 36\sqrt{3} \text{ cm}^2$       1. b)  $36\sqrt{3} \text{ cm}^2$

2. a)  $A = 8^2 = 64 \text{ cm}^2$

2. a)  $64 \text{ cm}^2$

b)  $A = 7,1 \text{ cm}^2 = 50,41 \text{ cm}^2$

2. b)  $50,41 \text{ cm}^2$

c)  $A = (\sqrt{3})^2 = 3 \text{ cm}^2$

2. c)  $3 \text{ cm}^2$

d)  $A = \left(\frac{d\sqrt{2}}{2}\right)^2 = \left(\frac{6\sqrt{2}}{2}\right)^2 = (3\sqrt{2})^2 = 9 \cdot 2 = 18$   
 $18 \text{ cm}^2$

2. d)  $18 \text{ cm}^2$

3. a)  $l = \sqrt{25} \rightarrow l = 5 \text{ cm}$

3. a)  $5 \text{ cm}$

3. b)  $2\sqrt{3} \text{ cm}$

b)  $l = \sqrt{12} \rightarrow l = \sqrt{2^2 \cdot 3} \rightarrow l = 2\sqrt{3} \text{ cm}$

4. a)  $A = \frac{D \cdot d}{2} \rightarrow A = \frac{5 \cdot 8}{2} \rightarrow A = \frac{40}{2} = 20 \text{ cm}^2$

4. a)  $20 \text{ cm}^2$



$$b) A = \frac{D \cdot d}{2} \quad A = \frac{8 \cdot 6}{2} \quad A = \frac{48}{2} = 24 \text{ cm}^2 \quad 4. b) 24 \text{ cm}^2$$

$$d = 2.4$$

$$\rightarrow d = 8$$

$$c) \cos 60^\circ = \frac{ca}{8} \rightarrow \frac{1}{2} \cdot 8 = ca \rightarrow ca = 4 \text{ cm} \quad 4. c) 32\sqrt{3} \text{ cm}^2$$

$$\sin 60^\circ = \frac{co}{8} \rightarrow \frac{\sqrt{3}}{2} \cdot 8 = co \rightarrow co = 4\sqrt{3} \text{ cm}$$

$$A = \frac{8 \cdot 8\sqrt{3}}{2} = 32\sqrt{3} \text{ cm}^2$$

$$D = 2.4\sqrt{3}$$

$$D = 8\sqrt{3}$$

$$5. A = \frac{(B+b) \cdot h}{2} \rightarrow A = \frac{(5+7) \cdot 4}{2} \rightarrow A = 12 \cdot 2$$

$$A = 24 \text{ cm}^2$$

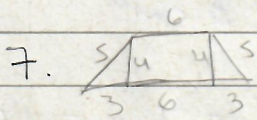
$$5) 24 \text{ cm}^2$$

$$6. 72 \cdot 4$$

$$32 \cdot 18 \rightarrow \text{lado} \quad A = l^2 \rightarrow A = 18^2 = 324 \text{ cm}^2$$

0

$$6) 324 \text{ cm}^2$$



$$7. A = \frac{(B+b) \cdot h}{2} \rightarrow A = \frac{(12+6) \cdot 4}{2}$$

$$A = 18 \cdot 2 = 36 \text{ cm}^2 \quad 7) 36 \text{ cm}^2$$

$$8. a) A = 6 \cdot 4 = 24 \text{ cm}^2$$

$$8. a) 24 \text{ cm}^2$$

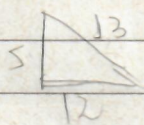
$$b) \sin 60^\circ = \frac{co}{6} \rightarrow \frac{\sqrt{3}}{2} \cdot 6 = co \rightarrow co = 3\sqrt{3}$$

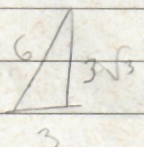
$$A = 8 \cdot 3\sqrt{3} = 24\sqrt{3} \text{ cm}^2$$

$$8. b) 24\sqrt{3} \text{ cm}^2$$



9. a)  $A = \frac{8 \cdot 5}{2} = \frac{40}{2} = 20 \text{ cm}^2$       9. a)  $20 \text{ cm}^2$

b)   $A = \frac{12 \cdot 5}{2} = \frac{60}{2} = 30 \text{ cm}^2$       9. b)  $30 \text{ cm}^2$

c)   $A = \frac{6 \cdot 3\sqrt{3}}{2} = 9\sqrt{3} \text{ cm}^2$       9. c)  $9\sqrt{3} \text{ cm}^2$

d)  $\sin 45^\circ = \frac{CO}{6} \rightarrow \frac{\sqrt{2}}{2} \cdot x^3 = CO \rightarrow CO = 3\sqrt{2}$   
 $A = \frac{48 \cdot 3\sqrt{2}}{2} = 12\sqrt{2} \text{ cm}^2$       9. d)  $12\sqrt{2} \text{ cm}^2$

10.  $2x \cdot x = 450$   
 $2x^2 = 450$   
 $x^2 = \frac{450}{2} = 225$

10. altura = 15 m  
 base = 30 m

$x = \sqrt{225} = 15$

$A = 16\sqrt{3} = \frac{16\pi}{3}$

Exercícios de Fixação

11.  $0,99 \cdot 1,11 \approx 0,99 \cdot 100 = 99 \text{ cm}^2$   
 1)  $99 \text{ cm}^2$

$A = \frac{l^2 \sqrt{3}}{4} = \frac{8^2 \sqrt{3}}{4}$

$\frac{64 \sqrt{3}}{4} = 16\sqrt{3}$

12. a)  $r = \text{apótema}$        $r = \frac{h}{3}$

$r = \frac{4\sqrt{3}}{3}$

$A = \pi \left( \frac{4\sqrt{3}}{3} \right)^2 = A = \frac{\pi \cdot 16 \cdot 3}{3} = \frac{16\pi}{3}$

aproximadamente 11      12. a)  $16\sqrt{3} = \frac{16\pi}{3} \text{ cm}^2$

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b.  $A = \pi r^2 \rightarrow A = \pi 10^2 \quad A = 100\pi \text{ cm}^2 / 4 \rightarrow 25\pi \text{ cm}^2$   
 12. b)  $100\pi \text{ cm}^2 / 25$

c.  $120^\circ \hat{=} 33\%$  de A

$A = \pi 6^2 \rightarrow A = 36\pi \text{ cm}^2$

$A_{\text{rachurada}} = 12\pi \text{ cm}^2$

12. c)  $12\pi \text{ cm}^2$

13.  $20\%$  de 30 = 6, nova = 24  
 $20\%$  de 15 = 3, nova = 12  
 Área atual = 450, Área nova = 288

$\frac{288}{450} = 0,64 \rightarrow 64\%$ , Logo, perdeu-se 36%

13. (c) 36%

14. a)  $\frac{135}{360} = 0,375 \rightarrow 37,5\%$  do total

14. a)  $A_T = 24\pi - 16\sqrt{2} \text{ cm}^2$

$A_{\square} = 8^2 \pi = 64\pi \cdot 37,5\% \rightarrow 24\pi \text{ cm}^2$

$A_{\Delta} = \frac{1}{2} bh$ ;  $b = 8 \text{ cm}$ ,  $h = 8 \text{ sen } 135^\circ$

$A_{\Delta} = 8 \cdot \frac{\sqrt{2}}{2} = 4\sqrt{2} \text{ cm}$

$A_T = 24\pi - 16\sqrt{2} \text{ cm}^2$

$A_{\Delta} = \frac{1}{2} (8) (4\sqrt{2}) = 16\sqrt{2} \text{ cm}^2$

b)  $(12-x)^2 + y^2 = (6+x)^2$   $\left\{ \begin{array}{l} 6 = 12 - y - x \\ y = 6 - x \end{array} \right.$

$x = \frac{48 \pm \sqrt{2304 - 576}}{2}$

$144 - 24x + x^2 + y^2 = 36 + 12x + x^2$

$x = \frac{48 \pm \sqrt{1728}}{2}$

$108 - 24x + y^2 = 2x$

$x_1 \approx 44,78$

$y^2 + 108 = 36x$

$36 - 2x + x^2 = 36x - 108$

$x > 12$ , impossível

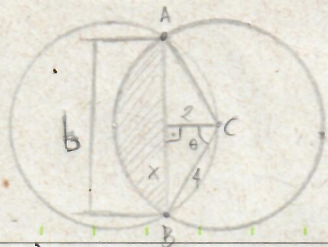
$y^2 = 36x - 108$

$x^2 - 48x + 144 = 0$

$\therefore x_2 = 3,21 \text{ cm}$

$A = \pi r^2 = \pi (24 - 12\sqrt{3})^2 = \pi (1008 - 576\sqrt{3}) = 1008\pi - 576\pi\sqrt{3} \text{ cm}^2$

14. b)  $A_T = 1008\pi - 576\pi\sqrt{3} \text{ cm}^2$



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c)  $16 = 4 + x^2 - 2 \cdot 2 \cdot x \cos 90^\circ$  (1)

$16 = 4 + x^2 - 0$

$x^2 = 16 - 4$

$x^2 = 12$

$x = \sqrt{12}$

$x = 2\sqrt{3}$

$\frac{\text{sen } \theta}{2\sqrt{3}} = \frac{\text{sen } 90^\circ}{4}$

$\frac{2\sqrt{3}}{\text{sen } \theta} = 4$

$\text{sen } \theta = \frac{2\sqrt{3}}{4} = \frac{\sqrt{3}}{2}$

$\theta = 60^\circ \rightarrow \text{Anulo } 2\theta = 120^\circ$

$A_D = \frac{1}{2}bh = \frac{1}{2}(2x)(2)$

$= \frac{1}{2}(4\sqrt{3})(2) = 4\sqrt{3} \text{ cm}^2$

$A_{AD} = A_S - A_D = 16\pi - 4\sqrt{3}$

$= \frac{16\pi - 4\sqrt{3}}{3} \text{ cm}^2$

$A_{Final} = 2A_{AD} = 2 \left( \frac{16\pi - 4\sqrt{3}}{3} \right)$

$= \frac{32\pi - 24\sqrt{3}}{3} \text{ cm}^2$

$A_S = \frac{1}{2}ar^2 = \frac{1}{2} \left( \frac{2\pi}{3} \right) (4)$

$A_S = \frac{4\pi}{3}$

14.c)  $A_T = \frac{32\pi - 24\sqrt{3}}{3} \text{ cm}^2$

Exercícios de Aprofundamento e de Exames

15. e)  $5y + 3x - xy$

15. e)  $5y + 3x - xy$

16.  $A_{\Delta} \rightarrow 2 \cdot (0,5)^2 \rightarrow 2 \cdot 0,25 = 0,5$

$A_{\diamond} \rightarrow 0,5 \cdot 0,5 = 0,25$  0,75 m<sup>2</sup>

$A_{\langle \rangle} \rightarrow (1 \cdot 1) - 0,25 = 0,75$  30 \cdot 0,75 = 22,5

22,5

50 \cdot 0,25 = 12,5

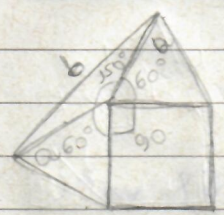
12,5

16. e) R\$ 35,00

35,0

e) R\$ 35,00

17.



$b^2 = 1^2 + 1^2 - 2 \cos(150^\circ)$

$b^2 = 1 + 1 - 2(-\frac{\sqrt{3}}{2})$

$b^2 = 2 + \sqrt{3}$

$b = \sqrt{2 + \sqrt{3}}$

$A = \frac{1}{2} \cdot 1 \cdot 1 \cdot \sin 150^\circ$

$b^2 = 2 + \sqrt{3}$

c)  $2 + \sqrt{3}$

$A = \frac{1}{2} \cdot 1 \cdot 1 \cdot \frac{1}{2} = \frac{1}{4}$

$b = \sqrt{2 + \sqrt{3}}$

17. c)  $2 + \sqrt{3}$

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$$18. a) \left. \begin{array}{l} DG, AH, BE, CF = 3x \\ CG, BF, AE, HD = x \end{array} \right\} 4x$$

$$GH, GF, FE, HE \rightarrow 1,5x^2$$

$$\text{Área } ABCD = 4x \cdot 4x = 16x^2$$

$$\text{Área } EGHF = 16x^2 - 4(1,5x^2) = 16x^2 - 6x^2 = 10x^2$$

$$\text{Razão} = \frac{10}{16} = \frac{5}{8} \quad \text{18. a) } EGHF = \frac{5}{8} ABCD$$

$$b) \text{ Quadrado sombreado} = \frac{1}{2} EFGH$$

$$80 \cdot \frac{1}{8} = 10$$

$$18. b) 25 \text{ cm}^2$$

$$80 \cdot 0,3125 = 25$$
$$25 = 25$$

$$19. a) (10 - 2)^2 + 2^2 = x^2$$

$$8^2 + 4 = x^2$$

$$64 + 4 = x^2$$

$$x = \sqrt{68}$$

$$A = (\sqrt{68})^2$$

$$A = 68 \text{ m}^2$$

$$19. a) 68 \text{ m}^2$$

$$b) A = \frac{(10-x) \cdot x \cdot x}{2}$$

$$A = 100 - \frac{4(10-x) \cdot x}{2} \rightarrow 100 - 20x + 2x^2$$

$$A = 2x^2 - 20x + 100 \text{ m}^2 \quad 19. b) 2x^2 - 20x + 100 \text{ m}^2$$

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c)  $A_{\text{calçada}} = \frac{4(10-x)x}{x} = 20x - 2x^2$       19. c) ~~R\$~~ 350,00

$P_T = 3A_{\text{calçada}} + 4_{\text{canteiro}} = 3 \cdot (20x - 2x^2) + 4(2x^2 - 20x + 100) = 2x^2 - 20x + 400$

$\Delta = 400 - 3200 = -2800 \rightarrow P_{\text{min}} = \frac{\Delta}{4a} = \frac{-2800}{8} = \text{R\$ } 350,00$

20.  $(24 + 18 + 8) \cdot 2 = A$       d)

$100 = A$

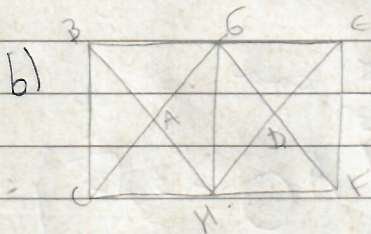
20. d)  $100 \text{ cm}^2$

21. a)  $A_{ABC} = \frac{1}{2} \overline{BD}h - A_{ABB}$

$A_{ADE} = \frac{1}{2} \overline{BD}h - A_{ABD}$

21. a) As bases e alturas são as mesmas, logo têm a mesma área.

Se  $BD \parallel CE$ ,  $h$  é igual para os 2 triângulos.



$A_{ABC} = \frac{1}{2} \overline{CH}h - A_{ACH}$

$A_{AGH} = \frac{1}{2} \overline{CH}h - A_{ACH}$

$\rightarrow A_{ABC} = A_{AGH}$

$A_{DEF} = \frac{1}{2} \overline{GH}h - A_{DEG}$  ;  $A_{DGH} = \frac{1}{2} \overline{GH}h - A_{DEG}$

$A_{DGH} = A_{DEF}$

21. b)  $9 \text{ cm}^2$

$A_{AGDH} = A_{ABC} + A_{DEF} = 5 + 4 = 9 \text{ cm}^2$

22.

$A_{\text{total}} = 160 \cdot 120 - 50 \cdot 60 = 19200 - 3000 = 16200 \text{ m}^2$

Cada parte deve possuir  $8100 \text{ m}^2$

$A_{ABCP} = 8100 \rightarrow \frac{(AP+50)100}{2} = 8100 \rightarrow 50AP + 2500 = 8100$

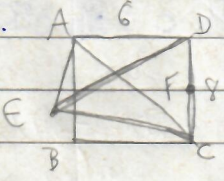
$\rightarrow 50AP = 5600 \rightarrow AP = 112$  ; deslocamento =  $120 - 112 = 8 \text{ m}$

22. **B** 8

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23.   $A_{AEC} = A_{ADCE} - A_{ACD} = A_{ABFE} + A_{CEF} - A_{ACD}$   
( $EF = h = \frac{\sqrt{3}}{2} l = \frac{\sqrt{3}}{2} (8) = 4\sqrt{3}$ );  $= \frac{(6+h)^2}{4} + \frac{1}{2} \cdot 4\sqrt{3} \cdot 6 - \frac{6 \cdot 8}{2}$   
 $= (12 - 8\sqrt{3}) + (8\sqrt{3}) - (24)$

23.  $A_{AEC} = 16\sqrt{3} - 12$   
 $= 12 + 16\sqrt{3} - 24$   
 $= 16\sqrt{3} - 12$

24. O triângulo é equilátero.

$$A = A_0 + A_{\Delta} + A_{\circ} = \pi + A_{\Delta} + A_{\circ}$$

$$A_0 = \pi r^2 = \pi \cdot 1 = \pi \text{ cm}^2$$

$$A_{\Delta} = \frac{1}{3} (A_{\Delta} - A_0) = \frac{1}{3} (A_{\Delta} - \pi)$$

$$A_{\Delta} = \frac{\sqrt{3} l^2}{4}; \quad \pi = \frac{1}{3} h = \frac{1}{3} \cdot \frac{\sqrt{3}}{2} l = \frac{\sqrt{3}}{6} l \Rightarrow l = \frac{\sqrt{3}}{6} l$$

$$\Rightarrow l = \frac{6\sqrt{3}}{3} = 2\sqrt{3}$$

$$A_{\Delta} = \frac{12\sqrt{3}}{4} = 3\sqrt{3} \text{ cm}^2$$

$$A_{\Delta} = \frac{1}{3} (3\sqrt{3} - \pi) = \sqrt{3} - \frac{\pi}{3} \text{ cm}^2$$

$$A_{\circ} = \frac{1}{3} (A_{\circ} - A_{\Delta}) = \frac{1}{3} (A_{\circ} - 3\sqrt{3})$$

$$R = 2r = 2 \therefore A_{\circ} = \pi R^2 = 4\pi \text{ cm}^2$$

$$A_{\circ} = \frac{1}{3} (4\pi - 3\sqrt{3}) = \frac{4}{3}\pi - \sqrt{3} \text{ cm}^2$$

$$A = \frac{4}{3}\pi - \sqrt{3} + \sqrt{3} - \frac{\pi}{3} + \pi = \frac{4}{3}\pi - \frac{1}{3}\pi = 2\pi \text{ cm}^2$$

24. (A)



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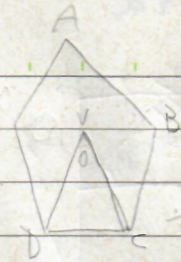
25.

$$S_p = S \cdot (A_{DOC} - A_{DVE})$$

$$S_p = S \left( \frac{60^\circ}{360^\circ} \cdot \pi a^2 - \frac{a^2 \sqrt{3}}{4} \right)$$

$$S_p = S \left( \frac{\pi a^2}{6} - \frac{a^2 \sqrt{3}}{4} \right)$$

$$S_p = \frac{5a^2}{2} \left( \frac{\pi}{3} - \frac{\sqrt{3}}{4} \right) \rightarrow S_p = \frac{5a^2}{2} \left( \frac{\pi}{3} - \frac{\sqrt{3}}{4} \right)$$



DOC é parte de  
uma circunferência  
de raio  $a$ . DC foi  
uma  $\Delta$  equi-  
látero.

26.

$$\cos \theta = \frac{BC}{BE} = \frac{12}{16} = \frac{3}{4} \rightarrow \theta = \cos^{-1} \left( \frac{3}{4} \right) \rightarrow \theta \approx 41,4^\circ$$

$$\hat{A}BC = 90^\circ \rightarrow \hat{A}BF = 90^\circ - 41,4^\circ = 48,6^\circ$$

$$\sin 48,6^\circ = \frac{AF}{AB} = \frac{AF}{12} \rightarrow AF = 12 \sin 48,6^\circ \approx 12(0,75) \approx 9 \text{ cm}$$

26. 9 cm

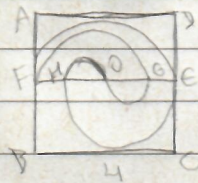
$$27. FH = GE; \quad HO = FO - FH = OE - GE = OG$$

Área do semicírculo de diâmetro HO é igual a de OG

" " " " " " FG e HO " " GO e HE

Tendo isso em mente, podemos desenhar a figura da seguinte

forma:



Logo, podemos calcular a área do  
semicírculo de diâmetro FE. Como  
FE vale 4, seu raio vale 2:

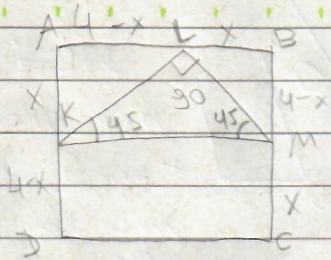
$$A = \frac{2^2 \pi}{2} \rightarrow A = \frac{4\pi}{2} \rightarrow A = 2\pi$$

$$27. A = 2\pi$$

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28.



$ABMK = CDKM$ , logo

$ABCD = ABMK + CDKM$

chamando  $ABMK + CDKM$  de  $2y$ :

$$2y = ABCD$$

$$y = \frac{4^2}{2}$$

Se o  $\Delta$  é isósceles então:

$KL = LM$ , então o ângulo  $y = \frac{16}{2}$

de  $BLM = \alpha$  de  $LKA$ , ou

mantendo uma congruência  $y = 8 \rightarrow CDKM = 8$

por LAA, tendo suas áreas

iguais. Nota-se a presença

de 2 trapézios ( $ABMK$  e  $CDKM$ ) com áreas:

(Considere:  $LB = MC = AK = x$  e  $AL = KD = BM = 4 - x$ )

$$ABMK \rightarrow \left[ \frac{(4-x) - x}{2} \right] \cdot 4 = 16$$

$$CDKM \rightarrow \left[ \frac{(4-x) + x}{2} \right] \cdot 4 = 16$$

$$ABMK = CDKM$$

28. (B) 8