U7L2 p.452 1a,c 3 4a,e 5a,c,d,f 6b,c 7a,e 8, 11, 15, 16

1.a) $59+64+69+\dots$ $a=59, d=5, n=10$

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

$S_{10} = 5[118+9(5)]$

$= 5(163)$

$= 815$

$\therefore$ The sum of the first 10 terms is 815.

c) $-103-110-117-\dots$ $a=-103$, $d=-7$, $n=10$

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

$S_{10} = 5[-206+(9)(-7)]$

$= 5(-206-63)$

$= 5(-269)$

$= -1345$

$\therefore$ The sum of the first 10 terms is -1345.

3. 20 rows of bricks $\rightarrow n=20$
top row has 5 bricks $\rightarrow t_1$ or $a=5$
bottom " " 62 " $\rightarrow t_{20}=62$

$S_{20} = ?$

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

$S_{20} = 10(5+62)$

$S_{20} = 10(67)$

$S_{20} = 670$

$\therefore$ There are 670 bricks in the stack.

4. a)(i) $d=6$ $\therefore$ series is arithmetic
(ii) $a=-5$

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

$S_{25} = \frac{25}{2}[-10+(24)(6)]$

$= \frac{25}{2}[-10+144]$

$= \frac{25}{\cancel{2}_1}(\cancel{134}^{67})$

$= 1675$

$\therefore$ The sum of the first 25 terms is 1675.

4. e)(i) $d=-9$ $\therefore$ arithmetic
(ii) $a=31$

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

$S_{25} = \frac{25}{2}[62+24(-9)]$

$= \frac{25}{2}[62-216]$

$= \frac{25}{\cancel{2}_1}(\cancel{-154}^{-77})$

$= -1925$

$\therefore$ The sum of the first 25 terms is -1925.

5. a) $37+41+45+49+\ldots$

$a=37, d=4, n=12$

(i) $t_n = a+(n-1)d$

$t_{12} = 37+(11)(4)$

$t_{12} = 37+44$

$\boxed{t_{12} = 81}$

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

$S_{12} = 6(37+81)$

$= 6(118)$

$\boxed{S_{12} = 708}$

5. c) $-18-12-6+0+\ldots$

$a=-18, d=6, n=12$

(i) $t_n = a+(n-1)d$

$t_{12} = -18+11(6)$

$t_{12} = -18+66$

$\boxed{t_{12} = 48}$

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

$S_{12} = 6(-18+48)$

$= 6(30)$

$\boxed{S_{12} = 180}$

5. d) $\frac{1}{5}+\frac{7}{10}+\frac{6}{5}+\frac{17}{10}+\ldots$

$a=\frac{1}{5}, \frac{5}{10}$ or $\frac{1}{2}, n=12$

(i) $t_n = a+(n-1)d$

$t_{12} = \frac{1}{5}+(11)\left(\frac{1}{2}\right)$

$= \frac{1}{5}+\frac{11}{2}$

$= \frac{2}{10}+\frac{55}{10}$

$\boxed{t_{12} = \frac{57}{10}}$

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

$S_{12} = 6\left(\frac{1}{5}+\frac{57}{10}\right)$

$S_{12} = \cancel{6}^{3}\left(\frac{59}{\cancel{10}_{5}}\right)$

$\boxed{S_{12} = \frac{177}{5}}$

5. f) $p+(2p+2q)+(3p+4q)+(4p+6q)+\ldots$

$a=p, d=p+2q, n=12$

(i) $t_n = a+(n-1)d$

$t_{12} = p+(11)(p+2q)$

$= p+11p+22q$

$\boxed{t_{12} = 12p+22q}$

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

$S_{12} = 6(p+12p+22q)$

$S_{12} = 6(13p+22q)$

$\boxed{S_{12} = 78p+132q}$

U7/L2 Cont'd p.452 6 b,c 7a,e 8, 11, 15, 16

6.b) $\overset{a}{t_1}=31$, $\overset{t_n}{t_{20}}=109$, find S_{20}

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

$S_{20} = 10(31+109)$

$S_{20} = 10(140)$

$\boxed{S_{20} = 1400}$

6.c) $t_1=53$, $t_2=37$, find S_{20}

$a=53$, $d=-16$, $n=20$

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

$S_{20} = 10[106+19(-16)]$

$S_{20} = 10[106-304]$

$S_{20} = 10(-198)$

$\boxed{S_{20} = -1980}$

7.a) $1+6+11+\dots+96$

$a=1$, $d=5$, $t_n=96$, $n=?$ $S_n=?$

(i) $t_n=a+(n-1)d$

$96 = 1+(n-1)(5)$

$96 = 1+5n-5$

$96 = 5n-4$

$100 = 5n$

$\boxed{n=20}$

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

$S_{20} = 10(1+96)$

$= 10(97)$

$\boxed{S_{20} = 970}$

e) $-31-38-45-\dots-136$

$a=-31$, $d=-7$, $t_n=-136$, $n=?$, $S_n=?$

(i) $t_n=a+(n-1)d$

$-136 = -31+(n-1)(-7)$

$-105 = -7n+7$

$-112 = -7n$

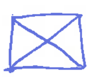
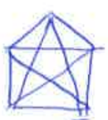
$\boxed{n=16}$

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

$S_{16} = 8(-31-136)$

$S_{16} = 8(-167)$

$\boxed{S_{16} = -1336}$

8.a)  2  5  9

n=4 n=5 n=6

4 sided 5-sided 6-sided septagon octagon

$\therefore$ 2, 5, 9, 14, 20, ...

$\boxed{\#\text{Diagonals} = \frac{n}{2}(n-3) \text{ or } \frac{n(n-3)}{2}}$ where n is the # sides

b) when $n=7$

$\#\text{Diagonals} = \frac{7}{2}(7-3)$

$= \frac{7}{\cancel{2}_1}(\cancel{4})^2$

$= 14$ ✓

11. $t_{20}=137$, $d=3$, $a=?$, $S_n=?$

(i) $t_n=a+(n-1)d$

$137 = a+19(3)$

$137 = 57+a$

$\boxed{a=80}$

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

$S_{20} = 10(80+137)$

$S_{20} = 10(217)$

$S_{20} = 2170$

$\therefore$ Jamal assembled a total of 2170 toys in the first 20 days.

15. $t_{10} = 34$, $S_{20} = 710$ Find t_{25}

(i) $S_{20} = 710$

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

$710 = 10[2a+19d]$

① $\boxed{71 = 2a+19d}$

(ii) $t_{10} = 34$

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

② $\boxed{34 = a+9d}$

or $\boxed{a = 34-9d}$

sub ② into ①

$2(34-9d)+19d = 71$

$68-18d+19d = 71$

$\boxed{d=3}$

Sub in ②

$a = 34-9(3)$

$\boxed{a=7}$

$\therefore$ $t_n = 7+(n-1)(3)$ is the general term

(iii) $t_{25} = 7+(24)(3)$

$= 7+72$

$= 79$

16. $1+4+7+\ldots+t_n$ has a sum of 1001. Find n.

$a=1, d=3, S_n=1001, n=?$

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

$1001 = \frac{n}{2}[2(1)+(n-1)(3)]$

$2002 = n(3n-1)$

$0 = 3n^2-n-2002$

RW

$n = \frac{1 \pm \sqrt{1-4(3)(-2002)}}{2(3)}$

$= \frac{1 \pm \sqrt{24025}}{6}$

$= \frac{1 \pm 155}{6}$

$= 26$ or $\cancel{-\frac{77}{3}}$

$\therefore$ The series has 26 terms.