

**Tingkatan 4 Bab 5**  
**Janjang**  
**Penyelesaian Lengkap**

**Praktis Formatif 5.1a**

1 (a)  $T_2 - T_1 = -13 - (-17) = 4$

$$T_3 - T_2 = -9 - (-13) = 4$$

Oleh sebab  $T_2 - T_1 = T_3 - T_2 = 4$

(pemalar), maka jujukan nombor itu ialah janjang aritmetik.

(b)  $T_2 - T_1 = \frac{3}{4} - 1 = -\frac{1}{4}$

$$T_3 - T_2 = \frac{1}{2} - \frac{3}{4} = -\frac{1}{4}$$

$$T_4 - T_3 = \frac{1}{4} - \frac{1}{2} = -\frac{1}{4}$$

Oleh sebab  $T_2 - T_1 = T_3 - T_2 = T_4 - T_3$

(pemalar), maka jujukan nombor itu ialah janjang aritmetik.

(c)  $T_2 - T_1 = \frac{7}{5} - \frac{3}{5} = \frac{2}{5}$

$$T_3 - T_2 = 2 - \frac{7}{5} = \frac{3}{5}$$

Oleh sebab  $T_2 - T_1 \neq T_3 - T_2$ , maka jujukan nombor itu bukan janjang aritmetik.

2 (a)  $T_2 - T_1 = 50 - 42 = 8$

$$T_3 - T_2 = 58 - 50 = 8$$

Oleh sebab  $T_2 - T_1 = T_3 - T_2 = 8$

(pemalar), maka jujukan nombor itu ialah janjang aritmetik. Beza sepunya = 8.

(b)  $T_2 - T_1 = \frac{17}{12} - \frac{7}{4} = -\frac{1}{3}$

$$T_3 - T_2 = \frac{13}{12} - \frac{17}{12} = -\frac{1}{3}$$

Oleh sebab  $T_2 - T_1 = T_3 - T_2 = -\frac{1}{3}$

(pemalar), maka jujukan nombor itu ialah janjang aritmetik. Beza sepunya =

$$-\frac{1}{3}$$

3  $T_1 = p(p+1) = p^2 + p$

$$T_2 = p(p+3) = p^2 + 3p$$

$$T_3 = p(p+5) = p^2 + 5p$$

$$T_2 - T_1 = p^2 + 3p - (p^2 + p) = 2p$$

$$T_3 - T_2 = p^2 + 5p - (p^2 + 3p) = 2p$$

Oleh sebab  $T_2 - T_1 = T_3 - T_2 = 2p$

(pemalar), maka jujukan nombor itu ialah janjang aritmetik.

Beza sepunya =  $2p$

**Praktis Formatif 5.1b**

1 (a) 4, 12, 20, ...

$$a = 4$$

$$d = 12 - 4 = 8$$

$$T_6 = a + 5d = 4 + 5(8) = 44$$

(b) 2,  $3\frac{1}{2}$ , 5, ...

$$a = 2$$

$$d = 3\frac{1}{2} - 2 = 1\frac{1}{2}$$

$$T_{11} = a + 10d = 2 + 10\left(\frac{3}{2}\right) = 17$$

(c) -9, -3, 3, ...

$$a = -9$$

$$d = -3 - (-9) = 6$$

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

$$= -9 + (n-1)(6)$$

$$= -9 + 6n - 6$$

$$= 6n - 15$$

2  $T_n = 23$

$$a + (n-1)d = 23$$

$$2 + (n-1)(3) = 23$$

$$2 + 3n - 3 = 23$$

$$3n = 24$$

$$n = 8$$

Maka,  $T_8$  sama dengan 23.

3 (a) 9, 3, -3, ..., -45

$$T_n = -45$$

$$a + (n-1)d = -45$$

$$9 + (n-1)(-6) = -45$$

$$n-1 = \frac{-45-9}{-6}$$

$$n-1 = 9$$

$$n = 10$$

Bilangan sebutan ialah 10.

(b)  $5, 6\frac{1}{2}, 8, \dots, 26$

$$T_n = 26$$

$$a + (n-1)d = 26$$

$$5 + (n-1)\left(\frac{3}{2}\right) = 26$$

$$\frac{3}{2}(n-1) = 21$$

$$n-1 = 21 \times \frac{2}{3}$$

$$n-1 = 14$$

$$n = 15$$

Bilangan sebutan ialah 15.

**4**  $154, 161, \dots, 294$

$$T_n = 294$$

$$154 + (n-1)(7) = 294$$

$$7(n-1) = 294 - 154$$

$$7(n-1) = 140$$

$$n-1 = 20$$

$$n = 21$$

Bilangan gandaan 7 ialah 21.

**5**  $x^2 - 2, 3x + 2, 11, \dots$

$$3x + 2 - (x^2 - 2) = 11 - (3x + 2)$$

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

$$x^2 - 6x + 5 = 0$$

$$(x-5)(x-1) = 0$$

$$x = 5 \text{ atau } 1$$

**6**  $4, p, q, \frac{35}{2}, \dots$

$$a = 4$$

$$T_4 = \frac{35}{2}$$

$$a + 3d = \frac{35}{2}$$

$$4 + 3d = \frac{35}{2}$$

$$8 + 6d = 35$$

$$6d = 27$$

$$d = 4.5$$

$$p = 4 + 4.5 = 8.5$$

$$q = 8.5 + 4.5 = 13$$

**7 (a)**  $T_4 = 13$

$$a + 3d = 13 \dots (1)$$

$$T_{10} = 31$$

$$a + 9d = 31 \dots (2)$$

$$(2) - (1) : 6d = 18$$

$$d = 3$$

$$\text{Daripada (1) : } a + 3(3) = 13$$

$$a = 13 - 9$$

$$a = 4$$

(b)  $T_{25} = 4 + 24(3)$

$$= 76$$

**8**  $T_5 = 14$

$$a + 4d = 14 \dots (1)$$

$$T_{13} = -18$$

$$a + 12d = -18 \dots (2)$$

$$(2) - (1) : 8d = -32$$

$$d = -4$$

$$\text{Daripada (1) : } a + 4d = 14$$

$$a + 4(-4) = 14$$

$$a = 30$$

$$T_9 = a + 8d = 30 + 8(-4) = -2$$

**9 (a)**  $T_3 = 9$

$$a + 2d = 9 \dots (1)$$

$$T_7 = 49$$

$$a + 6d = 49 \dots (2)$$

$$(2) - (1) : 4d = 40$$

$$d = 10$$

$$\text{Daripada (1) :}$$

$$a + 2(10) = 9$$

$$a = -11$$

$$T_{13} = a + 12d = -11 + 12(10) = 109$$

(b)  $T_n = 79$

$$a + (n-1)d = 79$$

$$-11 + (n-1)(10) = 79$$

$$10(n-1) = 90$$

$$n-1 = 9$$

$$n = 10$$

Sebutan ke-10 mempunyai nilai 79.

10  $T_4 = 36$   
 $a + 3d = 36 \dots (1)$

$T_{10} = 78$   
 $a + 9d = 78 \dots (2)$

$(2) - (1) : 6d = 42$   
 $d = 7$

Daripada (1) :  
 $a + 3(7) = 36$   
 $a = 15$

$T_n > 1\ 000$   
 $a + (n-1)d > 1\ 000$   
 $15 + (n-1)(7) > 1\ 000$   
 $7(n-1) > 985$   
 $n-1 > 140.7$   
 $n > 141.7$

Nilai integer  $n$  yang terkecil ialah 142.

$T_{142} = a + 141d = 15 + 141(7) = 1\ 002$

11 Jika  $x$ ,  $y$  dan  $z$  ialah tiga sebutan berturutan dalam satu jangjang aritmetik, maka

$y - x = z - y$   
 atau  $x - y = y - z \dots (1)$

$y + z, z + x, x + y.$   
 $\uparrow \quad \uparrow \quad \uparrow$   
 $T_1 \quad T_2 \quad T_3$

$T_2 - T_1 = z + x - (y + z) = x - y$   
 $T_3 - T_2 = x + y - (z + x) = y - z$

Daripada (1),  $x - y = y - z.$   
 Maka,  $T_2 - T_1 = T_3 - T_2.$

Maka,  $y + z, z + x$  dan  $x + y$  ialah tiga sebutan berturutan dalam satu jangjang aritmetik..

12 (a)  $a = 3\ 000, d = 250$   
 $T_7 = a + 6d = 3\ 000 + 6(250) = 4\ 500$   
 Gaji bulanan Encik Sulaiman pada tahun ke-7 ialah RM4 500.

(b)  $T_n = 5\ 250$   
 $a + (n-1)d = 5\ 250$   
 $3\ 000 + (n-1)(250) = 5\ 250$   
 $250(n-1) = 2\ 250$

$n-1 = 9$   
 $n = 10$

Maka, gaji bulanan Encik Sulaiman ialah RM2 250 pada tahun ke-10 perkhidmatannya.

13 (a)  $60, 57, 54, \dots$   
 $a = 60, d = -3$

$T_8 = a + 7d = 60 + 7(-3) = 39$   
 Jarak yang dilalui pada minit yang ke-8 ialah 39 m.

(b)  $T_n = 30$   
 $a + (n-1)d = 30$   
 $60 + (n-1)(-3) = 30$   
 $(n-1)(-3) = -30$   
 $n = 11$

Jarak yang dilalui ialah 30 m pada minit ke-11.

**Praktis Formatif 5.1c**

1 (a)  $a = -11.5, d = -9 - (-11.5) = 2.5$

$S_n = \frac{n}{2} [2a + (n-1)d]$   
 $S_{10} = \frac{10}{2} [2(-11.5) + (9)(2.5)]$   
 $S_{10} = -2.5$

(b)  $a = -1, d = 1 - (-1) = 2$   
 $S_n = \frac{n}{2} [2(-1) + (n-1)(2)]$

$S_n = \frac{n}{2} (-2 + 2n - 2)$   
 $S_n = \frac{n}{2} (2n - 4)$   
 $S_n = n^2 - 2n$

(c)  $a = -1, d = 3 - (-1) = 4$   
 $T_n = 43$   
 $-1 + (n-1)(4) = 43$   
 $(n-1)(4) = 44$   
 $(n-1) = 11$   
 $n = 12$

$$S_n = \frac{n}{2}(a+l)$$

$$S_{12} = \frac{12}{2}(-1+43)$$

$$S_{12} = \frac{12}{2}(-1+43)$$

$$S_{12} = 252$$

$$(d) a = \frac{3}{2}, d = \frac{5}{4} - \frac{3}{2} = -\frac{1}{4}$$

$$T_n = -1$$

$$\frac{3}{2} + (n-1)\left(-\frac{1}{4}\right) = -1$$

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

$$(n-1)\left(-\frac{1}{4}\right) = -\frac{5}{2}$$

$$n-1 = \frac{-\frac{5}{2}}{-\frac{1}{4}}$$

$$n-1 = 10$$

$$n = 11$$

$$S_n = \frac{n}{2}(a+l)$$

$$S_{11} = \frac{11}{2}\left(\frac{3}{2} + (-1)\right)$$

$$S_{11} = 2\frac{3}{4}$$

2 301, 308, ..., 994

$$a = 301, d = 7$$

$$T_n = 994$$

$$301 + (n-1)(7) = 994$$

$$(n-1)(7) = 693$$

$$n-1 = 99$$

$$n = 100$$

$$S_n = \frac{n}{2}(a+l)$$

$$S_{100} = \frac{100}{2}(301+994) = 64\ 750$$

3 -100, -95, ..., 155

$$a = -100, d = 5$$

$$T_n = 155$$

$$a + (n-1)d = 155$$

$$-100 + (n-1)(5) = 155$$

$$5(n-1) = 255$$

$$n-1 = 51$$

$$n = 52$$

$$T_n = \frac{n}{2}(a+l)$$

$$T_{52} = \frac{52}{2}(-100+155)$$

$$T_{52} = 1\ 430$$

4 27, 24, 21, ...

$$a = 27, d = -3$$

$$S_n = 0$$

$$\frac{n}{2}[2a + (n-1)d] = 0$$

$$\frac{n}{2}[2(27) - 3(n-1)] = 0$$

$$n(54 - 3n + 3) = 0$$

$$n(57 - 3n) = 0$$

$$3n - 57 = 0$$

$$n = 19$$

5 10, 7, 4, ...

$$a = 10, d = -3$$

$$S_n = -35$$

$$\frac{n}{2}[2a + (n-1)d] = -35$$

$$\frac{n}{2}[2(10) + (n-1)(-3)] = -35$$

$$n(20 - 3n + 3) = -70$$

$$n(23 - 3n) = -70$$

$$23n - 3n^2 = -70$$

$$3n^2 - 23n - 70 = 0$$

$$(n-10)(3n+7) = 0$$

$$n = 10 \text{ atau } n = -\frac{7}{3}$$

$$n = -\frac{7}{3} \text{ tidak diterima.}$$

$$\therefore n = 10$$

6 2, 5, 8, ...

$$a = 2, d = 3$$

$$S_n = 301$$

$$\frac{n}{2}[2a + (n-1)d] = 301$$

$$\frac{n}{2}[2(2) + (n-1)(3)] = 301$$

$$n(4 + 3n - 3) = 602$$

$$n(3n+1) = 602$$

$$3n^2 + n - 602 = 0$$

$$(n-14)(3n-43) = 0$$

$$n = 14 \text{ atau } n = \frac{43}{3}$$

$$n = \frac{43}{3} \text{ tidak diterima.}$$

$$\therefore n = 14$$

**7**  $T_4 = 13$   
 $a + 3d = 13 \dots (1)$

$$T_{10} = 31$$

$$a + 9d = 31 \dots (2)$$

$$(2) - (1) : 6d = 18$$

$$d = 3$$

Daripada (1) :

$$a + 3(3) = 13$$

$$a = 4$$

$$S_{14} = \frac{14}{2} [2(4) + 13(3)] = 329$$

**8**  $S_8 = 8$

$$\frac{8}{2}(2a + 7d) = 8$$

$$2a + 7d = 2 \dots (1)$$

$$S_{16} = 144$$

$$\frac{16}{2}(2a + 15d) = 144$$

$$2a + 15d = 18 \dots (2)$$

$$(2) - (1) : 8d = 16$$

$$d = 2$$

Daripada (1) :  $2a + 7(2) = 2$

$$a = -6$$

$$T_{16} = a + 15d = -6 + 15(2) = 24$$

**9**  $T_4 = 7$

$$a + 3d = 7 \dots (1)$$

$$2a + 6d = 14 \dots (1) \times 2$$

$$S_{10} = 145$$

$$\frac{10}{2}(2a + 9d) = 145$$

$$2a + 9d = 29 \dots (2)$$

$$(2) - (1) : 3d = 15$$

$$d = 5$$

Daripada (1) :  $a + 3(5) = 7$

$$a = -8$$

$$S_{11} = \frac{11}{2} [2(-8) + 10(5)] = 187$$

**10**  $4, 7, 10, \dots$   
 $a = 4, d = 3$

$$S_{12} - S_3$$

$$= \frac{12}{2} [2(4) + 11(3)] - \frac{3}{2} [2(4) + 2(3)]$$

$$= 246 - 21$$

$$= 225$$

**11 (a)**  $T_2 = 15$   
 $a + d = 15 \dots (1)$

$$T_4 = 23$$

$$a + 3d = 23 \dots (2)$$

$$2d = 8$$

$$d = 4$$

Daripada (1) :

$$a + 4 = 15$$

$$a = 11$$

(b)  $S_{10} - S_4$

$$= \frac{10}{2} [2(11) + 9(4)] - \frac{4}{2} [2(11) + 3(4)]$$

$$= 290 - 68$$

$$= 222$$

**12**  $S_n = \frac{n}{2}(a + l) = 360$

$$\frac{n}{2}(10 + 80) = 360$$

$$45n = 360$$

$$n = 8$$

$$\frac{n}{2} [2(10) + (n-1)d] = 360$$

$$\frac{8}{2} [20 + (8-1)d] = 360$$

$$4(20 + 7d) = 360$$

$$20 + 7d = 90$$

$$7d = 70$$

$$d = 10$$

**Kaedah Alternatif**

$$T_n = 10 + (n-1)d = 80$$

$$10 + (8-1)d = 80$$

$$d = 10$$

$$13 \text{ (a) } T_1 = \frac{1}{3}\pi h^2 k$$

$$T_2 = \frac{1}{3}\pi h^2(k+2) = \frac{1}{3}\pi h^2 k + \frac{2}{3}\pi h^2$$

$$T_3 = \frac{1}{3}\pi h^2(k+4) = \frac{1}{3}\pi h^2 k + \frac{4}{3}\pi h^2$$

$$T_2 - T_1 = \frac{2}{3}\pi h^2$$

$$T_3 - T_2 = \frac{2}{3}\pi h^2$$

Oleh sebab  $T_2 - T_1 = T_3 - T_2 =$

$\frac{2}{3}\pi h^2$  (pemalar), maka isi padu kon

membentuk janjang aritmetik.

$$\text{Beza sepunya} = \frac{2}{3}\pi h^2$$

$$(b) \quad T_4 = 30\pi$$

$$a + 3d = 30\pi$$

$$\frac{1}{3}\pi h^2 k + 3\left(\frac{2}{3}\pi h^2\right) = 30\pi$$

$$h^2 k + 6h^2 = 90 \dots (1)$$

$$S_5 = 120\pi$$

$$\frac{5}{2}[2a + 4d] = 120\pi$$

$$5a + 10d = 120\pi$$

$$a + 2d = 24\pi$$

$$\frac{1}{3}\pi h^2 k + 2\left(\frac{2}{3}\pi h^2\right) = 24\pi$$

$$h^2 k + 4h^2 = 72 \dots (2)$$

$$2h^2 = 18$$

$$h^2 = 9$$

$$h = 3$$

Jejari tapak = 3 cm

$$3^2 k + 6(3)^2 = 90$$

$$9k + 54 = 90$$

$$k = 4$$

Tinggi = 4 cm

$$14 \quad S_n = 2n^2 + 3n$$

$$(a) \quad T_3 = S_3 - S_2$$

$$= 2(3)^2 + 3(3) - [2(2)^2 + 3(2)]$$

$$= 27 - 14$$

$$= 13$$

$$(b) \quad T_{10} = S_{10} - S_9$$

$$= 2(10)^2 + 3(10) - [2(9)^2 + 3(9)]$$

$$= 230 - 189$$

$$= 41$$

$$15 \quad S_n = 6n - 3n^2$$

$$(a) \quad T_1 = S_1$$

$$= 6 - 3$$

$$= 3$$

$$(b) \quad T_2 = S_2 - S_1$$

$$= 6(2) - 3(2)^2 - (6 - 3)$$

$$= -3$$

$$d = T_2 - T_1$$

$$d = -3 - 3$$

$$d = -6$$

$$16 \quad S_m : S_n = m^2 : n^2$$

$$\frac{S_m}{S_n} = \frac{m^2}{n^2}$$

$$\frac{\frac{m}{2}[2a + (m-1)d]}{\frac{n}{2}[2a + (n-1)d]} = \frac{m^2}{n^2}$$

$$\frac{2a + (m-1)d}{2a + (n-1)d} = \frac{m}{n}$$

$$2an + (m-1)nd = 2am + (n-1)md$$

$$a(2n-2m) = (n-1)md - (m-1)nd$$

$$a = \frac{(n-1)md - (m-1)nd}{2n-2m}$$

$$a = \frac{-md + nd}{2n-2m}$$

$$a = \frac{d(-m+n)}{2(n-m)}$$

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

$$T_m : T_n = \frac{T_m}{T_n}$$

$$= \frac{a + (m-1)d}{a + (n-1)d}$$

$$= \frac{\frac{d}{2} + (m-1)d}{\frac{d}{2} + (n-1)d}$$

$$= \frac{d + 2d(m-1)}{d + 2d(n-1)}$$

$$= \frac{1 + 2(m-1)}{1 + 2(n-1)}$$

$$= \frac{2m-1}{2n-1}$$

$$= \frac{2m-1}{2n-1} \text{ (Tertunjuk)}$$

**Praktis Formatif 5.2a**

1 (a)  $\frac{1}{4}, 1, 4, \dots$

$$\frac{T_2}{T_1} = \frac{1}{\frac{1}{4}} = 4$$

$$\frac{T_3}{T_2} = \frac{4}{1} = 4$$

Oleh sebab  $\frac{T_2}{T_1} = \frac{T_3}{T_2} = 4$  (pemalar), maka jujukan nombor itu ialah jajjang geometri.

(b)  $1, -\frac{1}{2}, \frac{1}{4}, -\frac{1}{8}, \dots$

$$\frac{T_2}{T_1} = \frac{-\frac{1}{2}}{1} = -\frac{1}{2}$$

$$\frac{T_3}{T_2} = \frac{\frac{1}{4}}{-\frac{1}{2}} = -\frac{1}{2}$$

$$\frac{T_4}{T_3} = \frac{-\frac{1}{8}}{\frac{1}{4}} = -\frac{1}{2}$$

Oleh sebab  $\frac{T_2}{T_1} = \frac{T_3}{T_2} = \frac{T_4}{T_3} = -\frac{1}{2}$  (pemalar), maka jujukan nombor itu ialah jajjang geometri.

(c)  $\frac{2}{5}, \frac{3}{5}, \frac{4}{5}, \dots$

$$\frac{T_2}{T_1} = \frac{\frac{3}{5}}{\frac{2}{5}} = \frac{3}{2}$$

$$\frac{T_3}{T_2} = \frac{\frac{4}{5}}{\frac{3}{5}} = \frac{4}{3}$$

Oleh sebab  $\frac{T_2}{T_1} \neq \frac{T_3}{T_2}$ , maka jujukan nombor itu bukan jajjang geometri.

2 (a)  $\frac{3}{16}, \frac{3}{4}, 3, \dots$

$$\frac{T_2}{T_1} = \frac{\frac{3}{4}}{\frac{3}{16}} = 4$$

$$\frac{T_3}{T_2} = \frac{3}{\frac{3}{4}} = 4$$

Oleh sebab  $\frac{T_2}{T_1} = \frac{T_3}{T_2} = 4$  (pemalar), maka jujukan nombor itu ialah jajjang geometri. Nisbah sepunya = 4

(b)  $\frac{1}{3}, -\frac{1}{30}, \frac{1}{300}, -\frac{1}{3\,000}, \dots$

$$\frac{T_2}{T_1} = \frac{-\frac{1}{30}}{\frac{1}{3}} = -\frac{1}{10}$$

$$\frac{T_3}{T_2} = \frac{\frac{1}{300}}{-\frac{1}{30}} = -\frac{1}{10}$$

$$\frac{T_4}{T_3} = \frac{-\frac{1}{3\,000}}{\frac{1}{300}} = -\frac{1}{10}$$

Oleh sebab  $\frac{T_2}{T_1} = \frac{T_3}{T_2} = \frac{T_4}{T_3} = -\frac{1}{10}$  (pemalar), maka jujukan nombor itu ialah jajjang geometri. Nisbah sepunya =  $-\frac{1}{10}$ .

(c)  $\frac{p}{p+2}, p, p^2 + 2p, \dots$

$$\frac{T_2}{T_1} = \frac{p}{\frac{p}{p+2}} = p+2$$

$$\frac{T_3}{T_2} = \frac{p(p+2)}{p} = p+2$$

Oleh sebab  $\frac{T_2}{T_1} = \frac{T_3}{T_2} = p+2$  (pemalar), maka jujukan nombor itu ialah jajjang geometri. Nisbah sepunya =  $p+2$ .



$$3 \quad T_1 = \text{Luas } ABCD = bh$$

$$T_2 = \text{Luas } ABPQ = b\left(\frac{h}{2}\right) = \frac{bh}{2}$$

$$T_3 = \text{Luas } ABKL = b\left(\frac{h}{4}\right) = \frac{bh}{4}$$

$$T_4 = \text{Luas } ABTU = b\left(\frac{h}{8}\right) = \frac{bh}{8}$$

$$\frac{T_2}{T_1} = \frac{\frac{bh}{2}}{bh} = \frac{1}{2}$$

$$\frac{T_3}{T_2} = \frac{\frac{bh}{4}}{\frac{bh}{2}} = \frac{1}{2}$$

$$\frac{T_4}{T_3} = \frac{\frac{bh}{8}}{\frac{bh}{4}} = \frac{1}{2}$$

Oleh sebab  $\frac{T_2}{T_1} = \frac{T_3}{T_2} = \frac{T_4}{T_3} = \frac{1}{2}$ , maka luas

$ABCD$ ,  $ABPQ$ ,  $ABKL$  dan  $ABTU$  membentuk  
panjang geometri.

Nisbah sepunya =  $\frac{1}{2}$ .

### Praktis Formatif 5.2b

$$1 \text{ (a) } 8, 4, 2, \dots$$

$$a = 8, r = \frac{1}{2}$$

$$T_{11} = ar^{n-1} = (8)\left(\frac{1}{2}\right)^{10} = \frac{1}{128}$$

$$(b) \frac{16}{27}, \frac{8}{9}, \frac{4}{3}, \dots$$

$$a = \frac{16}{27}, r = \frac{\frac{8}{9}}{\frac{16}{27}} = \frac{3}{2}$$

$$T_5 = ar^4 = \left(\frac{16}{27}\right)\left(\frac{3}{2}\right)^4 = 3$$

$$(c) 3, 1, \frac{1}{3}, \dots$$

$$a = 3, r = \frac{1}{3}$$

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

$$2 \text{ (a) } \frac{1}{4}, \frac{1}{6}, \frac{1}{9}$$

$$a = \frac{1}{4}, r = \frac{\frac{1}{6}}{\frac{1}{4}} = \frac{2}{3}$$

$$T_n = \frac{4}{81}$$

$$\left(\frac{1}{4}\right)\left(\frac{2}{3}\right)^{n-1} = \frac{4}{81}$$

$$\left(\frac{2}{3}\right)^{n-1} = \frac{16}{81}$$

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

$$n-1 = 4$$

$$n = 5$$

Bilangan sebutan = 5

$$(b) 2, \frac{2}{3}, \frac{1}{3}, \dots$$

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

$$T_n = \frac{2}{729}$$

$$2\left(\frac{1}{3}\right)^{n-1} = \frac{2}{729}$$

$$\left(\frac{1}{3}\right)^{n-1} = \frac{1}{729}$$

$$\left(\frac{1}{3}\right)^{n-1} = \left(\frac{1}{3}\right)^6$$

$$n-1 = 6$$

$$n = 7$$

Bilangan sebutan = 7

$$(c) 1\,000, -200, 40, \dots$$

$$a = 1\,000, r = \frac{-200}{1\,000} = -\frac{1}{5}$$

$$T_n = -\frac{8}{625}$$

$$ar^{n-1} = -\frac{8}{625}$$

$$(1\,000)\left(-\frac{1}{5}\right)^{n-1} = -\frac{8}{625}$$

$$\left(-\frac{1}{5}\right)^{n-1} = -\frac{8}{625\,000}$$

$$\left(-\frac{1}{5}\right)^{n-1} = -\frac{1}{78\,125}$$

$$\left(-\frac{1}{5}\right)^{n-1} = \left(-\frac{1}{5}\right)^7$$

$$n-1=7$$

$$n=8$$

Bilangan sebutan = 8

3 (a)  $x-2, x+4, 4x+7, \dots$

$$\frac{x+4}{x-2} = \frac{4x+7}{x+4}$$

$$(x+4)^2 = (4x+7)(x-2)$$

$$x^2 + 8x + 16 = 4x^2 - x - 14$$

$$3x^2 - 9x - 30 = 0$$

$$x^2 - 3x - 10 = 0$$

$$(x-5)(x+2) = 0$$

$$x=5 \text{ atau } x=-2$$

Apabila  $x=5$ ,  $r = \frac{x+4}{x-2} = \frac{9}{3} = 3$

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

4 (a)  $x, x+4, 2x+2, \dots$

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

$$(x+4)^2 = x(2x+2)$$

$$x^2 + 8x + 16 = 2x^2 + 2x$$

$$x^2 - 6x - 16 = 0$$

$$(x-8)(x+2) = 0$$

$$x=8 \text{ atau } x=-2$$

$x=-2$  tidak diterima kerana soalan

menyatakan bahawa semua sebutan adalah positif.

$$\therefore x=8$$

(b) 8, 12, 18, ...

$$T_2 = x$$

$$ar = 8$$

$$a\left(\frac{12}{8}\right) = 8$$

$$a = \frac{16}{3}$$

$$T_6 = ar^5 = \left(\frac{16}{3}\right)\left(\frac{12}{8}\right)^5 = \frac{81}{2}$$

$$5 (a) T_2 = \frac{1}{2}$$

$$ar = \frac{1}{2} \dots (1)$$

$$T_4 = \frac{1}{128}$$

$$ar^3 = \frac{1}{128} \dots (2)$$

$$\frac{(2)}{(1)} : \frac{ar^3}{ar} = \frac{\frac{1}{128}}{\frac{1}{2}} = \frac{1}{64}$$

$$r^2 = \frac{1}{64}$$

$$r = \frac{1}{8}$$

Daripada (1) :  $a\left(\frac{1}{8}\right) = \frac{1}{2}$   
 $a = 4$

(b)  $T_n = ar^{n-1}$

$$T_n = 4\left(\frac{1}{8}\right)^{n-1}$$

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

$$T_n = 2^{2-3(n-1)}$$

$$T_n = 2^{5-3n}$$

6  $T_2 + T_3 = 12$

$$ar + ar^2 = 12$$

$$ar(1+r) = 12 \dots (1)$$

$$T_3 + T_4 = 4$$

$$ar^2 + ar^3 = 4$$

$$ar^2(1+r) = 4 \dots (2)$$

$$\frac{(2)}{(1)} : \frac{ar^2(1+r)}{ar(1+r)} = \frac{4}{12}$$

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

Daripada (1) :

$$ar(1+r) = 12$$

$$\frac{1}{3}\left(1+\frac{1}{3}\right)a = 12$$

$$\frac{4}{9}a = 12$$

$$a = 27$$

7  $3, 5, 8\frac{1}{3}, \dots$

$$a = 3, r = \frac{5}{3}$$

$$T_n > 60$$

$$3\left(\frac{5}{3}\right)^{n-1} > 60$$

$$\left(\frac{5}{3}\right)^{n-1} > 20$$

$$(n-1)\lg\left(\frac{5}{3}\right) > \lg 20$$

$$n-1 > \frac{\lg 20}{\lg\left(\frac{5}{3}\right)}$$

$$n-1 > 5.86$$

$$n > 6.86$$

Sebutan terkecil yang melebihi 60 ialah sebutan ke-7.

8  $27, 18, 12, \dots$

$$a = 27, r = \frac{18}{27} = \frac{2}{3}$$

$$T_n < 1$$

$$27\left(\frac{2}{3}\right)^{n-1} < 1$$

$$\left(\frac{2}{3}\right)^{n-1} < \frac{1}{27}$$

$$(n-1)\lg\left(\frac{2}{3}\right) < \lg\frac{1}{27}$$

$$-0.1761(n-1) < -1.4314$$

$$n-1 > \frac{-1.4314}{-0.1761}$$

$$n-1 > 8.03$$

$$n > 9.03$$

Sebutan terkecil yang kurang daripada 1 ialah sebutan ke-10.

9  $a = 40\,000, r = 1.05$

$$T_{11} = ar^t = 40\,000(1.05)^{10}$$

$$= \text{RM}65\,155.79$$

10  $a = 80\,000$

$$r = 0.9$$

Nilai kereta selepas 5 tahun:

$$T_6 = ar^5 = 80\,000(0.9)^5 = \text{RM}47\,239.20$$

$$\begin{array}{lll}
 \mathbf{11} \quad T_p = ar^{p-1} & T_q = ar^{q-1} & T_u = ar^{u-1} \\
 P = ar^{p-1} & Q = ar^{q-1} & U = ar^{u-1}
 \end{array}$$

$$\begin{aligned}
 P^{q-u} Q^{u-p} U^{p-q} &= (ar^{p-1})^{q-u} (ar^{q-1})^{u-p} (ar^{u-1})^{p-q} \\
 &= a^{q-u+u-p+p-q} r^{(p-1)(q-u)+(q-1)(u-p)+(u-1)(p-q)} \\
 &= a^0 r^{pq-pu-qu+qu-pq-u+p+pu-qu-p+q} \\
 &= (1)(r^0) \\
 &= \mathbf{1} \text{ [Tertunjuk]}
 \end{aligned}$$

**Praktis Formatif 5.2c**

1 (a) 1, 2, 4,

$$a=1, r=2$$

$$S_{10} = \frac{a(r^n - 1)}{r - 1} = \frac{1(2^{10} - 1)}{2 - 1} = 1\ 023$$

(b) 4, -6, 9, ...

$$a=4, r=-\frac{3}{2}$$

$$S_5 = \frac{4 \left[ \left( -\frac{3}{2} \right)^5 - 1 \right]}{-\frac{3}{2} - 1}$$

$$S_5 = \frac{4 \left( -\frac{275}{32} \right)}{\left( -\frac{5}{2} \right)} = \frac{-275}{8} \div -\frac{5}{2} = 13\frac{3}{4}$$

(c) 48, 12, 3, ...,  $\frac{3}{16}$

$$a=48, r=\left(\frac{1}{4}\right)$$

$$T_n = \frac{3}{16}$$

$$ar^{n-1} = \frac{3}{16}$$

$$48 \left( \frac{1}{4} \right)^{n-1} = \frac{3}{16}$$

$$\left( \frac{1}{4} \right)^{n-1} = \frac{1}{256}$$

$$\left( \frac{1}{4} \right)^{n-1} = \left( \frac{1}{4} \right)^4$$

$$n-1=4$$

$$n=5$$

$$S_5 = \frac{48 \left[ 1 - \left( \frac{1}{4} \right)^5 \right]}{1 - \frac{1}{4}}$$

$$S_5 = \frac{48 \left[ 1 - \left( \frac{1}{1\ 024} \right) \right]}{\frac{3}{4}}$$

$$S_5 = 48 \left( \frac{1\ 023}{1\ 024} \right) \times \frac{4}{3}$$

$$S_5 = 64 \left( \frac{1\ 023}{1\ 024} \right)$$

$$S_5 = \frac{1\ 023}{16} = 63\frac{15}{16}$$

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

$$S_4 = 11\frac{1}{4}$$

$$\frac{a \left[ 1 - \left( \frac{1}{2} \right)^4 \right]}{1 - \frac{1}{2}} = \frac{45}{4}$$

$$\frac{15}{16}a = \frac{45}{4} \times \frac{1}{2}$$

$$a = \frac{\frac{45}{8}}{\frac{15}{16}} = 6$$

3  $a=8$

$$T_2 = 4$$

$$r = \frac{4}{8} = \frac{1}{2}$$

$$S_n = 15\frac{1}{2}$$

$$\frac{8 \left[ 1 - \left( \frac{1}{2} \right)^n \right]}{1 - \frac{1}{2}} = \frac{31}{2}$$

$$16 \left[ 1 - \left( \frac{1}{2} \right)^n \right] = \frac{31}{2}$$

$$1 - \left( \frac{1}{2} \right)^n = \frac{31}{2(16)}$$

$$\left( \frac{1}{2} \right)^n = \frac{1}{32}$$

$$n=5$$

4  $a=5, r=2$

$$\begin{aligned} S_{11} - S_5 &= \frac{5(2^{11} - 1)}{2 - 1} - \frac{5(2^5 - 1)}{2 - 1} \\ &= 10\ 235 - 155 \\ &= 10\ 080 \end{aligned}$$

5  $T_4 = 54$

$$ar^3 = 54 \dots (1)$$

$$T_7 = 1\,458$$

$$ar^6 = 1\,458 \dots (2)$$

$$\frac{(2)}{(1)} : \frac{ar^6}{ar^3} = \frac{1\,458}{54}$$

$$r^3 = 27$$

$$r = 3$$

Daripada (1) :

$$a(3)^3 = 54$$

$$a = \frac{54}{27}$$

$$a = 2$$

$$S_8 - S_3$$

$$= \frac{2(3^8 - 1)}{3 - 1} - \frac{2(3^3 - 1)}{3 - 1}$$

$$= 6\,560 - 26$$

$$= 6\,534$$

6  $S_2 = 25$

$$\frac{a(r^2 - 1)}{r - 1} = 25$$

$$\frac{a(r + 1)(r - 1)}{r - 1} = 25$$

$$a(r + 1) = 25 \dots (1)$$

$$T_3 = 80$$

$$ar^2 = 80 \dots (2)$$

$$\frac{(2)}{(1)} : \frac{ar^2}{a(r + 1)} = \frac{80}{25}$$

$$\frac{r^2}{r + 1} = \frac{16}{5}$$

$$5r^2 = 16r + 16$$

$$5r^2 - 16r - 16 = 0$$

$$(r - 4)(5r + 4) = 0$$

$$r = 4 \text{ atau } r = -\frac{4}{5}$$

Daripada (1) : apabila  $r = 4$ ,

$$a(4 + 1) = 25$$

$$a = 5$$

Daripada (1) : apabila  $r = -\frac{4}{5}$ ,

$$a\left(-\frac{4}{5} + 1\right) = 25$$

$$\frac{1}{5}a = 25$$

$$a = 125$$

7  $2, 3, \frac{9}{2}, \dots$

$$S_n > 60$$

$$\frac{2\left[\left(\frac{3}{2}\right)^n - 1\right]}{\frac{3}{2} - 1} > 60$$

$$4\left[\left(\frac{3}{2}\right)^n - 1\right] > 60$$

$$\left(\frac{3}{2}\right)^n - 1 > 15$$

$$\left(\frac{3}{2}\right)^n > 16$$

$$n \lg 1.5 > \lg 16$$

$$n > \frac{\lg 16}{\lg 1.5}$$

$$n > 6.84$$

Maka, sebutan ke-7 melebihi 6.

8  $a = 1, r = 2$

$$S_{18} = \frac{1(2^{18} - 1)}{2 - 1} = \text{RM}262\,143$$

9  $a = 4, r = 3$

$$S_9 = \frac{4(3^9 - 1)}{3 - 1} = 39\,364$$

10 (a)  $a = 600, r = 0.95$

$$T_7 = 600(0.95)^{7-1} = \text{RM}441 \text{ (betul kepada RM terdekat)}$$

$$\begin{aligned}
\text{(b)} \quad T_n &< 370 \\
ar^{n-1} &< 370 \\
600(0.95)^{n-1} &< 370 \\
0.95^{n-1} &< \frac{37}{60} \\
(n-1)\lg 0.95 &< \lg \frac{37}{60} \\
-0.0223(n-1) &< -0.2099 \\
n-1 &> \frac{-0.2099}{-0.0223} \\
n-1 &> 9.41 \\
n &> 10.41 \\
\text{Nilai minimum } n &= 11 \\
\text{(c)} S_8 &= \frac{600(1-0.95^8)}{1-0.95} = \text{RM4 039 (betul)} \\
&\text{kepada RM terdekat}
\end{aligned}$$

$$\begin{aligned}
\mathbf{11} \quad S_n &= 3(2^n - 1) \\
\text{(a)} T_3 &= S_3 - S_2 \\
&= 3(2^3 - 1) - 3(2^2 - 1) \\
&= 21 - 9 \\
&= 12
\end{aligned}$$

$$\begin{aligned}
\text{(b)} T_6 &= S_6 - S_5 \\
T_6 &= 3(2^6 - 1) - 3(2^5 - 1) \\
&= 189 - 93 \\
&= 96
\end{aligned}$$

$$\begin{aligned}
\mathbf{12} \quad S_n &= 200(1-0.5^n) \\
\text{(a)} T_1 &= S_1 = 200(1-0.5^1) = 100
\end{aligned}$$

$$\begin{aligned}
\text{(b)} T_2 &= S_2 - S_1 \\
&= 200(1-0.5^2) - 100 \\
&= 50 \\
r &= \frac{T_2}{T_1} = \frac{50}{100} = \frac{1}{2}
\end{aligned}$$

$$\begin{aligned}
\mathbf{13} \quad S_{2n} &= pS_n \\
\frac{a(r^{2n} - 1)}{r - 1} &= p \left[ \frac{a(r^n - 1)}{r - 1} \right] \\
(r^{2n} - 1) &= p(r^n - 1) \\
(r^n)^2 - 1 &= p(r^n - 1) \\
(r^n + 1)(r^n - 1) &= p(r^n - 1) \\
p &= (r^n + 1)
\end{aligned}$$

$$\begin{aligned}
S_{4n} &= qS_{2n} \\
\frac{a(r^{4n} - 1)}{r - 1} &= q \left[ \frac{a(r^{2n} - 1)}{r - 1} \right] \\
(r^{4n} - 1) &= q(r^{2n} - 1) \\
(r^{2n})^2 - 1 &= q(r^{2n} - 1) \\
(r^{2n} + 1)(r^{2n} - 1) &= q(r^{2n} - 1) \\
q &= (r^{2n} + 1) \\
(p - 1)^2 &= [(r^n + 1) - 1]^2 \\
&= r^{2n} \\
&= q - 1 \quad [\text{Tertunjuk}]
\end{aligned}$$

**Praktis Formatif 5.2d**

1 (a) 4, 2, 1, ...

$$S_{\infty} = \frac{4}{1 - \frac{1}{2}} = 8$$

(b) 6, 2,  $\frac{2}{3}$ , ...

$$S_{\infty} = \frac{6}{1 - \frac{1}{3}} = 9$$

(c)  $-\frac{2}{3}, \frac{4}{9}, -\frac{8}{27}, \dots$

$$r = \frac{\frac{4}{9}}{-\frac{2}{3}} = -\frac{2}{3}$$

$$S_{\infty} = \frac{-\frac{2}{3}}{1 - \left(-\frac{2}{3}\right)} = -\frac{2}{5}$$

2  $S_{\infty} = 16\frac{2}{3}$

$$\frac{10}{1-r} = \frac{50}{3}$$

$$50(1-r) = 30$$

$$1-r = \frac{3}{5}$$

$$r = \frac{2}{5}$$

3 (a)  $k+26, k+2, k-6, \dots$

$$\frac{k+2}{k+26} = \frac{k-6}{k+2}$$

$$(k+2)^2 = (k+26)(k-6)$$

$$k^2 + 4k + 4 = k^2 - 6k + 26k - 156$$

$$16k - 160 = 0$$

$$k = \frac{160}{16} = 10$$

(b) 10+26, 10+2, 10-6, ...

$$36, 12, 4, \dots$$

$$r = \frac{12}{36} = \frac{1}{3}$$

(c)  $S_{\infty} = \frac{36}{1 - \left(\frac{1}{3}\right)} = 54$

4  $T_3 = 2$

$$ar^2 = 2 \dots (1)$$

$$T_5 = \frac{1}{8}$$

$$ar^4 = \frac{1}{8} \dots (2)$$

$$\frac{(2)}{(1)} : r^2 = \frac{1}{16}$$

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

Daripada (1) :  $a\left(\frac{1}{4}\right)^2 = 2$

$$a = 32$$

$$S_{\infty} = \frac{32}{1 - \left(\frac{1}{4}\right)} = 42\frac{2}{3}$$

5  $T_2 = \frac{3}{2}$

$$ar = \frac{3}{2} \dots (1)$$

$$S_{\infty} = 6$$

$$\frac{a}{1-r} = 6 \dots (2)$$

$$\frac{(2)}{(1)} : \frac{a}{1-r} = \frac{6}{\frac{3}{2}}$$

$$\frac{a}{1-r} \times \frac{1}{ar} = 4$$

$$\frac{1}{r(1-r)} = 4$$

$$1 = 4r(1-r)$$

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

$$4r^2 - 4r + 1 = 0$$

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

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

Daripada (1) :

$$a\left(\frac{1}{2}\right) = \frac{3}{2}$$

$$a = 3$$



$$6 \quad S_{\infty} = \frac{27}{8}$$

$$\frac{a}{1-r} = \frac{27}{8} \dots (1)$$

$$S_2 = \frac{15}{8}$$

$$T_1 + T_2 = \frac{15}{8}$$

$$a + ar = \frac{15}{8}$$

$$a(1+r) = \frac{15}{8} \dots (2)$$

$$\frac{(2)}{(1)} : \frac{a(1+r)}{\frac{a}{1-r}} = \frac{\frac{15}{8}}{\frac{27}{8}}$$

$$(1+r)(1-r) = \frac{5}{9}$$

$$1-r^2 = \frac{5}{9}$$

$$r^2 = 1 - \frac{5}{9}$$

$$r^2 = \frac{4}{9}$$

$$r = \pm \frac{2}{3}$$

Daripada (2) :

$$\text{Apabila } r = \frac{2}{3}, a\left(1 + \frac{2}{3}\right) = \frac{15}{8}$$

$$a = \frac{\frac{15}{8}}{\frac{5}{3}}$$

$$a = \frac{9}{8}$$

$$\text{Apabila } r = -\frac{2}{3}, a\left(1 - \frac{2}{3}\right) = \frac{15}{8}$$

$$a = \frac{\frac{15}{8}}{\frac{1}{3}}$$

$$a = \frac{45}{8}$$

$$7 \text{ (a) } 0.888\dots$$

$$= 0.8 + 0.08 + 0.0008 + \dots$$

$$= \frac{0.8}{1-0.1}$$

$$= \frac{0.8}{1-0.1}$$

$$= \frac{0.8}{0.9}$$

$$= \frac{8}{9}$$

$$(b) 0.454545\dots$$

$$= 0.45 + 0.0045 + 0.00000045$$

$$= \frac{0.45}{1-0.01}$$

$$= \frac{0.45}{0.99}$$

$$= \frac{45}{99}$$

$$= \frac{5}{11}$$

$$(c) 0.228228228\dots$$

$$= 0.228 + 0.000000228 + 0.00000000228$$

$$= \frac{0.228}{1-0.999}$$

$$= \frac{228}{999}$$

$$= \frac{76}{333}$$

$$8 \text{ (a) } T_1 = \text{Luas } PQR = \frac{1}{2}x^2 \sin \theta$$

$$T_2 = \text{Luas } PQ_1R_1 = \frac{1}{2}\left(\frac{x}{2}\right)^2 \sin \theta$$

$$= \frac{1}{8}x^2 \sin \theta$$

$$T_3 = \text{Luas } PQ_2R_2 = \frac{1}{2}\left(\frac{x}{4}\right)^2 \sin \theta$$

$$= \frac{1}{32}x^2 \sin \theta$$

$$T_4 = \text{Luas } PQ_3R_3 = \frac{1}{2}\left(\frac{x}{8}\right)^2 \sin \theta$$

$$= \frac{1}{128}x^2 \sin \theta$$

$$\frac{T_2}{T_1} = \frac{\frac{1}{8}x^2 \sin \theta}{\frac{1}{2}x^2 \sin \theta} = \frac{1}{4}$$

$$\frac{T_3}{T_2} = \frac{\frac{1}{32}x^2 \sin \theta}{\frac{1}{8}x^2 \sin \theta} = \frac{1}{4}$$

$$\frac{T_4}{T_3} = \frac{\frac{1}{128}x^2 \sin \theta}{\frac{1}{32}x^2 \sin \theta} = \frac{1}{4}$$

Oleh sebab  $\frac{T_2}{T_1} = \frac{T_3}{T_2} = \frac{T_4}{T_3} = \frac{1}{4}$  (pemalar),

maka siri luas segi tiga itu membentuk  
 jantang geometri.

$$\text{Nisbah sepunya} = \frac{1}{4}$$

(b) (i)  $a = T_1 = \text{Luas } PQR$

$$= \frac{1}{2}(24)^2 \sin 30^\circ$$

$$= 144$$

$$T_5 = ar^4 = 144\left(\frac{1}{4}\right)^4 = \frac{9}{16} \text{ cm}^2$$

$$(ii) T_\infty = \frac{a}{1-r} = \frac{\frac{1}{2}(24)^2 \sin 30^\circ}{1-\frac{1}{4}}$$

$$= \frac{144}{\frac{3}{4}}$$

$$= 192 \text{ cm}^2$$

**Praktis Sumatif 5**

1 (a)  $k - 7, k - 1, 2k - 2, \dots$   
 $k - 1 - (k - 7) = 2k - 2 - (k - 1)$   
 $6 = k - 1$   
 $k = 7$

(b)  $0, 6, 12, \dots$   
 $S_9 - S_3$   
 $= \frac{9}{2}(2a + 8d) - \frac{3}{2}(2a + 2d)$   
 $= \frac{9}{2}[2(0) + 8(6)] - \frac{3}{2}[2(0) + 2(6)]$   
 $= 216 - 18$   
 $= 198$

2  $4, 7, 10, \dots$   
 $a = 4, d = 3$   
 $S_{23} - S_3$   
 $= \frac{23}{2}(2a + 22d) - \frac{3}{2}(2a + 2d)$   
 $= \frac{23}{2}[2(4) + 22(3)] - \frac{3}{2}[2(4) + 2(3)]$   
 $= 851 - 21$   
 $= 830$

3  $S_3 = 117$   
 $\frac{3}{2}[2a + (3 - 1)(7)] = 117$   
 $2a + 14 = 117 \times \frac{2}{3}$   
 $2a + 14 = 78$   
 $a = 32$   
 Tiga sebutan berturutan yang dikehendaki ialah 32, 39 dan 46.

4  $50, 46, 42, \dots$   
 $T_n < 0$   
 $50 + (n - 1)(-4) < 0$   
 $-4(n - 1) < -50$   
 $n - 1 > \frac{-50}{-4}$   
 $n - 1 > 12.5$   
 $n > 13.5$   
 Maka, nilai terkecil  $n$  ialah 14.

5  $a = 1\ 200, d = 80$   
 $T_{15} = a + 14d = 1\ 200 + 14(80) = \text{RM}2\ 320$

6  $a = 150, d = 5$   
 $S_{24} = \frac{24}{2}(2a + 23d)$   
 $= 12[2(150) + 23(5)]$   
 $= \text{RM}4\ 980$

7  $1, 2, 3, \dots$   
 $S_{20} = \frac{20}{2}[2(1) + 19(1)] = 210$  ketul bata

8 **Susu pekat**  
 $T_n = a + (n - 1)d$   
 $T_n = 65 + (n - 1)(-5)$   
 $T_n = 65 - 5n + 5$   
 $T_n = 70 - 5n \dots (1)$

**Susu cair**  
 $T_n = a + (n - 1)d$   
 $T_n = 45 + (n - 1)(-3)$   
 $T_n = 45 - 3n + 3$   
 $T_n = 48 - 3n \dots (2)$

Gantikan (1) ke dalam (2):  
 $70 - 5n = 48 - 3n$   
 $22 = 2n$   
 $n = 11$

Maka, baki bilangan tin susu pekat dan susu cair adalah sama selepas 10 hari.

Pada 0 hari ( $T_1$ ), gerai itu mempunyai 65 tin susu pekat dan 45 tin susu cair. Maka,  $T_{11}$  ialah hari ke-10.

9  $4, 4\frac{1}{7}, 4\frac{2}{7}, \dots$   
 $S_{15} = \frac{15}{2}(2a + 14d)$   
 $= \frac{15}{2}\left[2(4) + 14\left(\frac{1}{7}\right)\right]$   
 $= 75$  minit  
 $= 1$  jam 15 minit [kurang daripada 1.5 jam]

Maka, Nathan layak untuk larian peringkat negeri.

$$10 \quad T_1 = \pi r^2 h$$

$$T_2 = \pi r^2 (h+1)$$

$$T_3 = \pi r^2 (h+2)$$

$$T_2 - T_1 = \pi r^2 (h+1) - \pi r^2 h = \pi r^2$$

$$T_3 - T_2 = \pi r^2 (h+2) - \pi r^2 (h+1) = \pi r^2$$

Oleh sebab  $T_2 - T_1 = T_3 - T_2 = \pi r^2$

(pemalar), maka siri isi padu silinder itu ialah jangjang aritmetik.

Beza sepunya =  $\pi r^2$

11 (a) Katakan panjang sisi segi tiga sama sisi yang terkecil =  $x$  cm

$$3x, 3(x+2), 3(x+4), \dots$$

$$a = 3x, d = 6$$

$$S_5 = 90$$

$$\frac{5}{2}[2(3x) + 4(6)] = 90$$

$$6x + 24 = 90 \times \frac{2}{5}$$

$$6x = 12$$

$$x = 2$$

Maka, panjang sisi segi tiga sama sisi yang terkecil ialah 2 cm.

(b) 6, 12, 18, ...

$$S_n = 350$$

$$\frac{n}{2}[2(6) + (n-1)(6)] = 350$$

$$n(12 + 6n - 6) = 700$$

$$n(6n - 4) = 700$$

$$6n^2 - 4n - 700 = 0$$

$$3n^2 - 2n - 350 = 0$$

$$n = \frac{2 \pm \sqrt{(-2)^2 - 4(3)(-350)}}{2(3)}$$

$$n = \frac{2 \pm \sqrt{4 + 4200}}{6}$$

$$n = 11.14 \text{ atau } n = -10.47$$

$$n = 10.47 \text{ tidak diterima.}$$

Maka, bilangan segi tiga lengkap yang dapat dibentuk ialah 10 buah.

$$12 \text{ (a)} \quad S_n = 360^\circ$$

$$\frac{n}{2}(a+l) = 360$$

$$\frac{n}{2}(20+100) = 360$$

$$60n = 360$$

$$n = 6$$

$$\text{(b)} \quad T_n = 100$$

$$a + (n-1)d = 100$$

$$20 + (6-1)d = 100$$

$$5d = 80$$

$$d = 16^\circ$$

$$\text{(c)} \quad \pi r^2 = 25\pi$$

$$r = 5$$

Sudut sektor ke-2

$$= 20^\circ + 16^\circ$$

$$= 36^\circ$$

Luas sektor ke-2

$$= \frac{36}{360} \times \pi(5)^2$$

$$= \frac{5}{2} \pi \text{ cm}^2$$

13 **Zarah A**

$$120, 116, 112, \dots$$

$$a = 120, d = -4$$

**Zarah B**

$$x, x-5, x-10, \dots$$

$$a = x, d = -5$$

$$\text{(a)} \quad T_n = 0$$

$$120 + (n-1)(-4) = 0$$

$$-4(n-1) = -120$$

$$n-1 = 30$$

$$n = 31$$

$$\text{(b)} \quad T_{31} = 0$$

$$x + (n-1)(-5) = 0$$

$$x + (31-1)(-5) = 0$$

$$x = 150$$

(c)  $S_{31}$  (Zarah A)

$$= \frac{31}{2}[2(120) + 30(-4)]$$

$$= 1860 \text{ cm}$$

$$\begin{aligned}
 S_{31} & \text{ (zarah B)} \\
 &= \frac{31}{2}[2(150) + 30(-5)] \\
 &= 2\,325 \text{ cm}
 \end{aligned}$$

$$\begin{aligned}
 & \text{Beza jarak yang dilalui} \\
 &= 2\,325 - 1\,860 \\
 &= 465 \text{ cm}
 \end{aligned}$$

$$14 \quad T_1 = \pi(3)^2(5) = 45\pi$$

$$T_2 = \pi(3)^2(7) = 63\pi$$

$$T_3 = \pi(3)^2(9) = 81\pi$$

$$a = 45\pi, \quad r = 63\pi - 45\pi = 18\pi$$

$$\begin{aligned}
 \text{(a) } T_{15} &= a + 14d \\
 &= 45\pi + 14(18\pi) \\
 &= 297\pi \text{ cm}^3
 \end{aligned}$$

$$\text{(b) } S_{10} = 1260\pi$$

$$\frac{n}{2}[2(45\pi) + (n-1)(18\pi)] = 1260\pi$$

$$\frac{n}{2}(90 + 18n - 18) = 1260$$

$$\frac{n}{2}(72 + 18n) = 1260$$

$$n(36 + 9n) = 1260$$

$$36n + 9n^2 = 1260$$

$$9n^2 + 36n - 1260 = 0$$

$$n^2 + 4n - 140 = 0$$

$$(n-10)(n+14) = 0$$

$$n = 10 \text{ atau } n = -14$$

$n = -14$  tidak diterima.

Maka,  $n = 10$ .

$$15 \quad T_n = 500$$

$$a + (n-1)d = 500$$

$$4000 + (n-1)(-250) = 500$$

$$(n-1)(-250) = -3500$$

$$n-1 = 14$$

$$n = 15$$

$$S_{15} = \frac{n}{2}[2a + (n-1)d]$$

$$S_{15} = \frac{15}{2}[2(4000) + (15-1)(-250)]$$

$$S_{15} = 33\,750$$

Jumlah kos

$$= 33\,750 \times 0.50 = \text{RM}16\,875$$

$$16 \quad \frac{1}{3}, 1, 3, \dots$$

$$a = \frac{1}{3}, \quad r = 3$$

$$S_n = 364\frac{1}{3}$$

$$\frac{\frac{1}{3}(3^n - 1)}{3-1} = \frac{1\,093}{3}$$

$$\frac{3^n - 1}{6} = \frac{1\,093}{3}$$

$$3^n - 1 = 2\,186$$

$$3^n = 2\,187$$

$$3^n = 3^7$$

$$n = 7$$

$$17 \quad T_3 - T_2 = 20a$$

$$ar^2 - ar = 20a$$

$$r^2 - r - 20 = 0$$

$$(r-5)(r+4) = 0$$

$$r = 5 \text{ atau } -4$$

$$18 \quad S_n = \frac{5}{2}(3^n - 1)$$

$$T_3 = S_3 - S_2$$

$$= \frac{5}{2}(3^3 - 1) - \frac{5}{2}(3^2 - 1)$$

$$= 65 - 20$$

$$= 45$$

$$19 \quad a = 3, \quad r = 3$$

$$T_7 = ar^6 = (3)(3)^6 = 2\,187 \text{ sel baharu}$$

$$20 \quad a = 2\,000, \quad r = 1.05$$

$$S_8 = \frac{2\,000(1.05^8 - 1)}{1.05 - 1} = \text{RM}19\,098$$

$$21 \quad A_1 = \frac{1}{2}k^2$$

$$A_2 = \frac{1}{2} \left( \frac{k}{2} \right)^2 = \frac{1}{8} k^2$$

$$A_3 = \frac{1}{2} \left( \frac{k}{4} \right)^2 = \frac{1}{32} k^2$$

$$\frac{A_2}{A_1} = \frac{\frac{1}{8} k^2}{\frac{1}{2} k^2} = \frac{1}{4}$$

$$\frac{A_3}{A_2} = \frac{\frac{1}{32} k^2}{\frac{1}{8} k^2} = \frac{1}{4}$$

Oleh sebab  $\frac{A_2}{A_1} = \frac{A_3}{A_2} = \frac{1}{4}$  (pemalar),

maka siri luas segi tiga bersudut tegak membentuk jangjang geometri.

Nisbah sepunya =  $\frac{1}{4}$

22 (a) 50, 40, 32, ...

$$a = 50, r = \frac{4}{5}$$

$$T_8 = ar^7 = 50 \left( \frac{4}{5} \right)^7 = 10.49 \text{ cm}$$

(b)  $T_n < 5$

$$50 \left( \frac{4}{5} \right)^{n-1} < 5$$

$$\left( \frac{4}{5} \right)^{n-1} < \frac{5}{50}$$

$$(n-1) \lg \left( \frac{4}{5} \right) < \lg \frac{1}{10}$$

$$-0.097 (n-1) < -1$$

$$n-1 > \frac{-1}{-0.097}$$

$$n-1 > 10.31$$

$$n > 11.31$$

Maka, lantunan ke-12 adalah kurang daripada 5 cm.

23 (a) 3, 6, 12, ...

$$T_6 = 3(2)^5 = 96 \text{ orang ahli}$$

$$(b) S_9 = \frac{3[2^9 - 1]}{2 - 1} = 1533 \text{ orang ahli}$$

24 (a)  $T_1 = \frac{1}{2} bt$

$$T_2 = \frac{1}{2} (2b)(2t) = 2bt$$

$$T_3 = \frac{1}{2} (4b)(4t) = 8bt$$

$$\frac{T_2}{T_1} = \frac{2bt}{\frac{1}{2} bt} = 4$$

$$\frac{T_3}{T_2} = \frac{8bt}{2bt} = 4$$

Oleh sebab  $\frac{T_2}{T_1} = \frac{T_3}{T_2} = 4$  (pemalar), siri

luas segi tiga tepat itu membentuk jangjang geometri. Nisbah sepunya = 4

(b)  $b = 6, t = 3$

$$a = T_1 = \frac{1}{2} (6)(3) = 9$$

$$(i) T_8 = ar^7 = 9(4)^7 = 147\,456 \text{ cm}^2$$

$$(ii) S_4 = \frac{9(4^4 - 1)}{4 - 1} = 765 \text{ cm}^2$$

25 (a)

$$24\,000, \overset{\times 1.05}{\curvearrowright} 25\,200, \overset{\times 1.05}{\curvearrowright} 26\,460, \dots \rightarrow \text{J.G.}$$

$$T_6 = 24\,000(1.05)^{6-1} = \text{RM}30\,631$$

(b)  $T_n > 35\,000$

$$24\,000(1.05^{n-1}) > 35\,000$$

$$1.05^{n-1} > \frac{35}{24}$$

$$(n-1) \lg 1.05 > \lg \left( \frac{35}{24} \right)$$

$$n-1 > \frac{\lg \left( \frac{35}{24} \right)}{\lg 1.05}$$

$$n-1 > 7.73$$

$$n > 8.73$$

Nilai minimum  $n = 9$

$$(c) S_6 = \frac{24\,000(1.05^6 - 1)}{1.05 - 1} = \text{RM}163\,246$$

26 (a)  $T_7 = 8T_4$

$$ar^6 = 8ar^3$$

$$\frac{r^6}{r^3} = 8$$

$$r^3 = 8$$

$$r = 2$$

(b) (i)  $S_n = 3069$

$$\frac{3(2^n - 1)}{2 - 1} = 3069$$

$$2^n - 1 = 1023$$

$$2^n = 1024$$

$$2^n = 2^{10}$$

$$n = 10$$

(ii)  $T_{10} = ar^9 = 3(2)^9 = 1\ 536$  cm

27  $T_2 = 48$

$$ar = 48 \dots (1)$$

$$T_4 = 27$$

$$ar^3 = 27 \dots (2)$$

$$\frac{(2)}{(1)} : \frac{ar^3}{ar} = \frac{27}{48}$$

$$r^2 = \frac{9}{16}$$

$$r = \frac{3}{4}$$

Daripada (1) :

$$a\left(\frac{3}{4}\right) = 48$$

$$a = 48 \times \frac{4}{3}$$

$$a = 64$$

$$S_\infty = \frac{64}{1 - \frac{3}{4}} = 256$$

28 (a)  $T_3 = 10$

$$ar^2 = 10 \dots (1)$$

$$T_3 + T_4 = 15$$

$$10 + ar^3 = 15$$

$$ar^3 = 5 \dots (2)$$

$$\frac{(2)}{(1)} : \frac{ar^3}{ar^2} = \frac{5}{10} = \frac{1}{2}$$

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

Daripada (1) :

$$a\left(\frac{1}{2}\right)^2 = 10$$

$$a = 10(4)$$

$$a = 40$$

(b)  $S_\infty = \frac{40}{1 - \frac{1}{2}} = 80$

29 (a) Katakan  $AB = r$

$$T_1 = \frac{1}{4} \pi r^2$$

$$T_2 = \frac{1}{4} \pi \left(\frac{r}{2}\right)^2 = \frac{1}{16} \pi r^2$$

$$T_3 = \frac{1}{4} \pi \left(\frac{r}{4}\right)^2 = \frac{1}{64} \pi r^2$$

$$\frac{T_2}{T_1} = \frac{\frac{1}{16} \pi r^2}{\frac{1}{4} \pi r^2} = \frac{1}{4}$$

$$\frac{T_3}{T_2} = \frac{\frac{1}{64} \pi r^2}{\frac{1}{16} \pi r^2} = \frac{1}{4}$$

Oleh sebab  $\frac{T_2}{T_1} = \frac{T_3}{T_2} = \frac{1}{4}$  (pemalar),

maka siri luas sukuan bulatan itu membentuk janting geometri. Nisbah

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

(b)  $AB = 6$  cm

$$a = \frac{1}{4} \pi (6)^2 = 9\pi$$

$$S_\infty = \frac{9\pi}{1 - \frac{1}{4}} = 12\pi \text{ cm}^2$$

$$30 \text{ (a) } T_1 = \frac{1}{2}(50+40)(2) = 90$$

$$T_2 = \frac{1}{2}(40+32)(2) = 72$$

$$a = 90, r = \frac{72}{90} = \frac{4}{5}$$

$$T_5 = ar^4 = 90\left(\frac{4}{5}\right)^4 = 36.864 \text{ cm}^2$$

$$(b) T_\infty = \frac{90}{1 - \frac{4}{5}} = 450 \text{ cm}^2$$