GRAAD 10_KABV Kurrikulum

10.8 Analitiese Meetkunde

1.1 Afstandsformule

(a) Bereken die lengte van GH, waar G (-8;-1) en H (-5;8) is.
(b) Bereken die lengte van of AB, waar A (7;1) en B (-6;7) is.
(c) Bereken die lengte van ST, waar S (4;6) en T (-4;-6) is.
(d) Bereken die lengte van FG, waar F (-5;4) en G (-1;7).
(e) Vind die waarde van q as die afstand tussen L(q;3) en M(1;-1) $\sqrt{17}$ is.
(f) Vind die waarde van z as die afstand tussen D(-8;z) en E(-3;-3) $\sqrt{26}$ is.
(g) Vind die waarde van r as die afstand tussen C(-5;r) en D(-1;-2) $\sqrt{20}$ is.

1.2 Gradient tussen twee punte (parallel en/of loodregte lyne)

(a) As A(0;-4) , B(-5;-5) , C(1;4) en D(2;9) gegee is, bereken die gradiente van AB en CD en bepaal of die lyne parallel of loodreg is.

(b) As K(5;-4) , L(0;-8) , M(-1;-5) en N(3;-10) gegee is, bereken die gradiente van KL en MN en bepaal of die lyne parallel of loodreg is.

(c) As I(1;-5), J(-3;0), K(g;-4) en L(-3;1) gegee is, bereken die waarde van g as IJ en KL parallel is.

(d) G(1;-4) , H(0;-2) , I(3 ;q) en J(1;-1) is gegee, bereken die waarde van q as GH en IJ loodreg is.

1.3 Middelpuntstelling

(a) Bepaal die middelpunt van die lyn deur D(-10;-10) en E(5;5).

(b) Bepaal die middelpunt van die lyn deur J(2;-6) en K(-3;-4).

(c) Bepaal die middelpunt van die lyn deur M(-1;-4) en N(-6;-2).

(d) Bepaal die koordinate van die middelpunt van die lyn wat (-p-9k ; 6z-7m) en (-7p+7k;2z-7m) verbind.

(e) Die punt (1;1) lê op die middel van die lyn wat (-4;7) en (q;-5) verbind. Bepaal q.

(f) Die punt (5;-1) lê op die middel van die lyn wat (7;1) en (y;-3) verbind. Bepaal y.

(g) Die punt (-7;0) lê op die middel van die lyn wat (-9;-6) en (-5;p) verbind. Bepaal p.

Posbus1260 Cresta 2118 www.camiweb.com
Tel(011) 476 2020 Fax(011) 476 6824

MEMO

1.1 Afstandsformule [8.8.1.1; 8.8.1.2; 8.8.1.3]

(a) G(-8;-1) en H(-5;8)

$$GH = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$GH = \sqrt{(-5+8)^2 + (8+1)^2}$$
$$GH = \sqrt{3^2 + 9^2}$$
$$GH = \sqrt{9+81}$$
$$GH = \sqrt{90}$$
$$GH = 3\sqrt{10}$$

(b) A(7;1) en B(-6;7)

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$AB = \sqrt{(-6-7)^2 + (7-1)^2}$$
$$AB = \sqrt{(-13)^2 + 6^2}$$
$$AB = \sqrt{169+36}$$
$$AB = \sqrt{205}$$

(c) S(4;6) en T(-4;-6)

$$ST = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$ST = \sqrt{(-4-4)^2 + (-6-6)^2}$$
$$ST = \sqrt{(-8)^2 + (-12)^2}$$
$$ST = \sqrt{64+144}$$
$$ST = \sqrt{208}$$
$$ST = 4\sqrt{13}$$

(d) F(-5;4) G(-1;7)

$$FG = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$FG = \sqrt{(-1+5)^2 + (7-4)^2}$$
$$FG = \sqrt{(4)^2 + (3)^2}$$
$$FG = \sqrt{16+9}$$
$$FG = \sqrt{25}$$
$$FG = 5$$

(e)

$$LM = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$\sqrt{17} = \sqrt{(1-q)^2 + (-1-3)^2}$$
$$\sqrt{17} = \sqrt{1-2q+q^2 + (-4)^2}$$
$$17 = q^2 - 2q + 17$$
$$0 = q^2 - 2q$$
$$0 = q(q-2)$$
$$q = 0; q = 2$$

(f)

$$DE = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$\sqrt{26} = \sqrt{(-3+8)^2 + (-3-z)^2}$$
$$\sqrt{26} = \sqrt{(5)^2 + 9 + 6z + z^2}$$
$$26 = z^2 + 6z + 34$$
$$0 = z^2 + 6z + 8$$
$$0 = (z+4)(z+2)$$
$$z = -4; z = -2$$

(g)

$$CD = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$
$$\sqrt{20} = \sqrt{(-1+5)^2 + (-2-r)^2}$$
$$\sqrt{20} = \sqrt{(4)^2 + 4 + 4r + r^2}$$
$$20 = r^2 + 4r + 20$$
$$0 = r^2 + 4r$$
$$0 = r(r+4)$$
$$r = 0; r = -4$$

1.2 Gradient tussen twee punte (parallel en/of loodregte lyne) [8.8.4.1; 8.8.4.2]

(a) A(0;-4) , B(-5;-5) , C(1;4) en D(2;9)

$$m_{AB} = \frac{y_2 - y_1}{x_2 - x_1} \qquad m_{CD} = \frac{y_2 - y_1}{x_2 - x_1}$$
$$m_{AB} = \frac{-5-0}{-5+4} \qquad m_{CD} = \frac{9-4}{2-1}$$
$$m_{AB} = \frac{-5}{-1} \qquad m_{CD} = \frac{5}{1}$$
$$m_{AB} = 5 \qquad m_{CD} = 5$$

$$m_{AB} = m_{CD}$$
$$\therefore AB \,//\, CD$$

(b) IK(5;-4) , L(0;-8) , M(-1;-5) en N(3;-10)

$$m_{KL} = \frac{y_2 - y_1}{x_2 - x_1} \qquad m_{MN} = \frac{y_2 - y_1}{x_2 - x_1}$$
$$m_{KL} = \frac{-8+4}{0-5} \qquad m_{MN} = \frac{-10+5}{3+1}$$
$$m_{KL} = \frac{-4}{-5} \qquad m_{MN} = \frac{-5}{4}$$
$$m_{KL} = \frac{4}{5}$$

$m_{KL} \times m_{MN} = -1$

$\therefore KL \perp MN$

(c) I(1;-5), J(-3;0), K(g;-4) en L(-3;1)

$$m_{IJ} = m_{KL}$$
$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{y_2 - y_1}{x_2 - x_1}$$
$$\frac{0+5}{-3-1} = \frac{1+4}{-3-g}$$
$$\frac{5}{-4} = \frac{5}{-3-g}$$
$$5(-3-g) = -20$$
$$-15-5g = -20$$
$$-5g = -5$$
$$\therefore g = 1$$

(d) G(1;-4) , H(0;-2) , I(3 ;q) en J(1;-1), GH $\perp$ IJ

$$m_{GH} \times m_{IJ} = -1$$
$$\frac{-2+4}{0-1} \times \frac{-1-q}{1-3} = -1$$
$$\frac{2}{-1} \times \frac{-1-q}{-2} = -1$$
$$\frac{-1-q}{-2} = \frac{1}{2}$$
$$2(-1-q) = -2$$
$$-1-q = -1$$
$$-q = 0$$
$$\therefore q = 0$$

1.3 Middelpuntstelling [8.8.2.1; 8.8.2.2; 8.8.2.3]

a) D(-10;-10) en E(5;5)

$$M(x;y)=(\frac{x_2+x_1}{2};\frac{y_2+y_1}{2})$$
$$M(x;y)=(\frac{5-10}{2};\frac{5-10}{2})$$
$$M(x;y)=(\frac{-5}{2};\frac{-5}{2})$$

(b) J(2;-6) en K(-3;-4)

$$M(x;y)=(\frac{x_2+x_1}{2};\frac{y_2+y_1}{2})$$
$$M(x;y)=(\frac{-3+2}{2};\frac{-4-6}{2})$$
$$M(x;y)=(\frac{-1}{2};\frac{-10}{2})$$
$$M(x;y)=(-\frac{1}{2};-5)$$

(c) M(-1;-4) en N(-6;-2)

$$M(x;y)=(\frac{x_2+x_1}{2};\frac{y_2+y_1}{2})$$
$$M(x;y)=(\frac{-6-1}{2};\frac{-2-4}{2})$$
$$M(x;y)=(\frac{-7}{2};\frac{-6}{2})$$
$$M(X;y)=(-\frac{7}{2};-3)$$

(d) (-p-9k;6z-7m) en (-7p+7k;2z-7m).

$$M(x;y)=(\frac{x_2+x_1}{2};\frac{y_2+y_1}{2})$$
$$M(x;y)=(\frac{-p-9k-7p+7k}{2};\frac{6z-7m+2z-7m}{2})$$
$$M(x;y)=(\frac{-8p-2k}{2};\frac{8z-14m}{2})$$
$$M(x;y)=(-4p-k;4z-7m)$$

(e)

$$x = \frac{x_2 + x_1}{2}$$
$$1 = \frac{-4 + q}{2}$$
$$2 = -4 + q$$
$$q = 6$$

(f)

$$x = \frac{x_2 + x_1}{2}$$
$$5 = \frac{7 + y}{2}$$
$$10 = 7 + y$$
$$y = 3$$

(g)

$$y = \frac{y_2 + y_1}{2}$$
$$0 = \frac{-6 + p}{2}$$
$$0 = -6 + p$$
$$p = 6$$