Geraden und Dreiecke in der Ebene

Aufgabe 1 In welchem Punkt schneidet die Gerade g_1, die durch die Punkte P und Q festgelegt ist, die Gerade g_2, die durch die Punkte R und S verfäuft?

Aufgabe 2 Nimmt man die x-Achse als dritte Gerade hinzu, ergibt sich zusammen mit den Geraden g_1 und g_2 ein Dreieck.

2.1 Bestimme den Umfang dieses Dreiecks.

2.2 Bestimme den Flächeninhalt dieses Dreiecks.

2.3 Bestimme die Innenwinkel dieses Dreiecks.

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a)	$P\,(-15 \mid -20)$	$Q\,(-16 \mid -5)$	$R\,(16 \mid 2)$	$S\,(-6 \mid 3)$
b)	$P\,(4 \mid 19)$	$Q\,(11 \mid 1)$	$R\,(10 \mid 17)$	$S\,(-18 \mid 5)$
c)	$P\,(20 \mid -19)$	$Q\,(17 \mid 2)$	$R\,(18 \mid 12)$	$S\,(-7 \mid 11)$
d)	$P\,(2 \mid 15)$	$Q\,(-2 \mid 19)$	$R\,(-5 \mid 11)$	$S\,(4 \mid 5)$
e)	$P\,(8 \mid 19)$	$Q\,(-6 \mid -3)$	$R\,(-18 \mid 14)$	$S\,(-13 \mid 17)$
f)	$P\,(-10 \mid -16)$	$Q\,(3 \mid 18)$	$R\,(-5 \mid 1)$	$S\,(-19 \mid 16)$
g)	$P\,(-9 \mid 16)$	$Q\,(-13 \mid -18)$	$R\,(-1 \mid 20)$	$S\,(15 \mid -16)$
h)	$P\,(8 \mid -16)$	$Q\,(-5 \mid -2)$	$R\,(7 \mid 3)$	$S\,(-4 \mid 2)$
i)	$P\,(-17 \mid 13)$	$Q\,(-2 \mid 1)$	$R\,(10 \mid -16)$	$S\,(3 \mid 19)$
j)	$P\,(-2 \mid 1)$	$Q\,(11 \mid -15)$	$R\,(-4 \mid -1)$	$S\,(-14 \mid -7)$
k)	$P\,(-14 \mid 16)$	$Q\,(-17 \mid 15)$	$R\,(14 \mid 20)$	$S\,(6 \mid -2)$
l)	$P\,(-16 \mid 7)$	$Q\,(-5 \mid 2)$	$R\,(8 \mid 16)$	$S\,(-17 \mid -13)$
m)	$P\,(-1 \mid 18)$	$Q\,(12 \mid -16)$	$R\,(-6 \mid 5)$	$S\,(-15 \mid -19)$
n)	$P\,(7 \mid 6)$	$Q\,(4 \mid 15)$	$R\,(-5 \mid -16)$	$S\,(12 \mid 18)$
o)	$P\,(9 \mid 7)$	$Q\,(11 \mid -10)$	$R\,(14 \mid 16)$	$S\,(-6 \mid 19)$
p)	$P\,(-17 \mid -11)$	$Q\,(12 \mid 15)$	$R\,(13 \mid -6)$	$S\,(-13 \mid -12)$
q)	$P\,(15 \mid -9)$	$Q\,(-20 \mid 12)$	$R\,(11 \mid 19)$	$S\,(-4 \mid -15)$
r)	$P\,(7 \mid -11)$	$Q\,(1 \mid -2)$	$R\,(-3 \mid -7)$	$S\,(-10 \mid 6)$
s)	$P\,(-19 \mid -7)$	$Q\,(19 \mid -16)$	$R\,(-18 \mid -1)$	$S\,(-10 \mid 9)$
t)	$P\,(19 \mid 3)$	$Q\,(12 \mid 20)$	$R\,(7 \mid -8)$	$S\,(13 \mid 18)$
u)	$P\,(12 \mid -15)$	$Q\,(-5 \mid 1)$	$R\,(20 \mid -13)$	$S\,(-2 \mid 3)$

Lösung a)

$$g_1 : f(x) = -15x - 245 \qquad g_2 : f(x) = -\frac{1}{22}x + \frac{30}{11}$$

$$A\left(-\frac{49}{3} \;\middle|\; 0\right) \qquad B\,(60 \mid 0) \qquad C\,(-16.5653 \mid 3.480\,24)$$

$$U_D = 156.466 \qquad A_D = 132.829$$

$$\alpha = 86.1859 \qquad \beta = \frac{203}{78} \qquad \gamma = 91.2115$$

Lösung b)

$$g_1 : f(x) = -\frac{18}{7}x + \frac{205}{7} \qquad g_2 : f(x) = \frac{3}{7}x + \frac{89}{7}$$

$$A\left(-\frac{89}{3} \;\middle|\; 0\right) \qquad B\left(\frac{205}{18} \;\middle|\; 0\right) \qquad C\left(\frac{116}{21} \;\middle|\; \frac{739}{49}\right)$$

$$U_D = 95.5236 \qquad A_D = 309.592$$

$$\alpha = 23.1986 \qquad \beta = 68.7495 \qquad \gamma = 88.0519$$

Lösung c)

$$g_1 : f(x) = -7x + 121 \qquad g_2 : f(x) = \frac{1}{25}x + \frac{282}{25}$$

$$A\,(-282 \mid 0) \qquad B\left(\frac{121}{7} \;\middle|\; 0\right) \qquad C\,(15.5852 \mid 11.9034)$$

$$U_D = 609.133 \qquad A_D = 1781.26$$

$$\alpha = 2.290\,61 \qquad \beta = 81.8699 \qquad \gamma = 95.8395$$

Lösung d)

$$g_1 : f(x) = -x + 17 \qquad g_2 : f(x) = -\frac{2}{3}x + \frac{23}{3}$$

$$A\left(\frac{23}{2} \,\middle|\, 0\right) \qquad B\,(17 \mid 0) \qquad C\,(28 \mid -11)$$

$$U_D = 40.8869 \qquad A_D = \frac{121}{4}$$

$$\alpha = 33.6901 \qquad \beta = 45 \qquad \gamma = 101.31$$

Lösung e)

$$g_1 : f(x) = \frac{11}{7}x + \frac{45}{7} \qquad g_2 : f(x) = \frac{3}{5}x + \frac{124}{5}$$

$$A\left(-\frac{124}{3} \,\middle|\, 0\right) \qquad B\left(-\frac{45}{11} \,\middle|\, 0\right) \qquad C\left(\frac{643}{34} \,\middle|\, 36.1471\right)$$

$$U_D = 150.345 \qquad A_D = 673.102$$

$$\alpha = 30.9638 \qquad \beta = 57.5288 \qquad \gamma = 91.5074$$

Lösung f)

$$g_1 : f(x) = \frac{34}{13}x + \frac{132}{13} \qquad g_2 : f(x) = -\frac{15}{14}x - \frac{61}{14}$$

$$A\left(-\frac{61}{15} \,\middle|\, 0\right) \qquad B\left(-\frac{66}{17} \,\middle|\, 0\right) \qquad C\left(-3.935\,92 \,\middle|\, -\frac{94}{671}\right)$$

$$U_D = 0.525\,92 \qquad A_D = 0.012\,910\,2$$

$$\alpha = 46.9749 \qquad \beta = 69.0755 \qquad \gamma = 63.9496$$

Lösung g)

$$g_1 : f(x) = \frac{17}{2}x + \frac{185}{2} \qquad g_2 : f(x) = -\frac{9}{4}x + \frac{71}{4}$$

$$A\left(-\frac{185}{17} \,\middle|\, 0\right) \qquad B\left(\frac{71}{9} \,\middle|\, 0\right) \qquad C\left(-\frac{299}{43} \,\middle|\, 33.3953\right)$$

$$U_D = 88.942 \qquad A_D = 313.436$$

$$\alpha = 83.2902 \qquad \beta = 66.0375 \qquad \gamma = 30.6723$$

Lösung h)

$$g_1 : f(x) = -\frac{14}{13}x - \frac{96}{13} \qquad g_2 : f(x) = \frac{1}{11}x + \frac{26}{11}$$

$$A\left(-26 \mid 0\right) \qquad B\left(-\frac{48}{7} \,\middle|\, 0\right) \qquad C\left(-8.347\,31 \,\middle|\, \frac{268}{167}\right)$$

$$U_D = 39.0583 \qquad A_D = 15.3601$$

$$\alpha = 5.194\,43 \qquad \beta = 47.1211 \qquad \gamma = 127.684$$

Lösung i)

$$g_1 : f(x) = -\frac{4}{5}x - \frac{3}{5} \qquad g_2 : f(x) = -5x + 34$$

$$A\left(-\frac{3}{4} \,\middle|\, 0\right) \qquad B\left(\frac{34}{5} \,\middle|\, 0\right) \qquad C\left(\frac{173}{21} \,\middle|\, -\frac{151}{21}\right)$$

$$U_D = 26.3933 \qquad A_D = 27.144$$

$$\alpha = 38.6598 \qquad \beta = 78.6901 \qquad \gamma = 62.6501$$

Lösung j)

$$g_1 : f(x) = -\frac{16}{13}x - \frac{19}{13} \qquad g_2 : f(x) = \frac{3}{5}x + \frac{7}{5}$$

$$A\left(-\frac{7}{3} \,\middle|\, 0\right) \qquad B\left(-\frac{19}{16} \,\middle|\, 0\right) \qquad C\left(-\frac{186}{119} \,\middle|\, \frac{55}{119}\right)$$

$$U_D = 2.639\,67 \qquad A_D = 0.264\,793$$

$$\alpha = 30.9638 \qquad \beta = 50.9061 \qquad \gamma = 98.1301$$

Lösung k)

$$g_1 : f(x) = \frac{1}{3}x + \frac{62}{3} \qquad g_2 : f(x) = \frac{11}{4}x - \frac{37}{2}$$

$$A\left(-62 \mid 0\right) \qquad B\left(\frac{74}{11} \,\middle|\, 0\right) \qquad C\left(\frac{470}{29} \,\middle|\, \frac{756}{29}\right)$$

$$U_D = 178.904 \qquad A_D = 895.824$$

$$\alpha = 18.4349 \qquad \beta = 70.0169 \qquad \gamma = 91.5482$$

Lösung l)

$$g_1 : f(x) = -\frac{5}{11}x - \frac{3}{11} \qquad g_2 : f(x) = \frac{29}{25}x + \frac{168}{25}$$

$$A\left(-\frac{168}{29} \,\middle|\, 0\right) \qquad B\left(-\frac{3}{5} \,\middle|\, 0\right) \qquad C\left(-\frac{641}{148} \,\middle|\, \frac{251}{148}\right)$$

$$U_D = 11.5307 \qquad A_D = \frac{731}{166}$$

$$\alpha = 49.2364 \qquad \beta = 24.444 \qquad \gamma = 106.32$$

Lösung m)

$$g_1 : f(x) = -\frac{34}{13}x + \frac{200}{13} \qquad g_2 : f(x) = \frac{8}{3}x + 21$$

$$A\left(-\frac{63}{8} \;\middle|\; 0\right) \qquad B\left(\frac{100}{17} \;\middle|\; 0\right) \qquad C\left(-\frac{219}{206} \;\middle|\; 18.165\right)$$

$$U_D = 52.6052 \qquad A_D = 124.951$$

$$\alpha = 69.444 \qquad \beta = 69.0755 \qquad \gamma = 41.4805$$

Lösung n)

$$g_1 : f(x) = -3x + 27 \qquad g_2 : f(x) = 2x - 6$$

$$A\,(3 \mid 0) \qquad B\,(9 \mid 0) \qquad C\left(\frac{33}{5} \;\middle|\; \frac{36}{5}\right)$$

$$U_D = 21.6393 \qquad A_D = \frac{108}{5}$$

$$\alpha = 63.4349 \qquad \beta = 71.5651 \qquad \gamma = 45$$

Lösung o)

$$g_1 : f(x) = -\frac{17}{2}x + \frac{167}{2} \qquad g_2 : f(x) = -\frac{3}{20}x + \frac{181}{10}$$

$$A\left(\frac{167}{17} \;\middle|\; 0\right) \qquad B\left(\frac{362}{3} \;\middle|\; 0\right) \qquad C\,(7.832\,34 \mid 16.9251)$$

$$U_D = 241.982 \qquad A_D = 938.018$$

$$\alpha = 83.2902 \qquad \beta = 8.530\,77 \qquad \gamma = 88.1791$$

Lösung p)

$$g_1 : f(x) = \frac{26}{29}x + \frac{123}{29} \qquad g_2 : f(x) = \frac{3}{13}x - 9$$

$$A\left(-\frac{123}{26} \;\middle|\; 0\right) \qquad B\,(39 \mid 0) \qquad C\,(-19.8884 \mid -13.5896)$$

$$U_D = 124.525 \qquad A_D = 297.143$$

$$\alpha = 41.8779 \qquad \beta = 12.9946 \qquad \gamma = 125.128$$

Lösung q)

$$g_1 : f(x) = -\frac{3}{5}x \qquad g_2 : f(x) = \frac{34}{15}x - \frac{89}{15}$$

$$A\,(0 \mid 0) \qquad B\left(\frac{89}{34} \;\middle|\; 0\right) \qquad C\left(\frac{89}{43} \;\middle|\; -\frac{267}{215}\right)$$

$$U_D = 6.388\,74 \qquad A_D = \frac{538}{331}$$

$$\alpha = 30.9638 \qquad \beta = 66.1941 \qquad \gamma = 82.8422$$

Lösung r)

$$g_1 : f(x) = -\frac{3}{2}x - \frac{1}{2} \qquad g_2 : f(x) = -\frac{13}{7}x - \frac{88}{7}$$

$$A\left(-\frac{88}{13} \;\middle|\; 0\right) \qquad B\left(-\frac{1}{3} \;\middle|\; 0\right) \qquad C\left(-\frac{169}{5} \;\middle|\; \frac{251}{5}\right)$$

$$U_D = 123.784 \qquad A_D = 161.541$$

$$\alpha = 61.6992 \qquad \beta = 56.3099 \qquad \gamma = 61.9908$$

Lösung s)

$$g_1 : f(x) = -\frac{9}{38}x - \frac{23}{2} \qquad g_2 : f(x) = \frac{5}{4}x + \frac{43}{2}$$

$$A\left(-\frac{437}{9} \;\middle|\; 0\right) \qquad B\left(-\frac{86}{5} \;\middle|\; 0\right) \qquad C\left(-22.1947 \mid -6.243\,36\right)$$

$$U_D = 66.4411 \qquad A_D = 97.8821$$

$$\alpha = 13.3245 \qquad \beta = 51.3402 \qquad \gamma = 115.335$$

Lösung t)

$$g_1 : f(x) = -\frac{17}{7}x + \frac{344}{7} \qquad g_2 : f(x) = \frac{13}{3}x - \frac{115}{3}$$

$$A\left(\frac{115}{13} \;\middle|\; 0\right) \qquad B\left(\frac{344}{17} \;\middle|\; 0\right) \qquad C\left(12.9366 \mid 17.7254\right)$$

$$U_D = 48.7496 \qquad A_D = 100.938$$

$$\alpha = 77.0054 \qquad \beta = 67.6199 \qquad \gamma = 35.3748$$

Lösung u)

$$g_1 : f(x) = -\frac{16}{17}x - \frac{63}{17} \qquad g_2 : f(x) = -\frac{8}{11}x + \frac{17}{11}$$

$$A\left(-\frac{63}{16} \;\middle|\; 0\right) \qquad B\left(\frac{17}{8} \;\middle|\; 0\right) \qquad C\left(-\frac{491}{20} \;\middle|\; \frac{97}{5}\right)$$

$$U_D = 67.3522 \qquad A_D = 58.8063$$

$$\alpha = 43.2643 \qquad \beta = 36.0274 \qquad \gamma = 100.708$$