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

Lösung a)

$$g_1 : f(x) = \frac{4}{3}x - \frac{22}{3} \qquad g_2 : f(x) = \frac{4}{5}x - 4$$

$$A\,(5 \mid 0) \qquad B\left(\frac{11}{2} \;\middle|\; 0\right) \qquad C\left(\frac{25}{4} \;\middle|\; 1\right)$$

$$U_D = 3.350\,78 \qquad A_D = \frac{1}{4}$$

$$\alpha = 38.6598 \qquad \beta = 53.1301 \qquad \gamma = 88.2101$$

Lösung b)

$$g_1 : f(x) = \frac{4}{17}x - \frac{38}{17} \qquad g_2 : f(x) = \frac{1}{5}x - 10$$

$$A\left(\frac{19}{2} \;\middle|\; 0\right) \qquad B\,(50 \mid 0) \qquad C\,(-220 \mid -54)$$

$$U_D = 551.614 \qquad A_D = 1093.5$$

$$\alpha = 13.2405 \qquad \beta = 11.3099 \qquad \gamma = 155.45$$

Lösung c)

$$g_1 : f(x) = \frac{3}{5}x + \frac{33}{5} \qquad g_2 : f(x) = \frac{2}{5}x - 2$$

$$A\,(-11 \mid 0) \qquad B\,(5 \mid 0) \qquad C\left(-43 \;\middle|\; -\frac{96}{5}\right)$$

$$U_D = 105.016 \qquad A_D = \frac{768}{5}$$

$$\alpha = 30.9638 \qquad \beta = 21.8014 \qquad \gamma = 127.235$$

Lösung d)

$$g_1 : f(x) = -6x + 38 \qquad g_2 : f(x) = x - 5$$

$$A\,(5 \mid 0) \qquad B\left(\frac{19}{3} \,\middle|\, 0\right) \qquad C\left(\frac{43}{7} \,\middle|\, \frac{8}{7}\right)$$

$$U_D = 4.1082 \qquad A_D = \frac{16}{21}$$

$$\alpha = 45 \qquad \beta = 80.5377 \qquad \gamma = 54.4623$$

Lösung e)

$$g_1 : f(x) = -\frac{18}{11}x + \frac{76}{11} \qquad g_2 : f(x) = -\frac{4}{33}x - \frac{47}{33}$$

$$A\left(-\frac{47}{4} \,\middle|\, 0\right) \qquad B\left(\frac{38}{9} \,\middle|\, 0\right) \qquad C\left(\frac{11}{2} \,\middle|\, -\frac{23}{11}\right)$$

$$U_D = 35.7989 \qquad A_D = 16.6982$$

$$\alpha = 6.911\,23 \qquad \beta = 58.5704 \qquad \gamma = 114.518$$

Lösung f)

$$g_1 : f(x) = -4x + 21 \qquad g_2 : f(x) = -\frac{10}{13}x + \frac{3}{13}$$

$$A\left(\frac{3}{10} \,\middle|\, 0\right) \qquad B\left(\frac{21}{4} \,\middle|\, 0\right) \qquad C\left(\frac{45}{7} \,\middle|\, -\frac{33}{7}\right)$$

$$U_D = 17.5414 \qquad A_D = 11.6679$$

$$\alpha = 37.5686 \qquad \beta = 75.9638 \qquad \gamma = 66.4677$$

Lösung g)

$$g_1 : f(x) = \frac{1}{2}x - 17 \qquad g_2 : f(x) = \frac{1}{3}x + \frac{23}{3}$$

$$A\,(-23 \mid 0) \qquad B\,(34 \mid 0) \qquad C\,(148 \mid 57)$$

$$U_D = 364.706 \qquad A_D = 1624.5$$

$$\alpha = 18.4349 \qquad \beta = 26.5651 \qquad \gamma = 135$$

Lösung h)

$$g_1 : f(x) = 2x - 1 \qquad g_2 : f(x) = -\frac{1}{2}x - 17$$

$$A\,(-34 \mid 0) \qquad B\left(\frac{1}{2} \;\middle|\; 0\right) \qquad C\left(-\frac{32}{5} \;\middle|\; -\frac{69}{5}\right)$$

$$U_D = 80.7866 \qquad A_D = 238.05$$

$$\alpha = 26.5651 \qquad \beta = 63.4349 \qquad \gamma = 90$$

Lösung i)

$$g_1 : f(x) = 2x + 46 \qquad g_2 : f(x) = \frac{5}{3}x$$

$$A\,(-23 \mid 0) \qquad B\,(0 \mid 0) \qquad C\,(-138 \mid -230)$$

$$U_D = 548.372 \qquad A_D = 2645$$

$$\alpha = 63.4349 \qquad \beta = 59.0362 \qquad \gamma = 57.5288$$

Lösung j)

$$g_1 : f(x) = \frac{27}{23}x - \frac{83}{23} \qquad g_2 : f(x) = 3x + 1$$

$$A\left(-\frac{1}{3} \,\middle|\, 0\right) \qquad B\left(\frac{83}{27} \,\middle|\, 0\right) \qquad C\left(-\frac{53}{21} \,\middle|\, -\frac{46}{7}\right)$$

$$U_D = 18.9668 \qquad A_D = 11.1958$$

$$\alpha = 71.5651 \qquad \beta = 49.5739 \qquad \gamma = 58.861$$

Lösung k)

$$g_1 : f(x) = x + 1 \qquad g_2 : f(x) = \frac{5}{17}x + \frac{16}{17}$$

$$A\left(-\frac{16}{5} \,\middle|\, 0\right) \qquad B\left(-1 \mid 0\right) \qquad C\left(-\frac{1}{12} \,\middle|\, \frac{11}{12}\right)$$

$$U_D = 6.745\,04 \qquad A_D = \frac{121}{120}$$

$$\alpha = 16.3895 \qquad \beta = 45 \qquad \gamma = 118.61$$

Lösung l)

$$g_1 : f(x) = -\frac{1}{2}x + 5 \qquad g_2 : f(x) = \frac{5}{3}x + \frac{25}{3}$$

$$A\left(-5 \mid 0\right) \qquad B\left(10 \mid 0\right) \qquad C\left(-\frac{20}{13} \,\middle|\, \frac{75}{13}\right)$$

$$U_D = 34.6284 \qquad A_D = 43.2692$$

$$\alpha = 59.0362 \qquad \beta = 26.5651 \qquad \gamma = 94.3987$$

Lösung m)

$$g_1 : f(x) = -3x + 38 \qquad g_2 : f(x) = 3x + 43$$

$$A\left(-\frac{43}{3} \,\middle|\, 0\right) \qquad B\left(\frac{38}{3} \,\middle|\, 0\right) \qquad C\left(-\frac{5}{6} \,\middle|\, \frac{81}{2}\right)$$

$$U_D = 112.381 \qquad A_D = 546.75$$

$$\alpha = 71.5651 \qquad \beta = 71.5651 \qquad \gamma = 36.8699$$

Lösung n)

$$g_1 : f(x) = -2x + 37 \qquad g_2 : f(x) = -x - 19$$

$$A\left(-19 \mid 0\right) \qquad B\left(\frac{37}{2} \,\middle|\, 0\right) \qquad C\left(56 \mid -75\right)$$

$$U_D = 227.419 \qquad A_D = 1406.25$$

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

Lösung o)

$$g_1 : f(x) = -\frac{21}{19}x + \frac{7}{19} \qquad g_2 : f(x) = -x - 15$$

$$A\left(-15 \mid 0\right) \qquad B\left(\frac{1}{3} \,\middle|\, 0\right) \qquad C\left(146 \mid -161\right)$$

$$U_D = 460.139 \qquad A_D = 1234.33$$

$$\alpha = 45 \qquad \beta = 47.8624 \qquad \gamma = 87.1376$$

Lösung p)

$$g_1 : f(x) = \frac{1}{4}x + \frac{1}{4} \qquad g_2 : f(x) = -\frac{21}{4}x + \frac{19}{4}$$

$$A\,(-1 \mid 0) \qquad B\left(\frac{19}{21} \,\middle|\, 0\right) \qquad C\left(\frac{9}{11} \,\middle|\, \frac{5}{11}\right)$$

$$U_D = 4.241\,62 \qquad A_D = \frac{100}{231}$$

$$\alpha = 14.0362 \qquad \beta = 79.2157 \qquad \gamma = 86.7481$$

Lösung q)

$$g_1 : f(x) = \frac{5}{3}x + \frac{59}{3} \qquad g_2 : f(x) = \frac{2}{3}x + 13$$

$$A\left(-\frac{39}{2} \,\middle|\, 0\right) \qquad B\left(-\frac{59}{5} \,\middle|\, 0\right) \qquad C\left(-\frac{20}{3} \,\middle|\, \frac{77}{9}\right)$$

$$U_D = 33.1012 \qquad A_D = 32.9389$$

$$\alpha = 33.6901 \qquad \beta = 59.0362 \qquad \gamma = 87.2737$$

Lösung r)

$$g_1 : f(x) = -\frac{10}{3}x - \frac{22}{3} \qquad g_2 : f(x) = -8x - 20$$

$$A\left(-\frac{5}{2} \,\middle|\, 0\right) \qquad B\left(-\frac{11}{5} \,\middle|\, 0\right) \qquad C\left(-\frac{19}{7} \,\middle|\, \frac{12}{7}\right)$$

$$U_D = \frac{439}{115} \qquad A_D = \frac{9}{35}$$

$$\alpha = \frac{663}{8} \qquad \beta = 73.3008 \qquad \gamma = 23.8243$$

Lösung s)

$$g_1 : f(x) = \frac{7}{8}x - \frac{31}{8} \qquad g_2 : f(x) = \frac{1}{7}x - \frac{22}{7}$$

$$A\left(\frac{31}{7} \;\middle|\; 0\right) \qquad B\,(22 \mid 0) \qquad C\,(1 \mid -3)$$

$$U_D = 43.3404 \qquad A_D = \frac{369}{14}$$

$$\alpha = 41.1859 \qquad \beta = 8.1301 \qquad \gamma = 130.684$$

Lösung t)

$$g_1 : f(x) = -\frac{3}{4}x - 3 \qquad g_2 : f(x) = 6x - 60$$

$$A\,(-4 \mid 0) \qquad B\,(10 \mid 0) \qquad C\left(\frac{76}{9} \;\middle|\; -\frac{28}{3}\right)$$

$$U_D = 39.0176 \qquad A_D = \frac{196}{3}$$

$$\alpha = 36.8699 \qquad \beta = 80.5377 \qquad \gamma = 62.5924$$

Lösung u)

$$g_1 : f(x) = 4x - 59 \qquad g_2 : f(x) = -6x + 16$$

$$A\left(\frac{8}{3} \;\middle|\; 0\right) \qquad B\left(\frac{59}{4} \;\middle|\; 0\right) \qquad C\left(\frac{15}{2} \;\middle|\; -29\right)$$

$$U_D = 71.3759 \qquad A_D = 175.208$$

$$\alpha = 80.5377 \qquad \beta = 75.9638 \qquad \gamma = 23.4986$$