## Sequences \& Series (Q 5, Paper 1)

## Lesson No. 1: Working with Sequences

## 2007

5 (a) The $n$th term of a sequence is given by $T_{n}=1-n$.
(i) Find $T_{5}$, the fifth term.
(ii) Find $T_{5}-T_{10}$ where $T_{10}$ is the tenth term

## Solution

5 (a) (i)
$T_{n}=1-n \Rightarrow T_{5}=1-(5)=-4$

Put a bracket around $n$ on each side and substitute in the little number (subscript).

## 5 (a) (ii)

$T_{10}=1-(10)=-9$
$\Rightarrow T_{5}-T_{10}=-9-(-4)=-9+4=-5$

## 2000

5 (a) The $n$th term of a sequence is given by $T_{n}=n^{2}+1$.
(i) Write down the first three terms of the sequence.
(ii) Show that $T_{1}+T_{2}+T_{3}=T_{4}$.

## Solution

5 (a) (i)
$T_{n}=n^{2}+1$
$\Rightarrow T_{1}=(1)^{2}+1=1+1=2$
$\Rightarrow T_{2}=(2)^{2}+1=4+1=5$
$\Rightarrow T_{3}=(3)^{2}+1=9+1=10$
Arithmetic sequence: 2, 5, 10
5 (a) (ii)
$T_{n}=n^{2}+1$
$\Rightarrow T_{4}=(4)^{2}+1=16+1=17$
$T_{1}+T_{2}+T_{3}=2+5+10=17$
$\therefore T_{1}+T_{2}+T_{3}=T_{4}$

## 1999

5 (a) The $n$th term of a sequence is given by

$$
T_{n}=\frac{n}{n+1} .
$$

(i) Find $T_{2}$, the second term.
(ii) Show that $T_{2}+T_{3}>1$.

Solution

$$
\begin{aligned}
& 5 \text { (a) (i) } \\
& T_{n}=\frac{n}{n+1} \\
& \Rightarrow T_{2}=\frac{(2)}{(2)+1}=\frac{2}{3}
\end{aligned}
$$

5 (a) (ii)
$T_{n}=\frac{n}{n+1}$
$\Rightarrow T_{3}=\frac{\text { (3) }}{(3)+1}=\frac{3}{4}$
$\therefore T_{2}+T_{3}=\frac{2}{3}+\frac{3}{4}=\frac{17}{12}=1 \frac{5}{12}>1$

