Graad 10 – Boek B
(Hersiene KABV uitgawe)

ONDERWYSERS HANDLEIDING

INHOUD:

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Hoofstuk B1

Funksies en relasies

B1.1 Hersiening – graad 9:

Bestudeer die volgende tabel:

Aantal balle gekoop (A):	1	2	3	4	8	12
Totale koste (K):	R2	R4	R6			

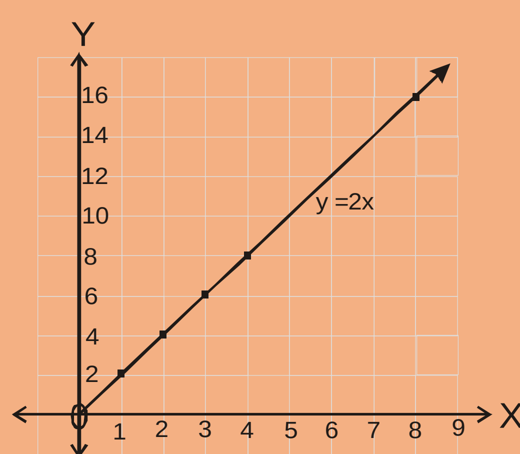
In graad 9 het ons reeds gesien dat ons die tabel kan voltooi deur die verband tussen A en K te bepaal en ook dan ′n formule of vergelyking saam te stel.
In hierdie geval is die formule: $K = 2 \times A$
Ons het dan ook gesien dat K die afhanklike veranderlike en A die onafhanklike veranderlike genoem word, want die waarde van K hang van A se waarde af.
Tabelle is dan ook grafies voorgestel. By funksies en relasies word meer male gebruik gemaak van x as die onafhanklike en y as die afhanklike veranderlikes. M.a.w. die bostaande tabel sal dan as volg lyk, met vergelyking $y = 2x$:

Voltooide tabel:

Aantal balle gekoop (x):	1	2	3	4	8
Totale koste (y):	R2	R4	R6	R8	R16

Uit die tabel kan ons dan die volgende geordende getalle pare neerskryf en dit dan grafies voorstel:

(1 ; 2)
(2 ; 4)
(3 ; 6)
(4 ; 8)
(8 ; 16)



Hierdie geordende pare kan as ′n versameling geskryf word:

$\{(1\,;\,2)\,;\,(2\,;\,4)\,;\,(3\,;\,6)\,;\,(4\,;\,8)\,;\,(8\,;\,16)\}$

Uit bogenoemde versameling kan ons dan ook die definisieversameling (al die moontlike x-koördinate in die versameling) en die waardeversameling (al die moontlike y- koördinate in die versameling) neer skryf:
Definisieversameling: $x \in \{1\,;\,2\,;\,3\,;\,4\,;\,8\}$
Waardeversameling: $y \in \{2\,;\,4\,;\,6\,;\,8\,;\,16\}$

B1.2 Funksiebegrip:

'n Versameling van geordende getallepare, soos hierbo, word dan 'n **relasie** genoem. Wanneer elke element in die definisieversameling aan slegs **een** element in die waardeversameling gekoppel word, word die relasie 'n **funksie** genoem.

Die volgende is voorbeelde van relasies: $\{(1\,;\,1)\,;\,(1\,;\,2)\,;\,(1\,;\,3)\,;\,(2\,;\,1)\,;\,(2\,;\,2)\,;\,(2\,;3)\}$

$\{(-1\,;\,0)\,;\,(0\,;\,1)\,;\,(1\,;\,2)\,;\,(2\,;\,1)\,;\,(3\,;\,-1)\}$

$\{(1\,;\,2)\,;\,(2\,;\,4)\,;\,(3\,;\,6)\,;\,(4\,;\,8)\,;\,(8\,;\,16)\}$

Net die volgende is egter funksies: $\{(-1\,;\,0)\,;\,(0\,;\,1)\,;\,(1\,;\,2)\,;\,(2\,;\,1)\,;\,(3\,;\,-1)\}$

$\{(1\,;\,2)\,;\,(2\,;\,4)\,;\,(3\,;\,6)\,;\,(4\,;\,8)\,;\,(8\,;\,16)\}$

Want die x-waardes word nie herhaal nie!

B1.3 Notasies:

Omdat daar dikwels met meer as een funksie op 'n keer gewerk word, word die verskillende funksies benoem. Ons maak gebruik van verskillende notasies (maniere van skryf) en die letters van die alfabet kan gebruik word om aan die verskillende funksies verskillende "name" te gee.

B1.3.1 Versamelingkeurdernotasie:

$f = \{(x\,;\,y)\,/\,y = x + 1\}$ of $g = \{(x\,;\,y) : y = -2x\,;\,x > 0\}$

Dit lees: "f is die versameling van geordende pare $(x\,;\,y)$ sodat y gelyk is aan $x + 1$"
of "g is die versameling van geordende pare $(x\,;\,y)$ sodat y gelyk is aan $-2x$ met x groter as 0"

Die funksies hier ter sprake is dan: $y = x + 1$ en $y = -2x$

B1.3.2 Funksienotasie:

$f(x) = x + 1$ of $g(x) = -2x$

Dit is dus dieselfde as: $y = x + 1$ of $y = -2x$

Dit beteken: in plaas daarvan om "y" te skryf word $f(x), g(x), h(x)$ ens. geskryf. Die f en die g dui dus op die "naam " van elke spesifieke funksie, sodat daar tussen die verskillende funksies onderskei kan word, waar die x dui op die elemente van die definisieversameling wat in die vergelyking in vervang moet word om die waardeversameling te verkry.

B1.3.3 Beeldpuntnotasie:

	$f: x \longrightarrow x + 1$ of	$g: x \longrightarrow -2x$
Dit is dus dieselfde as:	$y = x + 1$ of	$y = -2x$
Dit lees: " f beeld x af op $x + 1$"	of	" g beeld x af op $-2x$"

Vb.1 $f: x \rightarrow -3x + 2$

(a) Skryf die uitdrukking vir $f(x)$ neer.

(b) Bereken: (i) $f(-1)$ (ii) $f(m)$ (iii) x as $f(x) = 8$

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(a) $f(x) = -3x + 2$

(b) (i)

$$f(-1) = -3(-1) + 2$$
$$f(-1) = 3 + 2$$
$$f(-1) = 5$$

$\therefore$ $y = 5$ as $x = -1$ $\therefore$ Geordende getallepaar is: $(-1 ; 5)$

(ii)

$$f(x) = -3x + 2$$
$$f(m) = -3(m) + 2$$
$$f(-1) = -3m + 2$$

$\therefore$ $y = -3m + 2$ as $x = m$ $\therefore$ Geordende getallepaar is: $(m ; -3m + 2)$

(iii)

$$f(x) = -3x + 2$$
$$8 = -3x + 2$$
$$3x = 2 - 8$$
$$3x = -6$$
$$x = -2$$

$\therefore$ $x = -2$ as $f(x) = 8 = y$ $\therefore$ Geordende getallepaar is: $(-2 ; 8)$

Vb.2 $p = \{(x ; y) / y = x^2 - 1\}$ en $q(x) = \frac{x+1}{2}$

Bereken: (a) $q(0)$ (b) $p\left(\frac{1}{2}\right)$

(c) $p(-2) + q(3)$ (d) x as $p(x) = q(x)$

****

(a) $q(x) = \frac{x+1}{2}$

$$q(0) = \frac{0+1}{2}$$
$$q(0) = \frac{1}{2}$$
$$\therefore \left(0 ; \frac{1}{2}\right)$$

(b) $p(x) = x^2 - 1$

$$p\left(\frac{1}{2}\right) = \left(\frac{1}{2}\right)^2 - 1$$
$$p\left(\frac{1}{2}\right) = \frac{1}{4} - \frac{4}{4}$$
$$p\left(\frac{1}{2}\right) = \frac{-3}{4}$$
$$\therefore \left(\frac{1}{2} ; \frac{-3}{4}\right)$$

(c) $p(-2) + q(3)$

$= [(-2)^2 - 1] + \left[\frac{3+1}{2}\right]$

$= [4 - 1] + \left(\frac{4}{2}\right)$

$= 3 + 2$

$= 5$

(d) As $p(x) = q(x)$

Dan is $x^2 - 1 = \frac{x+1}{2}$

$\therefore\ 2x^2 - 2 = x + 1$

$\therefore\ 2x^2 - x - 3 = 0$

$\therefore\ (2x - 3)(x + 1) = 0$

$\therefore\ 2x - 3 = 0$ of $x + 1 = 0$

$\therefore\ 2x = 3$ $\quad x = -1$

$\therefore\ x = \frac{3}{2}$

Oefening 1: Datum: ___________________

(1) As $h(x) = x + 1$, bereken: (a) $h(-7)$ (b) $h(0)$ (c) $h(p)$

(a) $h(x) = x + 1$

$h(-7) = (-7) + 1$

$h(-7) = -7 + 1$

$h(-7) = -6$

$\therefore\ (-7\ ;\ -6)$

(b) $h(x) = x + 1$

$h(0) = (0) + 1$

$h(0) = 0 + 1$

$h(0) = 1$

$\therefore\ (0\ ;\ 1)$

(c) $h(x) = x + 1$

$h(p) = (p) + 1$

$h(p) = p + 1$

$\therefore\ (p\ ;\ p + 1)$

(2) $f(x) = 5 - 2x$

Bereken: (a) $f(-1)$ (b) $f\left(\frac{1}{2}\right)$ (c) $f(0)$

(d) $f(k)$ (e) x as $f(x) = -3$

(a) $f(x) = 5 - 2x$

$f(-1) = 5 - 2(-1)$

$f(-1) = 5 + 2$

$f(-1) = 7$

$\therefore\ (-1\ ;\ 7)$

(b) $f(x) = 5 - 2x$

$f\left(\frac{1}{2}\right) = 5 - 2\left(\frac{1}{2}\right)$

$f\left(\frac{1}{2}\right) = 5 - 1$

$f\left(\frac{1}{2}\right) = 4$

$\therefore\ \left(\frac{1}{2}\ ;\ 4\right)$

(c) $f(x) = 5 - 2x$

$f(0) = 5 - 2(0)$

$f(0) = 5 - 0$

$f(0) = 5$

$\therefore\ (0\ ;\ 5)$

(d) $f(x) = 5 - 2x$

$f(k) = 5 - 2(k)$

$f(k) = 5 - 2k$

$\therefore\ (k\ ;\ 5 - 2k)$

(e) $f(x) = 5 - 2x$

$-3 = 5 - 2x$

$2x = 5 + 3$

$2x = 8$

$x = 4$

$\therefore\ (4\ ;\ -3)$

(3) $g = \{(x\,;\,y) : y = 2(x - 3)\}$

Bereken: (a) $g(5)$ (b) $g(0{,}5)$ (c) $g(0)$

(d) $g(m + 1)$ (e) x as $g(x) = 2$

(a) $g(x) = 2(x-3)$

$g(5) = 2(5-3)$

$g(5) = 2(2)$

$g(5) = 4$

$\therefore \quad (5\,;\,4)$

(b) $g(x) = 2(x-3)$

$g(0{,}5) = 2(0{,}5-3)$

$g(0{,}5) = 2(-2{,}5)$

$g(0{,}5) = -5$

$\therefore \quad (0{,}5\,;\,-5)$

(c) $g(x) = 2(x-3)$

$g(0) = 2(0-3)$

$g(0) = 2(-3)$

$g(0) = -6$

$\therefore \quad (0\,;\,-6)$

(d) $g(x) = 2(x-3)$

$g(m+1) = 2(m+1-3)$

$g(m+1) = 2(m-2)$

$g(m+1) = 2m-4$

$\therefore \quad (m+1\,;\,2m-4)$

(e) $g(x) = 2(x-3)$

$2 = 2(x-3)$

$2 = 2x-6$

$2+6 = 2x$

$8 = 2x$

$4 = x$ $\therefore \quad (4\,;\,2)$

(4) $t : x \rightarrow x^2 - 2x - 8$

(a) Skryf 'n uitdrukking neer vir $t(x)$ $\rightarrow$ $t(x) = x^2 - 2x - 8$

(b) Bereken: (i) $t(-2)$ (ii) $t(-x)$ (iii) $t(1) + t(2)$

(iv) $t(0)$ (v) x as $t(x) = 0$

(i) $t(x) = x^2 - 2x - 8$

$t(-2) = (-2)^2 - 2(-2) - 8$

$t(-2) = 4 + 4 - 8$

$t(-2) = 0$ $\therefore \quad (-2\,;\,0)$

(ii) $t(x) = x^2 - 2x - 8$

$t(-x) = (-x)^2 - 2(-x) - 8$

$t(-x) = x^2 + 2x - 8$

$\therefore \quad (-x\,;\,x^2 + 2x - 8)$

(iii) $t(1) + t(2) = [(1)^2 - 2(1) - 8] + [(2)^2 - 2(2) - 8]$

$= [1 - 2 - 8] + [4 - 4 - 8]$

$= [-9] + [-8]$

$= -9 - 8 = -17$

(iv) $t(x) = x^2 - 2x - 8$

$t(0) = (0)^2 - 2(0) - 8$

$t(0) = 0 - 0 - 8$

$t(0) = -8$

$\therefore \quad (0\,;\,-8)$

(v) $t(x) = x^2 - 2x - 8$

$0 = x^2 - 2x - 8$

$0 = (x-4)(x+2)$

$x = 4$ **of** $x = -2$

$\therefore \quad (4\,;\,0)$ **of** $(-2\,;\,0)$

(5) $f(x) = \frac{2}{x}$ en $g(x) = \frac{x-1}{2x}$

Bereken: (a) $g(-1)$ (b) $f(-6)$

(c) x waarvoor $g(x)$ ongedefinieerd is (d) x as $f(x) = g(x)$

(a) $g(x) = \frac{x-1}{2x}$

$g(-1) = \frac{(-1)-1}{2(-1)}$

$g(-1) = \frac{-2}{-2}$

$g(-1) = 1$

$\therefore \quad (-1\,;\,1)$

(b) $f(x) = \frac{2}{x}$

$f(-6) = \frac{2}{-6}$

$f(-6) = \frac{1}{-3}$

$\therefore \quad \left(-6\,;\,-\frac{1}{3}\right)$

(c) $g(x) = \frac{x-1}{2x}$

Ongedef → $2x = 0$

Ongedef → $x = 0$

(d) $f(x) = g(x)$

KGV = $2x$
$x \neq 0$

$\therefore \quad \frac{2}{x} = \frac{x-1}{2x}$

$2 \times 2 = x - 1$

$4 = x - 1$

$4 + 1 = x$

$\therefore \quad x = 5$

(6) $m(x) = (x+3)(3x-1)$ en $p(x) = -x$

Bereken: (a) $m(0) - p(-1)$ (b) x as $p(x) = m(1)$

(c) x as $m(x) = 0$ (d) $m(a) + 2\,p(a)$

(a) $m(0) - p(-1)$

$= [(0)+3][3(0)-1] - [-(-1)]$

$= [0+3][0-1] - [1]$

$= [3][-1] - [1]$

$= -3 - 1$

$= -4$

(b) $p(x) = m(1)$

$\therefore \quad -x = [(1)+3][3(1)-1]$

$-x = [1+3][3-1]$

$-x = [1+3][3-1]$

$-x = [4][2] = 8$

$\therefore \quad x = -8$

(c) $m(x) = (x+3)(3x-1)$

$0 = (x+3)(3x-1)$

$\therefore \quad x + 3 = 0$ **of** $3x - 1 = 0$

$\therefore \quad x = -3$ **of** $x = \frac{1}{3}$

$\therefore \quad (-3\,;\,0)$ **of** $\left(\frac{1}{3}\,;\,0\right)$

(d) $m(a) + 2\,p(a)$

$= [(a)+3][3(a)-1] + 2[-(a)]$

$= [a+3][3a-1] + 2[-a]$

$= 3a^2 - 1a + 9a - 3 - 2a$

$= 3a^2 + 6a - 3$

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Hoofstuk B2

Lineêre funksie

B2.1 Standaard vorm:

Die standaardvorm van die reguitlyn is: $y = mx + c$
Waar m die lyn se gradiënt verteenwoordig en c die lyn se y-afsnit!
Die gradiënt (m) is die helling van 'n lyn, $\therefore\ m = \frac{y_2 - y_1}{x_2 - x_1}$

B2.2 Grafiese voorstellings:

Soos reeds gesien in graad 9 kan die lineêre funksie of reguit lyn dan, op verskillende maniere geskets word nl. tabelmetode, dubbel-afsnit metode of gradiënt-afsnit metode.

Vb.1 Skets f met behulp van die tabelmetode en skryf die waardeversameling van f neer:
$f = \{(x\,;\,y) : -x + 1 = y\,;\, x \in (-1\,;\,4]\}$

****

$\therefore$ Skets $y = -x + 1$ vir die interval $(-1\,;4]$.
$\therefore$ Die definisieversameling is $x \in (-1\,;\,4]$ met -1 nie ingesluit nie en 4 wel ingesluit!

$y = -(-1) + 1$
$= 1 + 1$
$= 2$

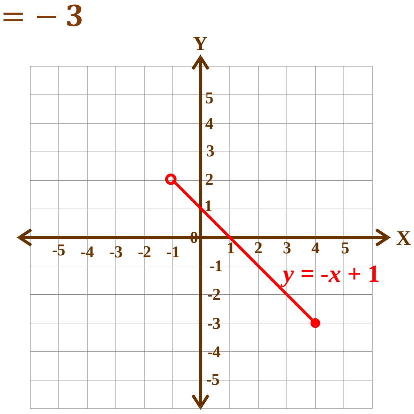
$y = -(0) + 1$
$= 0 + 1$
$= 1$

$y = -(4) + 1$
$= -4 + 1$
$= -3$

x	-1	0	4
y	2	1	-3

Geordende pare:

$(-1\,;\,2)$
$(0\,;\,1)$
$(4\,;\,-3)$



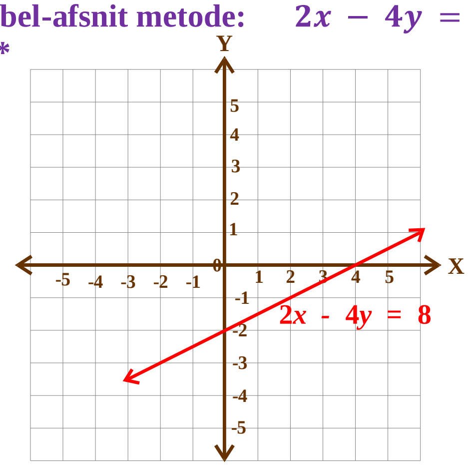
f se waardeversameling: $W_f \in [-3\,;\,2)$

Vb. 2 Skets die volgende met behulp van die dubbel-afsnit metode: $2x - 4y = 8$

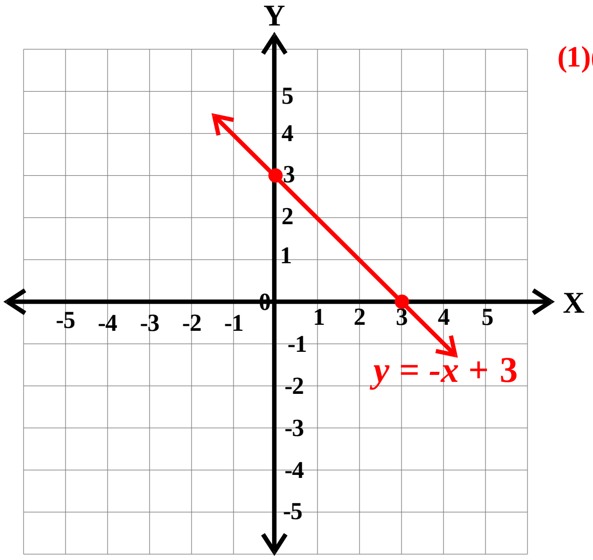
****

x-afsnit: $(y = 0)$
$\therefore\ 2x - 4(0) = 8$
$2x - 0 = 8$
$2x = 8$
$x = 4 \qquad \therefore\ (4\,;\,0)$

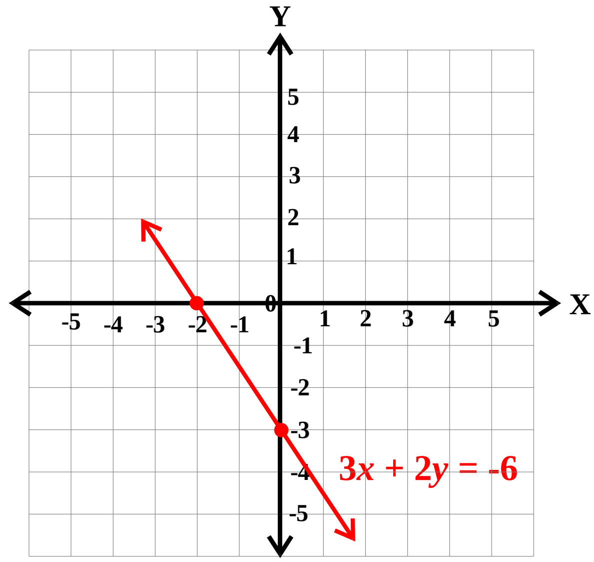
y-afsnit: $(x = 0)$
$\therefore\ 2(0) - 4y = 8$
$0 - 4y = 8$
$-4y = 8$
$y = -2 \qquad \therefore\ (0\,;\,-2)$



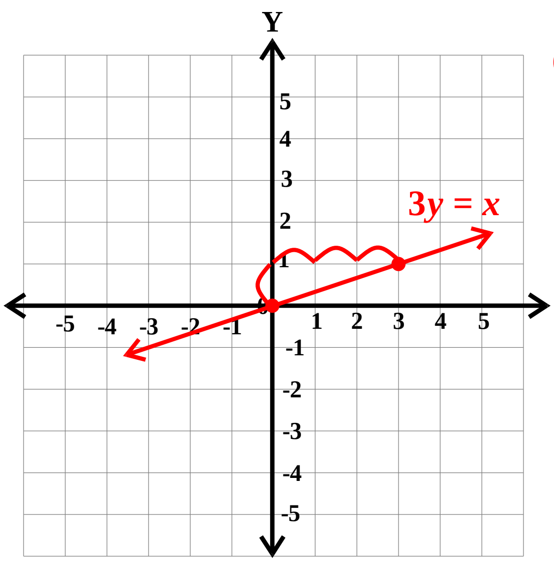
(1)(a)



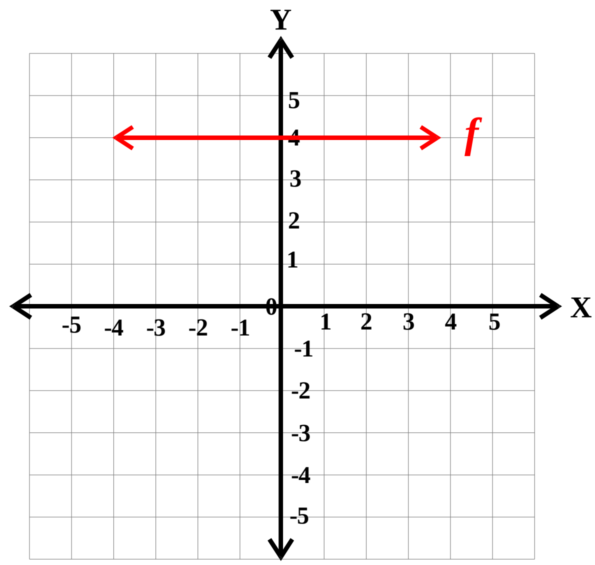
(1)(b)



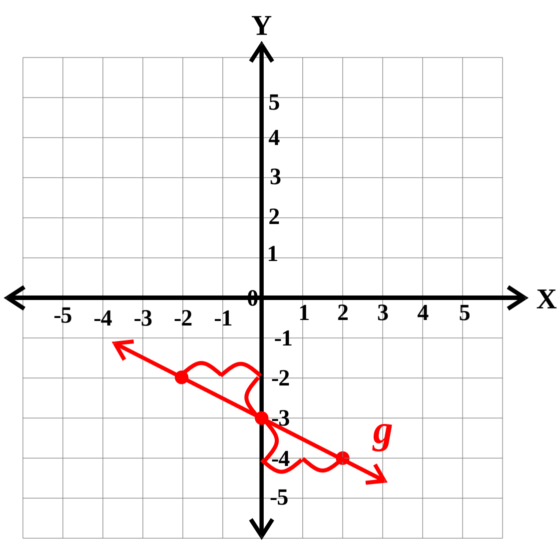
(1)(c)



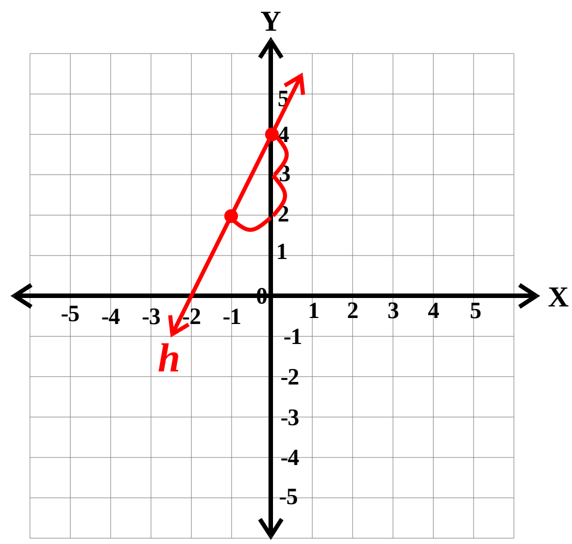
(1)(d)



(1)(e)



(1)(f)



Vb.3 (a) Skets die volgende met behulp van die gradiënt-afsnit metode: $f(x) = -2x$
(b) Skets op dieselfde assestelsel: $g(x) = 3$

****

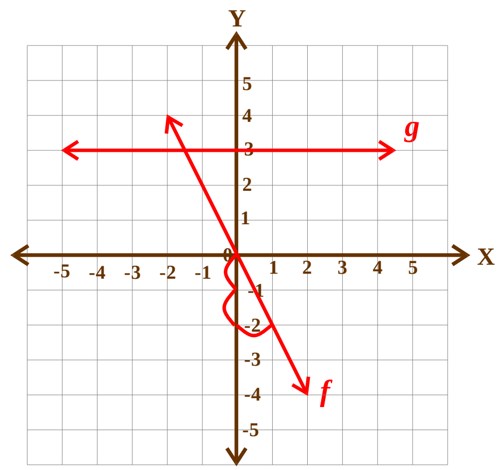
(a) $\therefore$ Skets $y = -2x + 0$

$\therefore$ y-afsnit: $c = 0$

en gradient: $m = -2$

$\therefore$ $m = \frac{-2}{+1} = \frac{y\text{−verandering}}{x\text{−verandering}}$

(b) As $g(x) = 3$, dan is $y = 3$



Oefening 1: Datum: __________________

(1) Skets die volgende lineêre funksies deur van enige metode gebruik te maak:

(a) $y = -x + 3$

$\underline{x\text{-afs}}$: $(y = 0)$ $\quad$ $\underline{y\text{-afs}}$: $(x = 0)$

$0 = -x + 3$ $\quad$ $y = -(0) + 3$

$x = 3$ $\quad$ $y = 3$

$(3\,;\,0)$ $\quad$ $(0\,;3)$

(b) $3x + 2y = -6$

$\underline{x\text{-afs}}$: $(y = 0)$ $\quad$ $\underline{y\text{-afs}}$: $(x = 0)$

$3x + 2(0) = -6$ $\quad$ $3(0) + 2y = -6$

$3x = -6$ $\quad$ $2y = -6$

$x = -2$ $\quad$ $y = -3$

$(-2\,;\,0)$ $\quad$ $(0\,;-3)$

(c) $3y = x$

$\therefore$ $y = \frac{x}{3} = \frac{1}{3}x + 0$

$\therefore$ $m = \frac{1}{3} = \frac{\Delta y}{\Delta x}$

$\therefore$ $c = 0$

(d) $f : x \to 4$

$\therefore$ $y = 4$

(e) $g(x) = -\frac{1}{2}x - 3$

$y = -\frac{1}{2}x - 3$

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

$\therefore$ $c = -3$

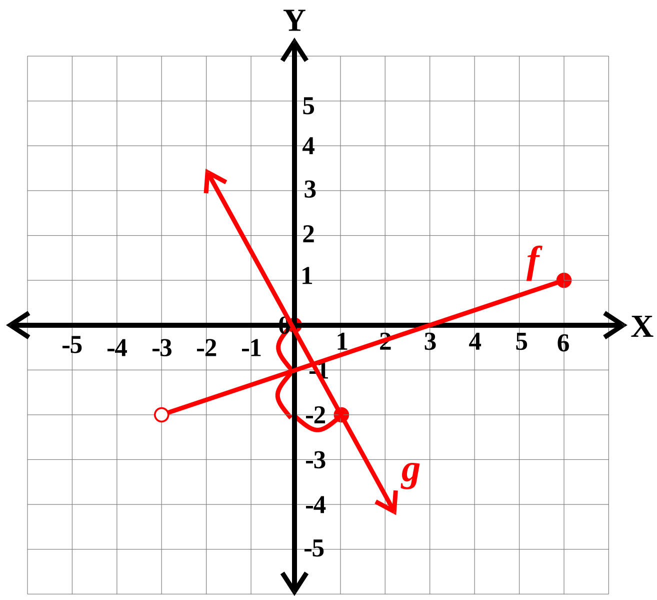
(f) $h = \{(x\,;\,y) : y - 4 = 2x\}$

$y = 2x + 4$

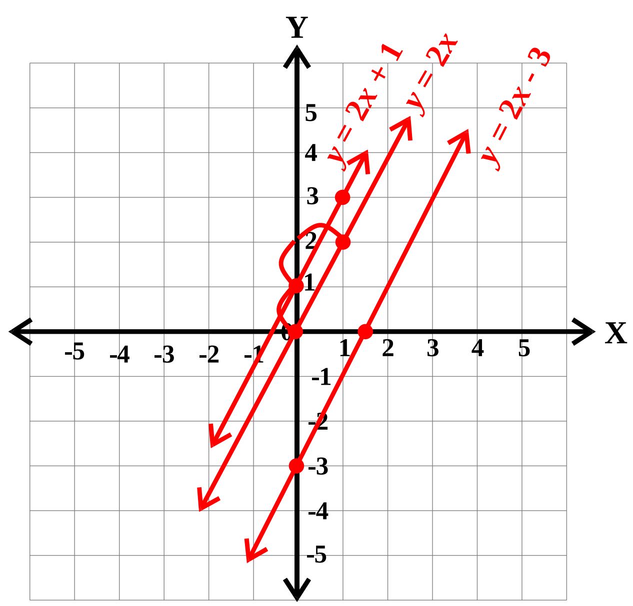
$\therefore$ $m = \frac{2}{1} = \frac{-2}{-1} = \frac{\Delta y}{\Delta x}$

$\therefore$ $c = 4$

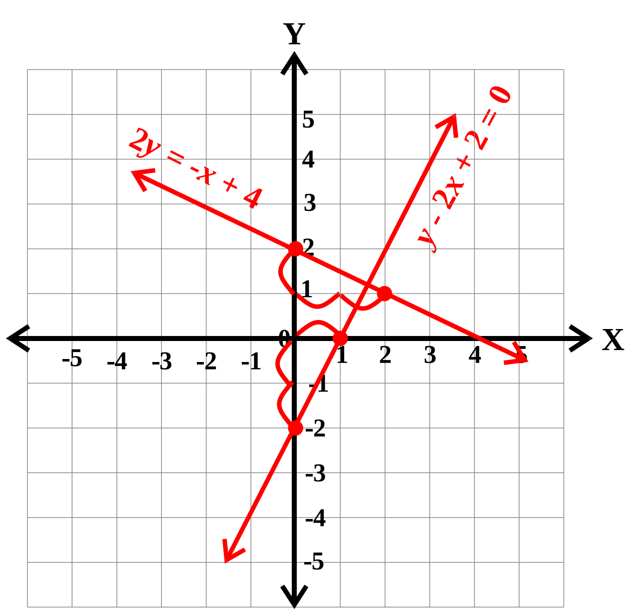
(2)(a)


Y
X
f
g
5
4
3
2
1
0
-1
-2
-3
-4
-5
-5
-4
-3
-2
-1
1
2
3
4
5
6

(3)(a)


Y
X
y = 2x + 1
y = 2x
y = 2x - 3

(4)(a)


Y
X
2y = -x + 4
y - 2x + 2 = 0

(2) Skets die volgende lineêre funksies deur van enige metode gebruik te maak en skryf elke funksie se definisie- en waardeversamelings neer:

(a) $f = \{(x\,;\,y) / 3y + 3 = x\,;\,x \in (-3\,;\,6]\}$

$3y = x - 3$

$y = \frac{1}{3}x - 1$

x	-3	0	6
y	-2	-1	1

$D_f: x \in (-3\,;\,6]$

$W_f: y \in (-2\,;\,1]$

(b) $g: x \to -2x$

$y = -2x$

$\therefore \quad m = \frac{-2}{1} = \frac{2}{-1} = \frac{\Delta y}{\Delta x}$

$\therefore \quad c = 0$

$D_g: x \in \mathbb{R}$

$W_g: y \in \mathbb{R}$

(3) (a) Skets die volgende lineêre funksies, op dieselfde assestelsel. Skryf eers die funksies in standaardvorm.

$2y = 4x - 6$

$y = 2x - 3$

x-afs: $(y = 0)$ y-afs: $(x = 0)$

$0 = 2x - 3 \qquad y = 2(0) - 3$

$x = \frac{3}{2} \qquad y = -3$

$\therefore \left(\frac{3}{2}\,;0\right) \qquad \therefore (0\,;\,-3)$

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

$2x = y$

$\therefore \quad m = \frac{2}{1} = \frac{-2}{-1} = \frac{\Delta y}{\Delta x}$

$\therefore \quad c = 0$

$y - 2x = 1$

$y = 2x + 1$

$\therefore \quad m = \frac{2}{1} = \frac{-2}{-1} = \frac{\Delta y}{\Delta x}$

$\therefore \quad c = 1$

(b) Wat merk jy van die funksies in (a) se gradiënte? **Al die gradiënte is gelyk aan 2.**

(c) Wat merk jy van die lyngrafieke in (a)? **Die lyne is ewewydig.**

(d) Watter afleiding kan jy uit (b) en (c) maak?

Lyne met dieselfde gradiënt is ewewydig.

(4) (a) Skets die volgende lineêre funksies, op dieselfde assestelsel. Skryf eers die funksies in standaardvorm.

$2y = -x + 4$ en $y - 2x + 2 = 0$

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

$\therefore \quad m = \frac{-1}{2} = \frac{1}{-2} = \frac{\Delta y}{\Delta x}$

$\therefore \quad c = 2$

$y = 2x - 2$

$\therefore \quad m = \frac{2}{1} = \frac{-2}{-1} = \frac{\Delta y}{\Delta x}$

$\therefore \quad c = -2$

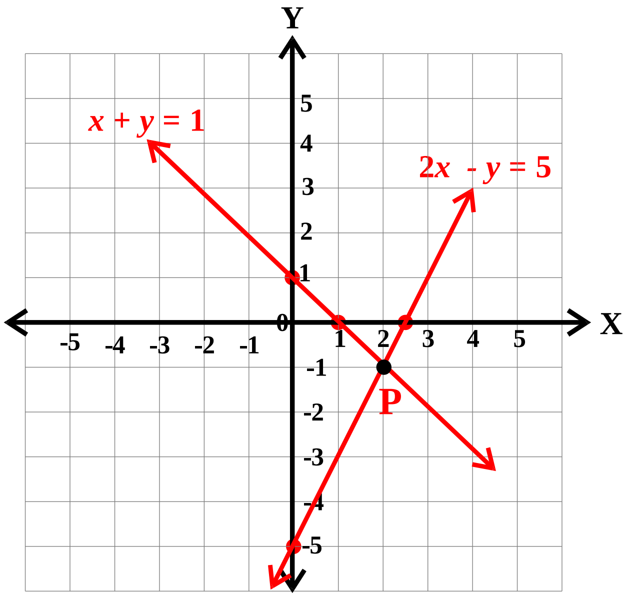
(b) Wat merk jy van die funksies in (a) se gradiënte? **Gradiënte is omgekeerd.**

(c) Wat merk jy van die lyngrafieke in (a)? **Die lyne is loodreg op mekaar.**

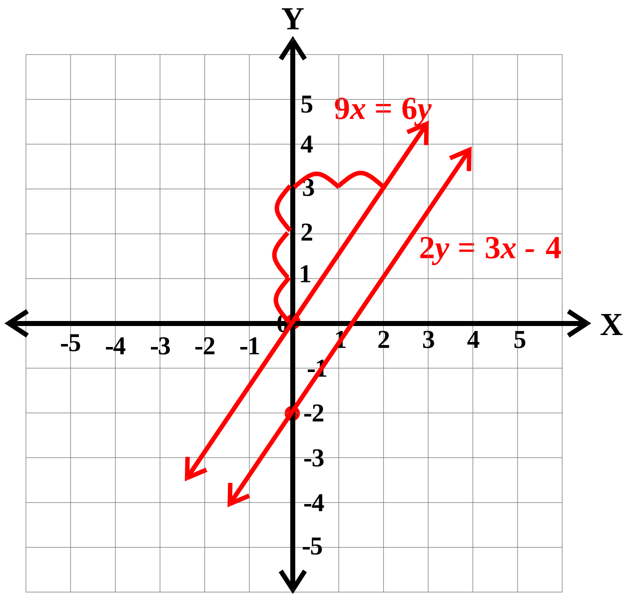
(d) Watter afleiding kan jy uit (b) en (c) maak?

Vir loodregte lyne is $m_1 \times m_2 = -1$.

(1)(a)


Y
X
x + y = 1
2x - y = 5
P
5
4
3
2
1
0
-1
-2
-3
-4
-5
-5 -4 -3 -2 -1
1 2 3 4 5

(1)(b)


Y
X
9x = 6y
2y = 3x - 4
5
4
3
2
1
0
-1
-2
-3
-4
-5
-5 -4 -3 -2 -1
1 2 3 4 5

B2.3 Grafiese oplossing van gelyktydige vergelykings:

Vb.4 Bepaal die gelyktydige oplossing van die volgende vergelykings deur eers die grafieke te teken: $2x - 1 = y$ **en** $8 - 2y = x$

****

Skets $y = 2x - 1$:

$m = 2 = \frac{2}{1} = \frac{y\text{-verandering} \Updownarrow}{x\text{-verandering} \Leftrightarrow}$

$c = -1$

Skets $8 - 2y = x$:

x**-afsnit:** $(y = 0)$

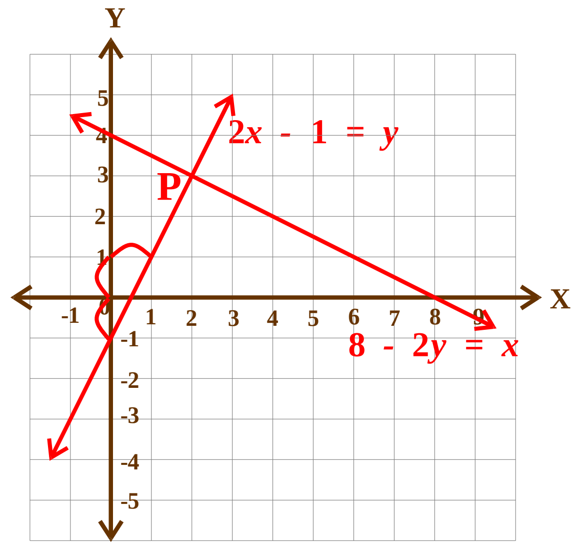
$\therefore\ 8 - 2(0) = x \qquad \therefore\ x = 8$

y**-afsnit:** $(x = 0)$

$\therefore 8 - 2y = 0$

$8 = 2y \qquad \therefore\ y = 4$

∴ Gelyktydige oplossing is by punt P(2 ; 3)



Oefening 2: Datum: ___________________

(1) Bepaal die gelyktydige oplossing van die volgende vergelykings deur die grafieke te teken:

(a) $x + y = 1$ en $2x - y = 5$

x-afs: $(y = 0)$

$x + 0 = 1$

$\therefore \quad x = 1$

$\therefore \quad (1\ ;\ 0)$

y-afs: $(x = 0)$

$0 + y = 1$

$\therefore \quad y = 1$

$\therefore \quad (0\ ;\ 1)$

x-afs: $(y = 0)$

$2x - 0 = 5$

$\therefore \quad x = \frac{5}{2} = 2,5$

$\therefore \quad (2,5\ ;\ 0)$

y-afs: $(x = 0)$

$2(0) - y = 5$

$\therefore \quad y = -5$

$\therefore \quad (0\ ;\ -5)$

$\therefore \quad \text{P}(2\ ;\ -1)$

(b) $3x - 4 = 2y$ en $9x = 6y$

$2y = 3x - 4$

$y = \frac{3}{2}x - \frac{4}{2}$

$y = \frac{3}{2}x - 2$

$\therefore \quad m = \frac{3}{2} = \frac{-3}{-2} = \frac{\Delta y}{\Delta x}$

$\therefore \quad c = -2$

$6y = 9x$

$y = \frac{9}{6}x$

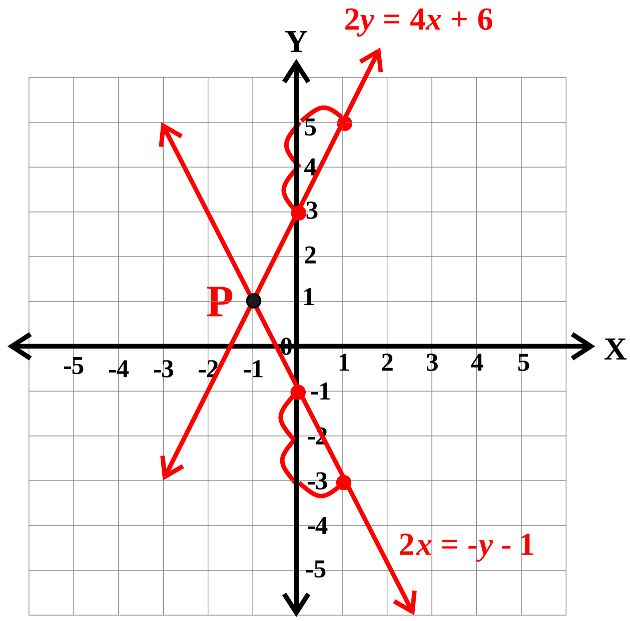
$y = \frac{3}{2}x$

$\therefore \quad m = \frac{3}{2} = \frac{-3}{-2} = \frac{\Delta y}{\Delta x}$

$\therefore \quad c = 0$

∴ Geen gelyktydige oplossing → die lyne is ewewydig

(2)



(2) Bepaal grafies die oplossing van: $\{(x\,;\,y)\,/\,2x = -y - 1\} \cap \{(x\,;\,y)\,/\,2y = 4x + 6\}$

$2x = -y - 1$

$y = -2x - 1$

$\therefore \quad m = \frac{-2}{1} = \frac{2}{-1} = \frac{\Delta y}{\Delta x}$

$\therefore \quad c = -1$

$2y = 4x + 6$

$y = \frac{4}{2}x + \frac{6}{2}$

$y = 2x + 3$

$\therefore \quad m = \frac{2}{1} = \frac{-2}{-1} = \frac{\Delta y}{\Delta x}$

$\therefore \quad c = 3$

$\therefore \quad P(-1\,;\,1)$

B2.4 Ewewydige en loodregte lyne:

Uit oefening 1 kan ons dus die volgende aflei:

Uit nr.(3): **Ewewydige lyne het dieselfde gradiënte.** $\therefore\ m_1 = m_2$

Uit nr.(4): **Loodregte lyne het omgekeerde gradiënte.** $\therefore\ m_1 \times m_2 = -1$

Vb.5 Bepaal of die volgende lyne ewewydig is aan mekaar, loodreg is op mekaar of nie een van die twee nie: $3x + y = 7$ **en** $-2y = 6x$

****

$y = -3x + 7$

$\therefore\ m_1 = -3$

$y = \frac{-6x}{2} = -3x$

$\therefore\ m_2 = -3$

$\therefore$ **Die lyne is ewewydig, want** $m_1 = m_2$.

Vb.6 Bereken die waarde(s) van p **indien** $2y + 3x = 2$ **en** $y - 2px + 3 = 0$ **loodreg is op mekaar.**

****

$2y + 3x = 2$ **en** $y - 2px + 3 = 0$

$\therefore\ 2y = -3x + 2$

$y = \frac{-3}{2}x + 1$

$\therefore\ m_1 = \frac{-3}{2}$

$\therefore\ y = 2px - 3$

$\therefore\ m_2 = 2p$

Maar die lyne is loodreg op mekaar, $\therefore\ m_1 \times m_2 = -1$

$\frac{-3}{2} \times \frac{2p}{1} = -1$

$\therefore\ -3p = -1$

$\therefore\ p = \frac{-1}{-3} = \frac{1}{3}$

Oefening 3: Datum: ________________

(1) Bepaal of die volgende lyne ewewydig is aan mekaar, loodreg is op mekaar of nie een van die twee nie:

(a) $x + y + 1 = 0$ en $x - y - 3 = 0$

$y = -x - 1$ | $x - 3 = y$

$y = x - 3$

$\therefore\ m_1 = -1$ | $\therefore\ m_2 = 1$

$\therefore$ Lyne is loodreg op mekaar want

$m_1 \times m_2 = -1 \times 1 = -1$

(b) $2x + y = 3$ en $4x + 6 = 2y$

$y = -2x + 3$ | $2x + 3 = y$

$y = 2x + 3$

$\therefore\ m_1 = -2$ | $\therefore\ m_2 = 2$

$\therefore$ Nie // of $\perp$

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

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

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

$\therefore\ m_1 = \frac{1}{3}$ | $\therefore\ m_2 = \frac{1}{3}$

$\therefore$ Lyne is ewewydig want

$m_1 = m_2$

(d) $6y + 4x = -3$ en $1 + 3x = 2y$

$6y = -4x - 3$ | $2y = 3x + 1$

$y = -\frac{4}{6}x - \frac{3}{6}$ | $y = \frac{3}{2}x + \frac{1}{2}$

$y = -\frac{2}{3}x - \frac{1}{2}$ | $y = \frac{3}{2}x + \frac{1}{2}$

$\therefore\ m_1 = -\frac{2}{3}$ | $\therefore\ m_2 = \frac{3}{2}$

$\therefore$ Lyne is loodreg op mekaar want

$m_1 \times m_2 = -\frac{2}{3} \times \frac{3}{2} = -1$

(2) Bereken die waarde(s) van k indien:

(a) $3x + 4y = -2$ en $6kx + 3 + y = 0$ ewewydig is aan mekaar.

$4y = -3x - 2$ | $y = -6kx - 3$

$y = \frac{-3}{4}x - \frac{2}{4}$ $\therefore\ m_1 = -\frac{3}{4}$ en $m_2 = -6k$

$\therefore\ -\frac{3}{4} = -6k$ $\rightarrow$ lyne is ewewydig

$\therefore\ -3 = -24k$

$\therefore\ k = \frac{-3}{-24}$ $\rightarrow$ **$\therefore\ k = \frac{1}{8}$**

(b) $y - 2kx = 6$ en $4x - y = 1$ loodreg is op mekaar.

$y = 2kx + 6$ | $4x - 1 = y$

$\therefore\ m_1 = 2k$ | en $m_2 = 4$

Vir loodregte lyne $\rightarrow$ $m_1 \times m_2 = -1$

$\therefore\ 2k \times 4 = -1$

$\therefore\ 8k = -1$

$\therefore\ k = -\frac{1}{8}$