

C2 Arithmetic Series Questions

Specimen

5. The fourth term of an arithmetic series is 11. The sixth term of the arithmetic series is 17.
- (a) Find the common difference and the first term. [4]
- (b) Find the sum of the first eight terms of the series. [1]

2005 Winter

5. In an arithmetic series the sum of the first term and the fifth term is zero. The thirteenth term is 20.
- (a) Find the first term and the common difference of the series. [5]
- (b) Calculate the sum of the first twenty terms of the series. [2]

2005 Summer

3. (a) An arithmetic series has first term a and common difference d . Write down the n th term and prove that the sum of the first n terms is given by

$$S_n = \frac{n}{2}[2a + (n-1)d] . \quad [4]$$

- (b) The seventh term of an arithmetic series is twice the third term. The sum of the first ten terms of the series is 195.
- (i) Find the common difference of the series.
- (ii) Find the sum of the first sixty terms. [7]

2006 Winter

5. The sum of the first two terms of an arithmetic series is 3. The eighth term of the arithmetic series is 47.

Find

- (a) the first term and the common difference of the series, [4]
(b) the sum of the first twenty terms of the series. [2]

2006 Summer

4. (a) An arithmetic series has first term a and common difference d . Prove that the sum of the first n terms is given by

$$S_n = \frac{n}{2} [2a + (n-1)d]. \quad [3]$$

- (b) The sum of the first twenty terms of an arithmetic series is 540 and the sum of the first thirty terms of the series is 1260.

- (i) Find the first term and the common difference of the series.
(ii) Calculate the 50th term of the series. [6]

2007 Winter

4. In an arithmetic series, the eighth term is twice the third term. The twentieth term of the series is 11. Find the common difference and the first term of the series. [5]

2007 Summer

4. The third term of an arithmetic series is four times the sixth term of the series. The sum of the first twenty terms of the series is 350.

- (a) Find the first term and the common difference of the series. [6]
(b) Given that the n th term of the series is 125, find the value of n . [2]

2008 Winter

3. (a) An arithmetic series has first term a and common difference d . Prove that the sum of the first n terms of the series is given by

$$S_n = \frac{n}{2}[2a + (n-1)d]. \quad [3]$$

- (b) Find an expression, in terms of n , for the sum of the first n terms of the arithmetic series
 $1 + 3 + 5 + \dots$

Simplify your answer. [2]

- (c) The twentieth term of an arithmetic series is 98 and the sum of the first twenty terms of the series is 1010. Find the first term and the common difference of the series. [4]

2008 Summer

4. (a) An arithmetic series has first term a and common difference d . Prove that the sum of the first n terms of the series is given by

$$S_n = \frac{n}{2}[2a + (n-1)d]. \quad [3]$$

- (b) The sum of the first ten terms of an arithmetic series is 320. The sum of the twelfth and sixteenth terms of the series is 166. Find the first term and the common difference of the series. [5]

2009 Winter

4. (a) The thirteenth term of an arithmetic series is 51. The ninth term of the series is five times the second term. Find the first term and common difference of the arithmetic series. [5]
- (b) The first term of another arithmetic series is 5 and the twentieth term is 62. Find the sum of the first twenty terms of this arithmetic series. [2]

2009 Summer

4. (a) An arithmetic series has first term a and common difference d . Prove that the sum of the first n terms of the series is given by

$$S_n = \frac{n}{2}[2a + (n-1)d]. \quad [3]$$

- (b) The eighth term of an arithmetic series is 46. The sum of the first nine terms of the series is 225. Find the first term and the common difference of the series. [4]

- (c) Find an expression, in terms of n , for the sum of the first n terms of the arithmetic series

$$3 + 7 + 11 + 15 + \dots$$

Simplify your answer.

[3]

2010 Winter

4. The sum of the first eight terms of an arithmetic series is 124 and the sum of the first twenty terms of the series is 910.

- (a) Find the first term and common difference of the series. [5]

- (b) The n th term of the series is 183. Find the value of n . [2]

2010 Summer

5. (a) An arithmetic series has first term a and common difference d . Prove that the sum of the first n terms of the series is given by

$$S_n = \frac{n}{2}[2a + (n-1)d]. \quad [3]$$

- (b) The first term of an arithmetic series is 4 and the common difference is 2. The sum of the first n terms of the arithmetic series is 460.

Write down an equation satisfied by n . Hence find the value of n . [3]

- (c) The fifth term of another arithmetic series is 9. The sum of the sixth term and the tenth term of this series is 42. Find the first term and the common difference of the arithmetic series. [5]

2011 Winter

4. (a) An arithmetic series has first term a and common difference d . Prove that the sum of the first n terms of the series is given by

$$S_n = \frac{n}{2} [2a + (n-1)d]. \quad [3]$$

- (b) The eighth term of an arithmetic series is 28. The sum of the first twenty terms of the series is 710. Find the first term and common difference of the arithmetic series. [5]
- (c) The first term of another arithmetic series is -3 and the fifteenth term is 67. Find the sum of the first fifteen terms of this arithmetic series. [2]

2011 Summer

4. (a) The sum of the first fifteen terms of an arithmetic series is 780. The sum of the second, fourth and tenth terms of the series is 100. Find the first term and the common difference of the series. [5]
- (b) The p th term of another arithmetic series is 1023. The $(p+4)$ th term of this series is 1059. Find the $(p+7)$ th term of the series. [3]

mathswizard.net

2012 Winter

4. The fifteenth term of an arithmetic series is seven times the fifth term. The sum of the first eleven terms of the series is 88.
- (a) Find the first term and common difference of the arithmetic series. [6]
- (b) Given that the n th term of the series is 143, find the value of n . [2]

2012 Summer

4. (a) An arithmetic series has first term a and common difference d . Prove that the sum of the first n terms of the series is given by

$$S_n = \frac{n}{2} [2a + (n-1)d]. \quad [3]$$

- (b) The sum of the third, fourth and tenth terms of an arithmetic series is 79. The sum of the sixth and seventh terms of the series is 61. Find the first term and the common difference of the series. [4]

- (c) Find an expression, in terms of n , for the sum of the first n terms of the arithmetic series

$$15 + 13 + 11 + 9 + \dots$$

Simplify your answer.

[3]

2013 Winter

4. (a) The first term of an arithmetic series is 1 and the common difference is 4.

(i) Show that the n th term of the arithmetic series is $4n - 3$.

(ii) The sum of the first n terms of this series is given by

$$S_n = 1 + 5 + \dots + (4n - 7) + (4n - 3).$$

Prove from first principles, without using the formula for the sum of the first n terms, that

$$S_n = n(2n - 1). \quad [4]$$

- (b) The sum of the first ten terms of another arithmetic series is 55. The sum of the fourth, seventh and ninth terms of the series is 27. Find the first term and the common difference of this arithmetic series. [5]

2013 Summer

4. (a) An arithmetic series has first term a and common difference d . Prove that the sum of the first n terms of the series is given by

$$S_n = \frac{n}{2} [2a + (n-1)d]. \quad [3]$$

- (b) The sum of the first ten terms of an arithmetic series is 115. The sum of the next four terms of this series is 130. Find the first term and the common difference of the arithmetic series. [5]

2014 Winter

3. (a) The sum of the third and eighth terms of an arithmetic series is zero. The sum of the fifth, seventh and tenth terms of the series is 22. Find the first term and the common difference of the series. [4]
- (b) The first term of another arithmetic series is 9 and the common difference is 2. The sum of the first $2n$ terms of this arithmetic series is 3 times the sum of the first n terms of the series. Find the value of n . [5]

2014 Summer

4. (a) An arithmetic series has first term a and common difference d . Prove that the sum of the first n terms of the series is given by
- $$S_n = \frac{n}{2}[2a + (n-1)d]. \quad [3]$$
- (b) The first term of an arithmetic series is 3 and the common difference is 2. The sum of the first n terms of the series is 360. Write down an equation satisfied by n . Hence find the value of n . [3]
- (c) The tenth term of another arithmetic series is seven times the third term. The sum of the eighth and ninth terms of the series is 80. Find the first term and common difference of this arithmetic series. [4]

2015

4. (a) The first term of an arithmetic series is 4 and the common difference is 6.
- (i) Show that the n th term of the arithmetic series is $6n - 2$.
- (ii) The sum of the first n terms of this series is given by

$$S_n = 4 + 10 + \dots + (6n - 8) + (6n - 2).$$

Without using the formula for the sum of the first n terms of an arithmetic series, **prove that**

$$S_n = n(3n + 1). \quad [4]$$

2016

4. (a) Gwilym has decided to run in a half marathon race. In order to get himself fit, he devises a training programme whereby he runs around his local track each day, gradually increasing the distance he runs from day to day. On the first day, he runs 6 laps of the track and subsequently, on any given day, he runs 2 laps further than he did on the day before.
- (i) How many laps does he run on the 20th day of his programme?
- (ii) After how many days will the total number of laps he has run since the beginning of his training programme be equal to 750? [6]

- (b) The n th term of an **arithmetic** series is denoted by t_n . It is known that

$$t_{12} + t_{13} = 50.$$

- (i) **Write down** the value of $t_{11} + t_{14}$. [1]
- (ii) Find the sum of the first twenty-four terms of this arithmetic series. [2]

2017

4. (a) An arithmetic series has first term a and common difference d . Prove that the sum of the first n terms of the series is given by

$$S_n = \frac{n}{2}[2a + (n-1)d]. \quad [3]$$

- (b) The sum of the first eight terms of an arithmetic series is 156 and the sum of the first sixteen terms of the series is 760. Find the first term and common difference of this series. [4]

- (c) The p th term of another arithmetic series is 2057. The $(p + 5)$ th term of this series is 2102. Find the $(p + 8)$ th term of the series. [3]