ARITHMETIC SERIES

1 Find the sum of the first 16 terms of the arithmetic series $3+4\frac{1}{4}+5\frac{1}{2}+\ldots$

4 The first three terms of an arithmetic series are $-2+3+8+\ldots$

(a) Find the 60th term. **(b)** Hence, or otherwise, find the sum of the first 60 terms of the series.

6 An object falling freely from a height travels 4.9 metres in the first second, 14.7 metres in the second second and 24.5 metres in the third second. How far has it fallen:

(a) after six seconds **(b)** between the fifth and the sixth second?

8 Find the sum of the first 20 terms of an arithmetic series whose eighth term is 6 and whose twelfth term is 9.

10 Evaluate: **(a)** $\sum_{k=1}^{10}(3k-7)$ **(b)** $\sum_{k=1}^{8}(4k+1)$ **(c)** $\sum_{k=1}^{n}(4k-1)$

11 The first term of an arithmetic series is 7, the common difference is 2 and the sum of the first n terms is 247. Find the value of n.

14 Find the sum of the integers between 0 and 101 that are:

(a) divisible by 2 **(b)** divisible by 5 **(c)** divisible by 2 and 5 **(d)** divisible by 2 or 5 but not both.

16 The sum of the magnitudes of the angles of an irregular pentagon (five-sided polygon) is 540°. The magnitudes of the angles form the terms of an arithmetic series. If the largest angle has a magnitude of 136°, find the magnitude of each of the other four angles.

21 The track of a vinyl record is in the shape of a spiral curve, but it may be considered as a number of concentric circles of minimum and maximum radius 5.25 cm and 10.5 cm respectively. The record rotates at $33\frac{1}{3}$ revolutions per minute and takes 18 minutes to play from start to finish. Find an approximation to the length of the track.

22 Given $S_n = 3n^2 - 11n$, find T_n and hence show that the series is arithmetic.

27 Find the first three terms of an arithmetic series in which the fifth term is three times the second term, and the sum of the first six terms is 36.

28 Logs of wood are stacked in a pile so that there are 15 logs on the top row, 16 on the next row, 17 on the next, and so on. If there are 246 logs altogether:

(a) how many rows are there **(b)** how many logs are on the bottom row?

30 How many terms of the series $6 + 10 + 14 + \ldots$ must be taken to give a sum of 880?

32 Find the sum of: **(a)** the first n odd positive integers **(b)** the first n even positive integers
(c) the first n positive integers, and find this value of n if the sum is 210.

34 Cans of fruit in a supermarket display are stacked so that there are 3 cans in the top row, 5 in the next row, 7 in the next row and so on. If there are 10 rows in the display, find:

(a) the number of cans in the bottom row **(b)** the total number of cans in the display.

35 The first term of an arithmetic series is 5. The ratio of the sum of the first four terms to the sum of the first ten terms is 8 : 35. Find the common difference.