

## Pure 24 – Arithmetic Sequences and Series

Please **complete** this homework by \_\_\_\_\_. Start it early. If you can't do a question you will then have time to ask your teacher for help or go to a drop in session.

### Section 1 – Preparation for Benchmark 4.

### Section 2 – Consolidation of this week's topic. Please complete all questions.

1. An arithmetic series has first term 8 and common difference 3
  - a) Find the 18<sup>th</sup> term (2)
  - b) Find the **sum** of the first 20 terms (2)
  
2. An arithmetic series has first term 6 and common difference 2. Given that the  $n$ th term is 40, find the value of  $n$ . (3)
  
3. An arithmetic series has fourth term 20 and sixteenth term 92.
  - a) write down 2 equations in terms of  $a$  and  $d$  (2)
  - b) find the values of  $a$  and  $d$  (3)
  - c) find an expression (in terms of  $n$ ) for the  $n$ th term, simplifying your answer (3)
  
4. An arithmetic sequence has first term 6 and common difference 2.
  - a) Write down the first 3 terms. (1)
  - b) Find the 42<sup>nd</sup> term. (1)
  - c) Find an expression for the  $n$ th term. (1)
  - d) Find the **sum** of the first 14 terms. (2)
  
5. An arithmetic sequence has first term 9 and common difference 4.
  - a) Write down the first 4 terms. (1)
  - b) Find an expression for the  $n$ th term. (1)
  - c) Find the **sum** of the first 12 terms. (2)
  
6. An arithmetic sequence has third term 10 and sixth term  $-2$ 
  - a) Given that  $a$  is the first term and  $d$  is the common difference, write down 2 equations involving  $a$  and  $d$ . (2)
  - b) Solve these equations simultaneously to find the values of  $a$  and  $d$ . (3)

7. An arithmetic sequence has first term 6 and common difference 4. Given that the  $n^{\text{th}}$  term of the sequence is 98, find the value of  $n$ . (2)
8. The  $n^{\text{th}}$  term of an arithmetic sequence is  $u_n$  where  $u_n = 45 - 6n$ .
- a) Find the value of  $u_1$  and the value of  $u_2$ . (1)
- b) Write down the common difference of the arithmetic sequence. (1)
- c) Given that  $\sum_{r=1}^n u_r = 0$ , find the value of  $n$ . (3)
9. Prove that the sum of the first  $n$  terms of an Arithmetic series is given by:

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

(4)

10. An athlete prepares for a race by completing a practice run on each of 11 consecutive days. On each day after the first day he runs further than he ran on the previous day. The lengths of his 11 practice runs form an arithmetic sequence with first term  $a$  km and common difference  $d$  km.
- He runs 9 km on the 11th day, and he runs a total of 77 km over the 11 day period.
- Find the value of  $a$  and the value of  $d$ . (7)

(Total: 47 Marks)