

MAA3 Geometria

1.3 a) $\alpha = 26^\circ$ (samanholttaiset kulmat, l || m)
 $\beta = 146^\circ$ (— , —)

b) $\alpha = 180^\circ - 75^\circ = 105^\circ$
 samanholttaiset kulmat yhtä suuret \Rightarrow m || l

2.18 $\alpha = \beta$ (samanholtt. k. l1, l2)
 $\beta = \beta$ (— , —)
 $\Rightarrow \alpha = \beta$

1.13 a) $\beta + 5\beta = 180^\circ \Rightarrow \beta = \frac{180^\circ}{6} = 30^\circ$
 $\gamma = 5\beta = 5 \cdot 30^\circ = 150^\circ$ (samanholttaiset kulmat, l || m)
 $\alpha = 360^\circ - 150^\circ - 150^\circ = 60^\circ$

b) $\alpha = 24^\circ$ (näkikulmat)
 $\beta = 180^\circ - 2 \cdot 24^\circ = 132^\circ \neq 134^\circ$
 \Rightarrow samanholttaiset kulmat eri suuret \Rightarrow l || m

3.1 a) $k = \frac{1,25}{85} = \frac{1}{68}$
 b) $\frac{x}{15m} = \frac{125cm}{85m} \cdot 15m \Rightarrow x = \frac{125cm \cdot 15m}{85m} \approx 22,06cm \approx 22cm$

1.14 a) $\alpha + 3\alpha + 5\alpha = 9\alpha = 180^\circ \Rightarrow \alpha = 20^\circ$

b) $\beta = \frac{180^\circ}{3} = 60^\circ$ (tasasivuinen kolmio)
 $\alpha = 180^\circ - 60^\circ = 120^\circ$

c) $\gamma = \alpha$ (tasakylkisen kolmion kantakulmat)
 $\beta = 90^\circ - 50^\circ = 40^\circ$
 $\alpha + \beta + \gamma = 2\alpha + \beta = 2\alpha + 40^\circ = 180^\circ$
 $\Rightarrow 2\alpha = 140^\circ \Rightarrow \alpha = 70^\circ$

3.3 a) $\Delta ABC \sim \Delta EDC$ (k.k.)
 $1^\circ \angle A = \angle D$ (samanholtt. k., AB || ED)
 $2^\circ \angle ACB = \angle CDE$ (näkikulmat)
 $\frac{x}{20} = \frac{28}{16} \cdot 20 \Rightarrow x = \frac{20 \cdot 28}{16} = 35$

b) $\Delta ABC \sim \Delta DEC$ (k.k.)
 $1^\circ \angle C$ yhteinen
 $2^\circ \angle A = \angle D$ (samanholttaiset kulmat, AB || DE)
 $\frac{x+10}{8} = \frac{10}{5} = 2 \cdot 8 \Rightarrow x+10 = 16 \Rightarrow x = 6$

1.16 $2x + 15^\circ = 30^\circ - x$ (näkikulmat)
 $\Rightarrow 3x = 15^\circ \Rightarrow x = 5^\circ$
 $\alpha = 180^\circ - (2 \cdot 5^\circ + 15^\circ) = 155^\circ$

3.4 $\Delta ABC \sim \Delta ADE$ (k.k.)
 $1^\circ \angle A$ yhteinen
 $2^\circ \angle B = \angle D = 90^\circ$
 $\frac{x}{5} = \frac{x+20}{15} \cdot 15 \Rightarrow 15x = 5(x+20)$
 $\Rightarrow 15x = 5x + 100 \Rightarrow 10x = 100 \Rightarrow x = 10(m)$

2.1 $aari: 1a = (10m)^2 = 100m^2$
 $A = A_1 + A_2 = \frac{1}{2}(x+5) \cdot 80 + \frac{1}{2}x \cdot 80$
 $= 40(x+5) + 40x = 80x + 200$
 $= 150a = 15000m^2$
 $\Rightarrow 80x = 14800 \quad | :8 \Rightarrow x = 185$
 \Rightarrow mitat 185 m ja 190 m

3.8 a) $\frac{x}{6} = \frac{5}{3} \cdot 6 \Rightarrow x = \frac{6 \cdot 5}{3} = 10$
 b) $\frac{y}{16} = \frac{3}{5} \cdot 16 \Rightarrow y = \frac{3 \cdot 16}{5} = \frac{48}{5}$
 c) $k = \frac{3}{5}$ (tai $\frac{5}{3}$)

2.10 a) $\gamma = 130^\circ$ (samanholttaiset kulmat)
 $\beta = 180^\circ - \gamma = 50^\circ$
 $\delta = \beta$ (samanholttaiset kulmat)
 $\alpha = 180^\circ - \delta = 180^\circ - 50^\circ = 130^\circ$

b) $\gamma = \delta$ (tasakylkisen kolmion kantakulmat)
 $2\gamma + 90^\circ = 180^\circ \Rightarrow \gamma = 45^\circ$
 $x = 90^\circ - \gamma = 90^\circ - 45^\circ = 45^\circ$
 $\beta = x = 45^\circ$ (a-selitys)
 $\alpha = 180^\circ - \beta = 135^\circ$ (a-selitys)

mittakaava	tod. pituus	pituus kartalla
1:20 000	12,5 km	62,5 cm ①
1:250 000 ②	190 km	76 cm
1:10 000	350 m ③	3,5 cm

① $\frac{1}{20000} \cdot 12,5 km = 0,000625 km = 62,5 cm$
 ② $\frac{0,76m}{190000m} = \frac{76}{19000000} = \frac{1}{250000}$
 ③ $\frac{3,5cm}{x} = \frac{1}{10000} \Rightarrow x = 10000 \cdot 3,5cm = 350m$

2.17 $\beta = \beta_1$ (kantakulmat)
 $2\beta + 20^\circ = 180^\circ \Rightarrow \beta = 80^\circ$
 $\gamma = \beta_1 = 80^\circ$ (samanholtt. kulmat)
 $\delta = 180^\circ - \beta_1 = 180^\circ - 80^\circ = 100^\circ$

4-kulmion kulmien summa:
 $4\alpha + \alpha + \gamma + \delta = 5\alpha + 80^\circ + 100^\circ = (4-2) \cdot 180^\circ = 360^\circ$
 $\Rightarrow 5\alpha = 180^\circ \Rightarrow \alpha = 36^\circ$ (TAI: $\alpha = \epsilon \Rightarrow \epsilon + 4\alpha = \alpha + 4\alpha = 5\alpha = 180^\circ \Rightarrow \alpha = 36^\circ$)

3.13 a) $\Delta ABC \sim \Delta ADE$ (k.k.)
 $1^\circ \angle A$ yhteinen
 $2^\circ \angle D = \angle B = 90^\circ$
 $\frac{x}{79} = \frac{60}{79+42} \cdot 79$
 $\Rightarrow x = \frac{60 \cdot 79}{79+42} \approx 39,174 \approx 39(m)$

b) $\Delta ABC \sim \Delta EFC$ (k.k.) $1^\circ \angle C$ yhteinen, $2^\circ \angle B = \angle F = 90^\circ$
 $\frac{y}{42} = \frac{105}{79+42} \cdot 42 \Rightarrow y = \frac{105 \cdot 42}{79+42} \approx 36,446 \approx 36(m)$

3.17 $\Delta ABC \sim \Delta AFG \sim \Delta ADE$ (k.k.)
 $1^\circ \angle A$ yhteinen
 $2^\circ \angle D = \angle F = \angle B = 90^\circ$

a) $\frac{x+2}{3,2} = \frac{2}{1,8} \cdot 3,2 \quad | \cdot 2$
 $\Rightarrow x = \frac{2 \cdot 3,2}{1,8} - 2 = 1,5556 \approx 1,6$

b) $\frac{h}{2+x+3} = \frac{1,8}{2} \cdot (2+x+3) \Rightarrow h = \frac{1,8 \cdot (5+1,5556)}{2} = 5,9(m)$

3.21 $\Delta ABC \sim \Delta ADE$ (k.k.) $1^\circ \angle A = \angle D$, $2^\circ \angle B = \angle E = 90^\circ$
 $\frac{A}{19} = \frac{x}{3} \cdot 1,3 \Rightarrow x = \frac{3 \cdot (11-2,5)}{19} \approx 1,342$
 $2,5-x = 2,5-1,342 = 1,158 > 1,05(m) \Rightarrow$ ei ole