GRAAD 11_Vergelykings van reguit lyne

11.8 Vergelykings van reguit lyne

1. Die vergelyking van 'n reguit lyn deur twee punte

A. Bereken die vergelyking van die reguit lyn deur die volgende punte:

(a) P(1;-1) en Q(-2;3)
(b) A(2;-5) en B(-3;-1)
(c) R(-4;-1) en S(-5;4)
(d) P(5;-4) en Q(4;-3)
(e) U(1;-1) en V(-3;-5)

B. Bereken die vergelyking van die lyn met 'n gegewe gradient deur een punt.

(a) Gradient = -2 deur die punt (-5;4)
(b) Gradient = -3 deur die punt (-2;6)
(c) Gradient = $\frac{1}{2}$ deur die punt (4;-8)
(d) Gradient = 3 deur die punt (0;9)
(e) Gradient = -1 deur die punt (0;0)

2. Parallel en loodregte lyne

(a) Bepaal of DE en FG parallel of loodreg is as D(5;-5), E(4;-8), F(0;-2) en G(3;-1) gegee is.

(b) Bepaal of AB en CD parallel of loodreg is as A(-3;-4), B(-8;1), C(-4;-4) en D(-9;1) gegee is.

(c) Bepaal of LM en NF parallel of loodreg is as L(0;1), M(1;5), N(-1;4) en F(-5;5) gegee is.

(d) Bereken die waarde van y as DE $\perp$ FG en D(-5;-2), E(-1;-1), F(-2;y) en G(-3;5) gegee is.

(e) Bereken die waarde van p as FG//HI en F(-4;0), G(-8;-5), H(p;-2) en I(-6;-7) gegee is.

Memo

1. The equation of a line through two points [8.8.5.1; 8.8.5.2]

A. Equation of the straight line.

(a) P(1;-1) and Q(-2;3)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$m = \frac{3-(-1)}{-2-(1)}$$
$$m = \frac{4}{-3}$$

$$y = mx + c$$
$$y = -\frac{4}{3}x + c$$
$$-1 = -\frac{4}{3}(1) + c$$
$$c = \frac{1}{3}$$

$$\therefore y = -\frac{4}{3}x + \frac{1}{3}$$

(b) A(2;-5) and B(-3;-1)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$m = \frac{-1-(-5)}{-3-(2)}$$
$$m = \frac{4}{-5}$$

$$y = mx + c$$
$$y = -\frac{4}{5}x + c$$
$$-5 = -\frac{4}{5}(2) + c$$
$$c = -\frac{17}{5}$$

$$\therefore y = -\frac{4}{5}x - \frac{17}{5}$$

(c) R(-4;-1) and S(-5;4)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$m = \frac{4-(-1)}{-5-(-4)}$$
$$m = \frac{5}{-1} = -5$$

$$y = mx + c$$
$$y = -5x + c$$
$$-1 = -5(-4) + c$$
$$c = -21$$

(d) P(5;-4) and Q(4;-3)

$$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y = mx + c$$
$$m = \frac{-3-(-4)}{4-(5)} \qquad y = -1x + c$$
$$m = \frac{1}{-1} = -1 \qquad -4 = -(5) + c$$
$$c = 1$$

$$\therefore y = -x + 1$$

(e) U(1;-1) and V(-3;-5)

$$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad y = mx + c$$
$$m = \frac{-5-(-1)}{-3-(1)} \qquad y = 1x + c$$
$$m = \frac{-4}{-4} = 1 \qquad -1 = (1) + c$$
$$c = -2$$

$$\therefore y = x - 2$$

B. Lines with a given gradient and one point.

(a) Gradient = -2 through (-5;4)

$$y = mx + c$$
$$y = -2x + c$$
$$4 = -2(-5) + c$$
$$c = -6$$
$$\therefore y = -2x - 6$$

(b) Gradient = -3 through (-2;6)

$y = mx + c$

$y = -3x + c$

$6 = -3(-2) + c$

$c = 0$

$\therefore y = -3x$

(c) Gradient = $\frac{1}{2}$ through (4;-8)

$y = mx + c$

$y = \frac{1}{2}x + c$

$-8 = \frac{1}{2}(4) + c$

$c = -10$

$\therefore y = \frac{1}{2}x - 10$

(d) Gradient = 3 through (0;9)

$y = mx + c$

$y = 3x + c$

$9 = 3(0) + c$

$c = 9$

$\therefore y = 3x + 9$

(e) Gradient = -1 through (0;0)

$y = mx + c$

$y = -1x + c$

$0 = -1(0) + c$

$c = 0$

$\therefore y = -x$

2. Parallel and perpendicular lines [8.8.4.1; 8.8.4.2]

(a) Determine whether DE and FG are parallel or perpendicular if D(5;-5), E(4;-8), F(0;-2) and G(3;-1) are given.

$$m_{DE} = \frac{-8-(-5)}{4-5} = \frac{-3}{-1} = 3$$

$$m_{FG} = \frac{-1-(-2)}{3-0} = \frac{1}{3}$$

$m_{DE} \neq m_{FG}$, lines are not parallel.
$m_{DE} \times m_{FG} \neq -1$, lines are not perpendicular.

(b) Determine whether AB and CD are parallel or perpendicular if A(-3;-4), B(-8;1), C(-4;-4) and D(-9;1) are given.

$$m_{AB} = \frac{1-(-4)}{-8-(-3)} = \frac{5}{-5} = -1$$

$$m_{CD} = \frac{1-(-4)}{-9-(-4)} = \frac{5}{-5} = -1$$

$m_{AB} = m_{CD}$, lines are parallel.

(c) Determine whether LM and NF are parallel or perpendicular if L(0;1), M(1;5), N(-1;4) and F(-5;5) are given.

$$m_{LM} = \frac{5-1}{1-0} = \frac{4}{1} = 4$$

$$m_{NF} = \frac{5-4}{-5-(-1)} = \frac{1}{-4}$$

$m_{LM} \times m_{NF} = 4 \times \frac{-1}{4} = -1$, lines are perpendicular.

(d) Calculate the value of y if DE $\perp$ FG and D(-5;-2), E(-1;-1), F(-2;y) and G(-3;5) are given.

$$m_{DE} = \frac{-1-(-2)}{-1-(-5)} = \frac{1}{4}$$

$$m_{FG} = \frac{5-y}{-3-(-2)} = \frac{5-y}{-1} = -5+y$$

$DE \perp FG$:

$$\frac{1}{4} \times (-5+y) = -1$$
$$-5+y = -4$$
$$\therefore y = 1$$

(e) Calculate the value of p if FG//HI and F(-4;0), G(-8;-5), H(p;-2) and I(-6;-7) are given.

$$m_{FG} = \frac{-5-0}{-8-(-4)} = \frac{-5}{-4} = \frac{5}{4}$$

$$m_{HI} = \frac{-7-(-2)}{-6-p} = \frac{-5}{-6-p}$$

FG//HI:

$$\frac{5}{4} = \frac{-5}{-6-p}$$
$$5(-6-p) = -20$$
$$-30-5p = -20$$
$$-5p = 10$$
$$\therefore p = -2$$