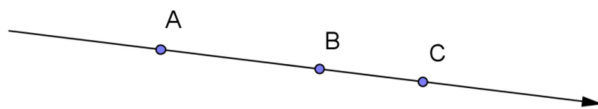


5. Trikotniki

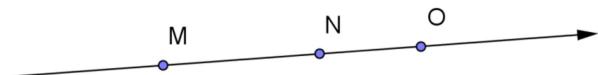
5.1. Koti

1

a)



b)



- 2 Točka F leži pred točkama G in H .
Točka G leži za točko F in pred točko H .
Točka H leži za točkama F in G .

3 $\beta = 27^\circ$

4

- a) γ in δ sta sokota.
 δ in ε sta sokota.
 α in β sta sovršna kота.
 γ in ε sta sovršna kота.
 α, β in δ so skladni koti.
 γ in ε sta skladna kота.
 $\alpha, \beta, \gamma, \delta$ in ε so koti z vzporednimi kraki.
- b) γ in δ sta sokota.
 α in ε sta skladna kота.
 β in γ sta skladna kота.
 α in ε sta kота z vzporednimi kraki.
 β, γ in δ so koti z vzporednimi kraki.

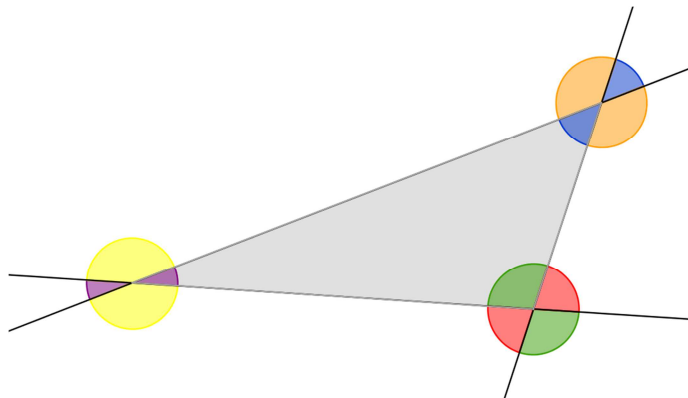
5

- a) $\alpha_1 = \alpha_2$, saj sta sovršna kота, $\alpha_3 = \alpha_2$, saj sta skladna kота z vzporednima krakoma. Torej velja $\alpha_1 = \alpha_3$.
- b) $\alpha_1 = \alpha_2$, saj sta skladna kота z vzporednima krakoma, $\alpha_2 = \alpha_3$, saj sta skladna kота z vzporednima krakoma. Torej velja $\alpha_1 = \alpha_3$.

6

- a) Kot γ je sovršni kot kота α .
- b) Sokota kота β sta kота α in γ .
- c) $\alpha = 47^\circ, \beta = 133^\circ, \gamma = 47^\circ, \delta = 133^\circ$
 $\alpha = 55^\circ, \beta = 125^\circ, \gamma = 55^\circ, \delta = 125^\circ$

7

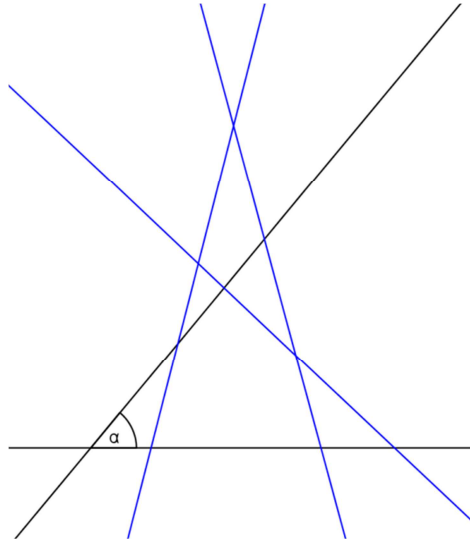


8

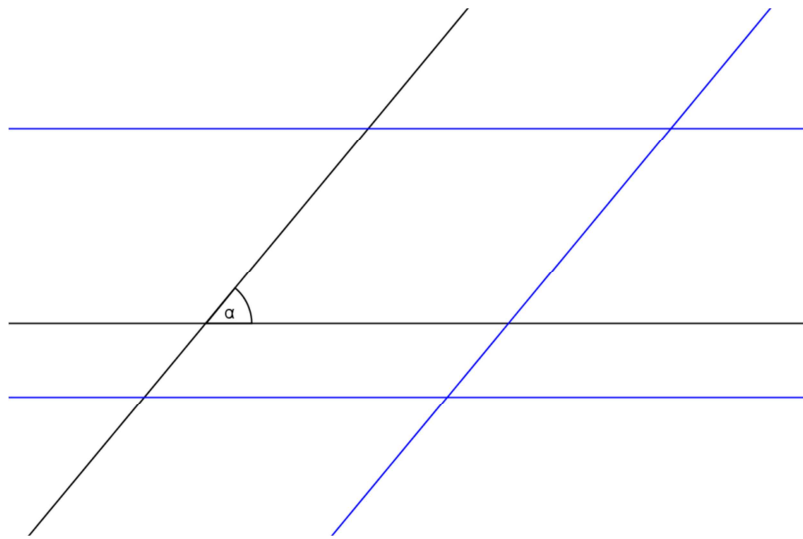
- a) $\alpha_1 = \gamma_3$, saj sta skladna kota z vzporednima krakoma.
- b) Modro obarvan lik je paralelogram. V paralelogramu sta nasproti ležeča kota skladna.
- c) $\alpha_1 = \alpha_3 = \beta_1 = \beta_3 = \gamma_1 = \gamma_3 = \delta_1 = \delta_3 = 35^\circ$
 $\alpha_2 = \alpha_4 = \beta_2 = \beta_4 = \gamma_2 = \gamma_4 = \delta_2 = \delta_4 = 145^\circ$

9

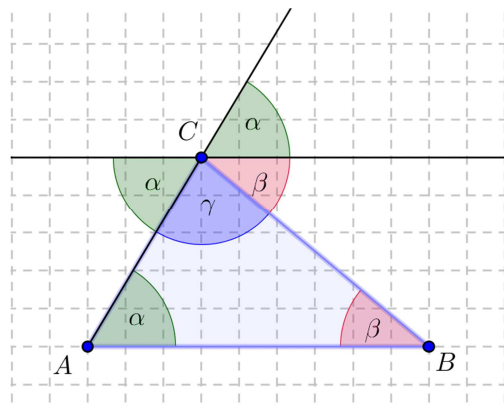
a)



b)

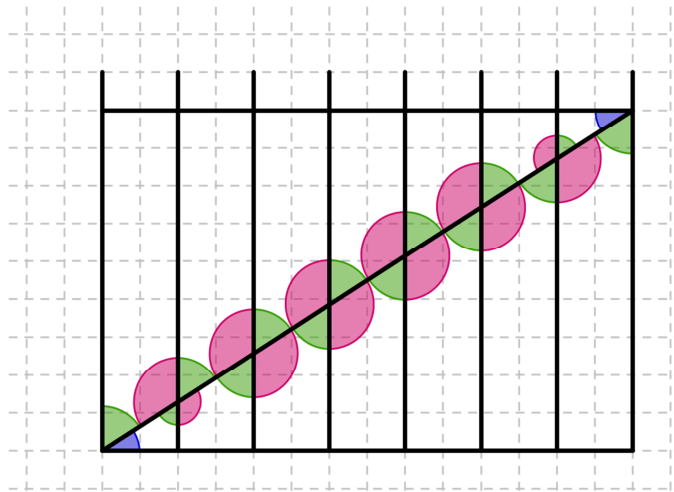


10



11 90°

12



13 Škarje, železniški tiri, električni drog, vrtna ograja, lestev, ...

14 $\alpha_2 = \alpha_4 = \alpha_6 = 114^\circ$

$$\alpha_1 = \alpha_3 = \alpha_5 = 180^\circ - \alpha_2 = 66^\circ$$

$$\beta_3 = \beta_1 = \beta_5 = 83^\circ$$

$$\beta_2 = \beta_4 = \beta_6 = 180^\circ - \beta_3 = 97^\circ$$

15

- a) Nepravilna. Enako velika kota s skupnim vrhom sta sovršna, če sta njuna kraka dopolnilna poltraka.
- b) Pravilna.
- c) Pravilna.
- č) Pravilna.
- d) Pravilna.

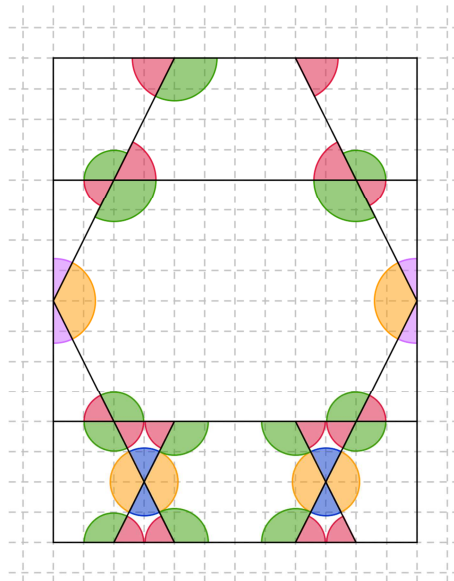
16

a) $\alpha_2 = \alpha_5 = 50^\circ, \alpha_3 = 35^\circ, \alpha_4 = 95^\circ$

b) $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6 = 60^\circ$

c) $\alpha_2 = \alpha_5 = 109^\circ, \alpha_4 = 43^\circ, \alpha_6 = 28^\circ$

17

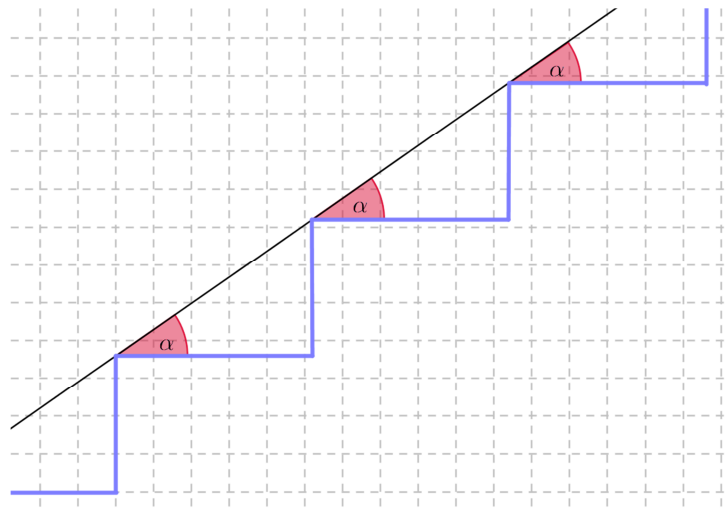


18

- a) $\alpha = 120^\circ$
- b) $\beta = 70^\circ$
- c) $\gamma = 130^\circ$
- č) $\delta = 50^\circ$

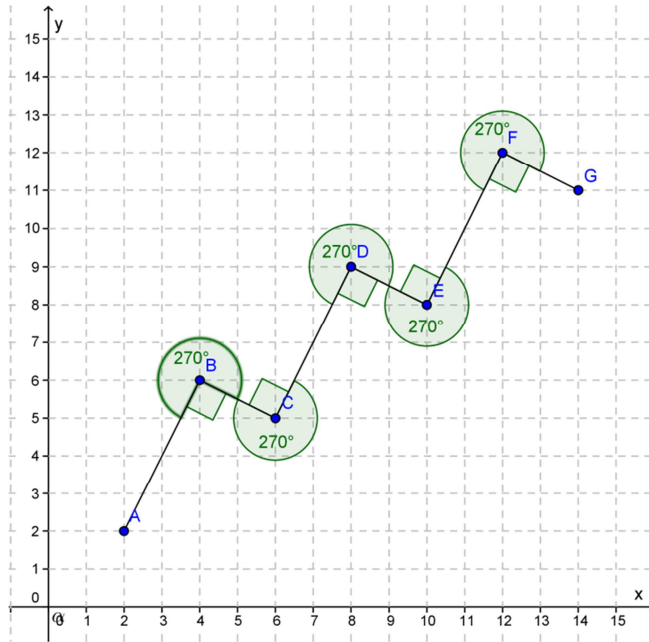
19

a)



- b) $\alpha \doteq 35^\circ$

20



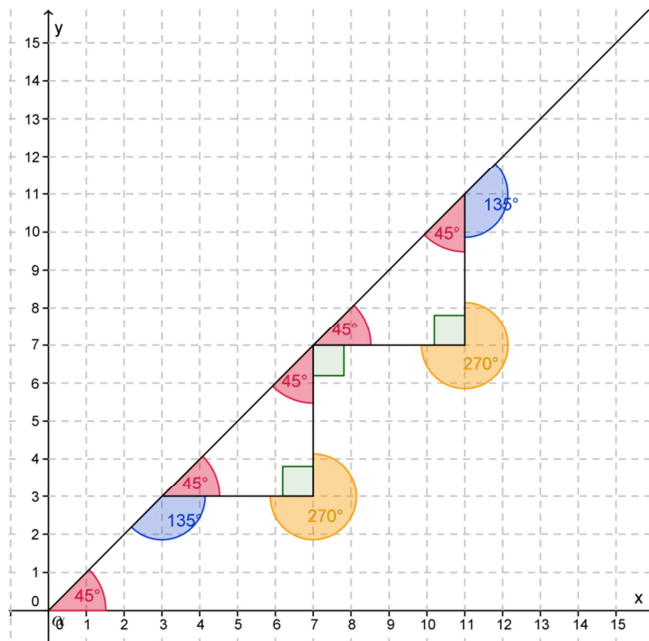
21 $\alpha = 105^\circ, \beta = 75^\circ$

22

a) $\alpha_2 = \alpha_5 = 23^\circ, \alpha_3 = \alpha_6 = 67^\circ, \alpha_4 = \alpha_7 = 90^\circ$

b) $\alpha_2 = \alpha_5 = 18^\circ, \alpha_3 = \alpha_6 = 67^\circ, \alpha_4 = \alpha_7 = 90^\circ$

23



24 $\alpha_1 = \alpha_3 = \delta_1 = \delta_3 = 77^\circ,$

$\alpha_2 = \alpha_4 = \delta_2 = \delta_4 = 103^\circ,$

$\beta_1 = \beta_3 = \gamma_1 = \gamma_3 = 130^\circ,$

$\beta_2 = \beta_4 = \gamma_2 = \gamma_4 = 50^\circ.$

25

a) Drži.

b) Drži.

5.2. Vrste trikotnikov

1 2: enakokraki, 3:raznostranični, 4: enakokraki, 5: enakokraki, 6: raznostranični, pravokotni.

2

a) Enakokraki trikotniki: ABH, BDH, DBC, DEH, EAH, AEF.

Raznostranični trikotniki: ABD, EFH, BHC, ...

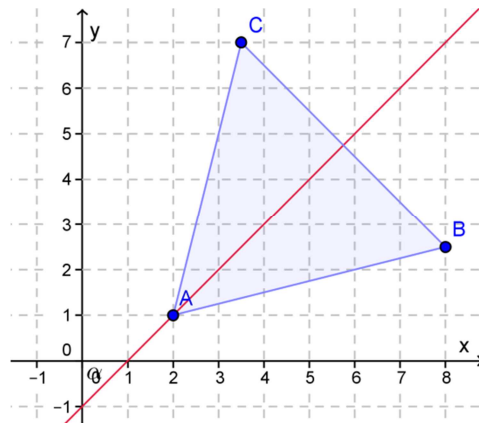
b) Ostrokotni trikotniki: ABH, BJH, AHG, ...

Pravokotni trikotniki: ABD, BCJ, JDH, GHE, ...

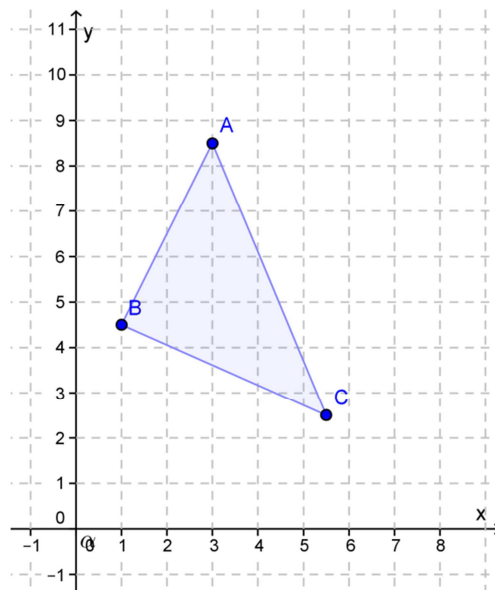
Topokotni trikotniki: BDH, BCD, AHE, ...

3

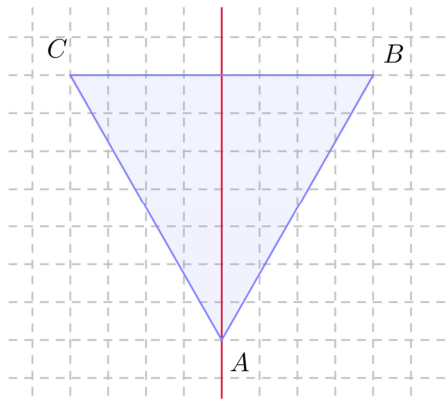
a)



b)



4



5

- a) $\beta = 84^\circ, \gamma = 12^\circ$
- b) $\beta = 56^\circ, \gamma = 68^\circ$
- c) $\alpha = 22^\circ, \gamma = 136^\circ$
- č) $\alpha = 10,5^\circ, \gamma = 159^\circ$
- d) $\alpha = \beta = 54^\circ$
- e) $\alpha = \beta = 47,5^\circ$

5.3. Koti v trikotniku

1

- a) $\gamma = 98^\circ$
- b) $\alpha = 75^\circ$
- c) $\beta = 30^\circ$

2

- a) $\gamma = 18^\circ$
- b) $\gamma = 26^\circ$
- c) $\alpha = 138^\circ$
- č) $\beta = 45^\circ$

3

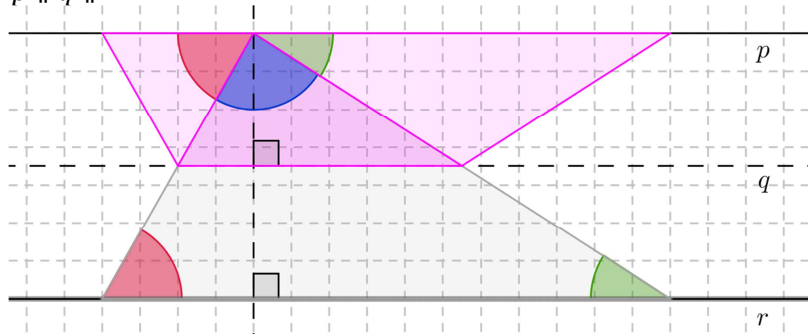
- $\beta = 15^\circ$

4

- d) $\gamma = 40^\circ$
- e) $\gamma = 60^\circ$
- f) $\alpha = 60^\circ, \gamma_1 = 30^\circ$
- č) $\beta = \gamma_1 = \gamma_2 = 45^\circ$

5 Vse.

6 $p \parallel q \parallel r$



7

- a) $\gamma = 101^\circ, \varepsilon = 143^\circ$
- b) $\alpha = 90^\circ, \beta = 26^\circ$
- c) $\alpha = 28^\circ, \gamma = 131^\circ$
- č) $\alpha = 58^\circ, \varepsilon = 122^\circ$
- d) $\alpha = 1^\circ, \varepsilon = 179^\circ$
- e) $\beta = 57^\circ, \varepsilon = 122^\circ$

f) $\gamma = 69^\circ, \varepsilon = 107^\circ$

g) $\alpha = 85^\circ, \gamma = 34^\circ$

8

a) $90^\circ, 45^\circ, 45^\circ$

b) $60^\circ, 60^\circ, 60^\circ$

c) $54^\circ, 54^\circ, 90^\circ$

č) $120^\circ, 40^\circ, 20^\circ$

d) $50^\circ, 70^\circ, 60^\circ$

e) $60^\circ, 70^\circ, 50^\circ$

9

a) Nepravilna.

b) Nepravilna.

c) Pravilna.

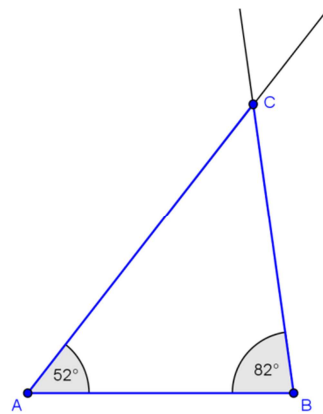
č) Pravilna.

d) Nepravilna.

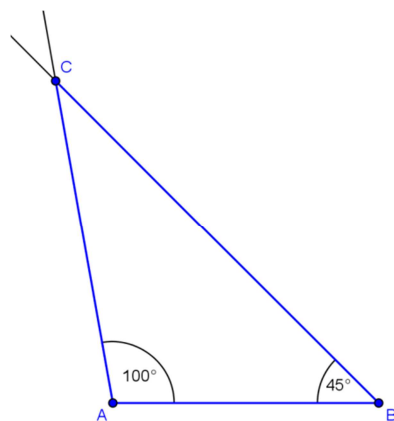
5.4. Načrtovanje trikotnikov

1

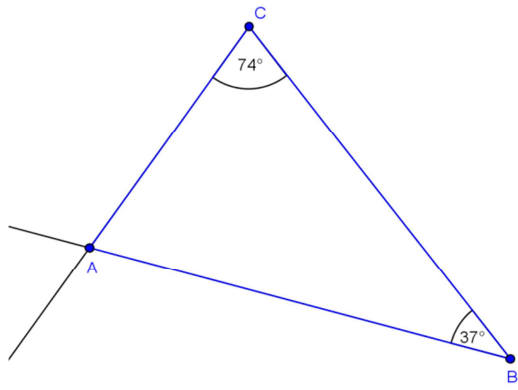
a)



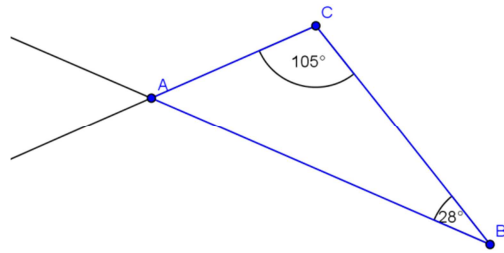
b)



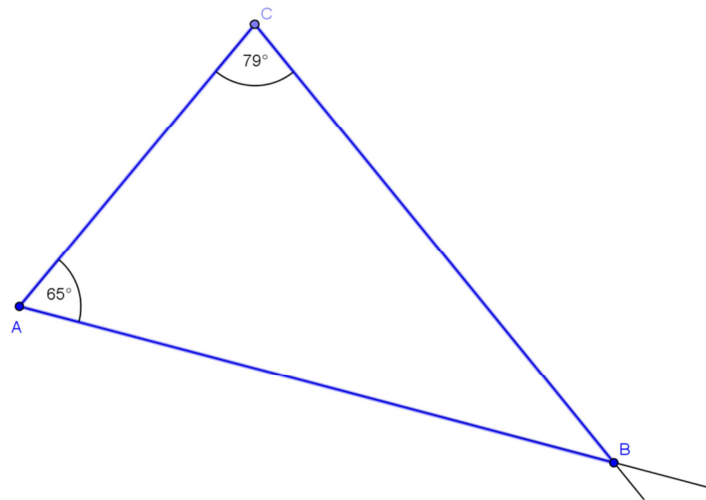
c)



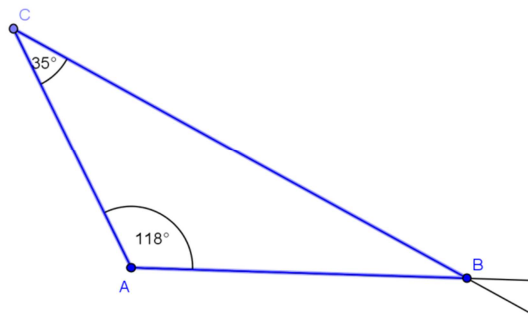
č)



d)

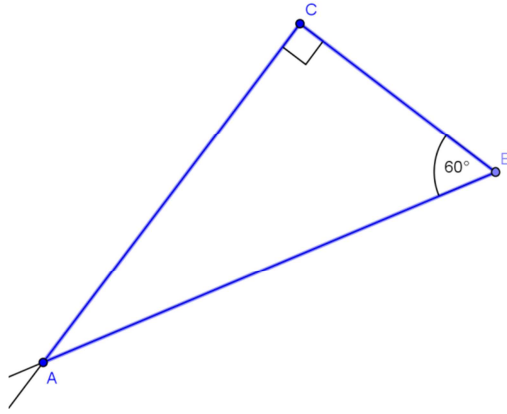


e)

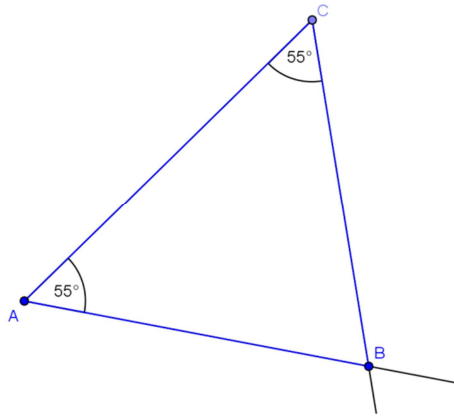


2

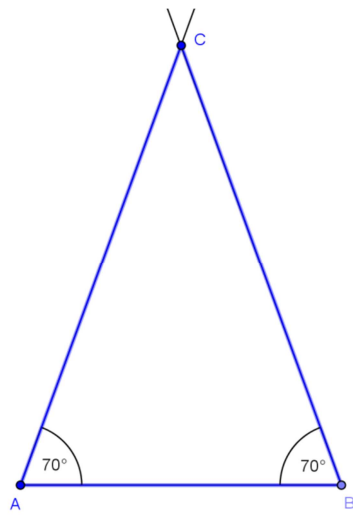
a)



b)

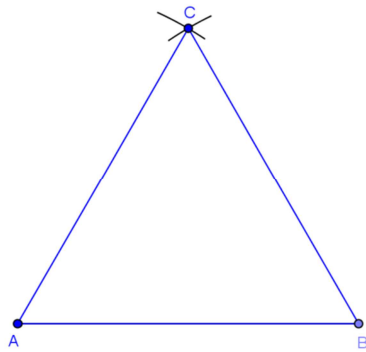


c)

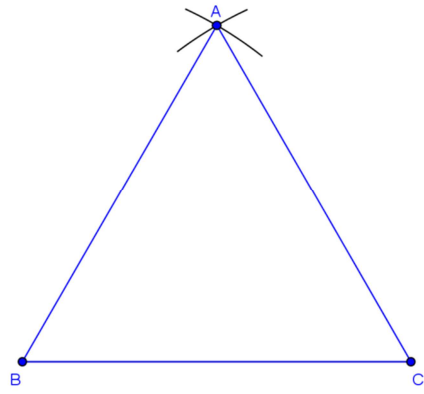


3

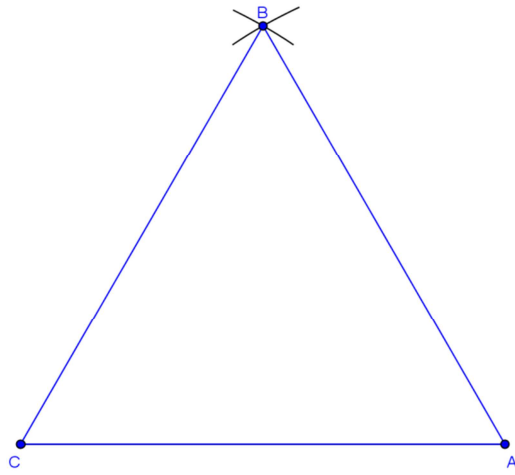
a)



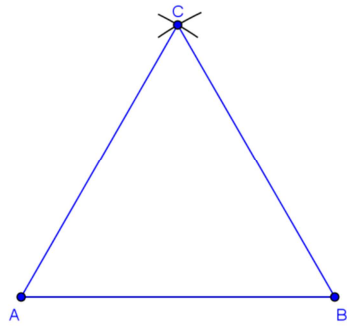
b)

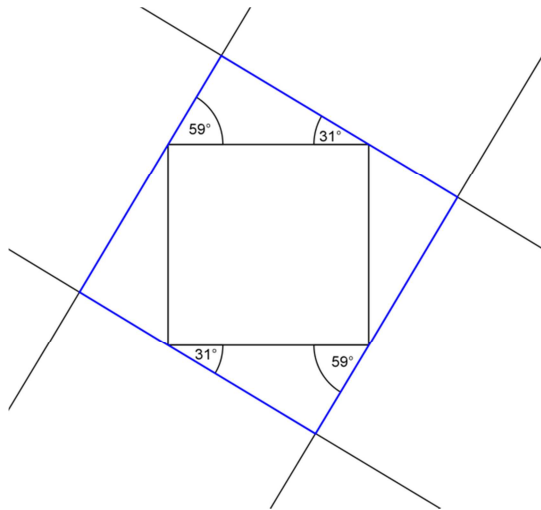


c)



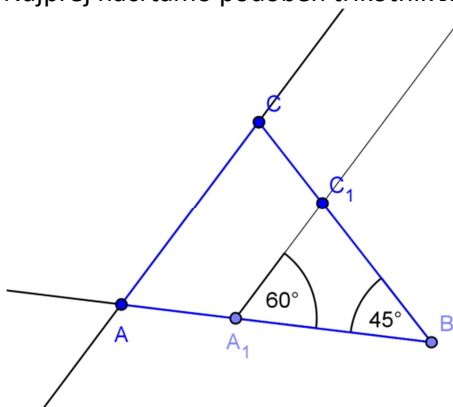
č)





5

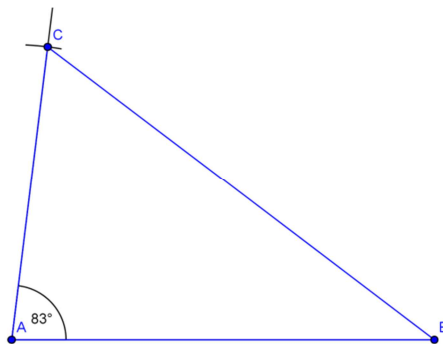
- b) Eden od podanih kotov ni priležni kot dane stranice.
 c) Najprej načrtamo podoben trikotnik A_1BC_1 .



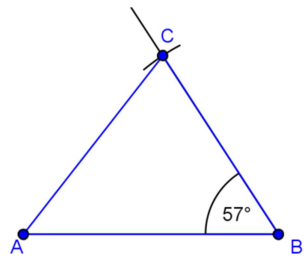
- č) Stranica, kot ob njej in kot nasproti dane stranice.
 d) Stranica $BC = a = 5$ cm.
 V oglišču B načrtamo kot $\beta = 45^\circ$ na stranico a .
 V poljubni točki A_1 na nosilki stanice c načrtamo kot $\alpha = 60^\circ$.
 V presečišču krakov kotov α in β označimo oglišče podobnega trikotnika C_1 .
 V presečišču vzporednice k stranici A_1C_1 skozi točko C in nosilke stranice c označimo oglišče A .

6

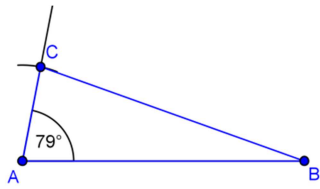
a)



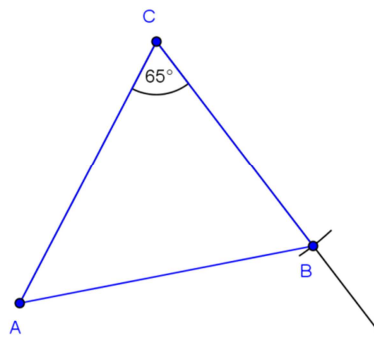
b)



c)

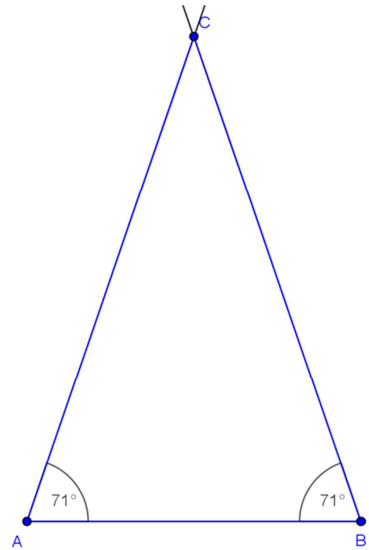


č)

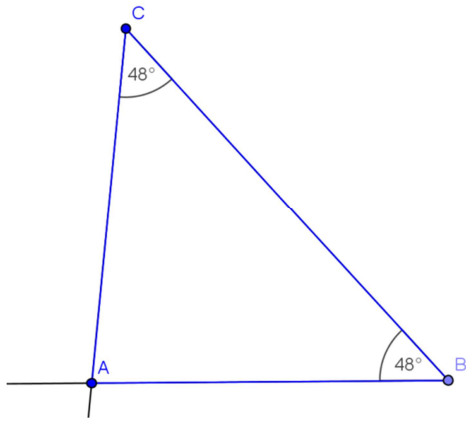


7

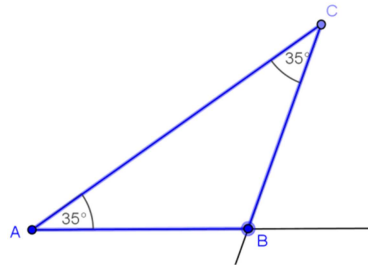
a)



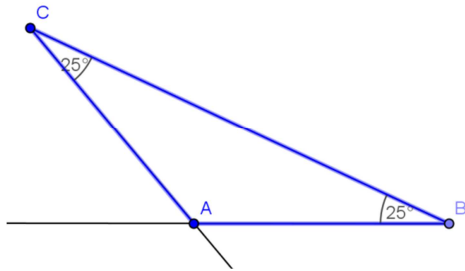
b)



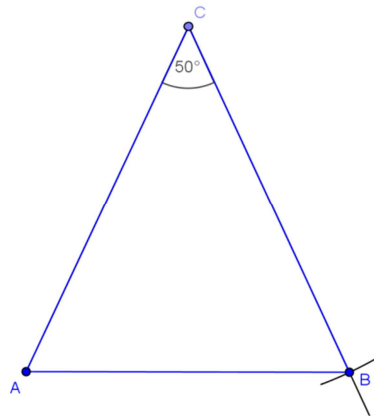
c)



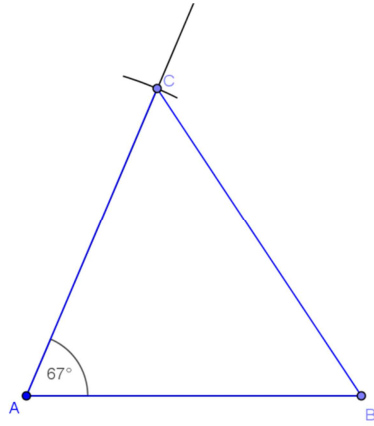
č)



d)

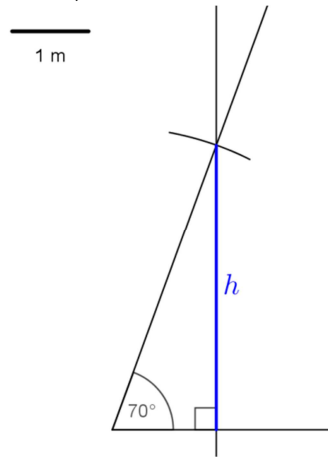


e)

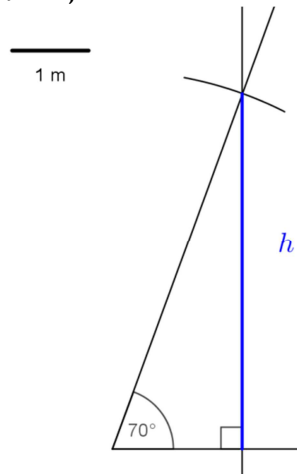


8

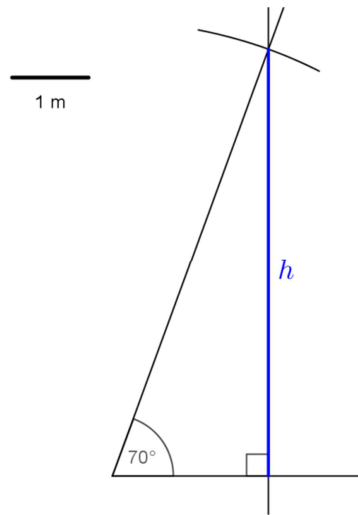
a) $h \doteq 3,8 \text{ m}$



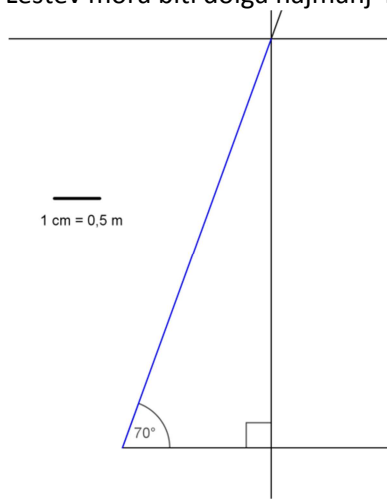
b) $h \doteq 4,7 \text{ m}$



c) $h \doteq 5,6 \text{ m}$

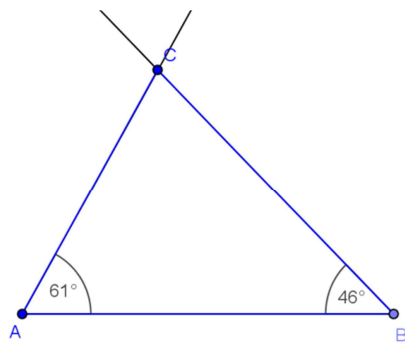


9 Lestev mora biti dolga najmanj 4,8 metra.

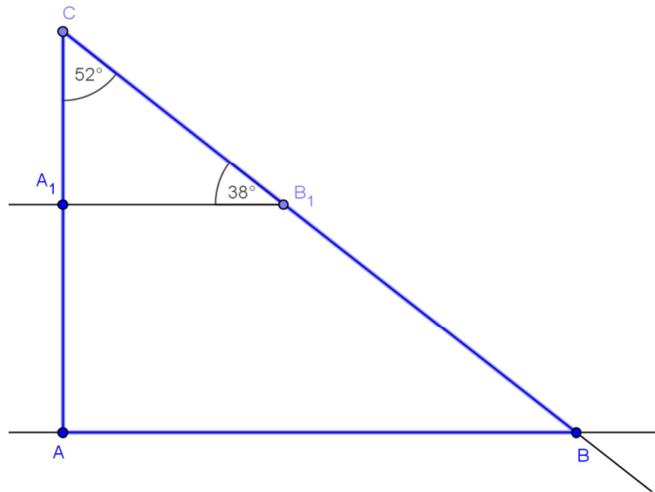


10

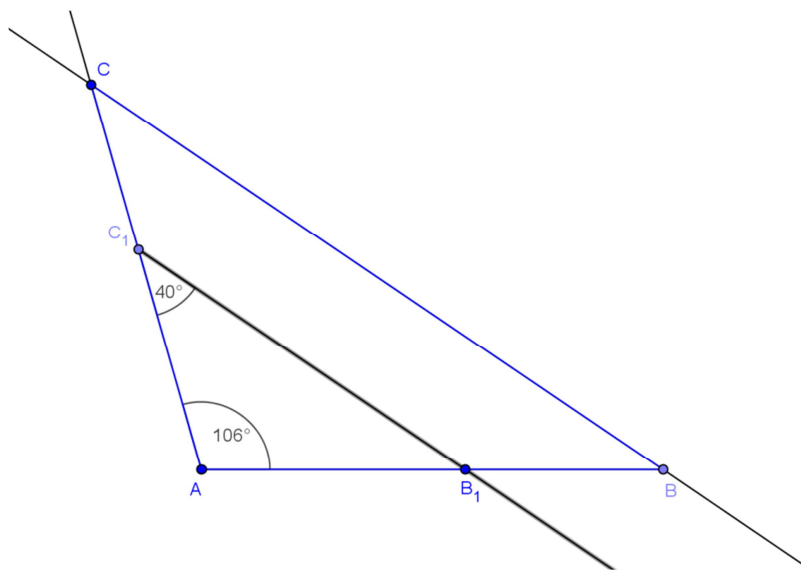
a)



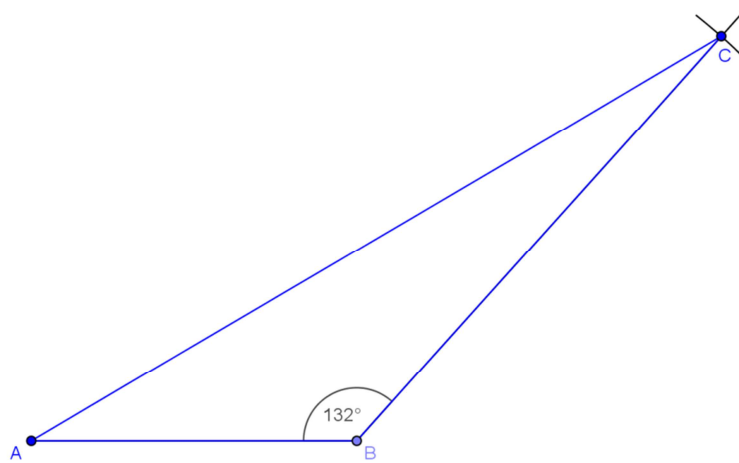
b)



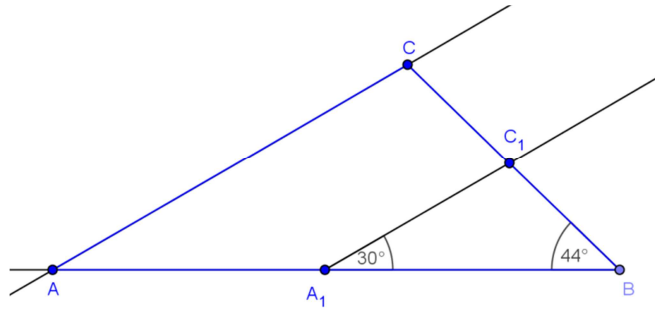
c)



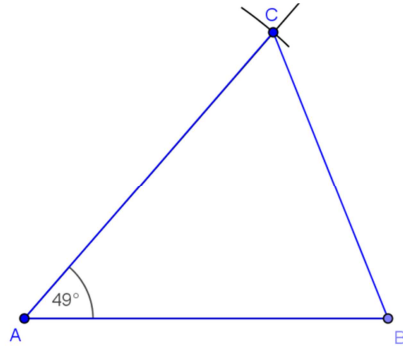
č)



d)

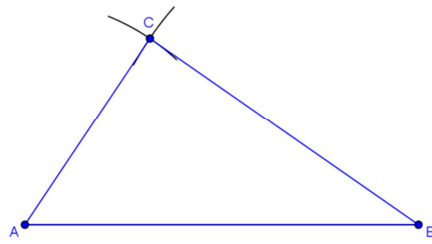


e)

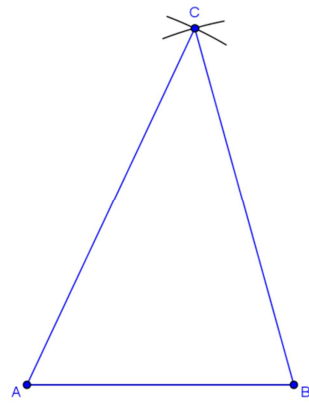


11

a)

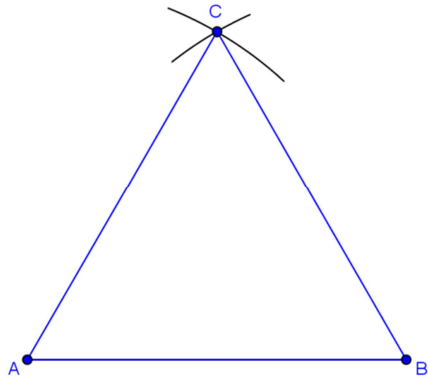


b)

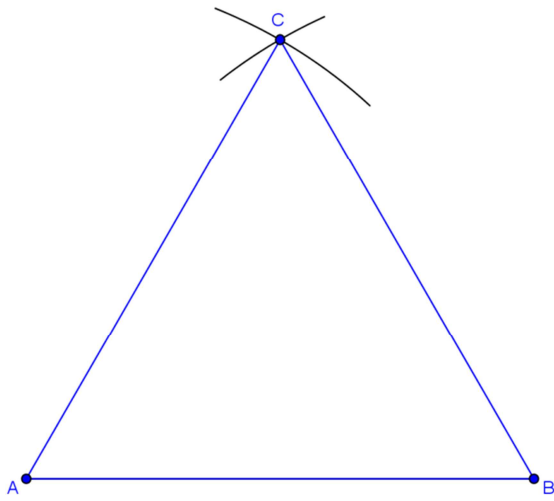


12

a)

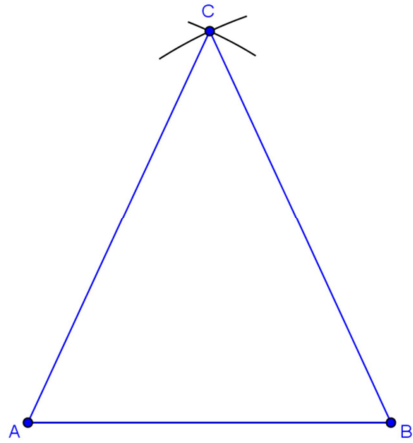


b)

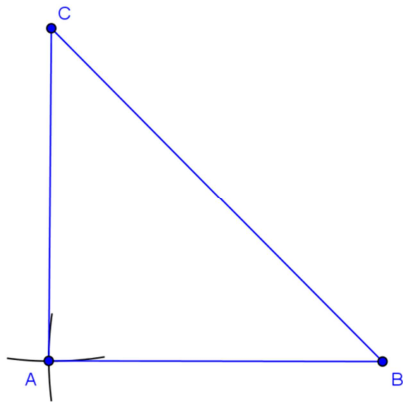


13

a)

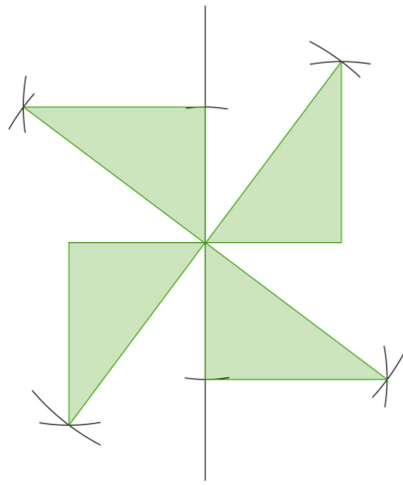


b)

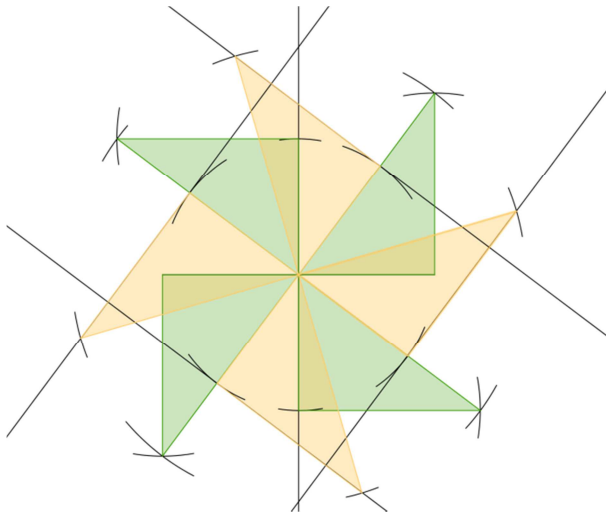


14

a)



b)

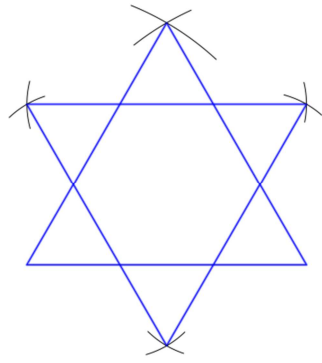


15

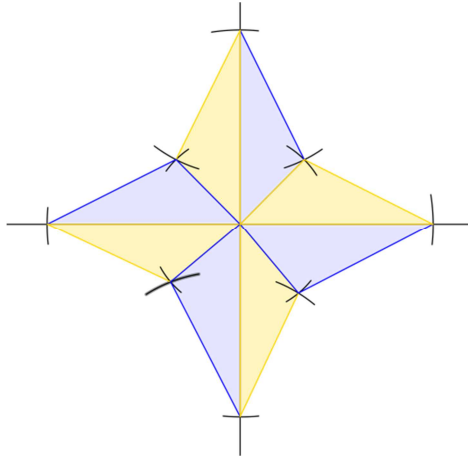
a) Napaka. Konstrukcija ni mogoča, ker je vsota dolžin stranic b in c manjša od dolžine stranice a .

b) $a + b > c, a + c > b, b + c > a$

16

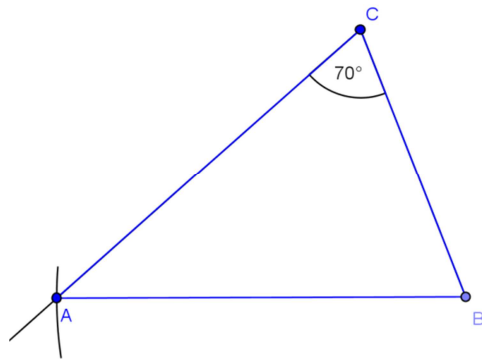


17

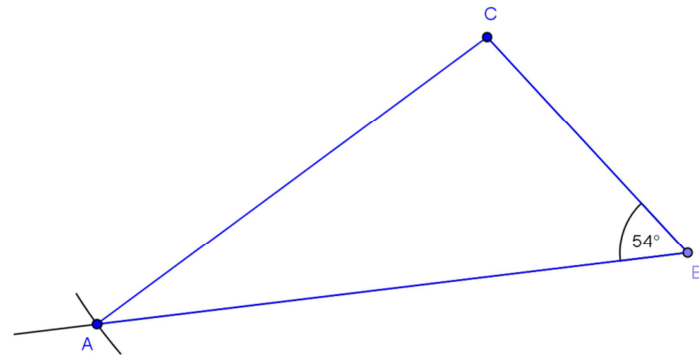


18

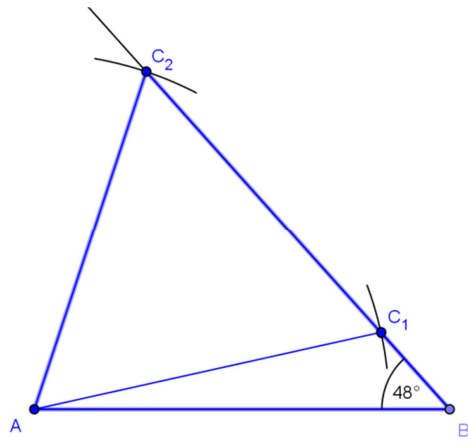
a)



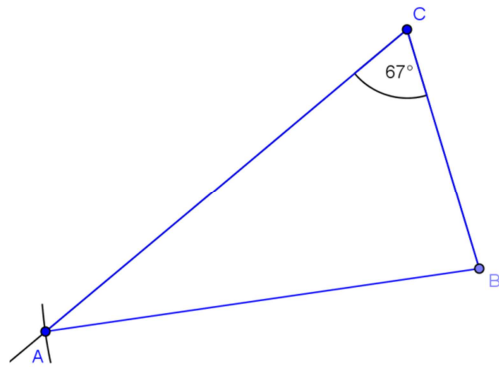
b)



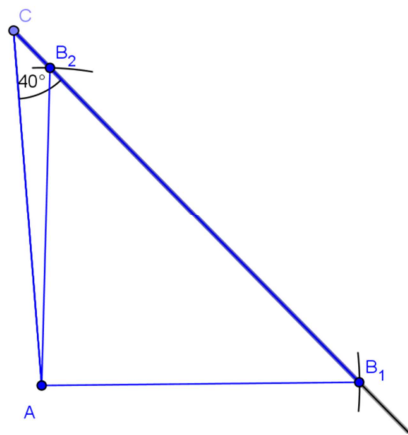
c)



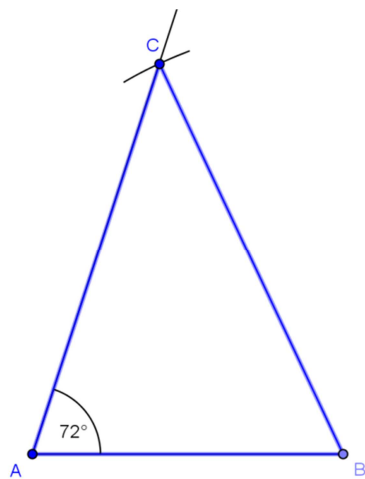
č)



d)

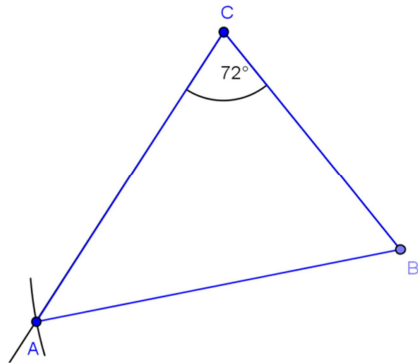


e)

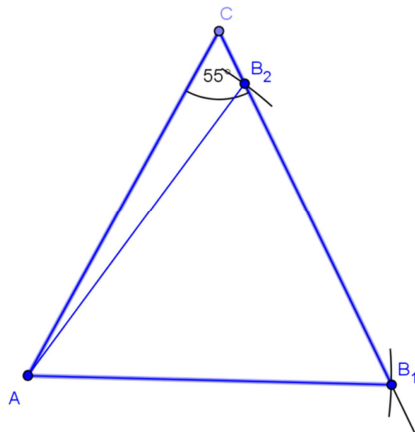


19

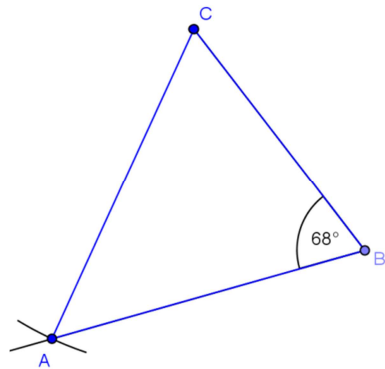
a)



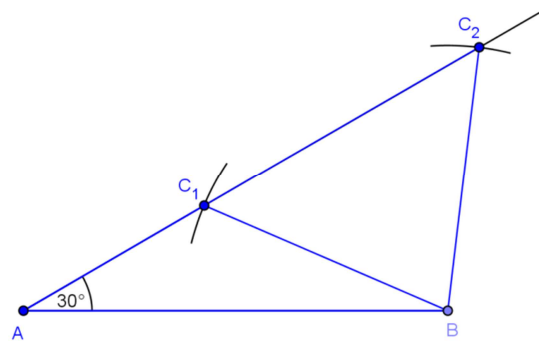
b)



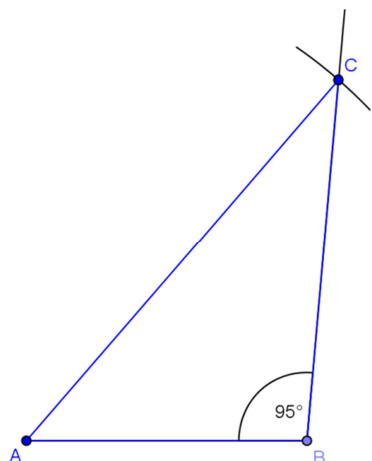
c)



č)



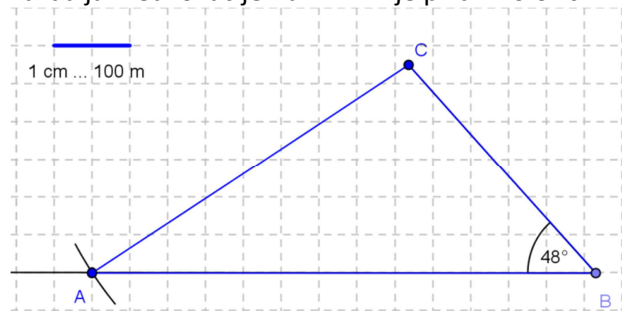
d)



20 Če nasproti podanega kota leži daljša od dveh podanih stranic, potem s temi podatki lahko načrtamo en trikotnik.

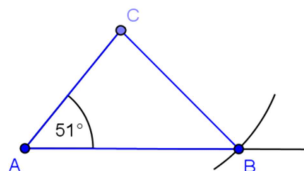
Če nasproti neznanega kota leži daljša od dveh podanih stranic, potem s temi podatki lahko načrtamo dva različna trikotnika.

21 Razdalja med lokacijema A in B je približno 670 m.

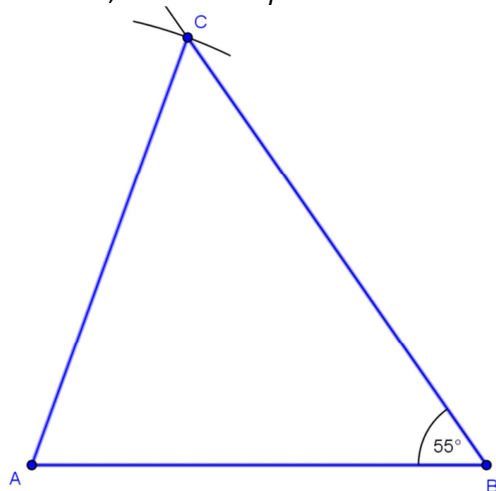


22 Trikotnika s temi podatki ne obstajata. Enoznačno je mogoče konstruirati trikotnik s podatki npr.:

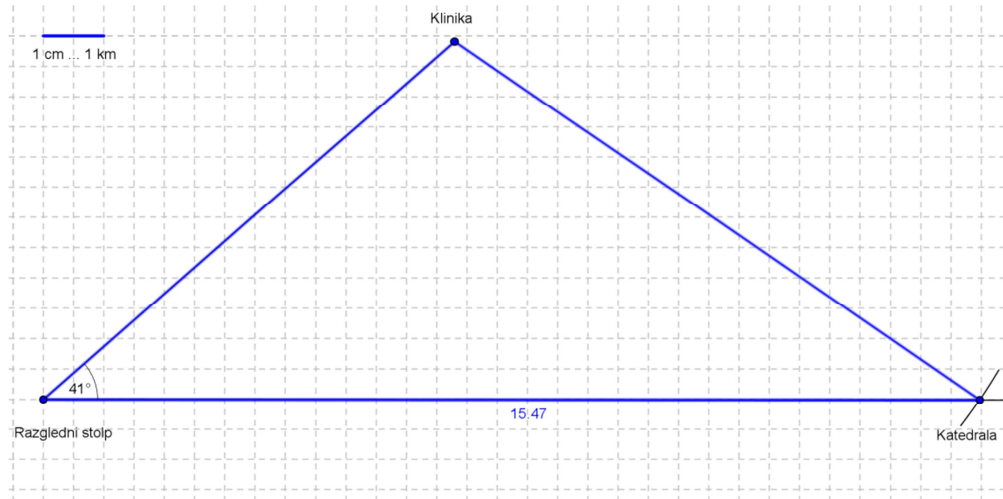
a) $a = 2,2$ cm, $b = 2$ cm in $\alpha = 51^\circ$



b) $b = 6$ cm, $c = 6$ cm in $\beta = 55^\circ$



23 Katedrala je od razglednega stolpa oddaljena približno 15,5 km.



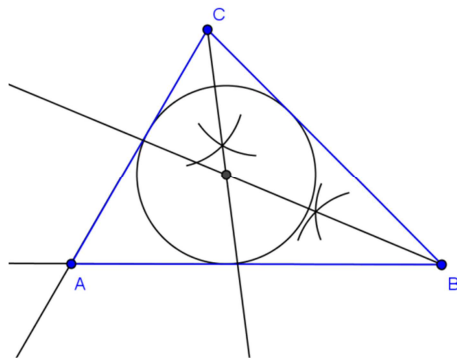
5.5. Znamenite točke trikotnika

1

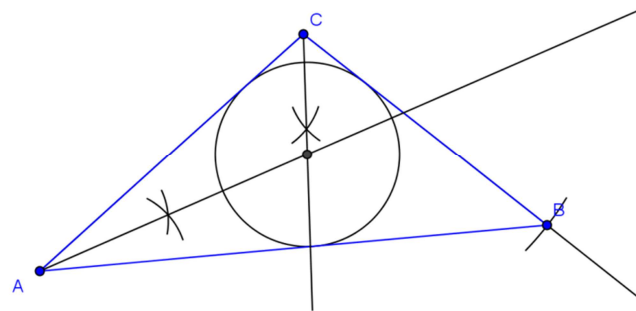
- a) Višinska točka.
- b) Težišče.

2

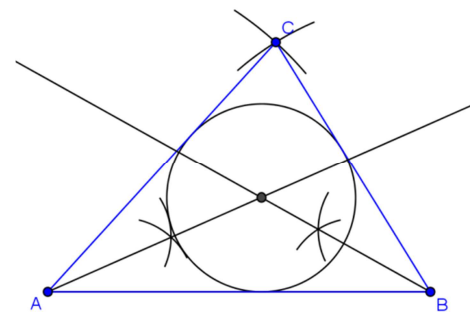
a)



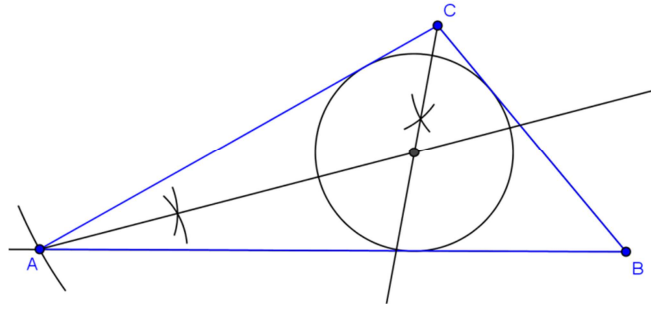
b)



c)

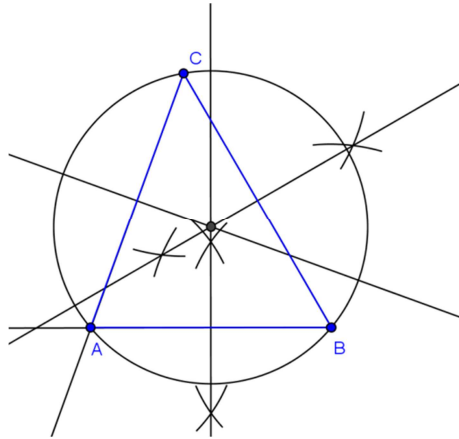


č)

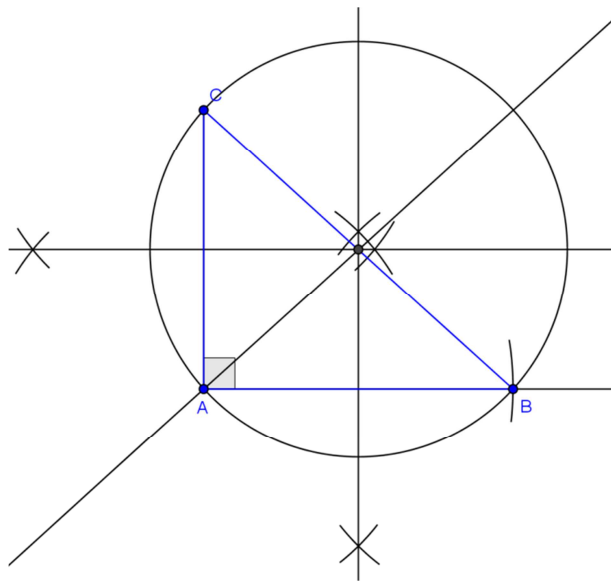


3

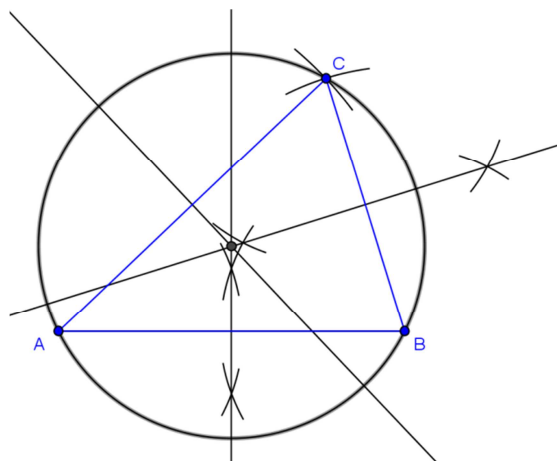
a)



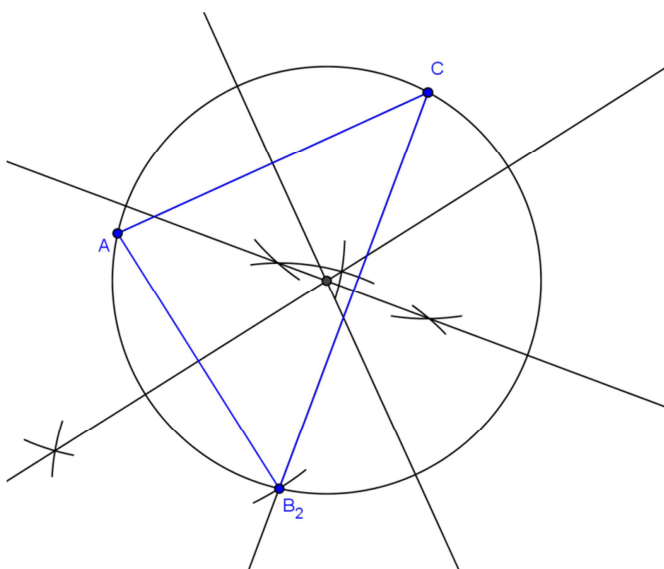
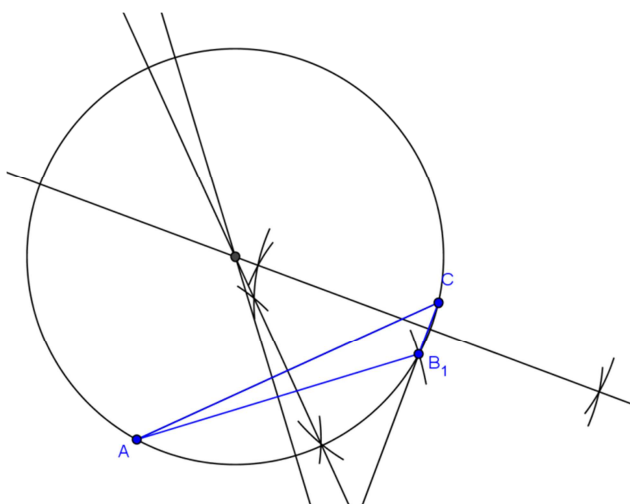
b)



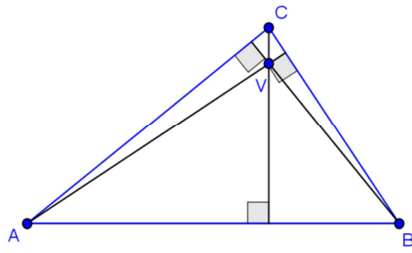
c)



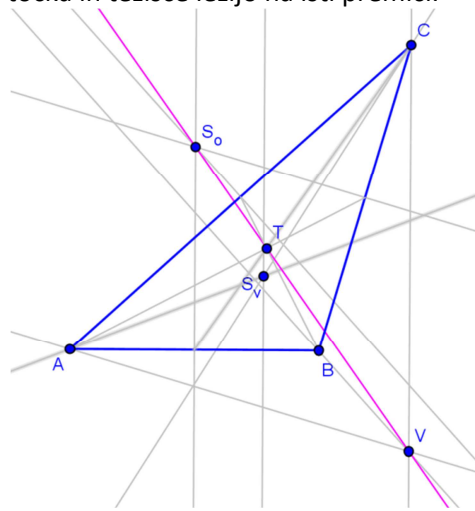
d)



- 4 Središči očrtane in včrtane krožnice sovpadata v enakostraničnem trikotniku.
- 5 Vse tri višine se sekajo v isti točki.

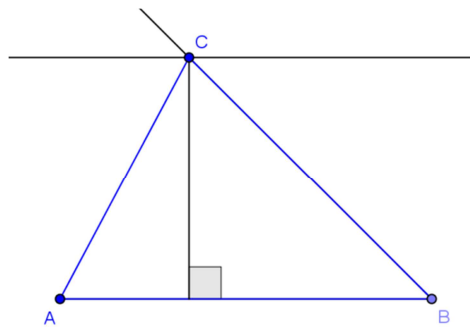


- 6 Središče očrtane krožnice in višinska točka ležita zunaj trikotnika, središče včrtane krožnice in težišče ležita znotraj trikotnika. Središče očrtane krožnice, višinska točka in težišče ležijo na isti premici.

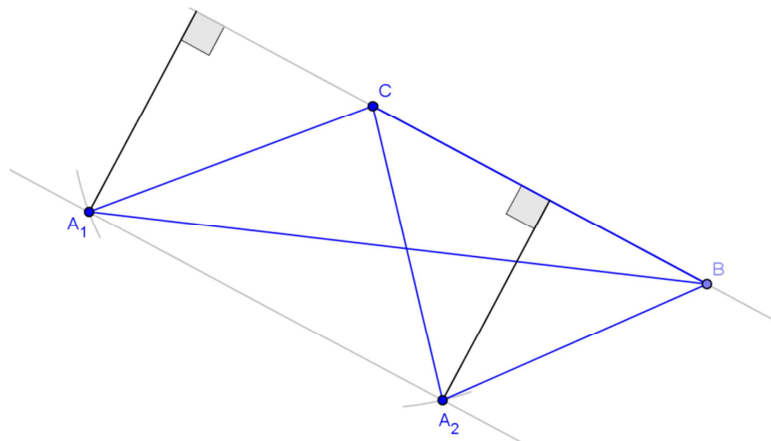


7

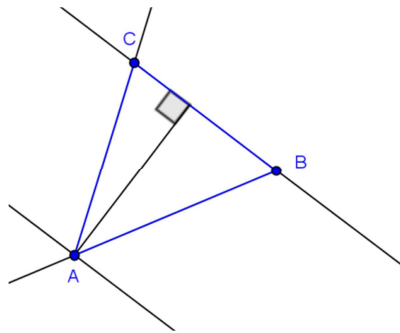
a)



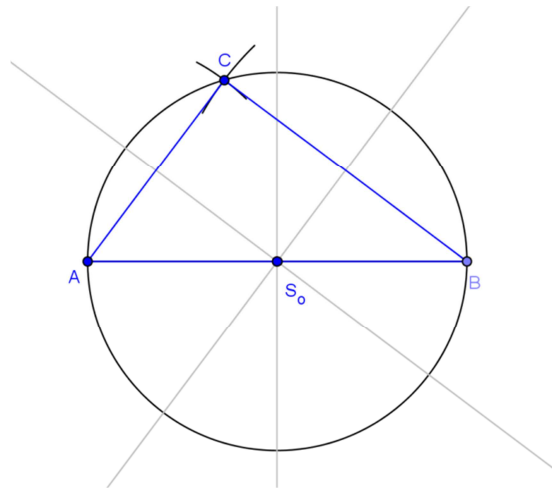
b)



c)

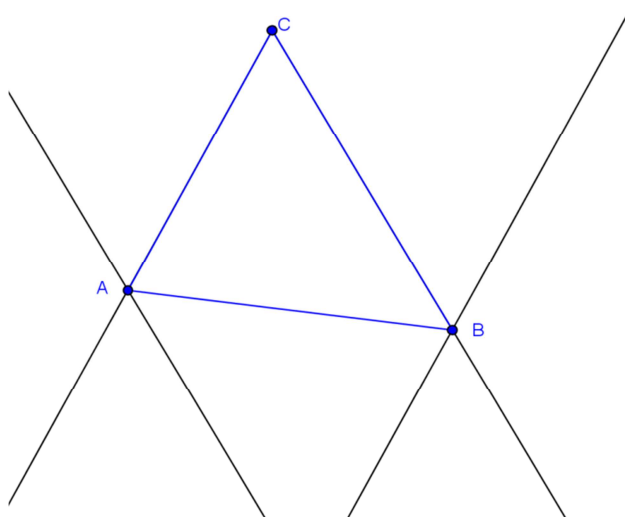


- 8 Trikotnik je pravokoten, središče očrtane krožnice leži v razpolovišču hipotenuze. Premer očrtane krožnice meri 5 cm.

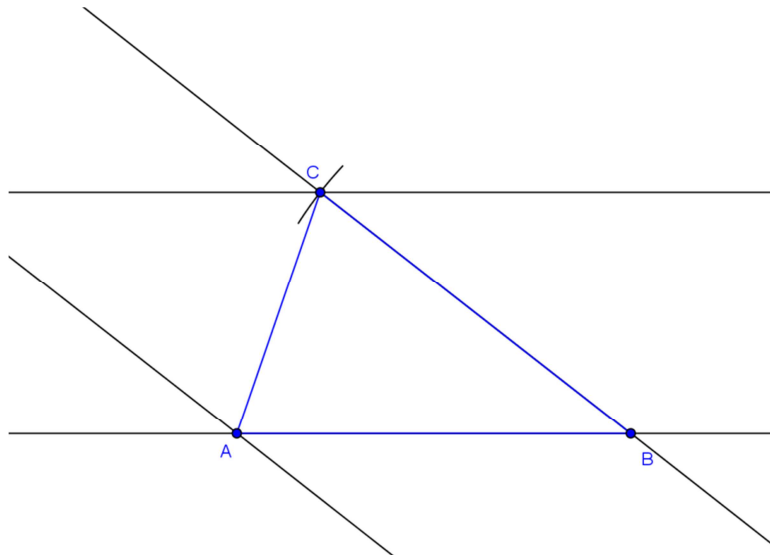


- 9 To je enakostranični trikotnik.
 10 Ne. Težišče je presečišče težiščnic, katere vedno ležijo znotraj trikotnika.
 11 Da, če je trikotnik topokoten, leži središče očrtane krožnice zunaj trikotnika.
 12

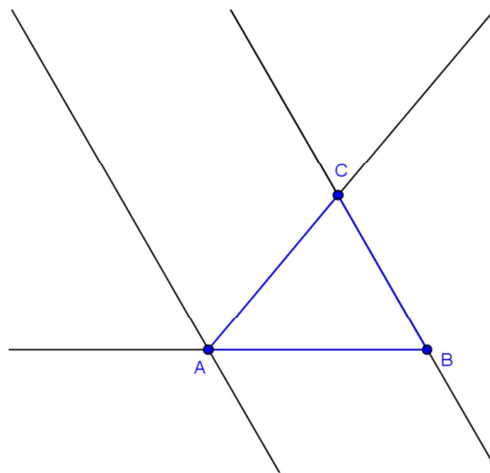
a)



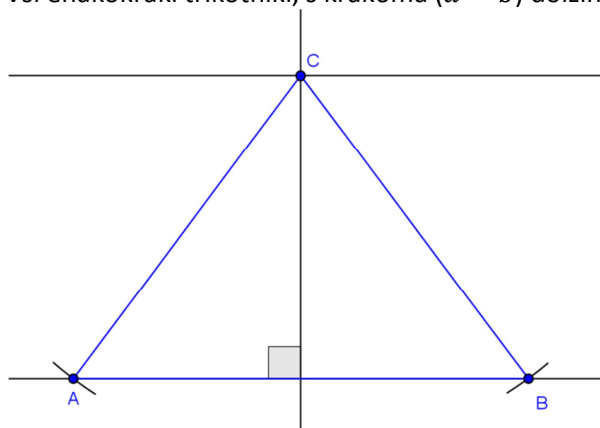
b)



c)

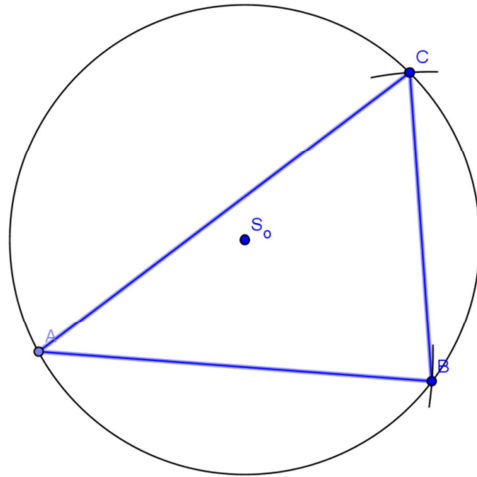


d) Vsi enakokraki trikotniki, s krakoma ($a = b$) dolžine več kot 4 cm.

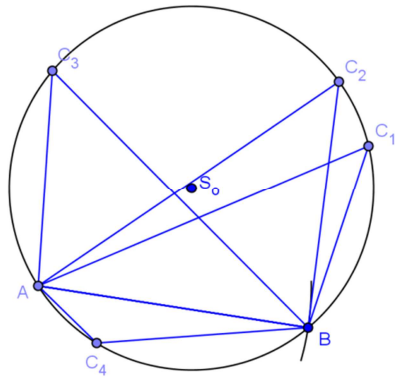


13

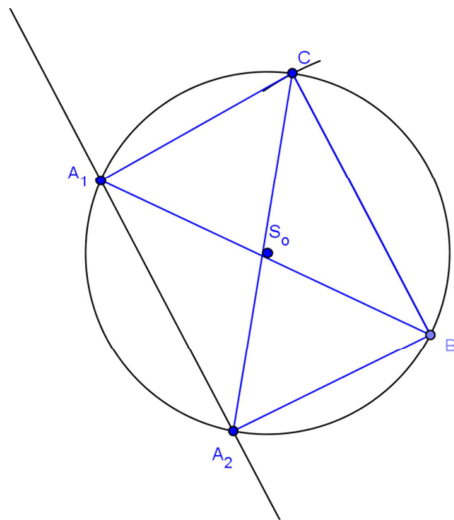
a)



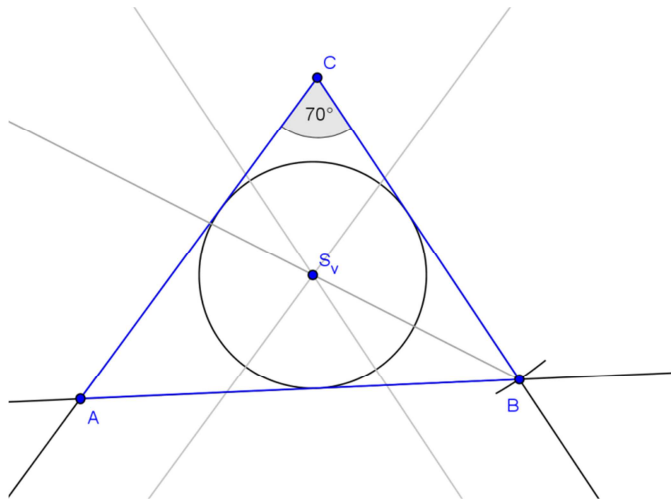
- b) Tak trikotnik ne obstaja.
 c) Naloga ima neskončno rešitev.



č)

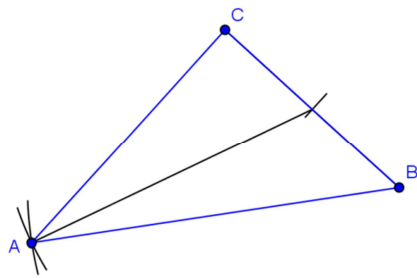


d)

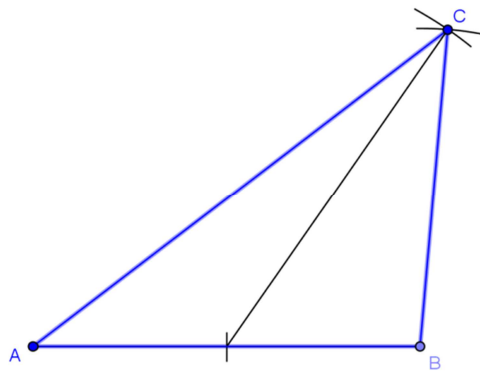


14

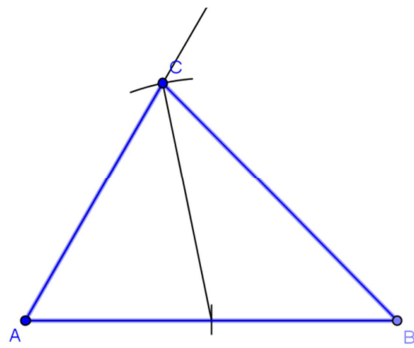
a)



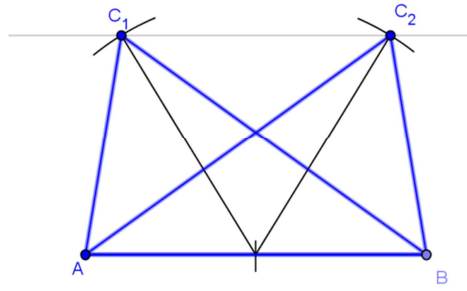
b)



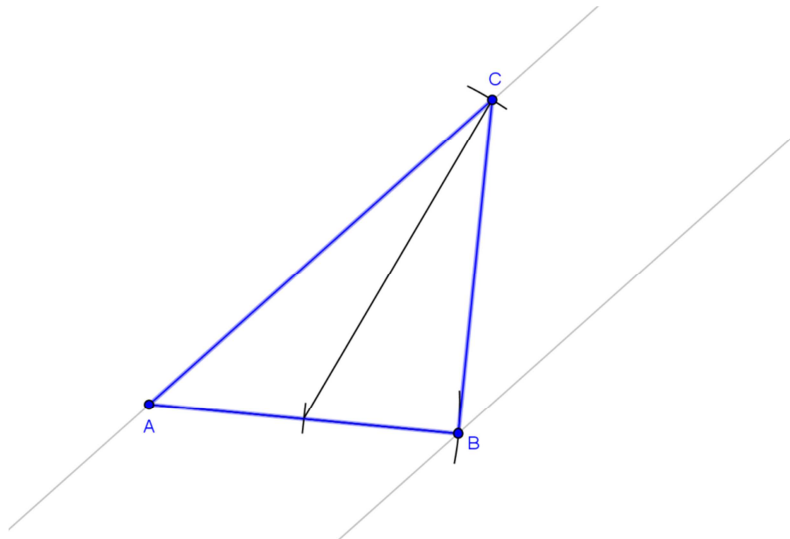
c)



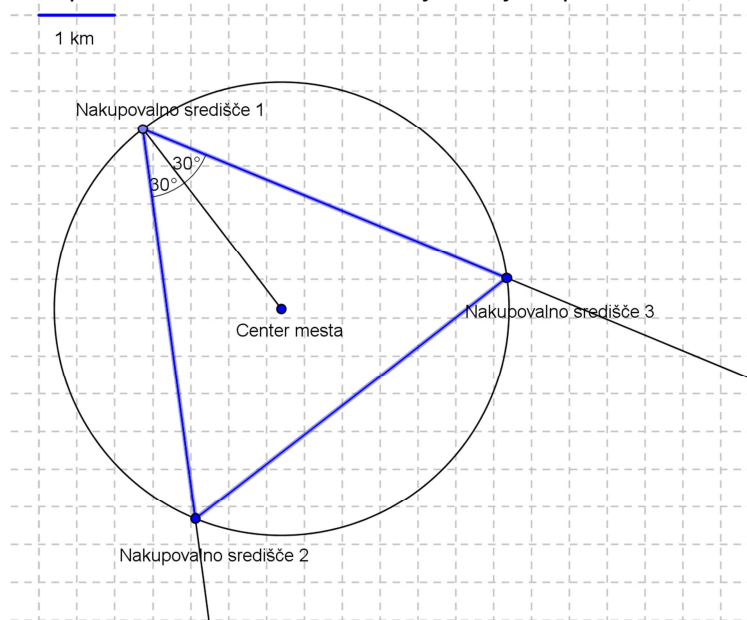
č)



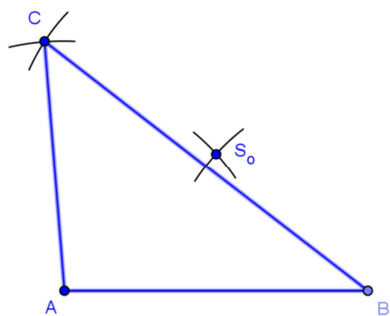
d)



15 Nakupovalna središča so med seboj oddaljena približno 5,2 km.

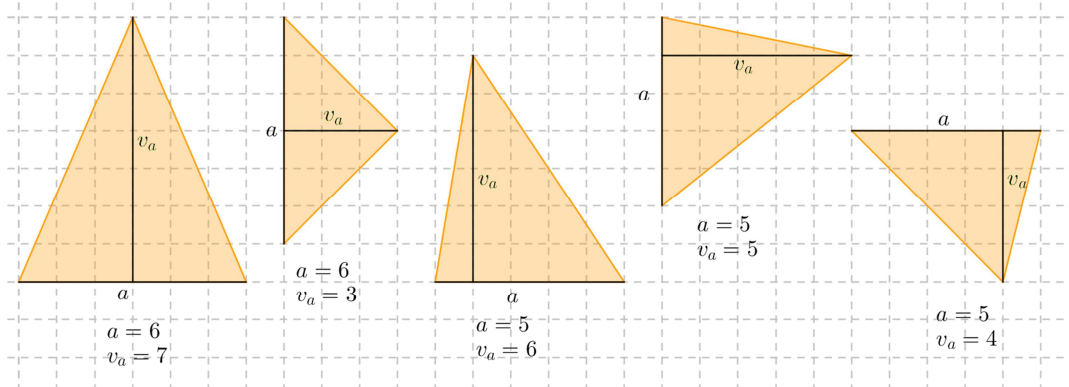


16



5.6. Obseg in ploščina trikotnika

1



2

- a) $o = 10,1$ cm
- b) $o = 9,8$ cm
- c) $o = 13,9$ cm
- č) $o = 10,7$ cm
- d) $o = 16,8$ cm

3

- a) $a = 2,1$ cm
- b) $c = 2,2$ cm
- c) $b = 3,9$ cm
- č) $c = 7,2$ cm ($a = b$)
- d) $a = 3,7$ cm

4

- a) Da.
- b) Da.
- c) Ne.
- č) Ne.

5

- a) $c < 8$ cm
- b) $b < 6,9$ cm
- c) $a < 8,2$ cm

6

- a) 9880 cm²
- b) $94,64$ cm²
- c) 418363 mm²

7

- $a = 4,6$ cm
- $b = 4,1$ cm
- $c = 4,2$ cm
- $v_a = 3,5$ cm

$$v_b = 3,9 \text{ cm}$$

$$v_c = 3,8 \text{ cm}$$

a) $o = 12,4 \text{ cm}$

b) $\frac{a \cdot v_a}{2} = 8,05; \frac{b \cdot v_b}{2} = 7,995; \frac{c \cdot v_c}{2} = 7,98$

Vsi izrazi imajo približno enako vrednost.

c) $p = \frac{a \cdot v_a}{2} = \frac{b \cdot v_b}{2} = \frac{c \cdot v_c}{2}$

8

a) $p = 14 \text{ cm}^2$

b) $p = 3,675 \text{ cm}^2$

c) $p = 8,28 \text{ cm}^2$

č) $p = 19,14 \text{ cm}^2$

d) $p = 12,035 \text{ cm}^2$

9 $p_1 = 1,5 \text{ cm}^2, p_2 = 1,425 \text{ cm}^2, p_3 = 2,08 \text{ cm}^2, p_4 = 1,305 \text{ cm}^2, p_5 = 1,54 \text{ cm}^2$

10

a) $p = 12 \text{ cm}^2, c = 4,7 \text{ cm}, v_a = 4,3 \text{ cm}$

b) $p = 15 \text{ cm}^2, a = 7,1 \text{ cm}, v_b = 4,9 \text{ cm}$

c) $p = 6 \text{ cm}^2, b = 3 \text{ cm}$

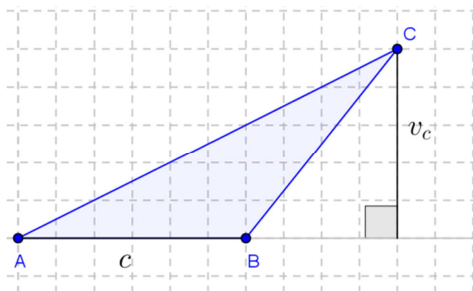
11

a) $a = 4 \text{ cm}$

b) $a = 4 \text{ cm}$

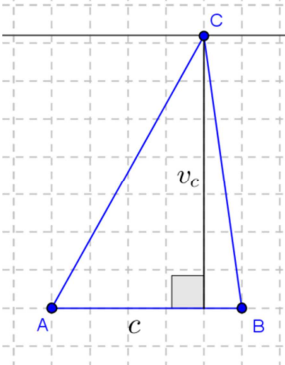
c) $v_a = 4 \text{ cm}$

12



a) $p = \frac{c \cdot v_c}{2} = \frac{6 \cdot 5}{2} = 15 \text{ cm}^2$

13 $c = 5 \text{ cm}, v_c = 7,2 \text{ cm}, o = 20,4 \text{ cm}$



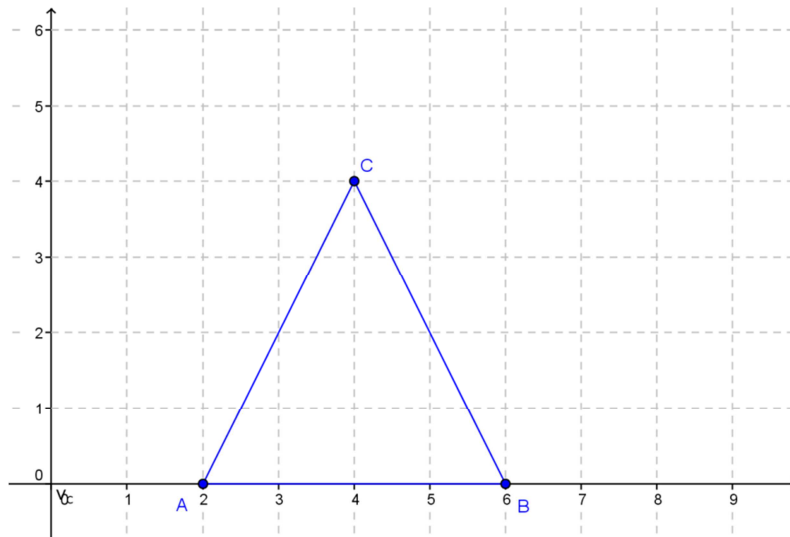
16

a) $p = 3,75 \text{ cm}^2$

b) $p = 5,25 \text{ cm}^2$

c) $p = 5,625 \text{ cm}^2$

17

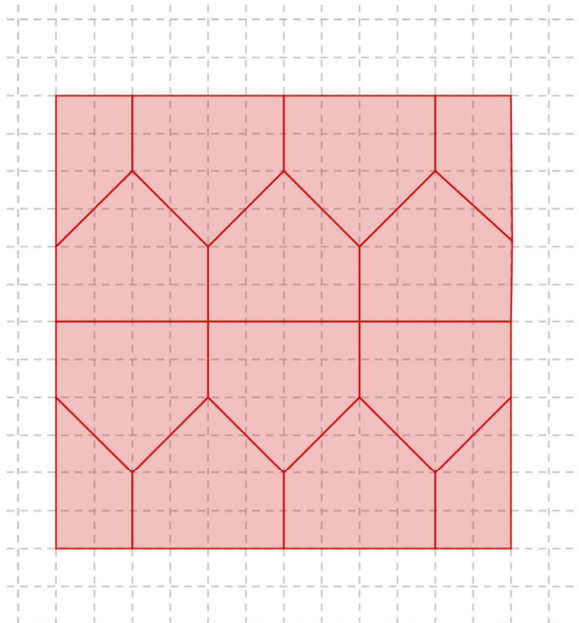


- a) $o = 12,9 \text{ cm}$
 b) $p = 8 \text{ cm}^2$
 c) Ploščina trikotnika se ne spremeni.
 č) Ploščina trikotnika se poveča, če točko C pomaknemo navzgor in zmanjša, če točko C pomaknemo navzdol vzporedno z osjo y .

18 Trikotniki s temi podatki ne obstajajo!

19

- a) $p = 12 \text{ cm}^2$
 b)



c) Ena škatla vsebuje $0,018 \text{ m}^2$ ploščic.

20 Potrebujemo $240,12 \text{ m}^2$ izolacije.

Utrdi svoje znanje

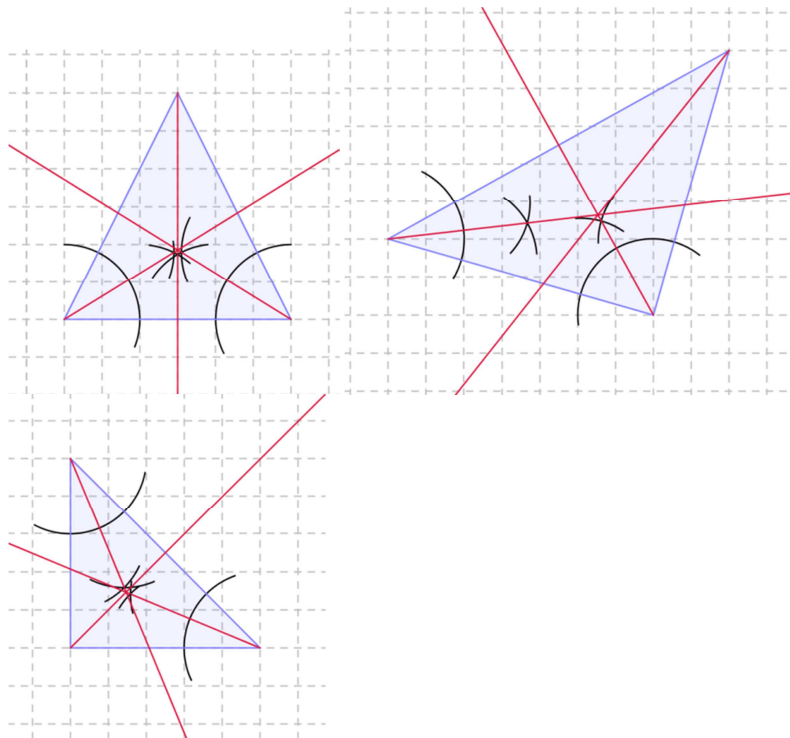
1

- a) $\alpha_1 = \beta_2 = \gamma_1 = \delta_2 = 32^\circ$
 $\alpha_2 = \beta_1 = \gamma_2 = \delta_1 = 58^\circ$
 $\varepsilon_1 = \varepsilon_3 = 116^\circ$
 $\varepsilon_2 = \varepsilon_4 = 64^\circ$
 b) $\alpha_1 = \beta_2 = \gamma_1 = \delta_2 = 49^\circ$
 $\alpha_2 = \beta_1 = \gamma_2 = \delta_1 = 41^\circ$

- $\varepsilon_1 = \varepsilon_3 = 98^\circ$
 $\varepsilon_2 = \varepsilon_4 = 82^\circ$
 c) $\alpha_1 = \beta_2 = \gamma_1 = \delta_2 = 37^\circ$
 $\alpha_2 = \beta_1 = \gamma_2 = \delta_1 = 53^\circ$
 $\varepsilon_1 = \varepsilon_3 = 74^\circ$
 $\varepsilon_2 = \varepsilon_4 = 106^\circ$
 č) $\alpha_1 = \beta_2 = \gamma_1 = \delta_2 = 50^\circ$
 $\alpha_2 = \beta_1 = \gamma_2 = \delta_1 = 40^\circ$
 $\varepsilon_1 = \varepsilon_3 = 100^\circ$
 $\varepsilon_2 = \varepsilon_4 = 80^\circ$
 d) $\alpha_1 = \beta_2 = \gamma_1 = \delta_2 = 61^\circ$
 $\alpha_2 = \beta_1 = \gamma_2 = \delta_1 = 29^\circ$
 $\varepsilon_1 = \varepsilon_3 = 122^\circ$
 $\varepsilon_2 = \varepsilon_4 = 58^\circ$
 e) $\alpha_1 = \beta_2 = \gamma_1 = \delta_2 = 45^\circ$
 $\alpha_2 = \beta_1 = \gamma_2 = \delta_1 = 45^\circ$
 $\varepsilon_1 = \varepsilon_3 = 90^\circ$
 $\varepsilon_2 = \varepsilon_4 = 90^\circ$
 f) $\alpha_1 = \beta_2 = \gamma_1 = \delta_2 = 67^\circ$
 $\alpha_2 = \beta_1 = \gamma_2 = \delta_1 = 23^\circ$
 $\varepsilon_1 = \varepsilon_3 = 134^\circ$
 $\varepsilon_2 = \varepsilon_4 = 46^\circ$
 g) $\alpha_1 = \beta_2 = \gamma_1 = \delta_2 = 62^\circ$
 $\alpha_2 = \beta_1 = \gamma_2 = \delta_1 = 28^\circ$
 $\varepsilon_1 = \varepsilon_3 = 124^\circ$
 $\varepsilon_2 = \varepsilon_4 = 56^\circ$

2

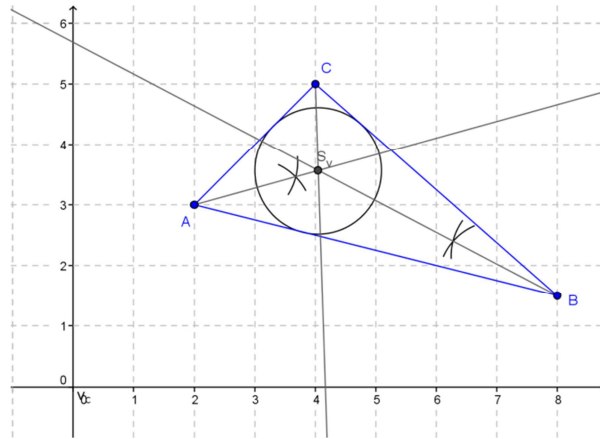
- a) a: enakokraki, b: enakokraki, pravokotni, c: enakokraki, pravokotni
 b)



3

- a) Nadja: $96^\circ, 42^\circ, 42^\circ$.
 b) Neja: $48^\circ, 66^\circ, 66^\circ$ ali $48^\circ, 48^\circ, 84^\circ$.

4

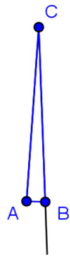


5

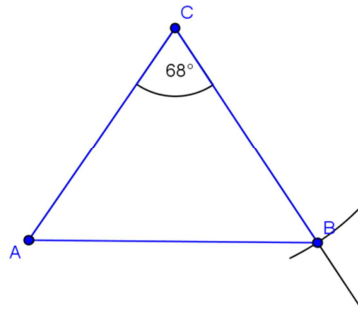
- a) Ne, ker kraka danih nimata presečišča.
- b) Ne, ker je vsota dolžin dveh stranic manjša od dolžine tretje stranice .
- c) Ne, ker je vsota dolžin dveh stranic manjša od dolžine tretje stranice.
- d) Ne, ker kraka danih nimata presečišča.

6

- a) $\gamma = 6^\circ$

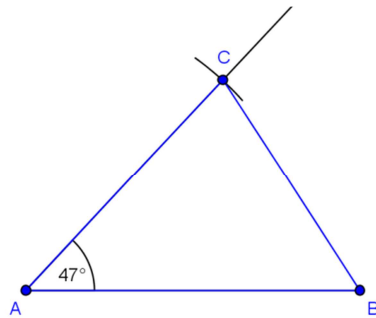


- b) $\gamma = 68^\circ$

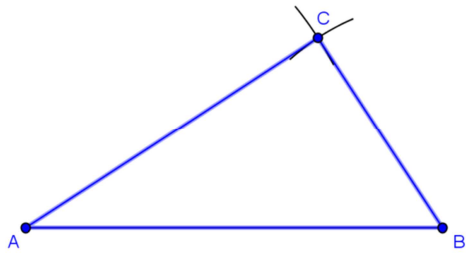


7

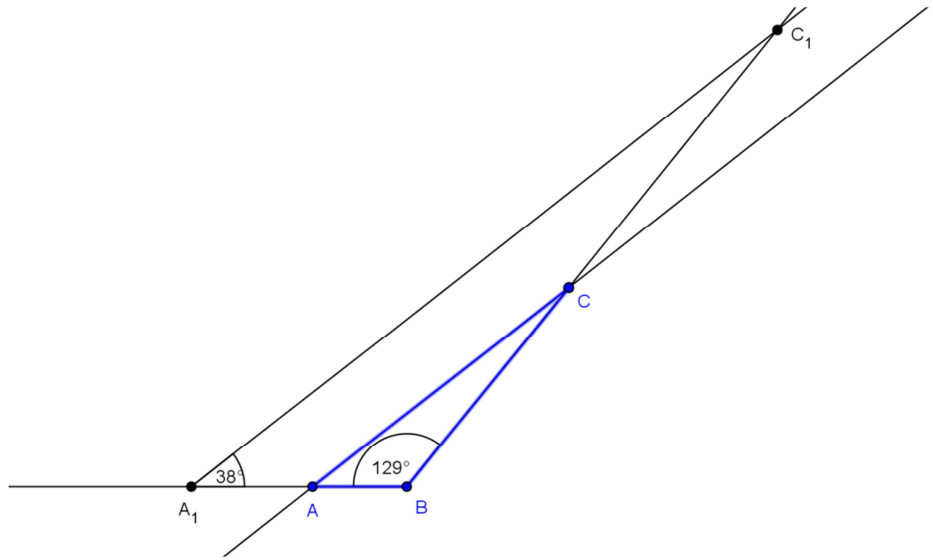
- a)



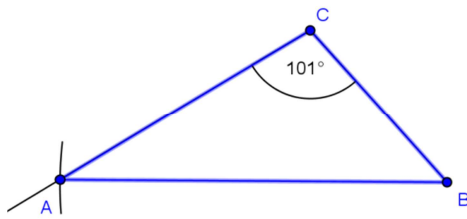
- b)



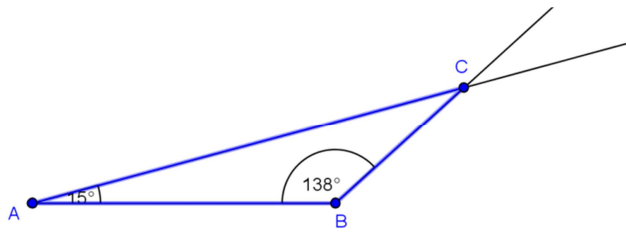
c)



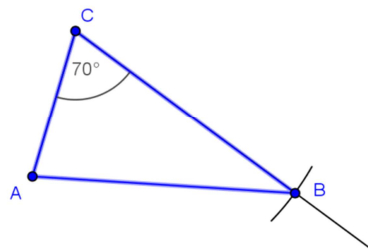
č)



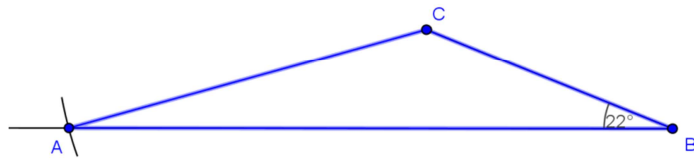
d)



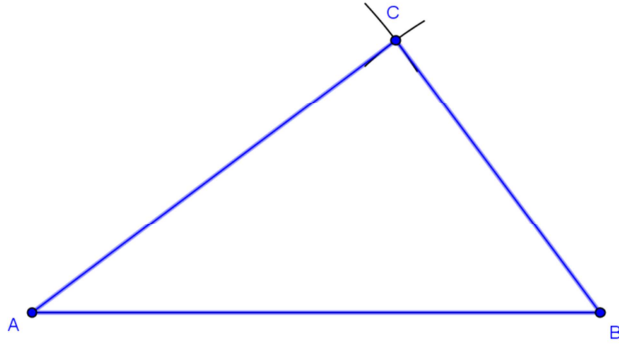
e)



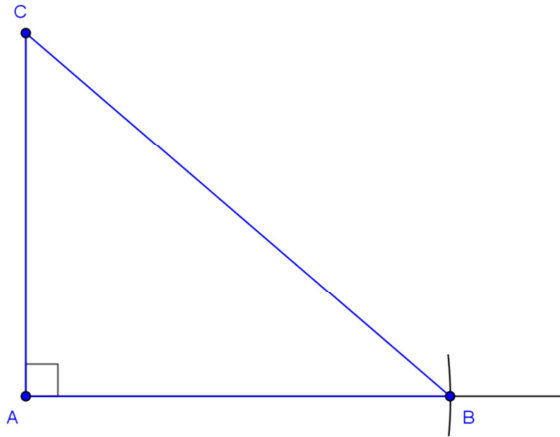
f)



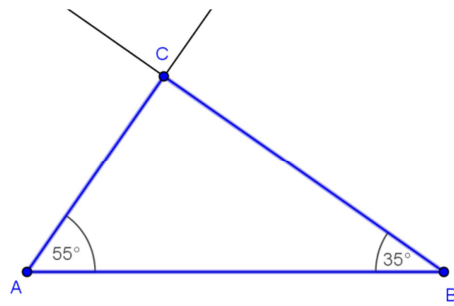
8
a)



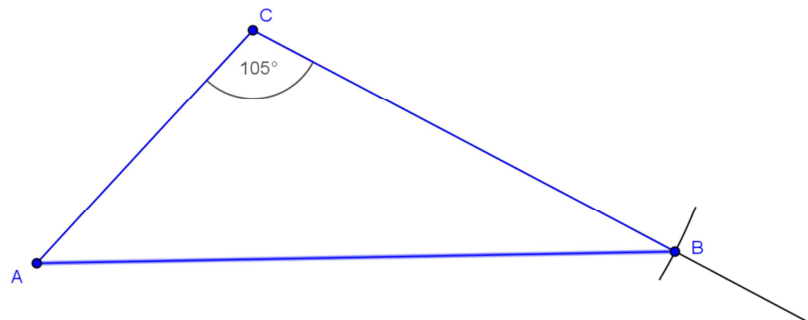
b)



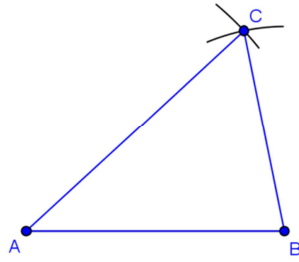
c)



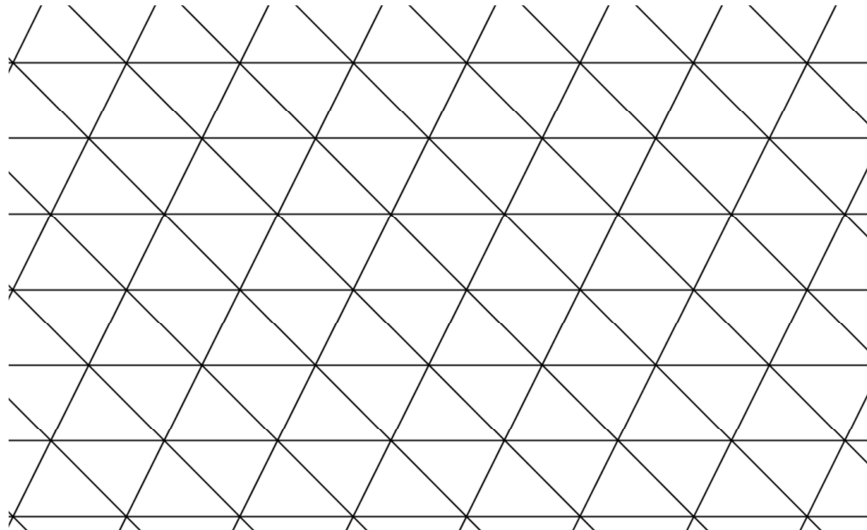
č)



d)



9

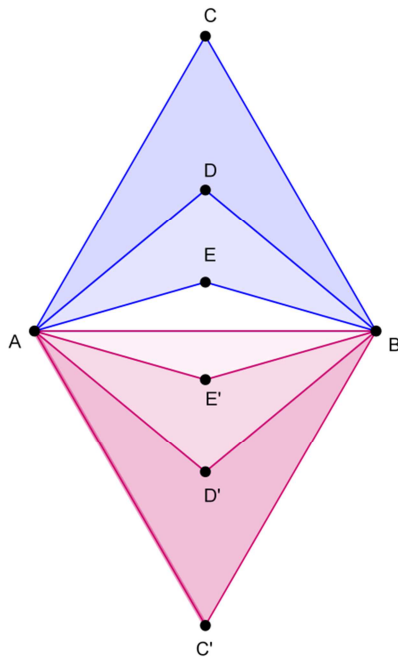


a) Tla imejo lahko obliko tistih večkotnikov, ki jih je mogoče narisati glede na mrežo, ki jo določa oblika trikotnika (trikotnik, paralelogram, ...).

b) Da.

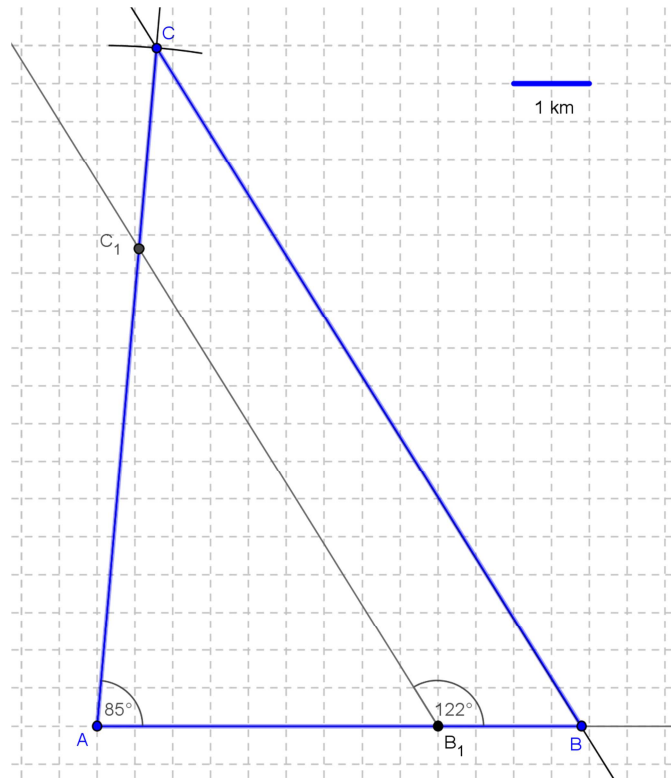
c) Ne.

10



11

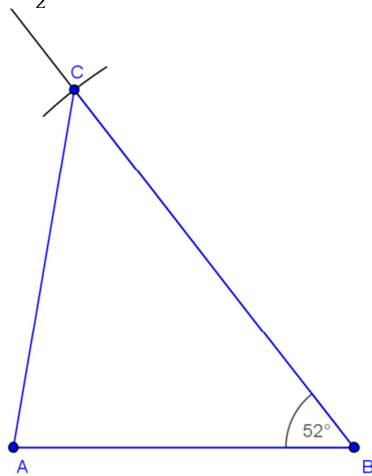
a) V pol ure je ladja preplula približno 6,4 km dolgo pot.



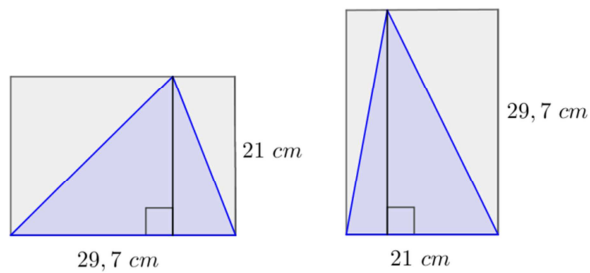
b) Ladja je plula s povprečno hitrostjo 12,8 km/h.

12 $o = 6 + 4,5 + 4,8 = 15,3 \text{ cm}$

$p = \frac{4,5 \cdot 4,7}{2} \doteq 10,6 \text{ cm}^2$

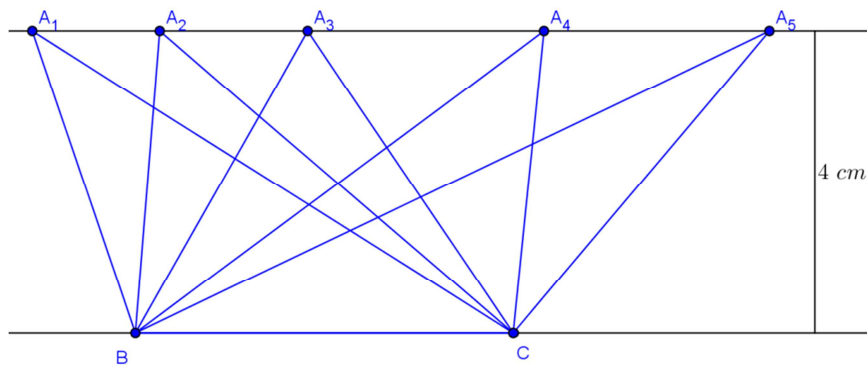


13 Katerikoli trikotnik z osnovnico 29,7 cm in višino 21 cm ali osnovnico 21 cm in višino 29,7 cm.



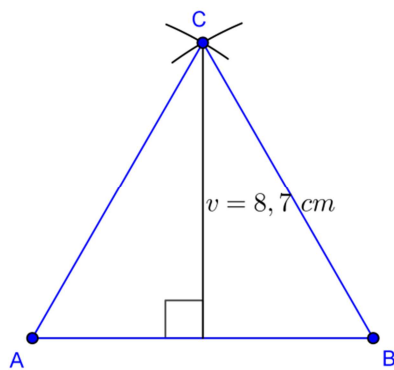
14 Površina šotora meri $9,4 \text{ m}^2$. Za impregnacijo šotora potrebuje 2 pločevinki pršila.

15 Takšni so vsi trikotniki, ki imajo oglišče A kjerkoli na vzporednici, ki je od stranice a oddaljena 4 cm.



16

a) $p \doteq 43,3 \text{ cm}^2, v \doteq 8,7 \text{ cm}$



b) $p_1 \doteq 32,5 \text{ cm}^2, p_2 \doteq 24,4 \text{ cm}^2, p_3 \doteq 18,3 \text{ cm}^2$

c) $o_1 = 45 \text{ cm}, o_2 = 67,5 \text{ cm}, o_3 = 101,25 \text{ cm}$