

NALOGE ZA 2. LETNIK - PRAVOKOTNI TRIKOTNIK IN KOTNE FUNKCIJE

Naloge¹ so namenjene utrjevanju učne snovi in pripravi na preverjanje in ocenjevanje znanja.

Šolsko leto: 2007/2008

1. V pravokotnem trikotniku sta a in b kateti, c hipotenuza, a_1 in b_1 pravokotni projekciji katet na hipotenuzo. Iz dveh znanih količin izračunaj ostale štiri. Rezultat naj bo natančen ali zaokrožen na dve decimalni mesti.

(a) $a = 7cm, b = 24cm$

[R: $c = 25cm, a_1 = 1,96cm, b_1 = 23.04cm, v = 6,72cm$]

(b) $b = 4m, c = 6m$

[R: $a = 2\sqrt{5}m, a_1 = \frac{10}{3}, b_1 = \frac{8}{3}, v = \frac{4\sqrt{5}}{3}$]

(c) $a_1 = 2mm, b_1 = 8mm$

[R: $a = 2\sqrt{5}mm, 4\sqrt{5}mm, c = 10mm, v = 4mm$]

(d) $c = 12cm, a_1 = 8cm$

[R: $a = 4\sqrt{6}cm, b = 4\sqrt{3}cm, b_1 = 4cm, v = 4\sqrt{2}$]

(e) $v = 12dm, b = 15dm$

[R: $a = 20dm, c = 25dm, a_1 = 16dm, b_1 = 9dm$]

(f) $v = 6cm, a_1 = 2cm$

[R: $a = 2\sqrt{10}cm, b = 6\sqrt{10}cm, c = 20cm, b_1 = 18cm$]

2. Nariši pravokotni trikotnik, če poznaš:

(a) $a_1 = 2cm, b_1 = 5cm$

(b) $b_1 = 3cm, c = 9cm$

(c) $v = 4cm, \alpha = 75^\circ$

(d) $a = 5,5cm, v = 3,5cm$

3. Nariši dolžino daljice. Pomagaj si z višinskim izrekom $v = \sqrt{a_1 b_1}$ in kotom v polkrogu.

$\sqrt{3}, \sqrt{5}, \sqrt{6}, \sqrt{7}, \sqrt{8}, \sqrt{10}, \sqrt{11}, \sqrt{12}, \sqrt{14}$

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KOTNE FUNKCIJE OSTRIH KOTOV

4. S kalkulatorjem izračunaj kot x do minute natančno, če je:

(a) $\sin x = \frac{5}{8}$ [R:38°41']

(b) $\sin x = \frac{\sqrt{5}}{2}$ [R:ni kota]

(c) $\cos x = \frac{4}{27}$ [R:81°29']

(d) $\cos x = \sqrt{\frac{1}{12}}$ [R:73°13']

(e) $\cos x = 3 - \sqrt{2}$ [R:ni kota]

(f) $\operatorname{tg} x = 1\frac{5}{9}$ [R:57°16']

(g) $\operatorname{tg} x = \cos 30^\circ$ [R:40°54']

(h) $\operatorname{ctg} x = 3 - \sqrt{2}$ [R:32°14']

(i) $\operatorname{ctg} x = \sin 60^\circ \cdot \cos 45^\circ \cdot \operatorname{tg} 30^\circ$ [R:70°32']

5. S kalkulatorjem izračunaj neznanko x :

(a) $\cos 218^\circ = x$ [R: $x = -0,7880$]

(b) $\operatorname{ctg} x = \sqrt{7}$ [R: 20°42'18'']

(c) $\operatorname{tg} x = 100\sqrt{6}$ [R: 89°45'58'']

(d) $\sin x = \left(-\frac{18}{23} + \sqrt{3}\right)^2$ [R: 64°20'53'']

(e) $\cos x = -\frac{15}{8} + \sqrt{3}$ [R: 98°13'7'']

6. V pravokotnem trikotniku z danimi podatki izračunaj zahtevano:

(a) $a = 15\text{cm}, b = 20\text{cm}, \beta = ?$ [R:53°8']

(b) $b = 7\text{cm}, c = 20\text{cm}, \alpha = ?$ [R:69°31']

(c) $a = 14\text{m}, c = 25\text{m}, \alpha = ?$ [R:34°3']

(d) $a = 18\text{dm}, b = 80\text{dm}, \alpha, \beta = ?$ [R:12°41', 77°19']

7. V pravokotnem trikotniku ABC s količinami a, b, c, a_1, b_1, v izračunaj neznane količine. Rezultati naj bodo natančni ali zaokroženi na dve decimalni mesti, koti pa do minute natančno.

(a) $a = 5\text{cm}, a_1 = 2\sqrt{5}\text{cm}$ [R: $b = \frac{5}{2}\text{cm}, c = \frac{5\sqrt{5}}{2}\text{cm}, \alpha = 63^\circ 26', \beta = 26^\circ 34'$]

(b) $a_1 = 1\text{m}, b_1 = 9\text{m}$ [R: $a = \sqrt{10}\text{m}, b = 3\sqrt{10}\text{m}, c = 10\text{m}, \alpha = 18^\circ 26', \beta = 71^\circ 34'$]

(c) $a = 6\text{dm}, v = \sqrt{11}$ [R: $b = 3,98\text{dm}, c = 7,2\text{dm}, \alpha = 56^\circ 26', \beta = 33^\circ 34'$]

$$(d) \quad b_1 = 10mm, \alpha = 72^0 \quad [R:a = 99,6mm, b = 32,36mm, c = 104,72mm, \beta = 18^0]$$

$$(e) \quad b_1 = 6cm, v = 3cm$$

$$[R:a = \frac{3\sqrt{5}}{2}cm, b = 3\sqrt{5}cm, c = 7,5cm, \alpha = 26^034', \beta = 63^026']$$

$$(f) \quad v = 12,5m, \beta = 22,5^0 \quad [R:a = 32,66m, b = 13,53m, c = 35,35m, \alpha = 67,5^0]$$

8. Enakokrakemu trikotniku s krakoma $a = b$, osnovnico c in višino na osnovnico v_c in višino na krak v_a izračunaj ostale količine natančno ali na dve decimalni mesti natančno, kote do minute natančno.

$$(a) \quad a = 6cm, \alpha = 66^0 \quad [R:c = 4,88cm, \gamma = 48^0]$$

$$(b) \quad c = 42dm, \gamma = 135^0 \quad [R:a = 22,73cm, \alpha = 22,5^0]$$

$$(c) \quad a = 6,75m, c = 13m \quad [R:\alpha = 15^038', \gamma = 148^044']$$

$$(d) \quad c = 9m, v_c = 2dm \quad [R:a = 45,05dm, \alpha = 2^032', \gamma = 174^056']$$

$$(e) \quad c = 19cm, v_a = 2cm \quad [R:a = 9,54cm, \alpha = 6^03', \gamma = 167^056']$$

$$(f) \quad v_c = 28dm, \gamma = 12^0 \quad [R:a = 28,15dm, c = 5,89dm, \alpha = 84^0]$$

$$(g) \quad v_c = 15cm, \alpha = 15^012' \quad [R:a = 57,21cm, c = 110,42cm, \gamma = 49^036']$$

$$(h) \quad a = 6mm, v_c = 4mm \quad [R:c = 4\sqrt{5}mm, \alpha = 41^049', \gamma = 96^022']$$

9. V rombu merita:

(a) diagonali $e = 18cm$ in $f = 24,5cm$. Izračunaj ostri kot med stranicama.

$$[R:\alpha = 72^037']$$

(b) diagonalna $e = 12cm$, ostri kot $\alpha = 18^0$. Izračunaj drugo diagonalno in stranico.

$$[R:1,901cm, 6,075cm]$$

10. Enakokraki trapez ima osnovnici $10cm$ in $7,5cm$, krak pa oklepa z večjo osnovnico kot 49^0 . Izračunaj višino trapeza.

$$[R:1,44cm]$$

11. Izračunaj brez uporabe kalkulatorja. Rezultat naj bo natančen.

$$(a) \quad \frac{2 - \cos 60^0 - \sin^{-1} 30^0}{1 - \sin 30^0 - \operatorname{tg} 45^0} \quad [R:1]$$

$$(b) \quad \left(\frac{1 + \operatorname{ctg} 30^0 - \operatorname{tg} 60^0}{2 + \sin 30^0 - \cos 60^0} \right)^{-2} \quad [R:4]$$

$$(c) \quad \left(\frac{4(\cos^2 60^0 + \sin^2 30^0)}{\cos 0^0 + \sin 90^0} \right)^{-7} \quad [R:1]$$

$$(d) \quad \frac{10 - 2 \cos 60^0 - \sin^{-2} 30^0}{5 + \cos 0^0 - \operatorname{ctg} 45^0} \quad [R:1]$$

$$(e) \left(\frac{\sin^2 60^\circ + \cos^2 30^\circ}{2 \operatorname{ctg} 45^\circ \operatorname{tg} 45^\circ} \right)^{-3} \quad [\text{R:} \frac{64}{27}]$$

KOTNE FUNKCIJE IN ENOTSKA KROŽNICA

12. Izračunaj vrednosti ostalih treh kotnih funkcij ostrega kota, če poznaš eno:

$$(a) \sin \alpha = \frac{3}{5} \quad [\text{R:} \cos \alpha = \frac{4}{5}, \operatorname{tg} \alpha = \frac{3}{4}, \operatorname{ctg} \alpha = \frac{4}{3}]$$

$$(b) \sin \alpha = \frac{\sqrt{5}}{3} \quad [\text{R:} \cos \alpha = \frac{2}{3}, \operatorname{tg} \alpha = \frac{\sqrt{5}}{2}, \operatorname{ctg} \alpha = \frac{2\sqrt{5}}{5}]$$

$$(c) \cos \alpha = \frac{5}{13} \quad [\text{R:} \sin \alpha = \frac{12}{13}, \operatorname{tg} \alpha = \frac{12}{5}, \operatorname{ctg} \alpha = \frac{5}{12}]$$

$$(d) \cos \alpha = 0, 2 \quad [\text{R:} \sin \alpha = \frac{2\sqrt{6}}{5}, \operatorname{tg} \alpha = 2\sqrt{6}, \operatorname{ctg} \alpha = \frac{\sqrt{6}}{12}]$$

13. Izrazi kotno funkcijo danega kota s funkcijo komplementarnega kota:

$$(a) \sin 35^\circ \quad [\text{R:} \cos 55^\circ]$$

$$(b) \cos 72^\circ 40' \quad [\text{R:} \sin 17^\circ 20']$$

$$(c) \operatorname{tg}(82^\circ - x) \quad [\text{R:} \operatorname{ctg}(8^\circ + x)]$$

$$(d) \operatorname{ctg}(13^\circ 56' 13'') \quad [\text{R:} \operatorname{tg} 76^\circ 3' 47'']$$

14. Zapiši s funkcijo ostrega kota in izračunaj vrednost brez uporabe kalkulatorja:

$$(a) \cos 120^\circ, \cos 300^\circ, \sin 210^\circ, \sin 315^\circ \quad [-\frac{1}{2}, \frac{1}{2}, -\frac{1}{2}, -\frac{\sqrt{2}}{2}]$$

$$(b) \operatorname{tg} 135^\circ, \operatorname{tg} 240^\circ, \operatorname{ctg} 150^\circ, \operatorname{ctg} 330^\circ \quad [-1, \sqrt{3}, -\sqrt{3}, -\sqrt{3}]$$

15. Izračunaj brez uporabe kalkulatorja:

$$(a) (\operatorname{tg}^3 210^\circ \cdot \sin 150^\circ)^{-2} \quad [\text{R:} 108]$$

$$(b) \left(\frac{2 \cos 315^\circ + \sin 225^\circ}{\operatorname{tg}^2 210^\circ} \right)^{-1} \quad [\text{R:} \frac{\sqrt{2}}{3}]$$

$$(c) \operatorname{tg}^{-1} 315^\circ \cdot \cos 45^\circ - \sin^4 150^\circ \quad [\text{R:} \frac{-8\sqrt{2}-1}{16}]$$

$$(d) \left(\frac{\cos 120^\circ + \sin 210^\circ}{\operatorname{tg} 225^\circ \cdot \operatorname{ctg} 135^\circ} \right)^{-1} \quad [\text{R:} 1]$$

$$(e) \frac{2 - \cos 300^\circ - \sin^{-1} 150^\circ}{1 + \sin 210^\circ + \operatorname{tg} 135^\circ} \quad [\text{R:} 1]$$