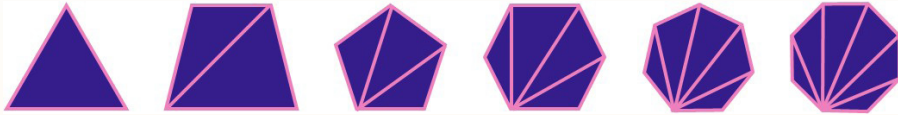


JAWAPAN

BAB 5 JANJANG

Inkuiri 1 (Halaman 128)

2.



3.

Susunan poligon, n	$n = 1$	$n = 2$	$n = 3$	$n = 4$	$n = 5$	$n = 6$
Hasil tambah sudut pedalaman	180	360°	540°	720°	900°	1 080°

- Sebutan berturutan bagi hasil tambah sudut pedalaman diperoleh dengan menambah 180° pada sebutan sebelumnya.
- Beza antara sebarang dua sebutan berturutan ialah satu pemalar yang sama dan nilai tetap yang menghubungkan dua sebutan itu ialah 180° .
- Hasil tambah sudut pedalaman bagi susunan poligon kesepuluh ialah apabila $n = 10$, iaitu $1\ 080^\circ + 180^\circ + 180^\circ + 180^\circ + 180^\circ = 1\ 800^\circ$

Latih Diri 5.1 (Halaman 129 & 130)

1. (a) Beza sepunya, $d = -21 - (-35)$
 $= 14$

Tambah 14 kepada sebutan sebelumnya.

- (b) Beza sepunya, $d = 5\sqrt{3} - 2\sqrt{3}$
 $= 3\sqrt{3}$

Tambah $3\sqrt{3}$ kepada sebutan sebelumnya.

- (c) Beza sepunya, $d = 2p - (p + q)$
 $= p - q$

Tambah $(p - q)$ kepada sebutan sebelumnya.

- (d) Beza sepunya, $d = \log_a 2^4 - \log_a 2$
 $= \log_a 2^4 - \log_a 2^1$
 $= \log_a 2^3$

Tambah $\log_a 2^3$ kepada sebutan sebelumnya.

2. (a) $d_1 = 13 - 9 = 4$

$$d_2 = 17 - 13 = 4$$

$d_1 = d_2$, maka jujukan ini ialah jangjang aritmetik.

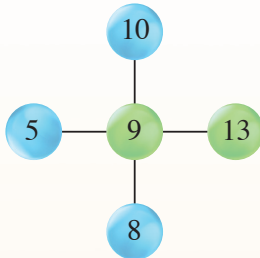
- (b) $d_1 = \frac{1}{4} - \frac{1}{2} = -\frac{1}{4}$

$$d_2 = \frac{1}{6} - \frac{1}{4} = -\frac{1}{12}$$

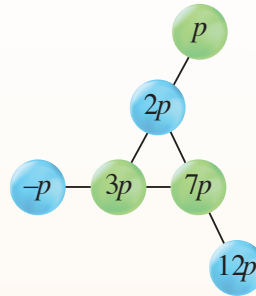
$d_1 \neq d_2$, maka jujukan ini bukan jangjang aritmetik.

- (c) $d_1 = 0.01 - 0.1 = -0.09$
 $d_2 = 0.001 - 0.01 = -0.009$
 $d_1 \neq d_2$, maka jujukan ini bukan jangjang aritmetik.
- (d) $d_1 = 5 - (5 - x) = x$
 $d_2 = (5 + x) - 5 = x$
 $d_1 = d_2$, maka jujukan ini ialah jangjang aritmetik.

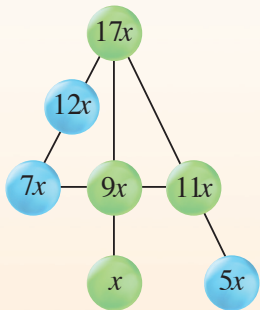
3. (a)



(b)



(c)



4. Jujukan bagi jarak setiap bendera: 5, 10, 15, ...

$$d_1 = 10 - 5 = 5$$

$$d_2 = 15 - 10 = 5$$

Beza sepunya, $d = 5$, maka susunan bendera mengikut jangjang aritmetik.

Inkuiri 2 (Halaman 130)

3.

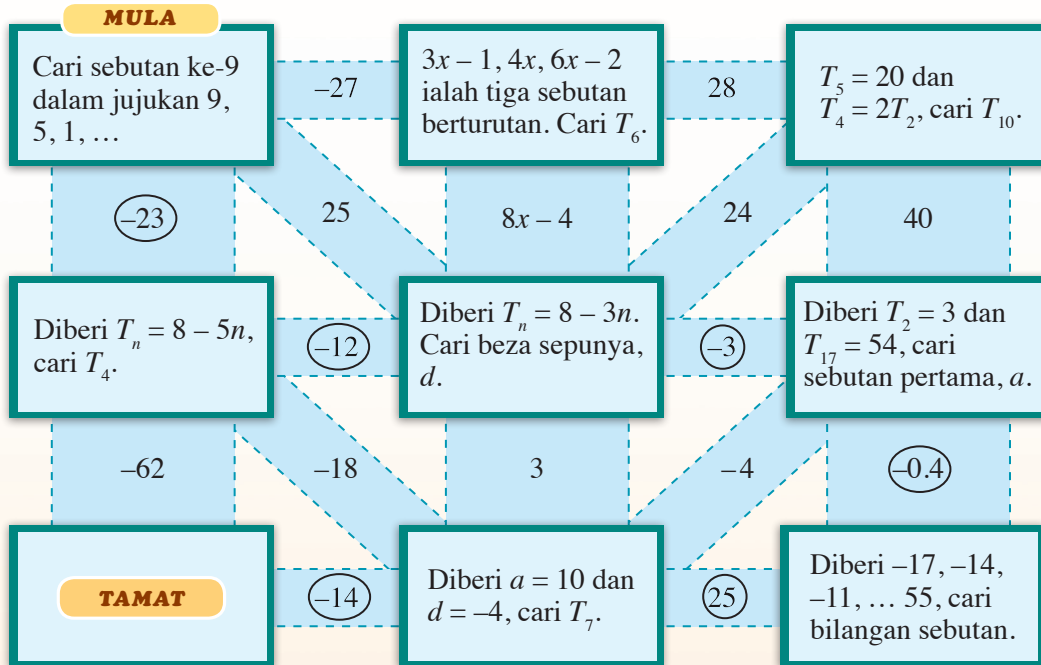
Sebutan	Nilai sebutan	Kaedah mendapatkan nilai sebutan	Rumus (kaedah deduksi)
T_1	a	Tidak mempunyai d	$T_1 = a + 0d$
T_2	$a + d$	Tambah d pada sebutan T_1	$T_2 = a + 1d$
T_3	$a + d + d$	Tambah d pada sebutan T_2	$T_3 = a + 2d$
...	
T_n		Tambah d pada sebutan T_{n-1}	$T_n = a + (n - 1)d$

4. (a) $T_{20} = a + 19d$

(b) Bilangan beza sepunya bagi sebutan ke- n , T_n ialah $(n - 1)$.

(c) $T_n = a + (n - 1)d$

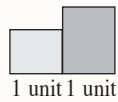
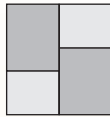
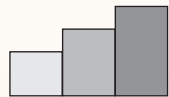
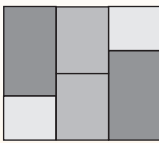
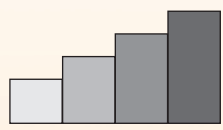
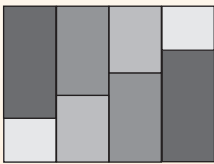
Latih Diri 5.2 (Halaman 132)



2. (a) Jujukan gaji: RM36 000, RM37 000, RM38 000, ...
 Jujukan ini ialah janjang aritmetik dengan $a = \text{RM}36\ 000$ dan $d = \text{RM}1\ 000$
 Gaji bagi n bilangan tahun Encik Muiz bekerja, $T_n = \text{RM}72\ 000$
- $$T_n = a + (n - 1)d$$
- $$72\ 000 = 36\ 000 + (n - 1)(1\ 000)$$
- $$36 = n - 1$$
- $$n = 37 \text{ tahun}$$
- Maka, Encik Muiz perlu bekerja selama untuk 37 tahun untuk memperoleh dua kali ganda gaji tahun pertama.
- (b) Gaji pada tahun ke-6, $T_6 = \text{RM}43\ 500$
- $$T_n = a + (n - 1)d$$
- $$43\ 500 = 36\ 000 + (6 - 1)d$$
- $$7\ 500 = 5d$$
- $$d = 1\ 500$$
- Maka, kenaikan gaji tahunan Encik Muiz ialah RM1 500.

Inkuiri 3 (Halaman 133)

5.

Hasil tambah sebutan	Bilangan petak mengikut bilangan sebutan	Rumus menggunakan kaedah deduksi luas segi empat tepat
S_2	<p>Rajah I</p>  $S_2 = T_1 + T_2$ $= a + (a + d)$ $= 2a + d$	<p>Rajah II</p>  $S_2 = \frac{[a + a + d]2}{2}$ $= \frac{2[2a + (2 - 1)d]}{2}$
S_3	<p>Rajah III</p>  $S_3 = T_1 + T_2 + T_3$ $= a + (a + d) + (a + 2d)$ $= 3a + 3d$	<p>Rajah IV</p>  $S_3 = \frac{[a + a + 2d]3}{2}$ $= \frac{3[2a + (3 - 1)d]}{2}$
S_4	 $S_4 = T_1 + T_2 + T_3 + T_4$ $= a + (a + d) + (a + 2d) + (a + 3d)$ $= 4a + 6d$	 $S_4 = \frac{[a + a + 3d]4}{2}$ $= \frac{4[2a + (4 - 1)d]}{2}$
⋮	⋮	⋮
S_n	$S_n = T_1 + T_2 + T_3 + T_4 + \dots + T_n$ $= a + (a + d) + (a + 2d) + (a + 3d) + \dots + [a + (n - 1)d]$ $= \frac{n[2a + (n - 1)d]}{2}$	$S_n = \frac{n[2a + (n - 1)d]}{2}$

Cabar Minda (Halaman 134)

$S_{20} = 230 + 630$ bermaksud hasil tambah sebutan kedua puluh ialah sepuluh sebutan pertama ditambah dengan sepuluh sebutan yang seterusnya.

Cabar Minda (Halaman 135)

Nilai $n < -25.99$ diabaikan kerana bilangan hari tidak boleh bernilai negatif.

Latih Diri 5.3 (Halaman 136)

- (a) $a = -20, d = -15 - (-20)$
 $= 5$
 $T_n = a + (n - 1)d$
 $100 = -20 + (n - 1)(5)$
 $120 = 5n - 5$
 $5n = 125$
 $n = 25$

$$\begin{aligned} \text{Maka, } S_{25} &= \frac{25}{2}[2(-20) + (25 - 1)(5)] \\ &= \frac{25}{2}[-40 + 120] \\ &= \frac{25}{2}[80] \\ &= 1\,000 \end{aligned}$$

$$\begin{aligned} \text{(b) } a &= \frac{3}{5}, d = \frac{6}{5} - \frac{3}{5} \\ &= \frac{3}{5} \end{aligned}$$

$$\begin{aligned} S_{23} &= \frac{23}{2}\left[2\left(\frac{3}{5}\right) + (23 - 1)\left(\frac{3}{5}\right)\right] \\ &= \frac{23}{2}\left[\frac{6}{5} + \frac{66}{5}\right] \\ &= \frac{23}{2}\left[\frac{72}{5}\right] \\ &= 165\frac{3}{5} \end{aligned}$$

2. Melintang:

$$\begin{aligned} \text{(a) } a &= 38, d = 34 - 38 \\ &= -4 \end{aligned}$$

$$\begin{aligned} S_{18} &= \frac{18}{2}[2(38) + (18 - 1)(-4)] \\ &= 9[8] \\ &= 72 \end{aligned}$$

$$\text{(b) } a = -10, d = 6$$

$$\begin{aligned} S_{100} &= \frac{100}{2}[2(-10) + (100 - 1)(6)] \\ &= 50[574] \\ &= 28\,700 \end{aligned}$$

$$\text{(c) } S_{42} = 5\,838, T_n = -22$$

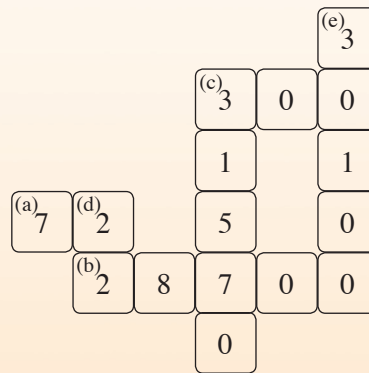
$$\begin{aligned} S_{42} &= \frac{42}{2}[a + (-22)] \\ 5\,838 &= 21[a - 22] \\ 278 &= a - 22 \\ a &= 300 \end{aligned}$$

Menegak:

$$\text{(c) } n = 140, a = 2, T_{140} = 449$$

$$\begin{aligned} T_{140} &= 449 \\ 2 + (140 - 1)d &= 449 \\ 139d &= 447 \\ d &= \frac{447}{139} \end{aligned}$$

$$\begin{aligned} S_{140} &= \frac{140}{2}\left[2(2) + (140 - 1)\left(\frac{447}{139}\right)\right] \\ &= 70[4 + 447] \\ &= 70[451] \\ &= 31\,570 \end{aligned}$$



$$(d) a = -15, d = -3, S_n = -1\ 023$$

$$-1\ 023 = \frac{n}{2}[2(-15) + (n-1)(-3)]$$

$$-2\ 046 = -27n - 3n^2$$

$$3n^2 + 27n - 2\ 046 = 0$$

$$n^2 + 9n - 682 = 0$$

$$(n + 31)(n - 22) = 0$$

$$n = -31 \text{ (Abaikan)} \quad \text{atau } n = 22$$

Maka, $n = 22$.

$$(e) S_{200} = S_{250} - S_{50}$$

$$= \frac{250}{2}[250 + 1] - \frac{50}{2}[50 + 1]$$

$$= 31\ 375 - 1\ 275$$

$$= 30\ 100$$

3. Jujukan bagi panjang garis yang selari dengan paksi-y: 1, 3, 5, ...

$$a = 1, d = 3 - 1 = 2$$

$$T_{11} = 1 + (11 - 1)(2)$$

$$= 21$$

Panjang garis terakhir yang selari dengan paksi-y ialah 21 unit.

Jujukan bagi panjang corak: 1, 1.5, 2, ..., 21

$$a = 1, d = 1.5 - 1 = 0.5$$

$$T_n = 1 + (n - 1)(0.5)$$

$$21 = 0.5n + 0.5$$

$$n = 41$$

$$S_{41} = \frac{41}{2}[2(1) + (41 - 1)(0.5)]$$

$$= \frac{41}{2}[22]$$

$$= 451$$

Maka, hasil tambah panjang keseluruhan corak ialah 451 unit.

4. (a) 1, 3, 5, 7, ..., $S_n \leq 200$

$$\frac{n}{2}[2(1) + (n-1)2] \leq 200$$

$$n[1 + (n-1)] \leq 200$$

$$n^2 \leq 200$$

$$n \leq 14.14$$

$$\therefore n = 14$$

$$S_{14} = \frac{14}{2}[2 + 13(2)]$$

$$= 7[28]$$

$$= 196$$

Terdapat 14 kepingan kayu berwarna sama yang lengkap dan 4 kepingan kayu yang tinggal.

- (b) $T_{14} = 1 + 13(2) = 27$ kepingan kayu

Jika biru, 1, 5, 9, ..., 27

$$T_n = 27 = 1 + (n-1)4$$

$$26 = 4(n-1)$$

$$30 = 4n$$

$$n = \frac{30}{4} \text{ bukan integer}$$

Jika kelabu, 3, 7, 11, ..., 27

$$T_n = 27 = 3 + (n - 1)4$$

$$24 = 4(n - 1)$$

$$n - 1 = 6$$

$$n = 7, \text{ nombor integer}$$

Maka, kepingan kayu terakhir ialah kelabu dan bilangan kepingan kayu ialah 27 keping.

Latih Diri 5.4 (Halaman 138)

1. (a) Jujukan jangkaan jualan buku: 10, 14, 18, ...

$$a = 10, d = 14 - 10$$

$$= 4$$

$$S_n > 1\,000$$

$$\frac{n}{2}[2(10) + (n - 1)(4)] > 1\,000$$

$$n[16 + 4n] > 2\,000$$

$$4n^2 + 16n - 2\,000 > 0$$

$$n^2 + 4n - 500 > 0$$

$$n > \frac{-4 + \sqrt{2\,016}}{2} \quad \text{atau} \quad n < \frac{-4 - \sqrt{2\,016}}{2}$$
$$> 20.4 \quad \quad \quad < -24.4 \text{ (Abaikan)}$$

Maka, $n = 21$, iaitu Encik Tong memerlukan 21 hari untuk menjual kesemua buku itu.

- (b) $S_{10} = \frac{10}{2}[2(10) + (10 - 1)d]$

$$1\,000 = 5[20 + 9d]$$

$$200 = 20 + 9d$$

$$9d = 180$$

$$d = 20$$

Kadar peningkatan buku yang perlu dijual setiap hari ialah 20 buah.

2. (a) $T_{15} = 30$

$$S_{15} = 240$$

$$\frac{15}{2}[a + 30] = 240$$

$$15a + 450 = 480$$

$$15a = 30$$

$$a = 2$$

Panjang dawai dengan bahagian terpendek ialah 2 cm.

- (b) $T_{15} = 30$

$$2 + (15 - 1)d = 30$$

$$2 + 14d = 30$$

$$14d = 28$$

$$d = 2$$

Beza panjang antara dua bahagian dawai berturutan ialah 2 cm.

Latihan Intensif 5.1 (Halaman 138)

1. (a) $d_1 = -17 - (-32) = 15$

$$d_2 = -2 - (-17) = 15$$

$$d_3 = 13 - (-2) = 15$$

Jujukan ialah jangjang aritmetik kerana beza sepunya, d adalah sama, iaitu 15.

$$\begin{aligned} \text{(b) } d_1 &= 5.7 - 8.2 = -2.5 \\ d_2 &= 3.2 - 5.7 = -2.5 \\ d_3 &= 1.7 - 3.2 = -1.5 \end{aligned}$$

Jujukan bukan janjang aritmetik kerana beza sepunya, d tidak sama.

$$2. \text{ (a) } a = -12, d = -9 - (-12)$$

$$= 3$$

$$T_9 = -12 + (9 - 1)(3)$$

$$= 12$$

$$\text{(b) } a = \frac{1}{3}, d = -\frac{1}{3} - \frac{1}{3}$$

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

$$T_{15} = \frac{1}{3} + (15 - 1)\left(-\frac{2}{3}\right)$$

$$= -9$$

$$3. \text{ (a) } a = -0.12, d = 0.07 - (-0.12)$$

$$= 0.19$$

$$T_n = 1.97$$

$$-0.12 + (n - 1)(0.19) = 1.97$$

$$0.19n - 0.19 = 2.09$$

$$0.19n = 2.28$$

$$n = 12$$

$$\text{(b) } a = x, d = 3x + y - x$$

$$= 2x + y$$

$$T_n = 27x + 13y$$

$$x + (n - 1)(2x + y) = 27x + 13y$$

$$2nx - x + ny - y = 27x + 13y$$

$$(2n - 1)x + (n - 1)y = 27x + 13y$$

$$2n - 1 = 27$$

$$2n = 28$$

$$n = 14$$

$$4. \text{ (a) } a = -23, d = -17 - (-23)$$

$$= 6$$

$$S_{17} = \frac{17}{2}[2(-23) + (17 - 1)(6)]$$

$$= \frac{17}{2}[50]$$

$$= 425$$

$$\text{(b) } S_{2n} = \frac{2n}{2}[2(-23) + (2n - 1)(6)]$$

$$= n[12n - 52]$$

$$= 4n[3n - 13]$$

$$\text{(c) } T_n = 121$$

$$-23 + (n - 1)(6) = 121$$

$$6n - 6 = 144$$

$$6n = 150$$

$$n = 25$$

$$S_{25} = \frac{25}{2}[-23 + 121]$$

$$= 1\ 225$$

5. (a) $S_n = 2n^2 - 5n$

$$S_1 = 2(1)^2 - 5(1)$$

$$= -3$$

(b) $T_9 = S_9 - S_8$

$$= [2(9)^2 - 5(9)] - [2(8)^2 - 5(8)]$$

$$= 117 - 88$$

$$= 29$$

(c) $T_4 + T_5 + \dots + T_8 = S_8 - S_3$

$$= [2(8)^2 - 5(8)] - [2(3)^2 - 5(3)]$$

$$= 88 - 3$$

$$= 85$$

6. (a) $T_2 = \frac{1}{2}, S_{14} = -70$

$$a + d = \frac{1}{2}$$

$$2a + 2d = 1 \dots \textcircled{1}$$

$$S_{14} = -70$$

$$\frac{14}{2}[2a + 13d] = -70$$

$$2a + 13d = -10 \dots \textcircled{2}$$

$$\textcircled{2} - \textcircled{1}: 11d = -11$$

$$d = -1$$

Maka, beza sepunya ialah -1 .

(b) $T_{14} = \frac{3}{2} + (14 - 1)(-1)$

$$= -\frac{23}{2}$$

7. Jujukan gaji bulanan syarikat A: RM3 500, RM3 520, RM3 540, ...

Jujukan gaji tahunan syarikat B: RM46 000, RM47 000, RM48 000, ...

Jumlah gaji dalam masa 3 tahun bagi syarikat A:

$$S_{36} = \frac{36}{2}[2(3\ 500) + 35(20)]$$

$$= \text{RM}138\ 600$$

Jumlah gaji dalam masa 3 tahun bagi syarikat B:

$$S_3 = \frac{3}{2}[2(46\ 000) + 2(1\ 000)]$$

$$= \text{RM}141\ 000$$

Lebih jumlah gaji = RM141 000 - RM138 600

$$= \text{RM}2\ 400$$

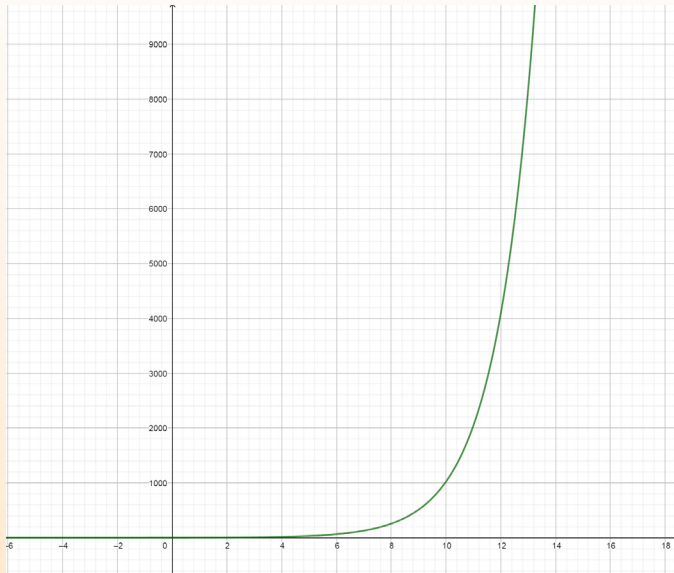
Yui Ming perlu memilih syarikat B dengan lebih jumlah gaji sebanyak RM2 400.

Inkuiri 4 (Halaman 139)

3.

1	2	$4 = 2^2$	$8 = 2^3$
$16 = 2^4$	$32 = 2^5$	$64 = 2^6$	$128 = 2^6$
$256 = 2^8$	$512 = 2^9$	$1\ 024 = 2^{10}$	$2\ 048 = 2^{11}$
$4\ 096 = 2^{12}$	$8\ 192 = 2^{13}$	$16\ 384 = 2^{14}$	$32\ 768 = 2^{15}$
$65\ 536 = 2^{16}$	$131\ 072 = 2^{17}$	$262\ 144 = 2^{18}$	$524\ 288 = 2^{19}$
$1\ 048\ 576 = 2^{20}$	$2\ 097\ 152 = 2^{21}$		

4. $20 \text{ minit} \times 22 = 440 \text{ minit}$
 $= 7 \text{ jam } 20 \text{ minit}$
5. Hasil darab 2 kepada masa sebelumnya.
- 6.

**Latih Diri 5.5 (Halaman 141)**

1. (a) $r_1 = \frac{40}{120} = \frac{1}{3}$

$$r_2 = \frac{\frac{40}{3}}{40} = \frac{1}{3}$$

$r_1 = r_2$, maka jujukan ialah jangjang geometri.

(b) $r_1 = \frac{0.003}{0.03} = 0.1$

$$r_2 = \frac{0.0003}{0.003} = 0.1$$

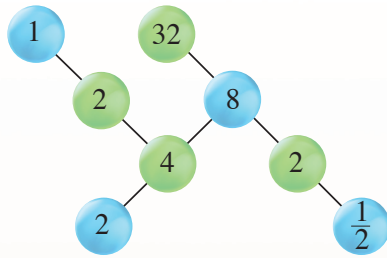
$r_1 = r_2$, maka jujukan ialah jangjang geometri.

(c) $r_1 = \frac{2x}{x+1}$

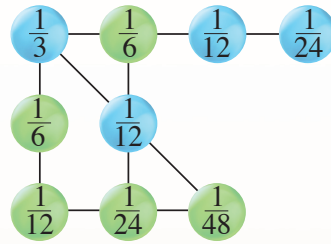
$$r_2 = \frac{5x+12}{2x}$$

$r_1 \neq r_2$, maka jujukan bukan jangjang geometri.

2. (a)



(b)



3.

$$r_1 = r_2$$

$$\frac{x+1}{x-2} = \frac{4x+4}{x+1}$$

$$(x+1)(x+1) = (4x+4)(x-2)$$

$$x^2 + 2x + 1 = 4x^2 - 4x - 8$$

$$3x^2 - 6x - 9 = 0$$

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

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

$$x = -1 \quad \text{atau} \quad x = 3$$

Nilai x yang positif ialah 3.

$$a = T_1 = 3 - 2 = 1$$

$$T_2 = 3 + 1 = 4$$

Nisbah sepunya, $r = 4$

Maka, tiga sebutan pertama ialah 1, 4, 16 dengan nisbah sepunya 4.

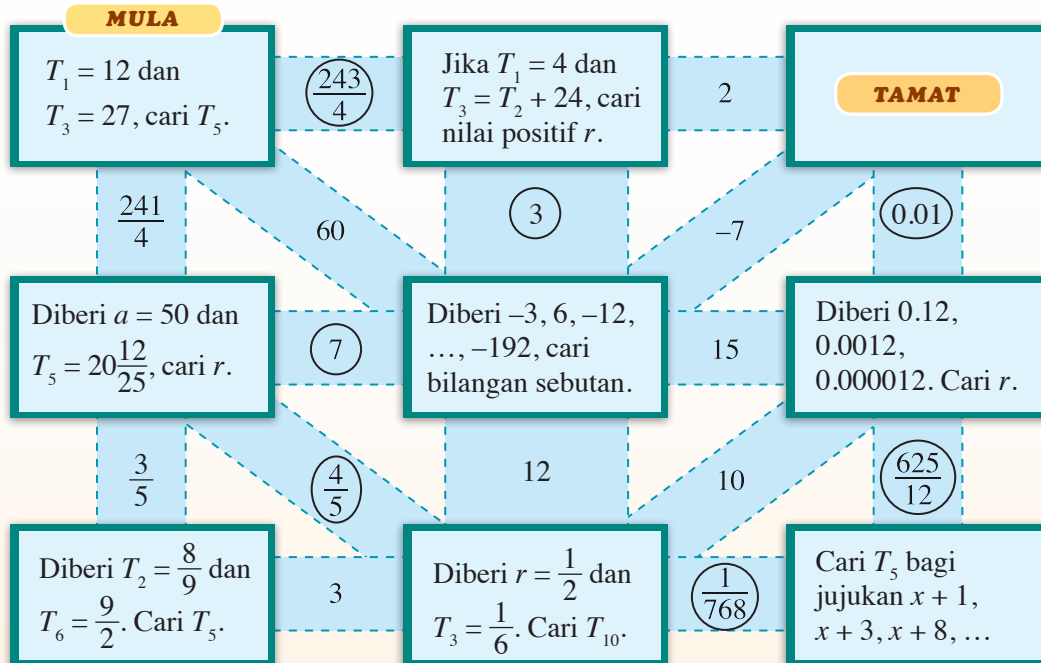
Inkuiri 5 (Halaman 141)

2.

Sebutan	Nilai sebutan	Kaedah mendapatkan nilai sebutan	Rumus
T_1	2	$2(3)^{1-1} = 2(3)^0$	a
T_2	6	$2(3)^{2-1} = 2(3)^1$	$ar = ar^{2-1}$
T_3	18	$2(3)^{3-1} = 2(3)^2$	$ar^2 = ar^{3-1}$
T_4	54	$2(3)^{4-1} = 2(3)^3$	$ar^3 = ar^{4-1}$
T_5	162	$2(3)^{5-1} = 2(3)^4$	$ar^4 = ar^{5-1}$
\vdots	\vdots	\vdots	\vdots
T_n		$2(3)^{n-1}$	ar^{n-1}

3. Rumus sebutan ke- $n = ar^{n-1}$

Latih Diri 5.6 (Halaman 143)



2. Jujukan bagi ketinggian bola: $3, 3(0.95), 3(0.95)^2, \dots$

$$T_n < 1$$

$$3(0.95)^{n-1} < 1$$

$$0.95^{n-1} < \frac{1}{3}$$

$$(n-1) \log 0.95 < \log \frac{1}{3}$$

$$n-1 > \frac{\log \frac{1}{3}}{\log 0.95}$$

$$n-1 > 21.4$$

$$n > 22.4$$

Maka, ketinggian bola kurang daripada 1 m pada lantunan yang ke-23.

Latih Diri 5.7 (Halaman 145)

1. (a) $a = 0.02, r = \frac{0.04}{0.02} = 2$

$$S_{12} = \frac{0.02(2^{12} - 1)}{2 - 1}$$

$$= 81.9$$

- (b) $a = p, r = \frac{p^3}{p} = p^2$

$$T_n = p(p^2)^{n-1}$$

$$p^{21} = p(p^2)^{n-1}$$

$$p^{20} = p^{2n-2}$$

$$20 = 2n - 2$$

$$2n = 22$$

$$n = 11$$

$$S_{11} = \frac{p[(p^2)^{11} - 1]}{p^2 - 1}$$

$$= \frac{p[p^{22} - 1]}{p^2 - 1}$$

$$(c) S_{15} = \frac{\frac{1}{2}[3^{15} - 1]}{2}$$

$$= 3\,587\,226.5$$

$$2. a = 3\,500, r = \frac{700}{3\,500} = \frac{1}{5}$$

$$S_n = 4\,368$$

$$\frac{3\,500\left[1 - \left(\frac{1}{5}\right)^n\right]}{1 - \frac{1}{5}} = 4\,368$$

$$3\,500\left[1 - \left(\frac{1}{5}\right)^n\right] = 3\,494.4$$

$$1 - \left(\frac{1}{5}\right)^n = 0.9984$$

$$\left(\frac{1}{5}\right)^n = 0.0016$$

$$n \log_{10} \frac{1}{5} = \log_{10} 0.0016$$

$$n = \frac{\log_{10} 0.0016}{\log_{10} \frac{1}{5}}$$

$$= 4$$

Bilangan sebutan ialah 4.

3. (a) Jujukan bilangan segi empat sama: 1, 4, 16, ...

$$r_1 = \frac{4}{1} = 4$$

$$r_2 = \frac{16}{4} = 4$$

$r_1 = r_2$. Maka, jujukan membentuk jangjang geometri.

- (b) $a = 1$

$$S_6 = \frac{1(4^6 - 1)}{4 - 1}$$

$$= 1\,365$$

Inkuiri B (Halaman 146)

2.

n	r^n	S_n
1	$\frac{1}{2}$	64
2	$\frac{1}{4}$	96
3	$\frac{1}{8}$	112
4	$\frac{1}{16}$	120
5	$\frac{1}{32}$	124
10	$\frac{1}{1\,024}$	127.875
20	$\frac{1}{1\,048\,576}$	127.999

3. Apabila n semakin bertambah, nilai r^n menghampiri sifar dan nilai S_n semakin meningkat.
4. Apabila n bertambah hingga ketakterhinggaan, nilai S_n semakin menghampiri $\frac{a}{1-r}$ dan $S_\infty = \frac{a}{1-r}$.

Latih Diri 5.8 (Halaman 148)

1. Melintang:

(a) $a = 1\,500, r = \frac{1}{3}$

$$S_\infty = \frac{1\,500}{1 - \frac{1}{3}}$$

$$= 2\,250$$

(b) Jujukan pembayaran pinjaman:

RM15 000, RM7 500, RM3 750, RM1 875, ...

$a = 15\,000, r = \frac{1}{2}$

$$S_\infty = \frac{15\,000}{1 - \frac{1}{2}}$$

$= \text{RM}30\,000$

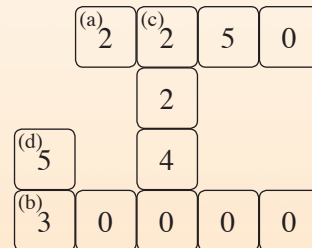
Menegak:

(c) $r = \frac{1}{2}$

$S_\infty = 4\,480$

$$\frac{a}{1 - \frac{1}{2}} = 4\,480$$

$a = 2\,240$



$$\begin{aligned}
 \text{(d) } 4.818181\dots &= 4 + 0.81 + 0.0081 + 0.000081 + \dots \\
 &= 4 + S_{\infty} \\
 &= 4 + \frac{0.81}{1 - 0.01} \\
 &= 4 + \frac{0.81}{0.99} \\
 &= 4 + \frac{9}{11} \\
 &= \frac{53}{11} \\
 \text{Maka, } h &= 53
 \end{aligned}$$

Latih Diri 5.9 (Halaman 149)

$$\begin{aligned}
 \text{1. (a) } \frac{4x + 20}{10x} &= \frac{3x - 10}{4x + 20} \\
 (4x + 20)^2 &= (3x - 10)(10x) \\
 16x^2 + 160x + 400 &= 30x^2 - 100x \\
 14x^2 - 260x - 400 &= 0 \\
 7x^2 - 130x - 200 &= 0 \\
 (7x + 10)(x - 20) &= 0 \\
 x &= -\frac{10}{7} \quad \text{atau} \quad x = 20
 \end{aligned}$$

Jujukan: a , 200, 100, 50

Maka, bahagian terpanjang ialah 400 cm.

$$\begin{aligned}
 \text{(b) } S_{\infty} &= \frac{400}{1 - \frac{1}{2}} \\
 &= 800 \text{ cm} \\
 &= 8 \text{ m}
 \end{aligned}$$

2. (a) Jujukan jejari: $j, j(1.4), j(1.4)^2, \dots$
 Jujukan lilitan: $\pi j, \pi j(1.4), \pi j(1.4)^2, \dots$

$$\begin{aligned}
 \text{(b) } S_{15} &= \frac{\pi(2)(1.4^{15} - 1)}{1.4 - 1} \\
 &= 772.8\pi \\
 &= 2\,428.8 \text{ cm} \\
 &= 24.28 \text{ m}
 \end{aligned}$$

Latihan Intensif 5.2 (Halaman 149)

$$\begin{aligned}
 \text{1. (a) } a &= -1, r = -3 \\
 T_n &= 2\,187 \\
 -1(-3)^{n-1} &= 2\,187 \\
 (-3)^{n-1} &= -2\,187 \\
 (-3)^{n-1} &= (-3)^7 \\
 n - 1 &= 7 \\
 n &= 8 \\
 S_8 &= \frac{-1(1 - 3^8)}{1 - (-3)} \\
 &= 1\,640
 \end{aligned}$$

$$(b) a = \log x^{-1}, r = 2$$

$$T_n = \log x^{-64}$$

$$\log x^{-1}(2)^{n-1} = \log x^{-64}$$

$$2^{n-1} \log x^{-1} = 64 \log x^{-1}$$

$$2^{n-1} = 64$$

$$2^{n-1} = 2^6$$

$$n - 1 = 6$$

$$n = 7$$

$$S_7 = \frac{\log x^{-1}(2^7 - 1)}{2 - 1}$$

$$= -127 \log x$$

$$= \log x^{-127}$$

$$(c) a = 0.54, r = 0.01$$

$$T_n = 5.4 \times 10^{-17}$$

$$0.54(0.01)^{n-1} = 5.4 \times 10^{-17}$$

$$0.54(10^{-2})^{n-1} = 0.54 \times 10^{-16}$$

$$10^{-2n+2} = 10^{-16}$$

$$-2n + 2 = -16$$

$$2n = 18$$

$$n = 9$$

$$S_9 = \frac{0.54(1 - 0.01^9)}{1 - 0.01}$$

$$= \frac{6}{11}$$

$$(d) a = 3, r = \frac{1}{2}$$

$$T_n = 3\left(\frac{1}{2}\right)^{n-1}$$

$$\frac{3}{64} = 3\left(\frac{1}{2}\right)^{n-1}$$

$$\left(\frac{1}{2}\right)^6 = \left(\frac{1}{2}\right)^{n-1}$$

$$6 = n - 1$$

$$n = 7$$

$$S_7 = \frac{3\left[1 - \left(\frac{1}{2}\right)^7\right]}{\frac{1}{2}}$$

$$= 5\frac{61}{64}$$

2. Diberi jangjang geometri 4.5, -9, 18, ... dan hasil tambah 769.5.

$$r = \frac{-9}{4.5} = -2$$

$$S_n = 769.5$$

$$\frac{4.5[1 - (-2)^n]}{3} = 769.5$$

$$1 - (-2)^n = 513$$

$$(-2)^n = -512$$

$$(-2)^n = (-2)^9$$

Bilangan sebutan, $n = 9$.

3. Sebutan berturutan x , $2x + 3$, $10x - 3$

$$(a) \quad \frac{2x + 3}{x} = \frac{10x - 3}{2x + 3}$$

$$(2x + 3)(2x + 3) = x(10x - 3)$$

$$4x^2 + 12x + 9 = 10x^2 - 3x$$

$$6x^2 - 15x - 9 = 0$$

$$2x^2 - 5x - 3 = 0$$

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

$$2x + 1 = 0 \quad , \quad x - 3 = 0$$

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

(b) Jika $x < 0$, sebutan berturutan ialah $-\frac{1}{2}$, 2 , -8 .

$$a = -\frac{1}{2}, r = -4$$

$$T_6 = -\frac{1}{2}(-4)^5$$

$$= 512$$

4. Luas segi tiga ketiga = 36 cm^2 , $T_3 + T_4 = 54 \text{ cm}^2$

$$(a) \quad ar^2 = 36 \dots \textcircled{1}$$

$$ar^2 + ar^3 = 54$$

$$ar^3 = 54 - 36$$

$$ar^3 = 18 \dots \textcircled{2}$$

$$\textcircled{2} \div \textcircled{1}: \quad r = \frac{1}{2}$$

Gantikan $r = \frac{1}{2}$ ke dalam $\textcircled{1}$.

$$a\left(\frac{1}{2}\right)^2 = 36$$

$$\frac{1}{4}a = 36$$

$$a = 144$$

$$(b) \quad S_{10} - S_2 = \frac{144\left[1 - \left(\frac{1}{2}\right)^{10}\right]}{\frac{1}{2}} - \frac{144\left[1 - \left(\frac{1}{2}\right)^2\right]}{\frac{1}{2}}$$

$$= 287.72 - 216$$

$$= 71.72 \text{ cm}^2$$

5. (a) Diberi $T_n = 3^{8-n}$

$$T_1 = 3^7, T_2 = 3^6$$

$$r = \frac{3^6}{3^7}$$

$$= 3^{-1}$$

$$= \frac{1}{3}$$

$$(b) \quad 3^5 + 3^4 + 3^3 = 243 + 81 + 27$$

$$= 351 \text{ cm}$$

$$6. a + ar + ar^2 = 7(ar^2)$$

$$a(1 + r + r^2) = 7(ar^2)$$

$$1 + r + r^2 = 7r^2$$

$$6r^2 - r - 1 = 0$$

$$(2r - 1)(3r + 1) = 0$$

$$2r - 1 = 0$$

$$3r + 1 = 0$$

$$r = \frac{1}{2}$$

$$r = -\frac{1}{3} \text{ (Abaikan)}$$

Jika $a = 14.5$,

$$14.5\left(\frac{1}{2}\right) = 7.25$$

Maka, jisim kanak-kanak kedua terbesar ialah 7.25 kg.

Latihan Pengukuhan (Halaman 150)

$$1. (a) (3x + 2) - (-2x - 1) = (9x + 3) - (3x + 2)$$

$$5x + 3 = 6x + 1$$

$$x = 2$$

Apabila $x = 2$, sebutan berturutan ialah $-5, 8, 21$.

$$\text{Maka, } d = 8 - (-5)$$

$$= 13$$

$$(b) T_3 = 8$$

$$a + 2(13) = 8$$

$$a + 26 = 8$$

$$a = -18$$

$$2. a + 8d = 21 + 3p \dots \textcircled{1}$$

$$a + a + d + a + 2d = 9p$$

$$3a + 3d = 9p$$

$$a + d = 3p \dots \textcircled{2}$$

$$\textcircled{1} - \textcircled{2}: 7d = 21$$

$$d = 3$$

$$3. (a) a + a + 2d = 24$$

$$2a + 2d = 24$$

$$a + d = 12 \dots \textcircled{1}$$

$$a + 4d = 36 \dots \textcircled{2}$$

$$\textcircled{2} - \textcircled{1}: 3d = 24$$

$$d = 8$$

Gantikan $d = 8$ ke dalam $\textcircled{1}$

$$a + 8 = 12$$

$$a = 12 - 8$$

$$= 4$$

Isi padu silinder terkecil ialah 4 cm^3 .

$$(b) S_9 = \frac{9}{2}[2(4) + 8(8)]$$

$$= 324 \text{ cm}^3$$

$$4. (a) ar^2 = 30 \dots \textcircled{1}$$

$$ar^2 + ar^3 = 45 \dots \textcircled{2}$$

Gantikan ❶ ke dalam ❷.

$$ar^3 = 15 \dots \text{❸}$$

$$\text{❸} \div \text{❶}: \quad r = \frac{1}{2}$$

Gantikan $r = \frac{1}{2}$ ke dalam ❶.

$$a\left(\frac{1}{2}\right)^2 = 30$$

$$a\left(\frac{1}{4}\right) = 30$$

$$a = 120$$

$$\begin{aligned} \text{(b)} \quad S_{\infty} &= \frac{a}{1-r} \\ &= \frac{120}{1-\frac{1}{2}} \\ &= 240 \end{aligned}$$

5. Tinggi susunan kerusi: 80, 84, 88, ...

$$\text{(a)} \quad T_n = 300$$

$$80 + (n-1)(4) = 300$$

$$n-1 = 55$$

$$n = 56$$

Bilangan kerusi maksimum ialah 56 buah.

(b) 56, 54, 52, ... ke-13

$$\begin{aligned} S_{13} &= \frac{13}{2}[2(56) + 12(-2)] \\ &= 572 \end{aligned}$$

6. Jujukan simpanan: 14 000, 14 000(1.05), 14 000(1.05)², ...

$$\begin{aligned} \text{(a)} \quad T_{18} &= 14\,000(1.05)^{17} \\ &= \text{RM}32\,088.26 \end{aligned}$$

Ya, simpanan sebanyak RM30 000 boleh dicapai.

$$\begin{aligned} \text{(b)} \quad T_{10} &= 14\,000(1.05)^9 \\ &= \text{RM}21\,718.60 \end{aligned}$$

Selepas 10 tahun wang di dalam bank ialah RM21 718.60.

Jujukan wang di dalam bank: 21 718.60, 21 718.60(1.03), ...

$$\begin{aligned} T_8 &= 21\,718.60(1.03)^7 \\ &= \text{RM}26\,711.14 \end{aligned}$$

Wang simpanan tidak mencapai RM30 000.

$$\text{7. (a)} \quad \frac{a(r^4 - 1)}{r - 1} = \frac{10a(r^2 - 1)}{r - 1}$$

$$r^4 - 1 = 10r^2 - 10$$

$$r^4 - 10r^2 + 9 = 0 \text{ (Tertunjuk)}$$

$$r^4 - 10r^2 + 9 = 0$$

$$(r^2 - 1)(r^2 - 9) = 0$$

$$r^2 - 1 = 0$$

$$r^2 = 1$$

$$r = \pm 1 \text{ (Diabaikan)}$$

$$r^2 - 9 = 0$$

$$r^2 = 9$$

$$r = \pm 3$$

Nilai positif r ialah 3.

(b) 2, 6, ..

$$S_6 = \frac{2(3^6 - 1)}{3 - 1}$$
$$= 728$$

$$\text{Jumlah perbelanjaan} = \text{RM}7.50 \times 728$$
$$= \text{RM}5\,460$$