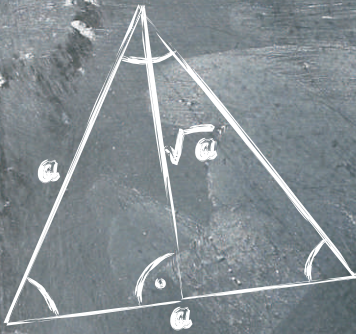


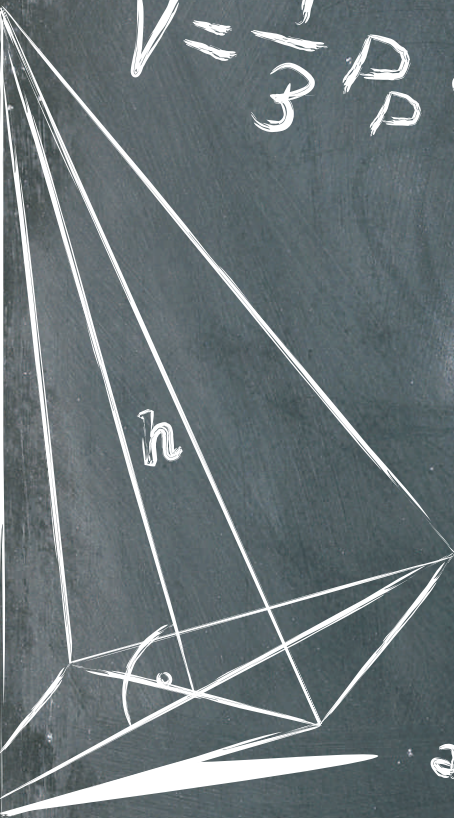
# ZESTAW WZORÓW

## DO EGZAMINU

## GIAMNAZJALNEGO



$$V = \frac{1}{3} P_p \cdot h$$

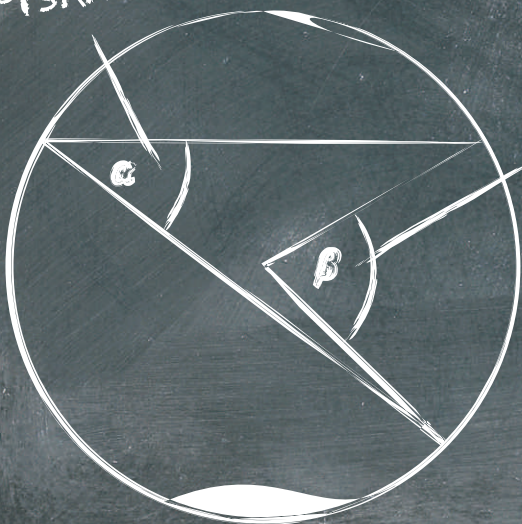


$$\alpha = \gamma$$

$$a = \sqrt{c^2 - b^2}$$

$$b = \sqrt{c^2 - a^2}$$

WPISANY



SPRODKOWY

$$\frac{\angle AB}{2\pi r} = \frac{\alpha}{360^\circ}$$

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## ZESTAW WZORÓW DO EGZAMINU GIMNAZJALNEGO

### PROCENTY, PROMILE

Ile wynosi  $p$  procent liczby  $a$  ?

1% liczby 50 wynosi

$$p\% \cdot a = \frac{p}{100} \cdot a$$

$$\frac{1}{100} \cdot 50 = 0,5$$

---

Ile wynosi  $p$  promili liczby  $a$  ?

1‰ liczby 50 wynosi

$$p\text{‰} \cdot a = \frac{p}{1000} \cdot a$$

$$\frac{1}{1000} \cdot 50 = 0,05$$

---

Jaka jest liczba  $a$ , której  $p\%$  jest równe  $b$  ?

0,3% liczby  $a$  jest 60, to

$$a = \frac{b \cdot 100}{p}$$

$$a = \frac{60 \cdot 100}{0,3} = 20000$$

---

Ile procent liczby  $a$  stanowi  $b$  ?

Ile procent liczby 60 stanowi 20?

$$p\% = \frac{b}{a} \cdot 100\%$$

$$60 - 100\%$$

$$\frac{20 - p\%}{100}$$

$$p\% = \frac{20}{60} \cdot 100\% = 33\frac{1}{3}\%$$

---

### TROCHĘ O POTĘGACH

$0^0$  nie istnieje!

$$a^n \cdot b^n = (a \cdot b)^n ; \quad a^n : b^n = \left(\frac{a}{b}\right)^n ; \quad a^{-n} = \left(\frac{1}{a}\right)^n$$

$$\left(\frac{1}{2}\right)^{-3} = 2^3$$

$$(a^n)^m = a^{n \cdot m} ; \quad a^n \cdot a^m = a^{n+m}$$

$$a^n : a^m = a^{n-m}$$

$$10^{-3} \cdot 10^3 = 10^{-3+3} = 1$$

uwaga we wzorach:  $a \neq 0$  i  $b \neq 0$

---

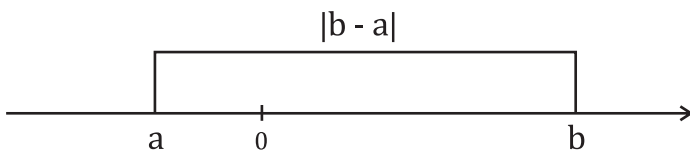
## WARTOŚĆ BEZWZGLĘDNA - MODUŁ



$|x|$  to odległość liczby  $x$  od zera

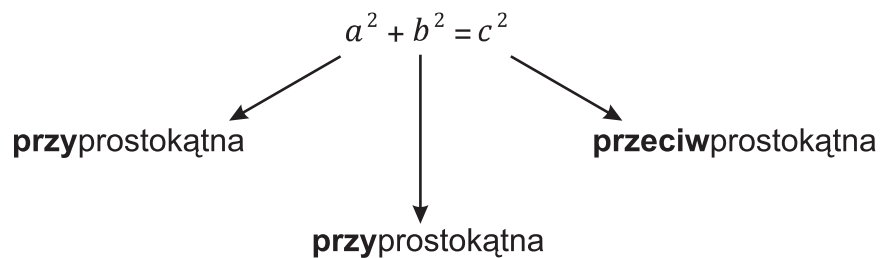
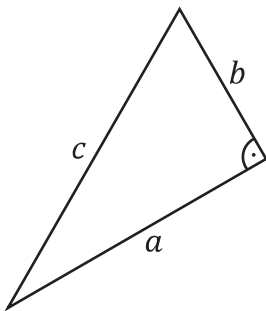
$$|x| = \begin{cases} x & x \geq 0 \\ -x & x < 0 \end{cases}$$

$$|5| = |-5| = 5$$



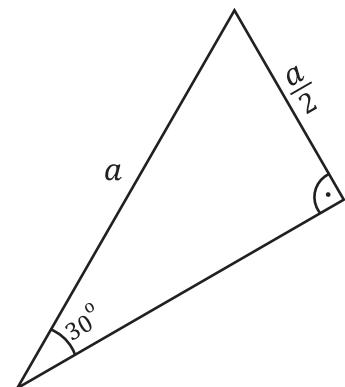
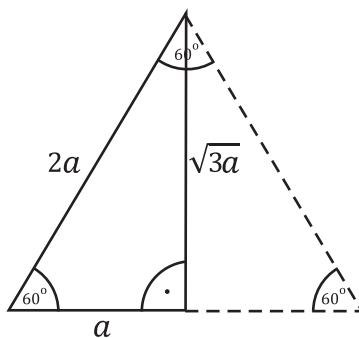
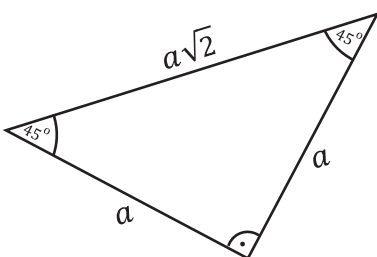
$|b - a|$  to odległość liczb  $a$  i  $b$

## PITAGORAS

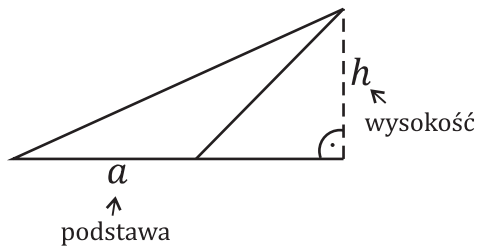


$$a = \sqrt{c^2 - b^2}$$

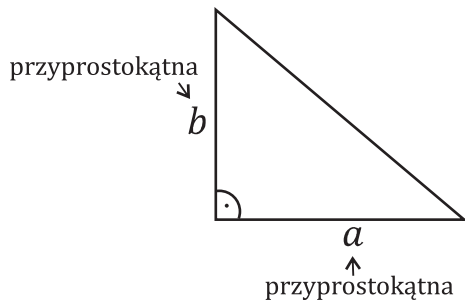
$$b = \sqrt{c^2 - a^2}$$



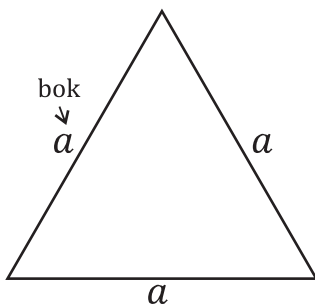
## POLE TRÓJKĄTA



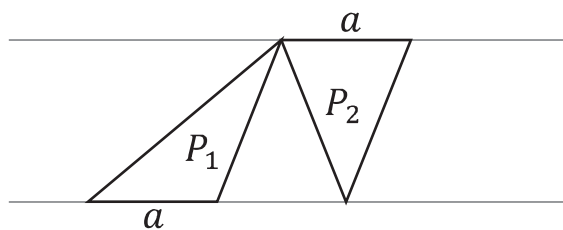
$$P = \frac{1}{2}ah$$



$$P = \frac{1}{2}ab$$

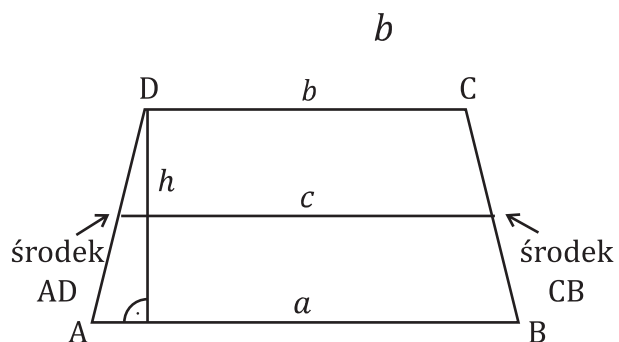


$$P = \frac{a^2\sqrt{3}}{4}$$



$$P_1 = P_2$$

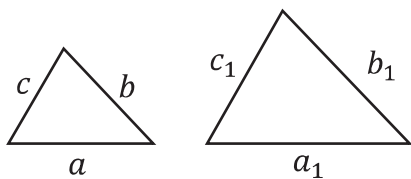
## TRAPEZ



$$a \parallel b, \text{ to } c = \frac{a+b}{2}$$

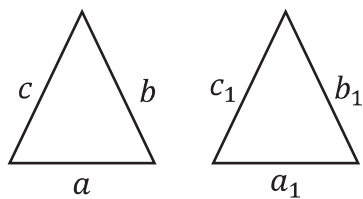
$$P = \frac{a+b}{2} \cdot h$$

## TRÓJKĄTY PODOBNE I PRZYSTAJĄCE



Podobne

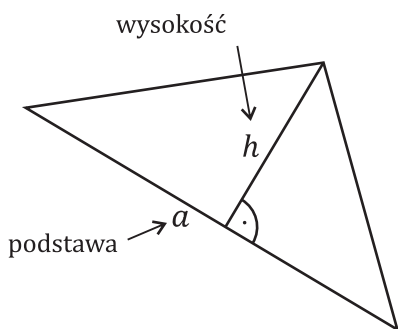
$$\frac{a_1}{a} = \frac{b_1}{b} = \frac{c_1}{c}$$



Przystające

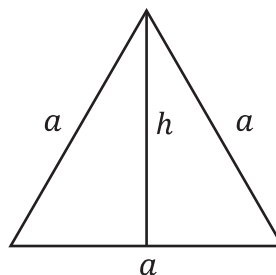
$$a_1 = a \text{ i } b_1 = b \text{ i } c_1 = c$$

## WYSOKOŚĆ TRÓJKĄTA



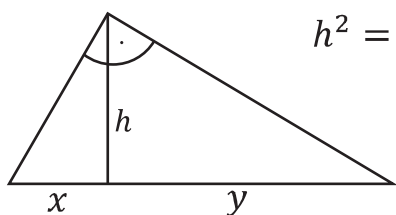
$$h = \frac{2 \cdot P}{a}$$

$P$  - pole

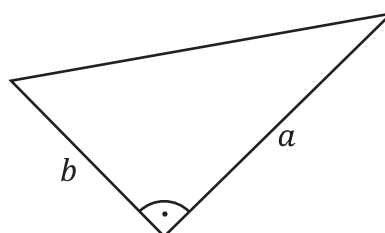


$$h = \frac{a\sqrt{3}}{2}$$

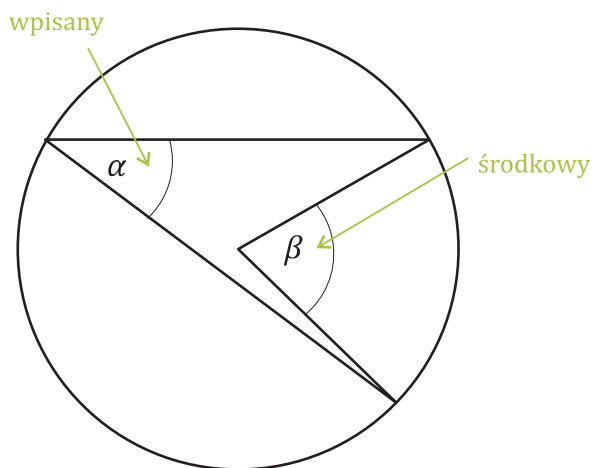
$$h = a \text{ lub } h = b$$



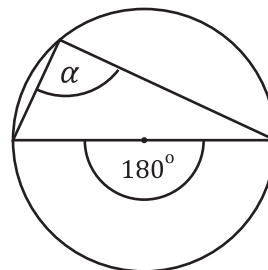
$$h^2 = x \cdot y$$



## KĄT ŚRODKOWY I KĄT WPISANY

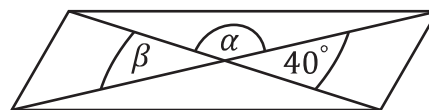
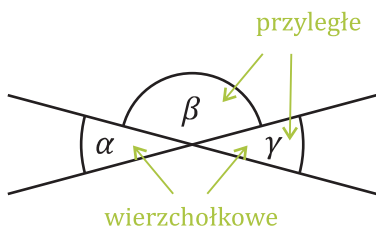


$$\beta = 2\alpha$$



$$\alpha = \frac{1}{2} \cdot 180^\circ = 90^\circ$$

## KĄTY PRZYLEGŁE I WIERZCHOŁKOWE



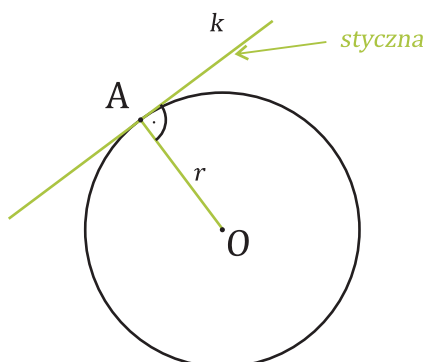
Wierzchołkowe  $\alpha = \gamma$

Przyległe  $\alpha + \beta = 180^\circ$

$$\beta = 40^\circ$$

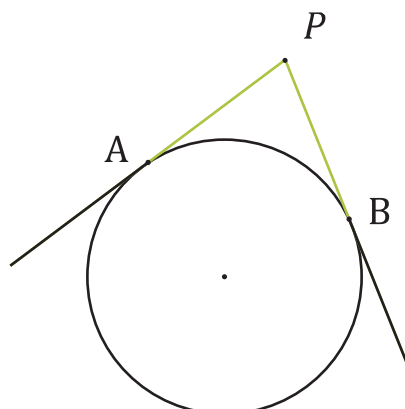
$$\alpha = 180^\circ - 40^\circ = 140^\circ$$

## STYCZNA



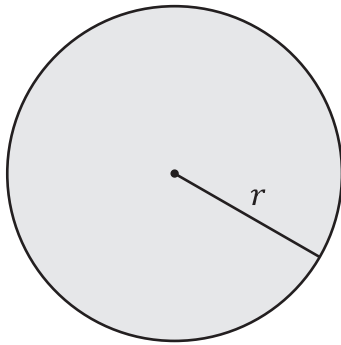
$$OA \perp k$$

$$|AO| = r$$

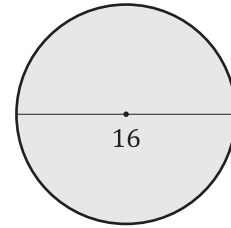


$$|PA| = |PB|$$

## POLE KOŁA

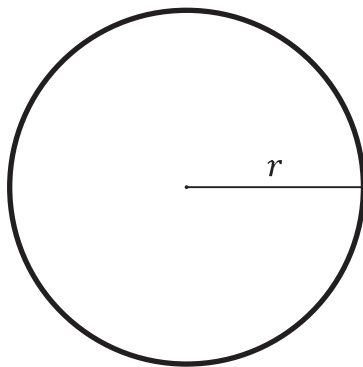


$$P = \pi r^2$$

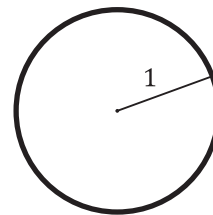


$$2r = 16 \quad r = 8 \quad P = 64\pi$$

## DŁUGOŚĆ OKRĘGU



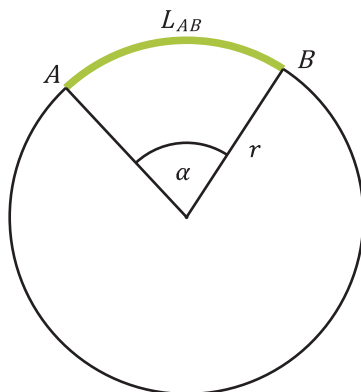
$$L = 2\pi r$$



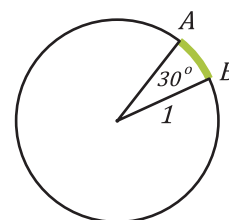
$$L = 2\pi \approx 6,28$$

$L$  - długość okręgu, obwód koła

## DŁUGOŚĆ ŁUKU OKRĘGU



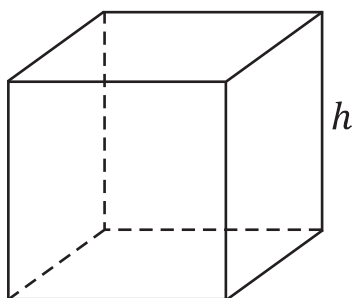
$$\frac{L_{AB}}{2\pi r} = \frac{\alpha}{360^\circ}$$



$$L_{AB} = \frac{30^\circ \cdot 2\pi}{360^\circ} \approx 0,52$$

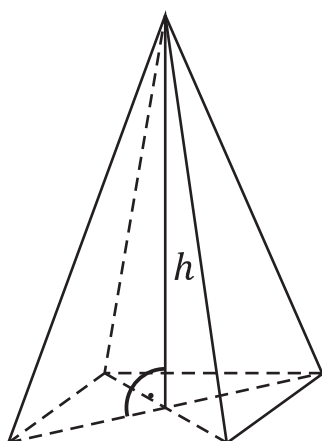


## OBJĘTOŚĆ BRYŁ (GRANIASTOSŁUP, OSTROŚLUP)



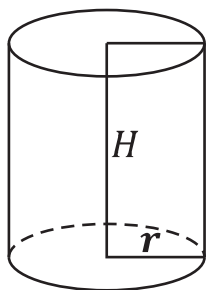
$$V = P_p \cdot h$$

$P_p$  - pole podstawy

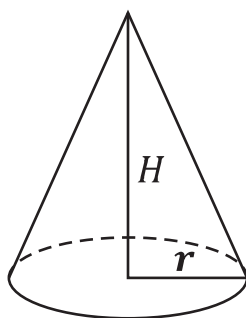


$$V = \frac{1}{3} P_p \cdot h$$

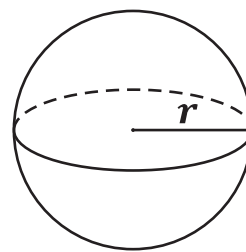
## BRYŁY OBROTOWE (WALEC, STOŻEK, KULA)



$$V = \pi \cdot r^2 \cdot H$$

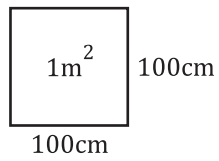


$$V = \frac{1}{3} \cdot \pi \cdot r^2 \cdot H$$

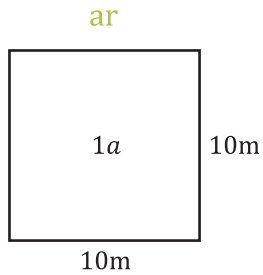


$$V = \frac{4}{3} \cdot \pi \cdot r^3$$

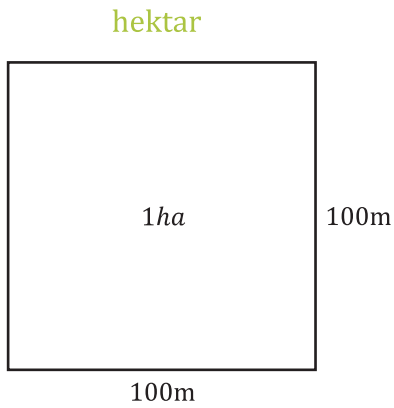
## JEDNOSTKI POLA



$$1m^2 = 10000cm^2$$

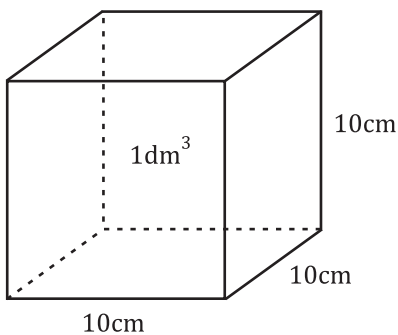


$$1a = 100m^2$$



$$1ha = 100a$$

## JEDNOSTKI OBJĘTOŚCI I POJEMNOŚCI



$$1dm^3 = 1000cm^3$$

$$1m^3 = 1000000cm^3$$

litr → 1l = 1dm<sup>3</sup>

hektolitr → 1hl = 100dm<sup>3</sup>

mililitr → 1ml = 0,001dm<sup>3</sup>

## ŚREDNIA

Dane:  $x_1, x_2, \dots, x_n$

2, 7, 13, 1

$$\bar{x} = \frac{x_1 + x_2 + \dots + x_n}{n}$$

$$\bar{x} = \frac{2 + 7 + 13 + 1}{4} = 5,75$$

## MEDIANA

Zestaw danych zawsze uporządkowany

$n$  – nieparzyste

$$\underbrace{x_1, \dots, x_{k-1}}_{k-1 \text{ danych}}, \underbrace{x_k, \dots, x_n}_{k-1 \text{ danych}}$$

$$M_e = x_k$$

$$1, 2, \underbrace{3\frac{1}{2}}_{3 \text{ dane}}, 16, \underbrace{18, 20, 50}_{3 \text{ dane}}$$

$$M_e = 16$$

$n$  – parzyste

$$\underbrace{x_1, \dots, x_{k-1}}_{k-1 \text{ danych}}, \underbrace{x_k, x_{k+1}, \dots, x_n}_{k-1 \text{ danych}}$$

$$M_e = \frac{x_k + x_{k+1}}{2}$$

$$1, 2, \underbrace{3\frac{1}{2}}_{3 \text{ dane}}, 16, 18, \underbrace{20, 50, 51}_{3 \text{ dane}}$$

$$M_e = \frac{16 + 18}{2} = 17$$