C1 HUI MINH NGOC ONG, GRADE 7, AGE 12, QASMT, BRISBANE AUSTRALIA

SLICK SUMMING

Arithmetic Series (simplified)

1st 2nd 3rd nth

$a, a+d, a+2d+\ldots+\overbrace{a+(n-1)d}$

$T_1\ T_2\ T_3 \qquad T_n$ Sum of this series $= \frac{n}{2}(a+T_n)$

Part 1.1

$1+2+3+\ldots+19+20$

$a=1\ d=1\ T_n=20$

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

$20=1+(n-1)1$

$20=1+(n-1) \therefore n=20 \therefore \text{Sum} = \frac{20}{2}(1+20)$

$=10\times 21$

$=210$

Part 1.2

$1+2+3+\ldots+99+100$

$a=1\ d=1\ T_n=100$

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

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

$100=1+(n-1) \therefore n=100 \therefore \text{Sum} = \frac{100}{2}(1+100)$

$=50\times 101$

$=5050$

Part 1.3

$40+41+42+\ldots+99+100$

$a=40\ d=1\ T_n=100$

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

$100=40+(n-1)1$

$100=40+(n-1) \therefore n=61 \therefore \text{Sum} = \frac{61}{2}(40+100)$

$=30.5\times 140$

$=4270$

Part 2.1

$a+a+d+a+2d+\ldots+a+(n-1)d \quad \frac{n}{2}(a+T_n)$

$1+3+5+\ldots+17+19$

$a=1 \quad d=2 \quad T_n=19$

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

$19=1+(n-1)2$

$19=1+2n-2$

$19=2n-1 \quad \therefore n=10$

$\frac{10}{2}(1+19)$

$=5\times 20$

$=100$ ✓ (checked using calculator)

Part 2.2

$2+4+6+\ldots+18+20$

$a=2 \quad d=2 \quad T_n=20$

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

$20=2+(n-1)2$

$20=2+2n-2$

$20=2n \quad \therefore n=10$

$\frac{10}{2}(2+20)$

$=5\times 22$

$=110$ ✓

Part 2.3

$42+44+46+\ldots+98+100$

$a=42 \quad d=2 \quad T_n=100$

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

$100=42+(n-1)2$

$100=42+2n-2$

$100=40+2n \quad \therefore n=30$

$\frac{30}{2}(42+100)$

$=15\times 142$

$=2130$

Part 3

$1+2+3+\ldots+(n-1)+n$

$a=1 \quad d=1 \quad T_n=n$

$T_n = 1+(n-1)\times 1 \quad \text{Sum} = \frac{n}{2}(1+n)$