3.2) Arithmetic series

Worked example	Your turn
Find the sum of the first 50 terms the sequence which begins: $7, 10, 13, 16, \ldots$	Find the sum of the first 80 terms the sequence which begins: $2, 6, 10, 14, \ldots$ 12800

Worked example	Your turn
Find the sum of the first 50 terms the sequence which begins: $10, 7, 4, 1, -2, \ldots$	Find the sum of the first 80 terms the sequence which begins: $18, 14, 10, 6, 2, \ldots$ -11200

Worked example	Your turn
Find the sum of the first 50 terms the sequence which begins: $p, 3p, 5p, 7p, 9p, \ldots$	Find the sum of the first 80 terms the sequence which begins: $k, 4k, 7k, 10k, 13k, \ldots$ $9560k$

Worked example	Your turn
Find the least number of terms for the sum of $6 + 11 + 16 + \cdots$ to exceed 2000.	Find the least number of terms for the sum of $4 + 9 + 14 + \cdots$ to exceed 2000. 28

Worked example	Your turn

A company offers two salary schemes for a 10-year period, Year 1 to Year 10 inclusive.
 	
Scheme 1: Salary in Year 1 is £$(P + 900)$
    Salary increases by £(T) each year, forming an arithmetic sequence.
 	
Scheme 2: Salary in Year 1 is £P
    Salary increases by £$2T$ each year, forming an arithmetic sequence.
 	
For the 10-year period, the total earned is the same for both salary schemes.
a) Find the value of T
b) For this value of T, the salary in Year 10 under Scheme 1 is £25890. Find the value of P
	A company offers two salary schemes for a 10-year period, Year 1 to Year 10 inclusive.
	
	Scheme 1: Salary in Year 1 is £P
	    Salary increases by £$(2T)$ each year, forming an arithmetic sequence.
	
	Scheme 2: Salary in Year 1 is £$(P + 1800)$
	    Salary increases by £T each year, forming an arithmetic sequence.
	
	For the 10-year period, the total earned is the same for both salary schemes.
	a) Find the value of T
	b) For this value of T, the salary in Year 10 under Scheme 2 is £29850. Find the value of P
	
	a) $T = 400$
	b) $P = 24450$

Worked example	Your turn
Prove that the sum of the first 200 natural numbers is 20100	Prove that the sum of the first 100 natural numbers is 5050
	Proof

Worked example	Your turn
Find the sum of the first 50 odd numbers	Find the sum of the first 50 even numbers 2550

Worked example	Your turn
Prove that the sum of the first n even numbers is $n^2 + n$	Prove that the sum of the first n odd numbers is n^2
	Proof

Worked example	Your turn
An arithmetic series is given by $(k+1) + (2k+5) + (3k+9) + \cdots + 217$ Given that the sum of the series is 2250, find the value of k	An arithmetic series is given by $(k+1) + (2k+3) + (3k+5) + \cdots + 303$ Given that the sum of the series is 2568, find the value of k $$k = 17$$

Worked example	Your turn
The common difference of an arithmetic sequence is 4. The sum of the first 60 terms of this sequence is 7380. Find the first term.	The common difference of an arithmetic sequence is 5. The sum of the first 40 terms of this sequence is 4020. Find the first term. 3

Worked example	Your turn
The common difference of an arithmetic sequence is 4. The sum of the first 60 terms of this sequence is -240. Find the first term.	The common difference of an arithmetic sequence is 5. The sum of the first 40 terms of this sequence is 2620. Find the first term. -32

Worked example	Your turn
The first term of an arithmetic sequence is 3. The sum of the first 50 terms is 2600. Work out the common difference of the sequence.	The first term of an arithmetic sequence is 4. The sum of the first 40 terms is 2500. Work out the common difference of the sequence. 3

Worked example	Your turn
The eighth term of an arithmetic sequence is 11. The fifth term of the same arithmetic sequence is 2. Find the sum of the first 50 terms of this arithmetic sequence.	The tenth term of an arithmetic sequence is 35. The fourth term of the same arithmetic sequence is 17. Find the sum of the first 50 terms of this arithmetic sequence. 4075