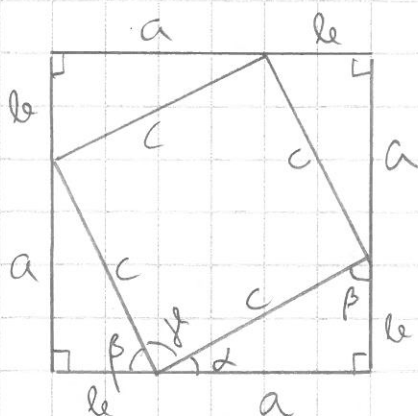


Pythagoraan lauseen todistus (kirja s. 60)



$$\alpha + \beta + 90^\circ = 180^\circ \quad (\Rightarrow) \alpha + \beta = 90^\circ$$

$$\underbrace{\alpha + \beta}_{90^\circ} + \gamma = 180^\circ \quad (\Rightarrow) \gamma = 90^\circ$$

$\Rightarrow$ iso- neljän sisällä on pieni nelio

Keskellä oleaan c- pienisen nelion pinta-ala

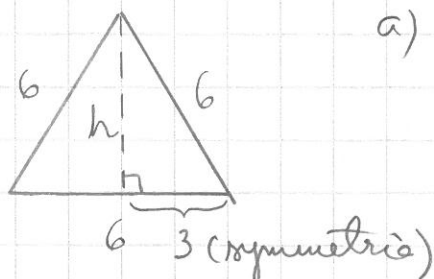
$$\underbrace{(a+b)^2}_{\text{iso nelio}} - \underbrace{4 \cdot \frac{1}{2} ab}_{4 \text{ kpl suor- kolmioita}} = c^2$$

$$\Leftrightarrow (a+b)(a+b) - 2ab = c^2$$

$$\Leftrightarrow a^2 + ab + ba + b^2 - 2ab = c^2$$

$$\Leftrightarrow \boxed{a^2 + b^2 = c^2} \quad \text{PYTHAGORAAN LAUSE}$$

5.6



a) Pythagoras: $h^2 + 3^2 = 6^2$

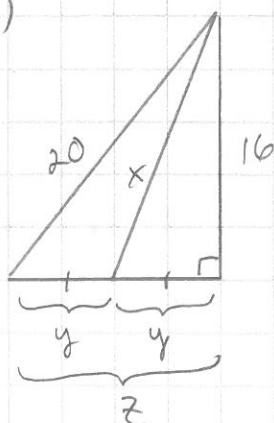
$$\Leftrightarrow h^2 + 9 = 36$$

$$\Leftrightarrow h^2 = 27 \quad | \sqrt{}$$

$$\Leftrightarrow h = \pm \sqrt{27} = \sqrt{9 \cdot 3} = \sqrt{9} \sqrt{3} = 3\sqrt{3}$$

b) $A = \frac{1}{2} \cdot 6 \cdot h = \frac{1}{2} \cdot 6 \cdot 3\sqrt{3} = 9\sqrt{3}$

5.12 a)



Pythagoras: $z^2 + 16^2 = 20^2$

$$\Leftrightarrow z^2 = 20^2 - 16^2 = 144 \quad | \sqrt{}$$

$$\Leftrightarrow z = \pm \sqrt{144} = 12$$

$$y = \frac{z}{2} = \frac{12}{2} = 6$$

Pythagoras: $6^2 + 16^2 = x^2$

$$\Leftrightarrow x^2 = 292 \quad | \sqrt{}$$

$$\Leftrightarrow x = \pm \sqrt{292} = \sqrt{4 \cdot 73} = \sqrt{4} \cdot \sqrt{73} = 2\sqrt{73}$$