



**Induction**

**Maths Past Exam Questions**

**Higher Level**

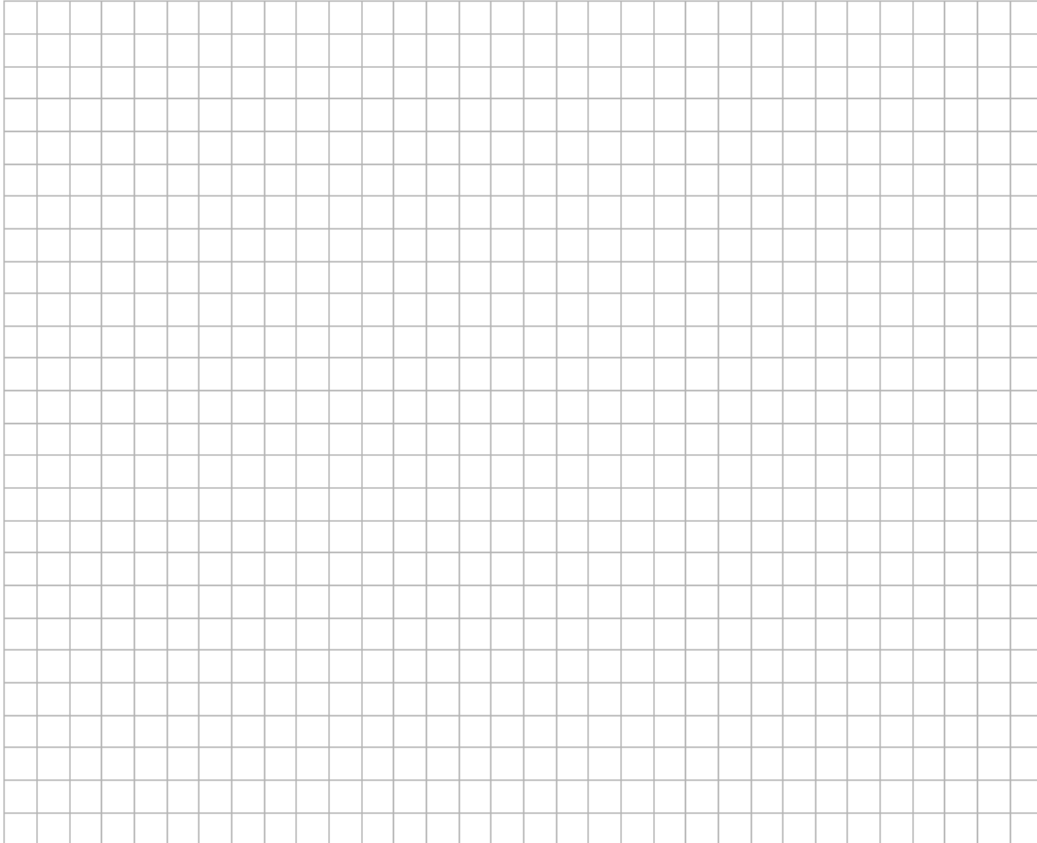
2012

Project Maths – Paper 1 Sample – Section A – Q2 A

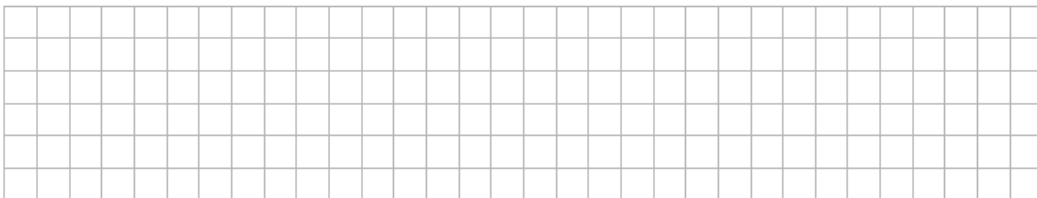
Question 2

(25 marks)

- (a) (i) Prove by induction that, for any  $n$ , the sum of the first  $n$  natural numbers is  $\frac{n(n+1)}{2}$ .



- (ii) Find the sum of all the natural numbers from 51 to 100, inclusive.



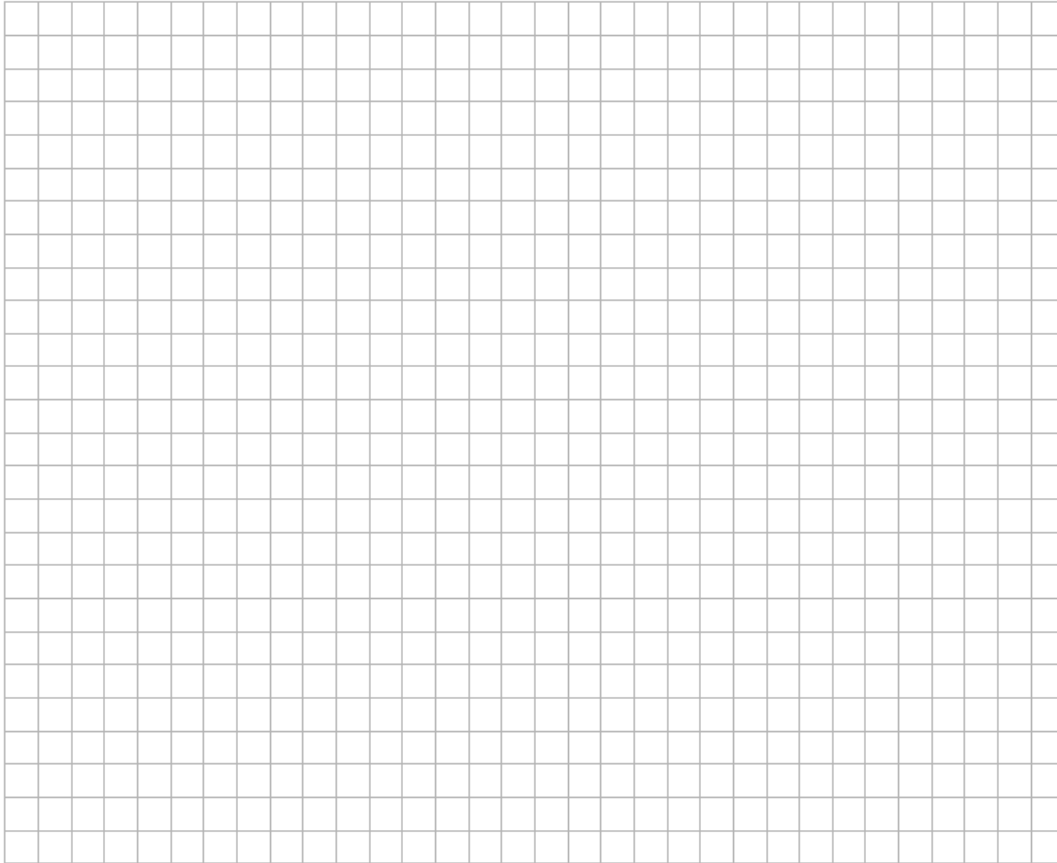
**Paper 1 – Project Maths – Section Q4**

**Question 4**

**(25 marks)**

- (a) Prove, by induction, the formula for the sum of the first  $n$  terms of a geometric series. That is, prove that, for  $r \neq 1$ :

$$a + ar + ar^2 + \dots + ar^{n-1} = \frac{a(1-r^n)}{1-r}.$$



- (b) By writing the recurring part as an infinite geometric series, express the following number as a fraction of integers:

$$5.\overline{21} = 5.21212121\dots$$

