

SHARP

Werkkaart 3 Memo: Getalpatrone

Graad 11 Wiskunde

1. a) $-\frac{3}{5}; -\frac{4}{5}; -1; -\frac{6}{5} \dots$

liniêr; trek af $\frac{1}{5}$

$-\frac{7}{5}; -\frac{8}{5}; -\frac{9}{5}$

b) 12; 24; 48; 96...

vermenigvuldig elke term met 2;

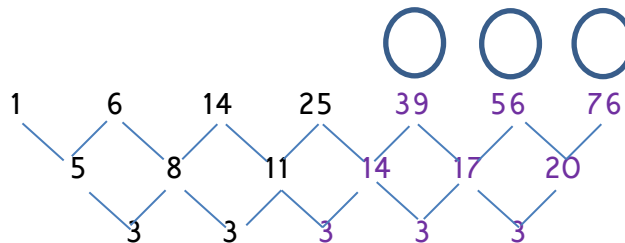
192; 384; 768

c) 1; 8; 27; 64 ...

elke term word verhef tot die derdemag om die volgende te kry; 125; 216; 343.

d)

Kwadraties



e) 1; 4; 9; 16

elke term posisie word gekwadreer

25; 36; 49

f) 11; 16; 21; 26...

liniêr, tel 5 by;

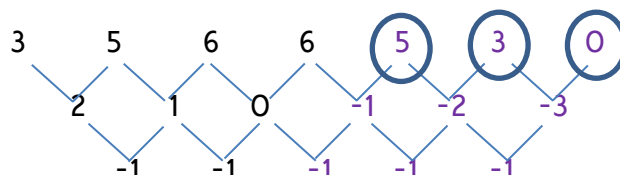
31; 36; 41

g) 48; 16; $\frac{16}{3}; \frac{16}{9} \dots$

Deel elke term met 3 $\rightarrow \frac{16}{27}; \frac{16}{81}; \frac{16}{243} \dots$

h)

Kwadraties



i) 0; 3; 8; 15...

elke term posisie word gekwadreer en dan word 1 afgetrek: 24; 35; 48

j) 1; 10; 101; 1010...

elke term word daar 'n nul gevoeg na die 1, of 'n 1 gevoeg na die 0:

10101; 101010; 1010101

2. a) 125; 119; 113; 107...

$$-6 \quad -6 \quad -6$$

$$\therefore T_n = -6n + x$$

$$125 = -6(1) + x$$

$$x = 131$$

$$\therefore T_n = -6n + 131$$

b) $-13\frac{1}{2}; -12\frac{3}{4}; -12; -11\frac{1}{4} \dots$

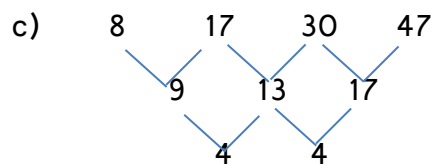
$$+\frac{3}{4} \quad +\frac{3}{4} \quad +\frac{3}{4}$$

$$\therefore T_n = \frac{3}{4}n + x$$

$$-13\frac{1}{2} = \frac{3}{4}(1) + x$$

$$x = -14\frac{1}{4}$$

$$\therefore T_n = \frac{3}{4}n - 14\frac{1}{4}$$



$$a + b + c = 8$$

$$3a + b = 9$$

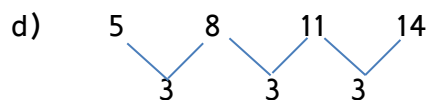
$$2a = 4$$

$$\therefore a = 2$$

$$\therefore b = 9 - 3(2) = 3$$

$$\therefore c = 8 - 2 - 3 = 3$$

$$\therefore T_n = 2n^2 + 3n + 3$$



$$\therefore T_n = 3n + x$$

$$5 = 3(1) + x$$

$$x = 2$$

$$\therefore T_n = 3n + 2$$

e) $12; 11\frac{1}{2}; 11; 10\frac{1}{2} \dots$

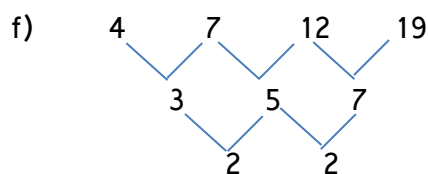
$$-\frac{1}{2} \quad -\frac{1}{2}$$

$$\therefore T_n = -\frac{1}{2}n + x$$

$$12 = -\frac{1}{2}(1) + x$$

$$12\frac{1}{2} = x$$

$$\therefore T_n = -\frac{1}{2}n + 12\frac{1}{2}$$



$$a + b + c = 4$$

$$3a + b = 3$$

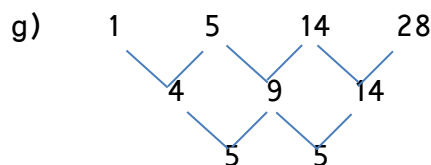
$$2a = 2$$

$$\therefore a = 1$$

$$\therefore b = 3 - 3(1) = 0$$

$$\therefore c = 4 - 1 - 0 = 3$$

$$\therefore T_n = n^2 + 3$$



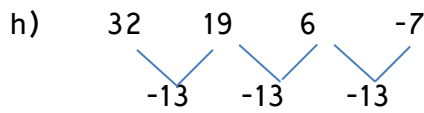
$$a + b + c = 1$$

$$3a + b = 4$$

$$2a = 5$$

$$\therefore a = 2\frac{1}{2}$$

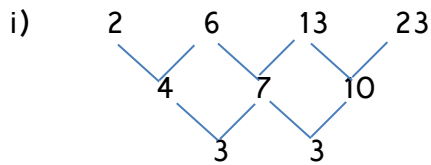
$$\therefore b = 4 - 3\left(2\frac{1}{2}\right) = -3\frac{1}{2}$$



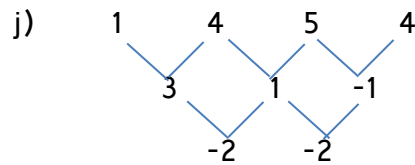
$$\begin{aligned} \therefore T_n &= -13n + x \\ 32 &= -13(1) + x \\ 45 &= x \\ \therefore T_n &= -13n + 45 \end{aligned}$$

$$\therefore c = 1 - 2\frac{1}{2} + 3\frac{1}{2} = 2$$

$$\therefore T_n = 2\frac{1}{2}n^2 - 3\frac{1}{2}n + 2$$



$$\begin{aligned} a + b + c &= 2 \\ 3a + b &= 4 \\ 2a &= 3 \\ \therefore a &= \frac{3}{2} \\ \therefore b &= 4 - 3\left(\frac{3}{2}\right) = -\frac{1}{2} \\ \therefore c &= 2 - \frac{3}{2} + \frac{1}{2} = 1 \\ \therefore T_n &= \frac{3}{2}n^2 - \frac{1}{2}n + 1 \end{aligned}$$



$$\begin{aligned} a + b + c &= 1 \\ 3a + b &= 3 \\ 2a &= -2 \\ \therefore a &= -1 \\ \therefore b &= 3 - 3(-1) = 6 \\ \therefore c &= 1 - 6 + 1 = -4 \\ \therefore T_n &= -n^2 + 6n - 4 \end{aligned}$$

3. a) $T_{11} = -6(11) + 131$
 $\therefore T_{11} = 65$

b) $T_{11} = \frac{3}{4}(11) - 14\frac{1}{4}$
 $\therefore T_{11} = -6$

c) $T_{11} = 2(11)^2 + 3(11) + 3$
 $\therefore T_{11} = 278$

d) $T_{11} = 3(11) + 2$
 $\therefore T_{11} = 35$

e) $T_{11} = -\frac{1}{2}(11) + 12\frac{1}{2}$
 $\therefore T_{11} = 7$

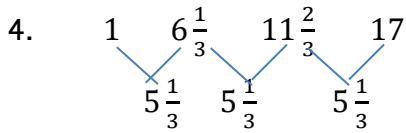
f) $T_{11} = (11)^2 + 3$
 $\therefore T_{11} = 124$

g) $T_{11} = 2\frac{1}{2}(11)^2 - 3\frac{1}{2}(11) + 2$
 $\therefore T_{11} = 266$

h) $T_{11} = -13(11) + 45$
 $\therefore T_{11} = -98$

i) $T_{11} = \frac{3}{2}(11)^2 - \frac{1}{2}(11) + 1$
 $\therefore T_{11} = 177$

j) $T_{11} = -(11)^2 + 6(11) - 4$
 $\therefore T_{11} = -59$



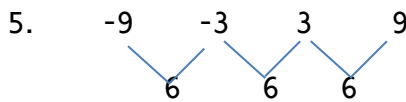
b) $T_{13} = 5\frac{1}{3}(13) - 4\frac{1}{3}$
 $\therefore T_{13} = 65$

a) $T_n = 5\frac{1}{3}n + x$
 $\therefore 1 = 5\frac{1}{3}(1) + x$
 $\therefore x = -4\frac{1}{3}$
 $\therefore T_n = 5\frac{1}{3}n - 4\frac{1}{3}$

c) $33 = 5\frac{1}{3}n - 4\frac{1}{3}$
 $\therefore 37\frac{1}{3} = 5\frac{1}{3}n$
 $\therefore n = 7$

d) $81 = 5\frac{1}{3}n - 4\frac{1}{3}$
 $\therefore 85\frac{1}{3} = 5\frac{1}{3}n$
 $\therefore n = 16$

$\therefore 81$ is deel van die ry.



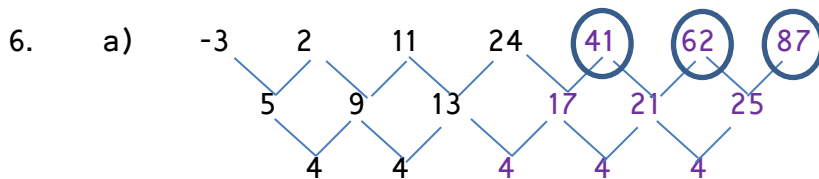
b) $T_{20} = 6(20) - 15$
 $\therefore T_{20} = 105$

a) $T_n = 6n + x$
 $\therefore -9 = 6(1) + x$
 $\therefore x = -15$
 $\therefore T_n = 6n - 15$

c) $75 = 6n - 15$
 $90 = 6n$
 $\therefore 15 = n$

d) $T_5 = 6(5) - 15$
 $T_5 = 15$

Som = $-9 + (-3) + 3 + 9 + 15$
 $= 15$



b) $a + b + c = -3$
 $3a + b = 5$
 $2a = 4$
 $\therefore a = 2$

$\therefore b = 5 - 3(2)$
 $\therefore b = -1$
 $\therefore c = -3 - 2 + 1$
 $\therefore c = -4$

$\therefore T_n = 2n^2 - n - 4$

c) $T_{14} = 2(14)^2 - (14) - 4$
 $\therefore T_{14} = 374$

d) $T_{12} = 2(12)^2 - (12) - 4$
 $\therefore T_{12} = 272$

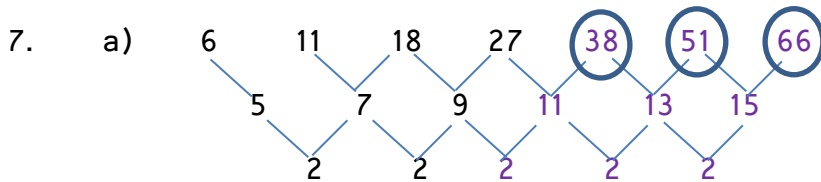
e) $116 = 2n^2 - n - 4$

$0 = 2n^2 - n - 120$

$0 = (2n + 15)(n - 8)$

$\therefore n = -\frac{15}{2}$ or $n = 8$

N/A



b) $a + b + c = 6$ $\therefore b = 5 - 3(1)$

$3a + b = 5$ $\therefore b = 2$

$2a = 2$ $\therefore c = 6 - 2 - 1$

$\therefore a = 1$ $\therefore c = 3$

$\therefore T_n = n^2 + 2n + 3$

c) $T_{10} = (10)^2 + 2(10) + 3$

$\therefore T_{10} = 123$

d) $258 = n^2 + 2n + 3$

$0 = n^2 + 2n - 255$

$0 = (n - 15)(n + 17)$

$\therefore n = 15$ or $n = -17$

NVT

e) $98 = n^2 + 2n + 3$

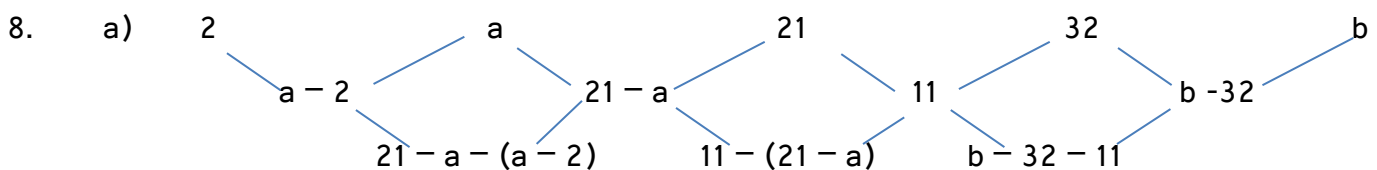
$0 = n^2 + 2n - 95$

$n = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$\therefore n = \frac{-2 \pm \sqrt{2^2 - 4(1)(-95)}}{2(1)}$

$\therefore n = 8.80$ of $n = -10.80$

$\therefore 98$ is nie deel van die ry nie



$$\therefore 21 - a - a + 2 = 11 - 21 + a = b - 43 \rightarrow \text{Ignoreer die een vir nou.}$$

$$\therefore 23 - 2a = -10 + a$$

$$\therefore 33 = 3a$$

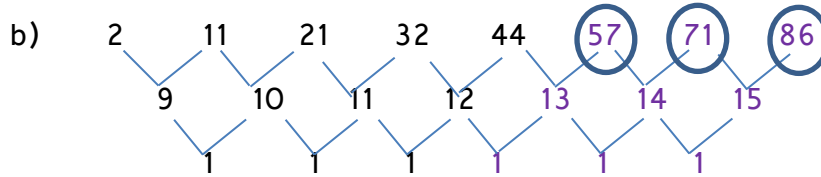
$$\therefore a = 11$$

EN

$$-10 + a = b - 43$$

$$\therefore -10 + 11 + 43 = b$$

$$\therefore b = 44$$



$$\text{c) } a + b + c = 2 \qquad \therefore b = 9 - 3\left(\frac{1}{2}\right)$$

$$3a + b = 9 \qquad \therefore b = 7\frac{1}{2}$$

$$2a = 1 \qquad \therefore c = 2 - \frac{1}{2} - 7\frac{1}{2}$$

$$\therefore a = \frac{1}{2} \qquad \therefore c = -6$$

$$\therefore T_n = \frac{1}{2}n^2 + 7\frac{1}{2}n - 6$$

$$\text{d) } T_{11} = \frac{1}{2}(11)^2 + 7\frac{1}{2}(11) - 6 \qquad \text{f) } 242 = \frac{1}{2}n^2 + 7\frac{1}{2}n - 6$$

$$\therefore T_{11} = 137$$

$$0 = \frac{1}{2}n^2 + 7\frac{1}{2}n - 248$$

$$0 = n^2 + 15n - 496$$

$$\therefore n = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\text{e) } 176 = \frac{1}{2}n^2 + 7\frac{1}{2}n - 6$$

$$0 = \frac{1}{2}n^2 + 7\frac{1}{2}n - 182$$

$$0 = n^2 + 15n - 364$$

$$0 = (n - 13)(n + 28)$$

$$\therefore n = 13 \text{ or } n = -28$$

NVT

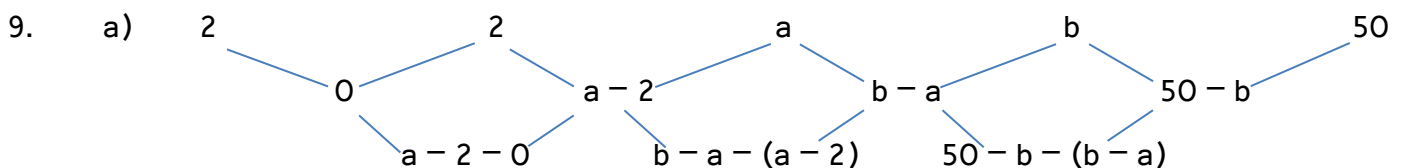
$$\therefore n = \frac{-15 \pm \sqrt{15^2 - 4(1)(-496)}}{2(1)}$$

$$\therefore n = 16 \text{ or } n = -31$$

NVT

$$\therefore 242 \text{ is deel van die ry}$$

Dit is die 16^{de} term.



$$\begin{aligned} \text{b)} \quad a + b + c &= 120 & \therefore b &= 16 - 3(-3) \\ 3a + b &= 16 & \therefore b &= 25 \\ 2a &= -6 & \therefore c &= 120 - 25 + 3 \\ \therefore a &= -3 & \therefore c &= 98 \end{aligned}$$

$$\therefore T_n = -3t^2 + 25t + 98$$

$$\text{c)} \quad 0 = -3t^2 + 25t + 98$$

$$0 = 3t^2 - 25t - 98$$

$$t = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$t = \frac{25 \pm \sqrt{(-25)^2 - 4(3)(-98)}}{2(3)}$$

$$t = 11,24 \text{ sekondes}$$

$$\text{d)} \quad y = -3t^2 + 25t + 98$$

$$y = -3\left(t^2 - \frac{25}{3}t - \frac{98}{3}\right)$$

$$y = -3\left(t^2 - \frac{25}{3}t + \left(\frac{25}{6}\right)^2 - \left(\frac{25}{6}\right)^2 - \frac{98}{3}\right)$$

$$y = -3\left[\left(t - \frac{25}{6}\right)^2 - 50\frac{1}{36}\right]$$

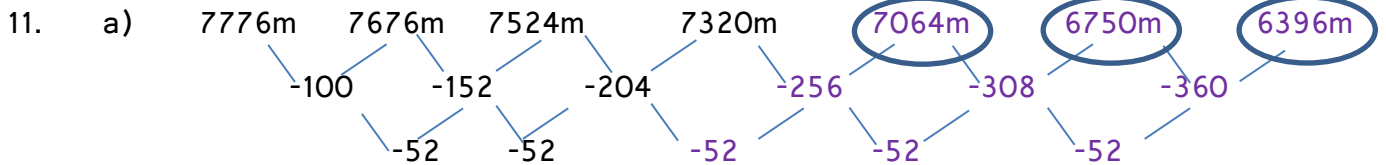
$$y = -3\left(t - \frac{25}{6}\right)^2 + 150,08m$$

$$\text{e)} \quad \text{laat } t = 0$$

$$T_0 = -3(0)^2 + 25(0) + 98$$

$$\therefore T_0 = 98$$

\therefore Die gebou is 98m hoog



$$\begin{aligned} \text{b)} \quad a + b + c &= 7776 & \therefore b &= -100 - 3(-26) \\ 3a + b &= -100 & \therefore b &= -22 \\ 2a &= -52 & \therefore c &= 7776 + 22 + 26 \\ \therefore a &= -26 & \therefore c &= 7824 \end{aligned}$$

$$\therefore T_n = -26t^2 - 22t + 7824$$

$$\text{c)} \quad 0 = -26t^2 - 22t + 7824$$

$$0 = 26t^2 + 22t - 7824$$

$$\therefore t = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\therefore t = \frac{-11 \pm \sqrt{11^2 - 4(26)(-7824)}}{2(26)}$$

$$\therefore t = 16,93 \text{ sekondes}$$

$$\text{e)} \quad 4436 = -26t^2 - 22t + 7824$$

$$0 = -26t^2 - 22t + 3388$$

$$0 = 26t^2 + 22t - 3388$$

$$\therefore t = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\therefore t = \frac{-11 \pm \sqrt{11^2 - 4(26)(-3388)}}{2(26)}$$

$$\therefore t = 11 \text{ of } t = -11\frac{11}{13} \text{ NVT}$$

d) $T_{15} = -26(15)^2 - 22(15) + 7824$

$\therefore T_{15} = 1644m$ vanaf die oppervlak

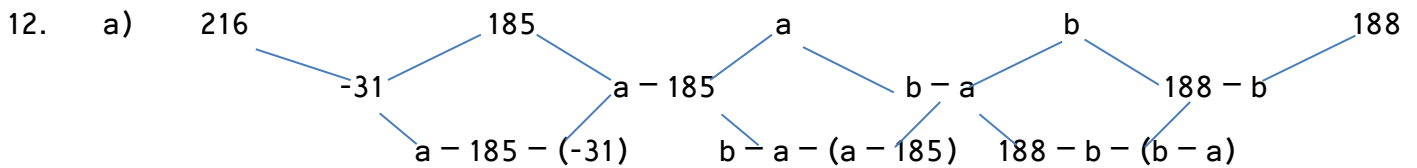
f) if $t = 17$ want dit bereik die oppervlak teen 16,93 sekondes

Dan $T_{17} = -26(17)^2 - 22(17) + 7824$

$\therefore T_{17} = -64m$

Met ander woorde, 64m bo die oppervlak (d.w.s in die lug) wat onmoontlik is

\therefore nee die patroon kan nie voortgaan as die submarine eers die oppervlak bereik nie.



$\therefore a - 185 + 31 = b - a - a + 185 = 188 - b - b + a$

$\therefore a - 154 = b - 2a + 185$ EN $b - 2a + 185 = 188 - 2b + a$

$\therefore 3a - b = 339$

$3b - 3a = 3$

$\therefore b = 3a - 339 \dots 1$

$b - a = 1$

$b = a + 1 \dots 2$

Subs 1 in 2:

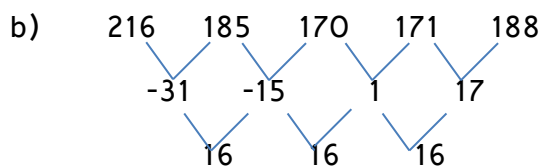
$3a - 339 = 1 + a$

$\therefore 2a = 340$

$\therefore a = 170$

$\therefore b = 1 + 170$

$\therefore b = 171$



$a + b + c = 216$

$\therefore b = -31 - 3(8)$

$3a + b = -31$

$\therefore b = -55$

$2a = 16$

$\therefore c = 216 + 55 - 8$

$\therefore a = 8$

$\therefore c = 263$

$\therefore T_n = 8w^2 - 55w + 263$

c) 3 maande $\rightarrow 3 \times 4 = 12$ weke $\quad \therefore w = 12$

$$\therefore T_{12} = 8(12)^2 - 55(12) + 263$$

$$\therefore T_{12} = R755$$

d) $1000 = 8w^2 - 55w + 263$

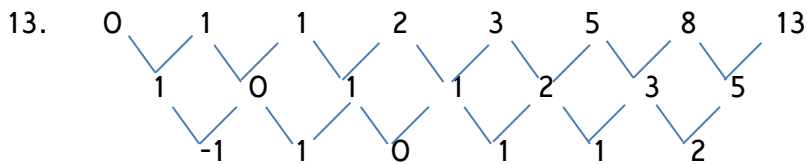
$$0 = 8w^2 - 55w - 737$$

$$\therefore w = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\therefore w = \frac{55 \pm \sqrt{55^2 - 4(8)(-737)}}{2(8)}$$

$$\therefore w = 13,63 \quad \text{or} \quad w = -6,76$$

\therefore na 14 weke sal Sally R1000 of meer verdien het.



\therefore Nee, die Fibonacci-volgorde is nie 'n tweede algemene verskilpatroon nie, aangesien daar geen gemeenskaplike tweede verskil is nie.