

$$26. \quad \underline{2x^2 + x - 6} < 0$$

$$\Delta = b^2 - 4ac$$

$$\Delta = 1^2 - 4 \cdot 2 \cdot (-6)$$

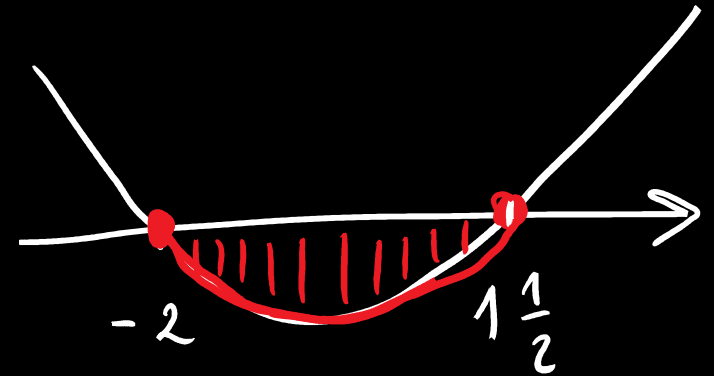
$$\Delta = 1 + 48$$

$$\Delta = 49$$

$$\sqrt{\Delta} = 7$$

$$x_1 = \frac{-b - \sqrt{\Delta}}{2a} = \frac{-1 - 7}{4} = \frac{-8}{4} = -2$$

$$x_2 = \frac{-b + \sqrt{\Delta}}{2a} = \frac{-1 + 7}{4} = \frac{6}{4} = \frac{3}{2} = 1\frac{1}{2}$$



$$x \in \left\langle -2, 1\frac{1}{2} \right\rangle \quad \text{1 plot}$$

1 plot

$$27 \quad (x^2 - 6) \cdot (3x + 2) = 0$$

$$\Downarrow \\ x^2 - 6 = 0$$

$$\Downarrow \\ 3x + 2 = 0$$

$$x^2 = 6 \quad \left| \sqrt{\quad} \right. \\ \left. \begin{array}{l} x = \sqrt{6} \\ x = -\sqrt{6} \end{array} \right.$$

$$3x = -2 \\ \left. x = -\frac{2}{3} \right.$$

$$\text{Odp: } x \in \left\{ -\sqrt{6}, \sqrt{6}, -\frac{2}{3} \right\} \quad \begin{array}{l} - \\ - \\ - \end{array}$$
$$x = \sqrt{6}, \quad x = -\sqrt{6}, \quad x = -\frac{2}{3} \quad \begin{array}{l} - \\ - \\ - \end{array}$$

$$28. \quad 4x + \frac{1}{x} \geq 4 \quad \boxed{x > 0}$$

$$4x + \frac{1}{x} - 4 \geq 0 \quad / \cdot x > 0$$

$$4x^2 + 1 - 4x \geq 0$$

$$4x^2 - 4x + 1 \geq 0$$

$a^2$

$b^2$

$a = 2x$

$b = 1$

$-2ab = -2 \cdot 2x \cdot 1 = -4x$

$$\boxed{(2x - 1)^2 \geq 0}$$

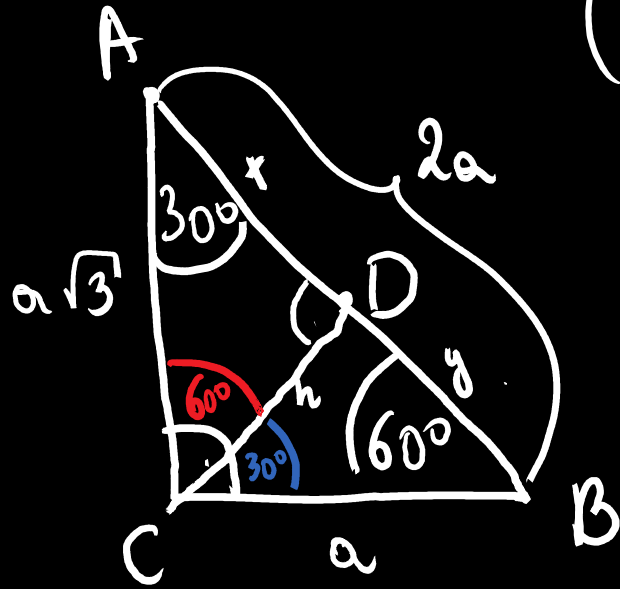
c. n. d.

$$a^2 \geq 0$$

$$(\quad)^2 \geq 0$$

$$(a - b)^2 = a^2 - \underbrace{2ab} + b^2$$

29.



$$\frac{(\text{?}) \cdot |AD|}{y \cdot |DB|} = \frac{3}{1}$$

~ - podobne  
 ≡ - przystające

W  $\triangle ACD$  miang kątów wynosi:  $30^\circ, 60^\circ, 90^\circ$

W  $\triangle BCD$  miang kątów wynosi:  $30^\circ, 60^\circ, 90^\circ$

W  $\triangle ABC$  — " — :  $30^\circ, 60^\circ, 90^\circ$

Więc  $\triangle ACD \sim \triangle BCD \sim \triangle ABC$

W  $\triangle ACD \sim \triangle ABC$

$$\frac{x}{a\sqrt{3}} = \frac{a\sqrt{3}}{2a} \quad / \cdot a\sqrt{3}$$

$$x = \frac{\sqrt{3}}{2} \cdot \frac{a\sqrt{3}}{1} = \frac{3a}{2}$$

W  $\triangle BCD \sim \triangle ABC$

$$\frac{y}{a} = \frac{a}{2a} \quad / \cdot a$$

$$y = \frac{1}{2}$$

$$\frac{(\text{?}) \cdot x}{y} = \frac{3}{1}$$

$$\frac{3}{2} \cdot \frac{3a}{2} = \frac{3}{1}$$

$$\frac{9a}{4} = \frac{3}{1}$$

$$\frac{9a}{4} \cdot \frac{4}{9} = \frac{3}{1} \cdot \frac{4}{9}$$

$$a = \frac{4}{3}$$

30.  $\{1, 2, 4, 5, 10\}$

4, 5  
5, 4

5/5  
5/5

2x pro 1 Linie  
2e zw.

$A = \{ \prod_{i=1}^2 \omega_i \in \emptyset \}$

$P(A) = ?$

$P(A) = \frac{|\bar{A}|}{|\Omega|}$

$$|\Omega| = \prod_{i=1}^2 5 = 25$$

$$P(A) = \frac{12}{25}$$

$A = \{ (1, 1), (2, 1), (2, 2), (4, 1), (4, 2), (4, 4), (5, 1), (5, 5), (10, 1), (10, 2), (10, 5), (10, 10) \}$

$$|\bar{A}| = 12$$

31.  $n \geq 1$   $a_n - u a_1$  arithm.

$$a_{21} + a_{24} + a_{27} + a_{30} = 100$$

$$a_1 + 20r + a_1 + 23r + a_1 + 26r + a_1 + 29r = 100$$

$$\boxed{4a_1 + 98r = 100} \quad /:2$$

$$\boxed{2a_1 + 49r = 50}$$

$$a_{25} + a_{26} = a_1 + 24r + a_1 + 25r =$$

$$= \boxed{2a_1 + 49r} = 50$$

$$\boxed{a_n = a_1 + (n-1) \cdot r}$$

$$a_{25} + a_{26} = ?$$

$$a_{21} = a_1 + 20r$$

$$a_{24} = a_1 + 23r$$

$$a_{27} = a_1 + 26r$$

$$a_{30} = a_1 + 29r$$

$$a_{25} = a_1 + 24r$$

$$a_{26} = a_1 + 25r$$

$$32. \quad f(x) = ax^2 + bx + c$$

$$x_1 = -2 \quad x_2 = 6$$

$$f(x) = a(x - x_1)(x - x_2)$$

$$A \begin{pmatrix} 1 & -5 \\ x & y=f(x) \end{pmatrix}$$

$$\underbrace{f_{\min}} = ?$$

$$f(x) = a(x+2)(x-6)$$

$$f(x) = \frac{1}{3}(x+2)(x-6) \quad f_{\min} = 9$$

$$-5 = a(1+2)(1-6) \quad | : (-15)$$

$$-5 = a \cdot \underbrace{3 \cdot (-5)}$$

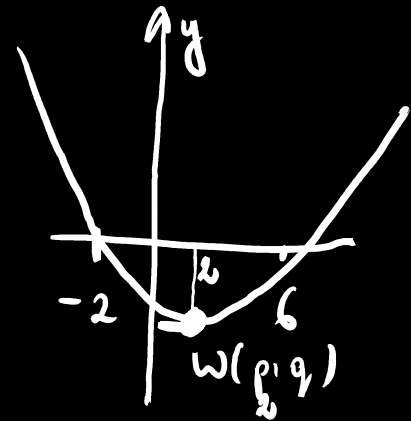
$$-5 = -15a \quad | : (-15)$$

$$9 = f(2) = \frac{1}{3} \cdot (2+2)(2-6)$$

$$9 = \frac{1}{3} \cdot 4 \cdot (-4) = -\frac{16}{3}$$

$$\frac{-5}{-15} = a$$

$$\boxed{a = \frac{1}{3}}$$



$C(0,0)$

$A$   $O_x$   
?

$B$   $O_y$   
?

$D(3,4)$   $h=5$

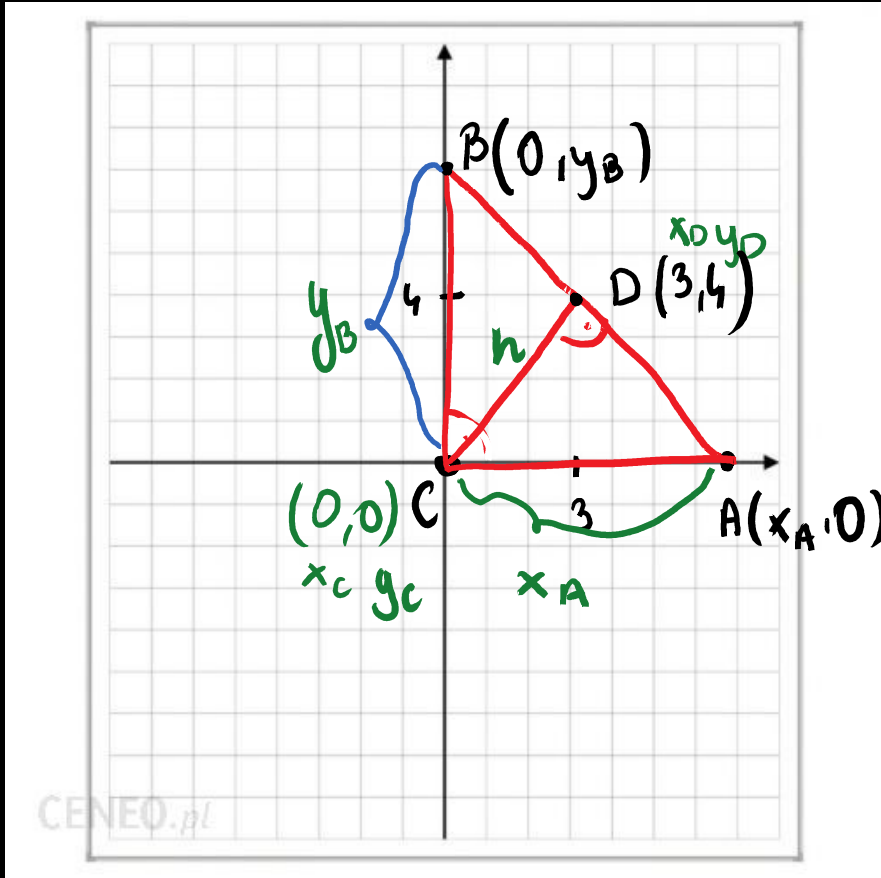
$|AB| = ?$

$$\begin{aligned} h &= |CD| = \sqrt{(x_D - x_C)^2 + (y_D - y_C)^2} = \\ &= \sqrt{(3 - 0)^2 + (4 - 0)^2} = \sqrt{9 + 16} = \\ &= \sqrt{25} = 5 \end{aligned}$$

$$P = \frac{1}{2} x_A \cdot y_B$$

$$P = \frac{1}{2} |AB| \cdot h$$

$$\begin{aligned} |AB| &= \sqrt{(x_B - x_A)^2 + (y_B - y_A)^2} = \sqrt{(0 - x_A)^2 + (y_B - 0)^2} = \\ &= \sqrt{x_A^2 + y_B^2} \end{aligned}$$





$$AB: \quad 4 = -\frac{3}{4} \cdot 3 + b$$

$$\text{podst. D} \quad 4 = -\frac{3}{4} + b$$

$$4 + 2\frac{1}{4} = b \quad y_B = 6\frac{1}{4}$$

$$6\frac{1}{4} = b$$

$$h = 5$$

$$B(0, 6\frac{1}{4})$$

$$|AB| = \sqrt{x_A^2 + y_B^2}$$

2 Pit

$$x_A^2 + \left(\frac{25}{4}\right)^2 = \sqrt{x_A^2 + \left(\frac{25}{4}\right)^2}$$

CD

$$y = ax + b$$

$$0 = 0 \cdot a + b$$

$$0 = b$$

$$4 = a \cdot 3 + b$$

$$4 = 3a + 0$$

$$\frac{4}{3} = a_1$$

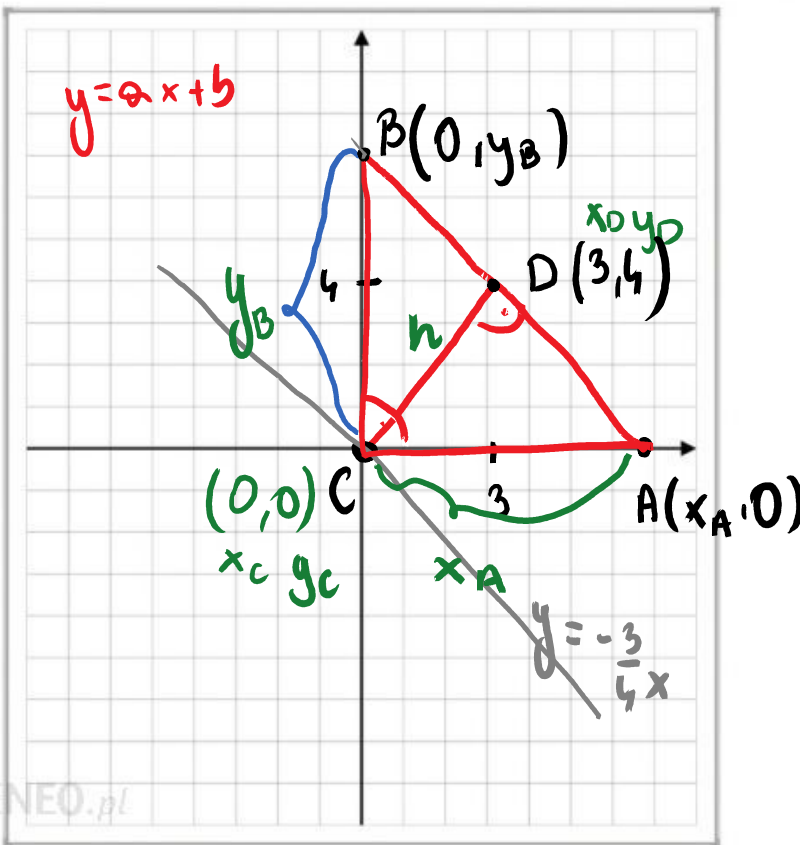
$$k \perp l \quad a_1 \cdot a_2 = -1$$

$$AB: \quad \frac{4}{3} \cdot a_2 = -1 \quad \cdot \frac{3}{4}$$

$$a_2 = -\frac{3}{4}$$

$$y = -\frac{3}{4}x + b$$

$$y = -\frac{3}{4}x + \underbrace{y_B}_b$$



$$AB: \quad 4 = -\frac{3}{4} \cdot 3 + b$$

$$\text{podst. D} \quad 4 = -\frac{3}{4} + b$$

$$4 + 2\frac{1}{4} = b \quad y_B = 6\frac{1}{4}$$

$$6\frac{1}{4} = b$$

$$h = 5$$

$$B(0, 6\frac{1}{4})$$

$$A(8\frac{1}{3}, 0)$$

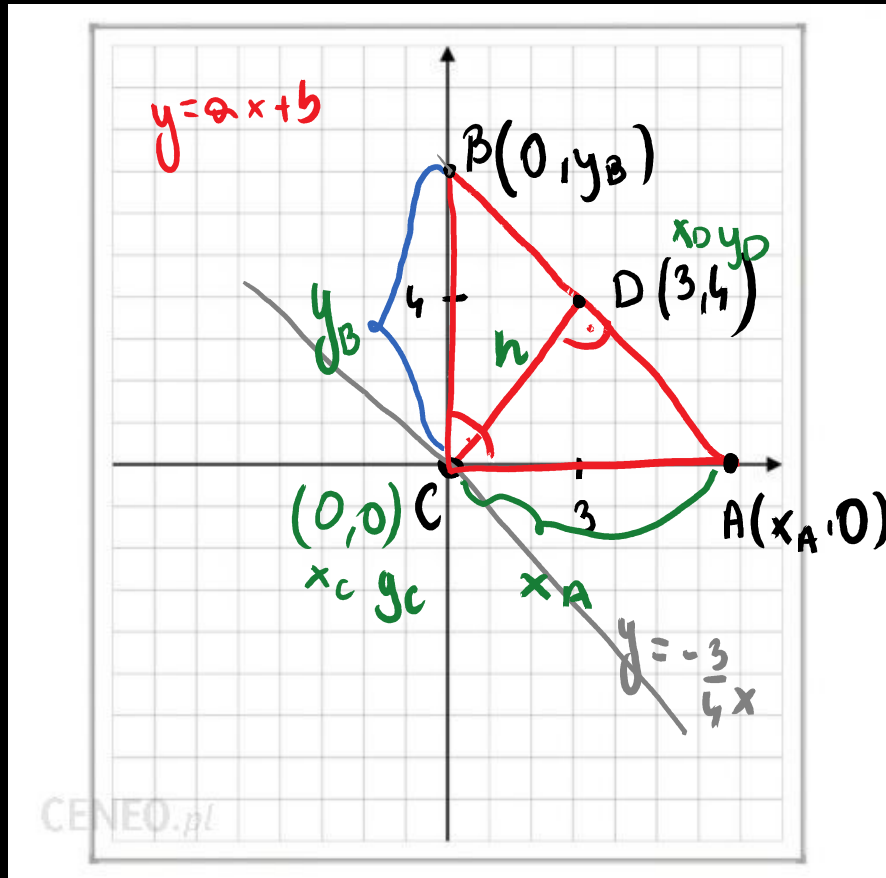
$$|AB| = \sqrt{x_A^2 + y_B^2}$$

$$|AB| = \sqrt{\left(\frac{25}{3}\right)^2 + \left(\frac{25}{4}\right)^2}$$

$$|AB| = \sqrt{\frac{625 \cdot 16}{9 \cdot 16} + \frac{625 \cdot 9}{16 \cdot 9}} = \sqrt{\frac{16 \cdot 625 + 9 \cdot 625}{9 \cdot 16}}$$

$$= \sqrt{\frac{25 \cdot 625}{9 \cdot 16}} = \frac{5 \cdot 25}{3 \cdot 4} = \frac{125}{12}$$

$$= 10\frac{5}{12}$$



$$\frac{1}{2} x_A \cdot y_B = \frac{1}{2} |AB| \cdot h$$

$$\frac{1}{2} x_A \cdot \frac{25}{4} = \frac{1}{2} \sqrt{x_A^2 + y_B^2} \cdot 5$$

$$\frac{25}{4} x_A = 5 \sqrt{x_A^2 + \left(\frac{25}{4}\right)^2} \quad / ( )^2$$

$$\left(\frac{25}{4}\right)^2 x_A^2 = 25 \left(x_A^2 + \left(\frac{25}{4}\right)^2\right)$$

$$\frac{625}{16} x_A^2 = 25 x_A^2 + 25 \cdot \frac{625}{16}$$

$$39 \frac{1}{16} x_A^2 - 25 x_A^2 = 25 \cdot \frac{625}{16}$$

$$14 \frac{1}{16} x_A^2 = 25 \cdot \frac{625}{16}$$

$$\frac{225}{16} x_A^2 = 25 \cdot \frac{625}{16} \quad / \cdot \frac{16}{225}$$

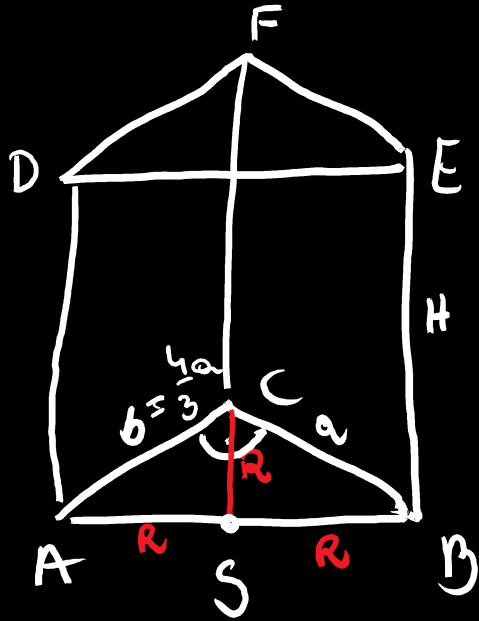
$$x_A^2 = \cancel{25} \cdot \frac{625}{\cancel{16}} \cdot \frac{\cancel{16}}{\cancel{225}} \quad \uparrow \quad \uparrow$$

$$x_A^2 = \frac{625}{9} \quad / \sqrt{\quad}$$

$$x_A = \frac{25}{3} = 8 \frac{1}{3}$$

A (

34



$$\frac{b}{a} = \frac{|AC|}{|BC|} = \frac{4}{3} / \cdot a$$

$$b = \frac{4}{3} a$$

2 tw. pit.

$$a^2 + \left(\frac{4}{3}a\right)^2 = 10^2$$

$$\frac{9}{9}a^2 + \frac{16}{9}a^2 = 100$$

$$\frac{25}{9}a^2 = 100 \quad / \cdot \frac{9}{25}$$

$$a^2 = \frac{100 \cdot 9}{25}$$

$$a^2 = 36 \quad a = 6$$

$$|CS| = 5$$

$$P_{BEFC} = 48$$

$$V = ? \quad V = P_p \cdot H$$

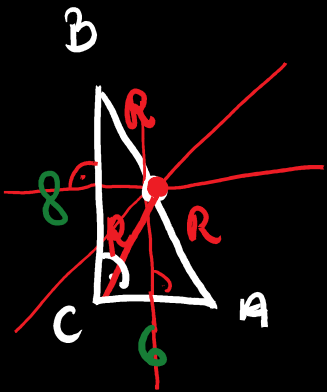
$$P_{BEFC} = a \cdot H$$

$$48 = 6 \cdot H \quad / : 6$$

$$8 = H$$

$$b = \frac{4}{3}a = \frac{4}{3} \cdot 6 = 8$$

$$V = \frac{1}{2} \cdot 6 \cdot 8 \cdot 8 = 3 \cdot 64 = 192$$



$$1. \quad a = -2 \quad b = 3$$

$$a^b - b^a = (-2)^3 - \left(\frac{3}{1}\right)^{-2} = -8 - \left(\frac{1}{3}\right)^2 = -8 - \frac{1}{9} = -8\frac{1}{9} = -\frac{73}{9}$$

$$2 \quad 9^9 \cdot 81^2 = 9^9 \cdot (9^2)^2 = 9^9 \cdot 9^4 = 9^{13}$$

$$\boxed{9^{13}} = \left( \underbrace{81^{\frac{1}{2}}}_{\boxed{13}} \right)^{\boxed{13}} = 81^{\frac{13}{2}} = 81^{6\frac{1}{2}}$$

$$3. \log_4 8 + 5 \log_4 2 =$$

$$= \log_4 8 + \log_4 2^5 =$$

$$= \log_4 8 + \log_4 32 =$$

$$= \log_4 8 \cdot 32 = \log_4 4 \cdot \underline{2} \cdot \underline{16} \cdot \underline{2} = \log_4 4^1 \cdot 4^1 \cdot 4^2 =$$

$$= \log_4 4^4 = 4$$

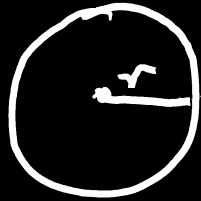
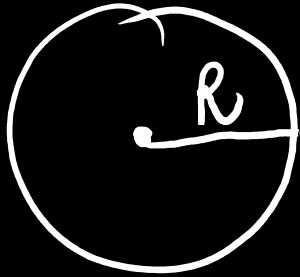
$$4^? = 4^4$$

$$\log_a a^b = b$$

$$n \log_a b = \log_a b^n$$

$$\log_a b + \log_a c = \log_a b \cdot c$$

4



$$R = 1r + \underbrace{30\%}_{} r$$

$$R = 1,3r$$

$$P_1 = \pi R^2$$

$$P_1 = \pi \cdot (1,3r)^2$$

$$P_1 = \pi \cdot 1,69r^2$$

$$\begin{aligned} P_1 - P_2 &= 1,69\pi r^2 - 1\pi r^2 = \\ &= 0,69\pi r^2 \end{aligned}$$

o 69% wiewise

$$P_2 = \pi r^2 - 100\%$$



5.

$$(2\sqrt{7} - 5)^2 \cdot (2\sqrt{7} + 5)^2 =$$

$$a^n \cdot b^n = (a \cdot b)^n$$

$$= \left[ (2\sqrt{7} - 5) \cdot (2\sqrt{7} + 5) \right]^2 =$$

$$(a-b)(a+b) = a^2 - b^2$$

$$= \left[ (2\sqrt{7})^2 - 5^2 \right]^2 =$$

$$= \left[ 4 \cdot 7 - 25 \right]^2 = \left[ 28 - 25 \right]^2 = 3^2 = 9$$

6

$$11 \leq 2x - 7 \leq 15$$

$$11 \leq 2x - 7$$

$$11 + 7 \leq 2x$$

$$18 \leq 2x \quad | : 2$$

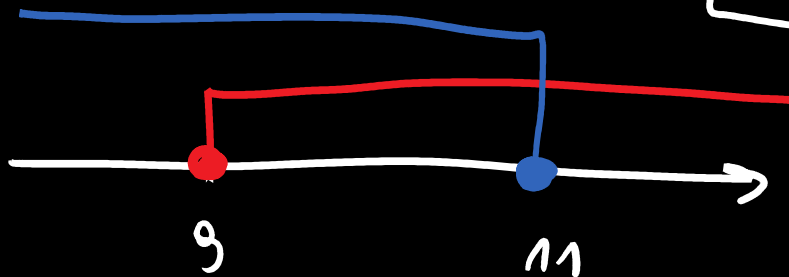
$$9 \leq x$$

$$2x - 7 \leq 15$$

$$2x \leq 15 + 7$$

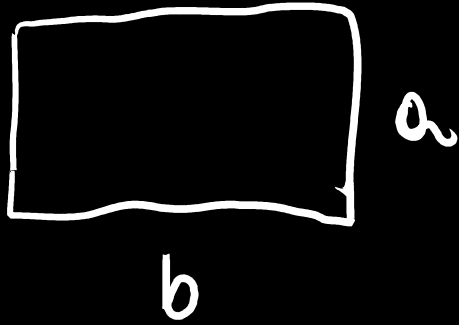
$$2x \leq 22 \quad | : 2$$

$$x \leq 11$$



$$x \in \langle 9, 11 \rangle$$

7.



$$Obw = 60$$

$$b = a + 10$$

$$2a + 2b = 60$$

$$2(a + b) = 60$$

$$8. \quad \frac{x+1}{x+2} = 3 \quad / \cdot (x+2) \quad x \neq -2 \quad x+2 \neq 0$$

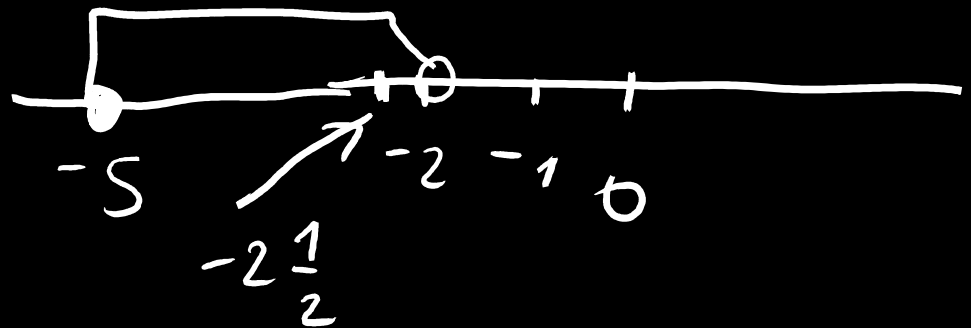
$$x+1 = 3(x+2)$$

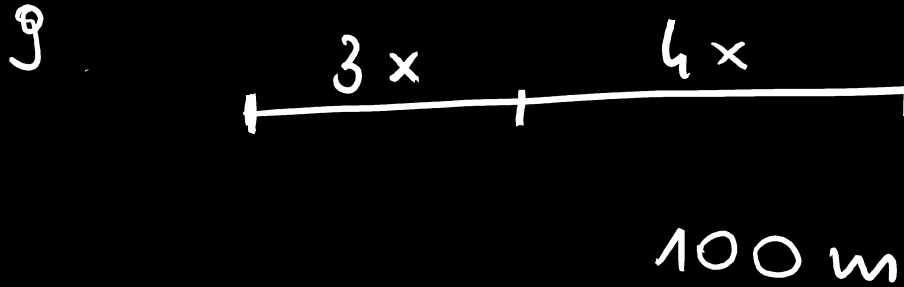
$$x+1 = 3x+6$$

$$x-3x = 5$$

$$-2x = 5 \quad / : (-2)$$

$$x = -\frac{5}{2} = -2\frac{1}{2}$$





$$3 : 4 : 5$$

$$12x = 100 \quad /: 12$$

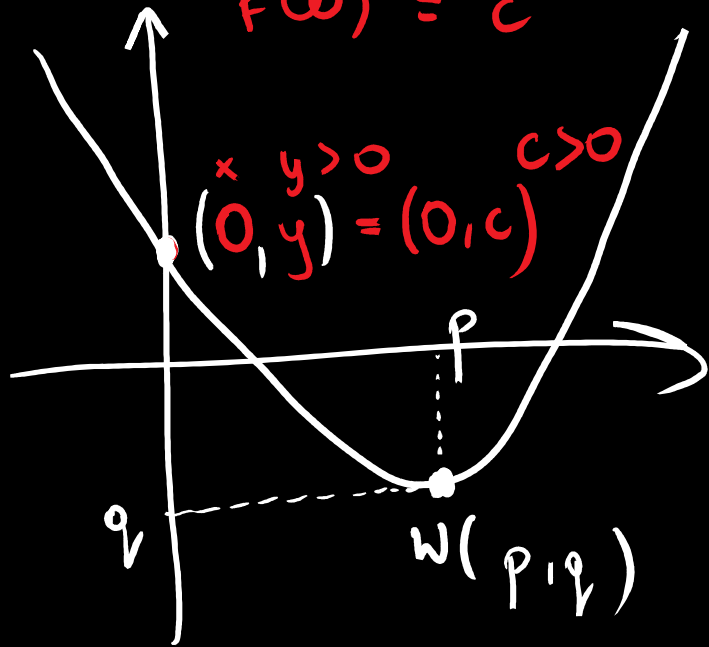
$$x = 8\frac{1}{3}$$

$$5x = 5 \cdot \frac{25}{3} = \frac{125}{3} = 41\frac{2}{3} \text{ m}$$

10.  $f(x) = x^2 + bx + c$

$f(0) = 0^2 + b \cdot 0 + c$

$f(0) = c$



(A)

$c > 0$

$a = 1$

$c \neq 0$

$p = -\frac{b}{2a}$

$p > 0$

$p = -\frac{b}{2 \cdot 1}$

$0 < p = -\frac{b}{2}$

$b < 0$

$-\frac{b}{2} > 0$

$-b > 0 \quad | \cdot (-1)$

$b < 0$

$$11. \quad a_1 = 2 \quad a_2 = 9$$

$$a_1 + r = a_2$$

$$r = a_2 - a_1 = 9 - 2 = 7$$

$$a_n = 2 + (n-1) \cdot 7$$

$$a_n = 2 + 7n - 7$$

$$a_n = 7n - 5$$

$$79 = 7n - 5$$

$$79 + 5 = 7n$$

$$84 = 7n \quad | :7$$

$$\underline{12 = n}$$

$$a_n = 79 \quad n = ?$$

$$a_n = a_1 + (n-1) \cdot r$$

$$a_{12} = 79$$

12

$$\underline{81}, \quad \underline{3x}, \quad \underline{4}$$

$$(3x)^2 = \overset{18}{81} \cdot 4$$

$$9x^2 = 81 \cdot 4 \quad / : 9$$

$$x^2 = 9 \cdot 4$$

$$x^2 = 36$$

$$x = 6 \quad \text{and} \quad x = -6$$

$$a_n^2 = a_{n-1} \cdot a_{n+1}$$



$$13. \quad \sin \alpha = \frac{2\sqrt{6}}{7}$$

$$\sin^2 \alpha + \cos^2 \alpha = 1$$

$$\left(\frac{2\sqrt{6}}{7}\right)^2 + \cos^2 \alpha = 1$$

$$\frac{4 \cdot 6}{49} + \cos^2 \alpha = 1$$

$$\cos^2 \alpha = 1 - \frac{24}{49}$$

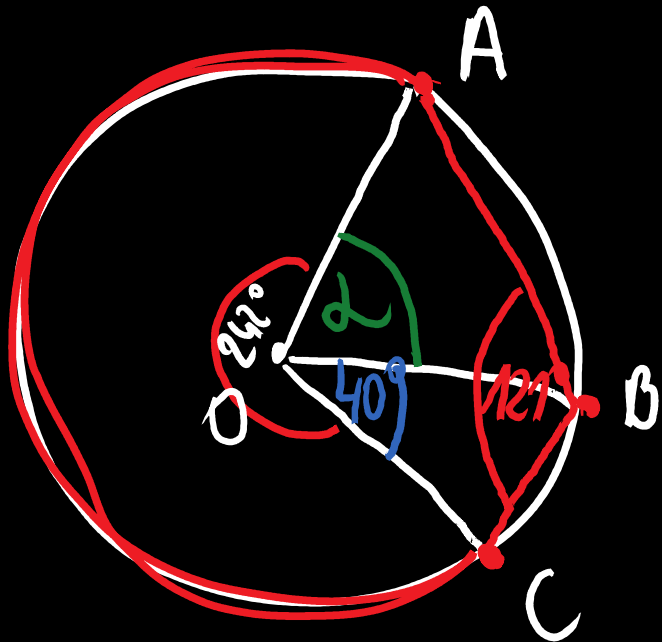
$$\cos^2 \alpha = \frac{49}{49} - \frac{24}{49}$$

$$\cos^2 \alpha = \frac{25}{49} \quad / \sqrt{\quad}$$

$$\cos \alpha = \frac{5}{7} \quad \text{but } \cos \alpha = -\frac{5}{7}$$

$$\alpha \in \left[ \frac{\pi}{2}, \pi \right] \quad \text{cw}$$

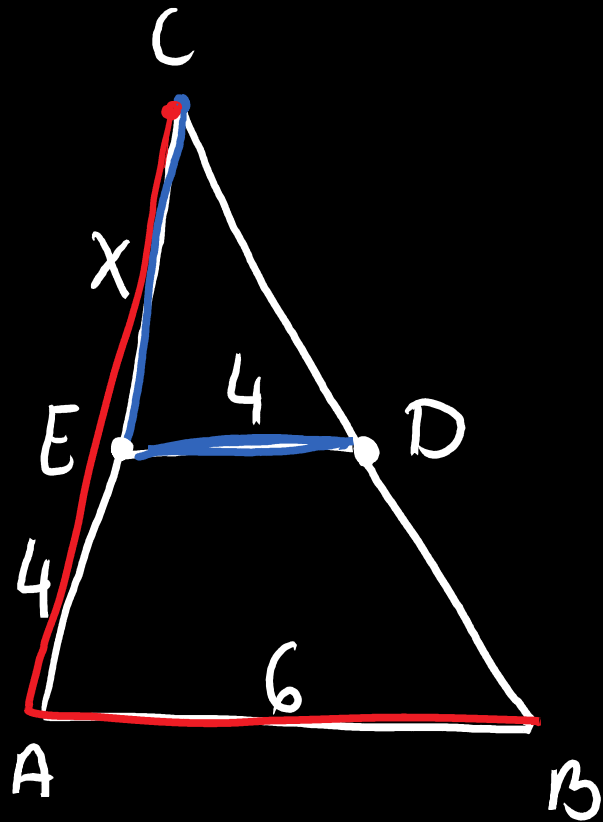
14.



$$\alpha = ?$$

$$\alpha = 360^\circ - 242^\circ - 40^\circ = 78^\circ$$

15.



$AB \parallel ED$

$$\frac{x}{4} = \frac{x+4}{6}$$

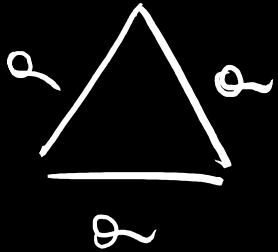
$$6x = 4(x+4)$$

$$6x = 4x + 16$$

$$2x = 16$$

$$x = 8$$

$$16. \quad P = 6\sqrt{3}$$



$$a = ?$$

$$P = \frac{a^2\sqrt{3}}{4}$$

$$6\sqrt{3} = \frac{a^2\sqrt{3}}{4} \quad | \cdot 4$$

$$24\sqrt{3} = a^2\sqrt{3} \quad | : \sqrt{3}$$

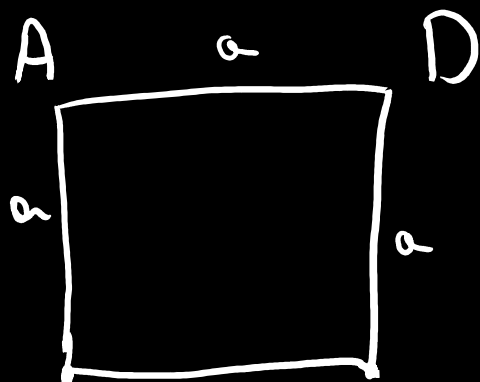
$$24 = a^2 \quad | \sqrt{\quad}$$

$$\sqrt{24} = a$$

$$a = \sqrt{4 \cdot 6} = 2\sqrt{6}$$

©

17.



$$B \begin{pmatrix} -2 \\ 4 \end{pmatrix} \quad C \begin{pmatrix} 5 \\ 1 \end{pmatrix}$$

$x_B$   $y_B$        $x_C$   $y_C$

$$P = a^2$$

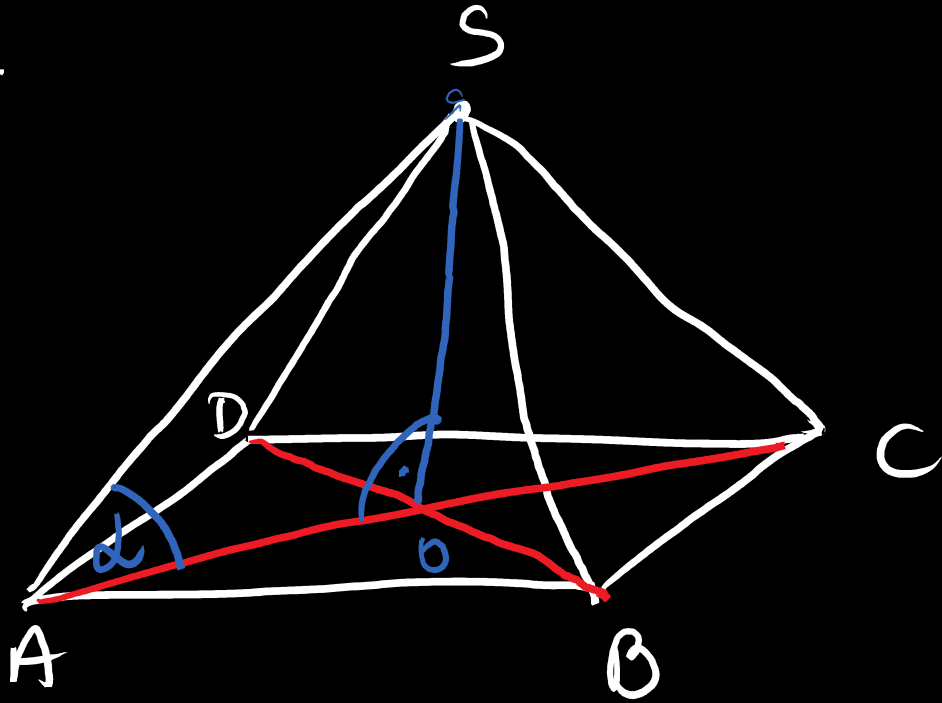
$$P = \sqrt{58}^2 = 58$$

$$a = |BC| = \sqrt{(x_C - x_B)^2 + (y_C - y_B)^2} = \sqrt{(5 + 2)^2 + (1 - 4)^2} =$$

$$= \sqrt{7^2 + (-3)^2} = \sqrt{49 + 9} = \sqrt{58}$$

©

18.



SA

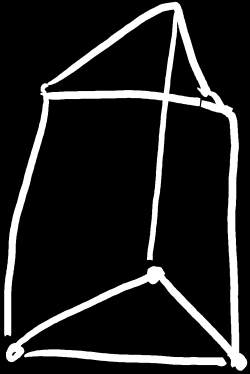
ABCD

~~SAO~~

13.

$$w = 14$$

$$k = ?$$



$$w = \underbrace{3} \cdot 2$$

$$k = \underbrace{3} \cdot 3$$

$$14 = n \cdot 2$$

$$n = 7$$

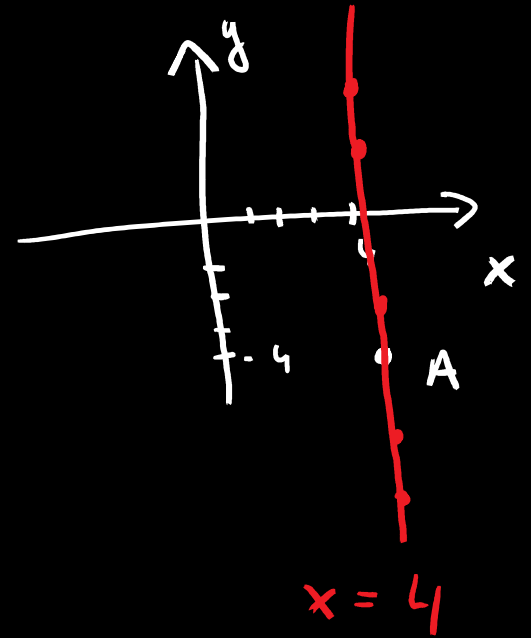
$$k = 7 \cdot 3 = 21$$

$$20. \quad A(4, -4)$$

$$k \perp OX$$

$$x = 4$$

$$x - 4 = 0$$





$$21. \quad l \quad \text{OX } \alpha = 30^\circ$$

$$\left( 0, -\sqrt{3} \right)$$

$$l: y = ax + b$$

$\implies$

$$l: y = \frac{\sqrt{3}}{3}x + b$$

$$a = \operatorname{tg} \alpha$$

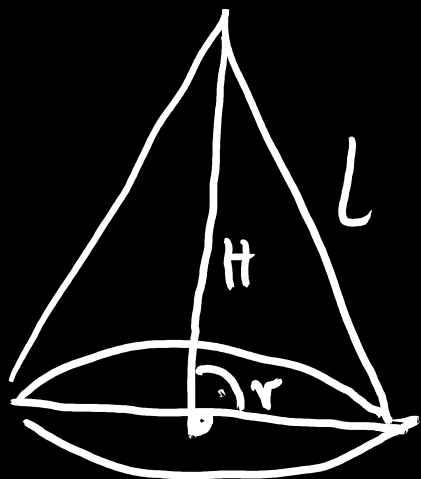
$$-\sqrt{3} = \frac{\sqrt{3}}{3} \cdot 0 + b$$

$$a = \operatorname{tg} 30^\circ = \frac{\sqrt{3}}{3}$$

$$-\sqrt{3} = b$$

$$l: y = \frac{\sqrt{3}}{3}x - \sqrt{3}$$

22.



$$H = 6$$

$$L = 3\sqrt{5}$$

$$V = \frac{1}{3} P_p \cdot H = \frac{1}{3} \cdot \pi r^2 \cdot H =$$

$$= \frac{1}{3} \cdot \pi \cdot 3^2 \cdot 6 =$$

$$= 18\pi$$

$$H^2 + r^2 = L^2$$

$$6^2 + r^2 = (3\sqrt{5})^2$$

$$36 + r^2 = 9 \cdot 5$$

$$r^2 = 45 - 36$$

$$r^2 = 9$$

$$r = 3$$

23.  $x, 2, 4, 6, \underline{8}, \underline{10}, 12, 14, 16$

$\bar{x} = 9 \rightarrow \bar{x} = \frac{x+2+4+6+8+10+12+14}{8}$

mediana =  
 $= \frac{8+10}{2} = 9$

$9 = \frac{x+56}{8} \quad | \cdot 8$

$72 = x + 56$

$72 - 56 = x$

$16 = x$

$$24 \cdot X < 2017$$

cyfra

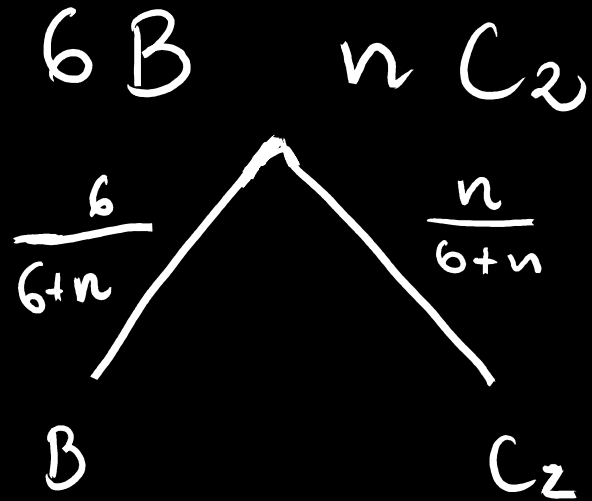
$$\frac{1}{\boxed{1}} \cdot \frac{10}{\boxed{0}} \cdot \frac{10}{\boxed{0}} \cdot \frac{10}{\boxed{0}} = 1000 +$$

$$\boxed{1017}$$

$$\frac{1}{\boxed{2}} \cdot \frac{1}{\boxed{0}} \cdot \frac{1}{\boxed{0}} \cdot \frac{10}{\boxed{0-10}} = 10 +$$

$$\frac{1}{\boxed{2}} \cdot \frac{1}{\boxed{0}} \cdot \frac{1}{\boxed{1}} \cdot \frac{7}{\boxed{0-6}} = 7$$

25.



1 kula

$$P(B) = \frac{1}{3}$$

$$n = ?$$

$$\frac{6}{6+n} = \frac{1}{3}$$

$$6+n = 18$$

$$n = 12$$