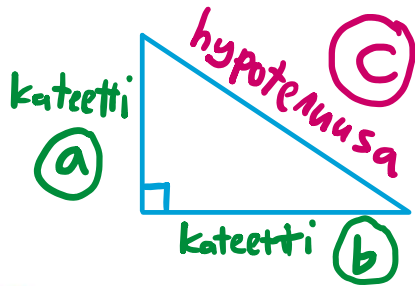
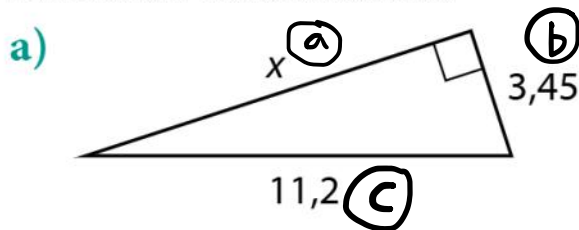


pythagoraan lause

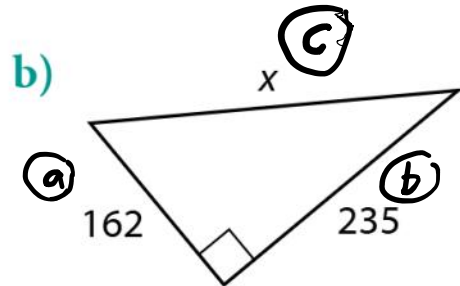
$$a^2 + b^2 = c^2$$



2.4 Laske kirjaimella x merkityn sivun pituus kolmen merkitsevän numeron tarkkuudella.

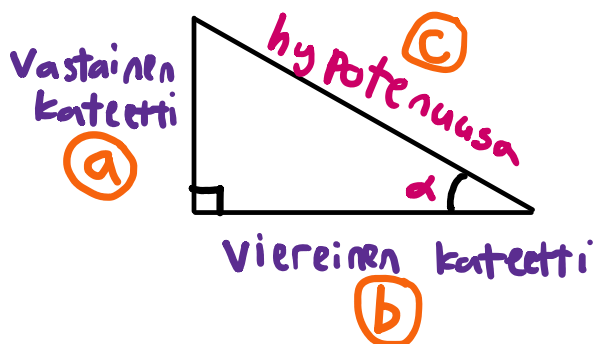


$$\begin{aligned} x^2 + 3,45^2 &= 11,2^2 \\ x^2 &= 11,2^2 - 3,45^2 \\ x^2 &= 113,5375 \\ x &= \sqrt{113,5375} \\ x &= 10,655... \\ x &\approx 10,7 \end{aligned}$$



$$\begin{aligned} 162^2 + 235^2 &= x^2 \\ x^2 &= 81469 \\ x &= \sqrt{81469} \\ x &= 285,42... \\ x &\approx 285 \end{aligned}$$

3) Trigonometria

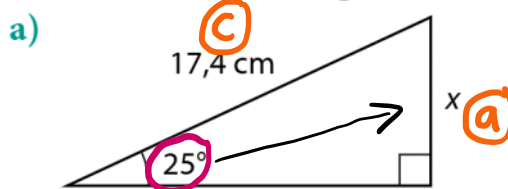


$$\sin \alpha = \frac{a}{c}$$

$$\cos \alpha = \frac{b}{c}$$

$$\tan \alpha = \frac{a}{b}$$

3.2 Laske kolmion sivun pituus x.



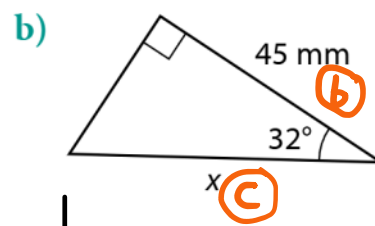
$$\sin 25^\circ = \frac{x}{17,4} \quad || \cdot 17,4$$

$$\sin 25^\circ \cdot 17,4 = x$$

$$\sin(25) \times 17,4$$

$$7,35355775428817018965$$

$$x \approx 7,35 \text{ cm} \quad (\text{tai} \approx 7,4 \text{ cm})$$



$$\cos 32^\circ = \frac{45}{x} \quad || \cdot x$$

$$\cos 32^\circ \cdot x = 45 \quad || : \cos 32^\circ$$

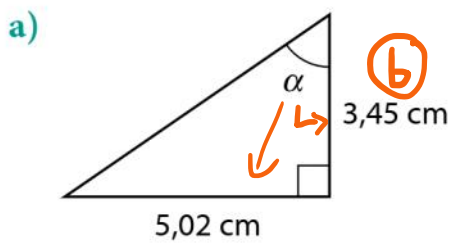
$$x = \frac{45}{\cos 32^\circ}$$

$$45 \div \cos(32)$$

$$53,0630281512943392421$$

$$x \approx 53 \text{ mm}$$

3.3 Laske kolmion kulma α asteen tarkkuudella.

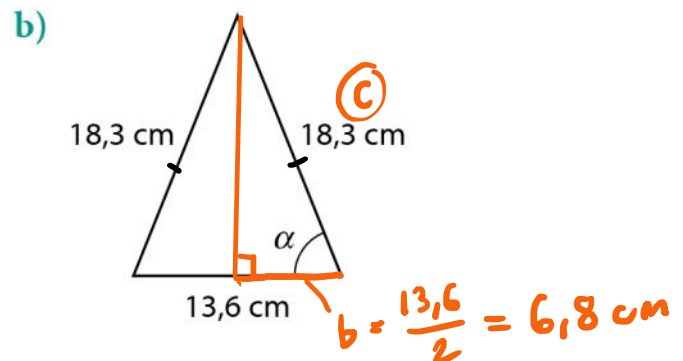


$$\tan \alpha = \frac{5,02}{3,45}$$

$$\tan^{-1}(\arctan(5,02 \div 3,45))$$

$$55,5011659916106943178$$

$$\alpha \approx 56^\circ \quad (55,5^\circ)$$



$$\cos \alpha = \frac{6,8}{18,3}$$

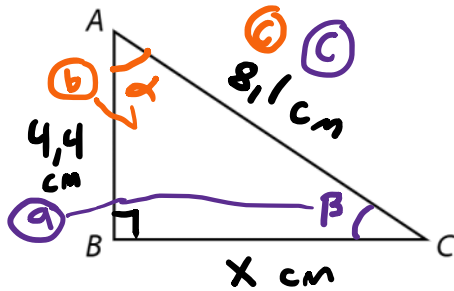
$$\arccos(6,8 \div 18,3)$$

$$68,1866169557061650755$$

$$\alpha \approx 68^\circ$$

3.7 Suorakulmaisessa kolmiossa ABC kateetin AB pituus on 4,4 cm ja hypotenuusan AC pituus 8,1 cm.

- a) Laske kateetin BC pituus. **PYTHAGORAAN LAUSE** $a^2 + b^2 = c^2$
 b) Laske kolmion terävien kulmien suuruudet 0,1 asteen tarkkuudella.
 c) Laske kolmion pinta-ala 0,1 neliösenttimetrin tarkkuudella.
 [K2015, 4]



$$\begin{aligned} \text{a) } x^2 + 4,4^2 &= 8,1^2 \\ x^2 &= 8,1^2 - 4,4^2 \\ x^2 &= 46,25 \\ x &= \sqrt{46,25} \end{aligned}$$

$\sqrt{46,25}$

6,80073525436772167251

$$x \approx 6,8 \text{ cm}$$

$$\text{b) } \cos \alpha = \frac{4,4}{8,1} \quad \sin \beta = \frac{4,4}{8,1}$$

$\arccos(4,4 \div 8,1)$

57,0975824512674949614

$$\alpha \approx 57,1^\circ$$

$\arcsin(4,4 \div 8,1)$

32,9024175487325050386

$$\beta \approx 32,9^\circ$$

$$\text{TAI } \beta = 180^\circ - 90^\circ - 57,1^\circ = 32,9^\circ$$

$$\text{c) } A = \frac{a \cdot h}{2}$$

$$A = \frac{4,4 \cdot 6,8}{2}$$

$4,4 \times 6,8 \div 2$

14,96

$$A \approx 15,0 \text{ cm}^2$$

3.8 Laske kolmion

- a) toisen kateetin ja hypotenuusan pituudet
 b) pinta-ala.

$$\text{a) } \tan 72^\circ = \frac{68}{b} \quad || \cdot b$$

$$\tan 72^\circ \cdot b = 68 \quad || : \tan 72^\circ$$

$$b = \frac{68}{\tan 72^\circ}$$

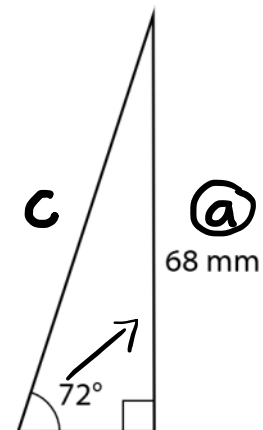
$$b = 22,09\dots$$

$$\sin 72^\circ = \frac{68}{c}$$

$$\sin 72^\circ \cdot c = 68 \quad || : \sin 72^\circ$$

$$c = \frac{68}{\sin 72^\circ}$$

$$c = 71,49\dots$$



$$\sin \alpha = \frac{a}{c}$$

$$b = 22,09\dots$$

$$b \approx 22 \text{ mm}$$

$$c = 71,49\dots$$

$$c \approx 71 \text{ mm}$$

$$\sin \alpha = \frac{c}{c}$$

$$\cos \alpha = \frac{b}{c}$$

$$\tan \alpha = \frac{a}{b}$$

$$\begin{aligned} \text{b) } A &= \frac{22 \cdot 68}{2} = 748 \text{ mm}^2 \\ &\approx 750 \text{ mm}^2 \text{ (:100)} \\ &= 7,5 \text{ cm}^2 \end{aligned}$$