



Skill: Summing arithmetic sequences

Questions

Attempt these questions independently showing full and clear solutions. Check each answer as you go.

- Find the sum, as far as the term indicated in the square brackets, of each of the following arithmetic progressions:
 - $4, 9, 14, \dots$ [find the sum up to the 18th term]
 - $5, 7, 9, \dots$ [find the sum up to the 82nd term]
 - $9, 5, 1, \dots$ [find the sum up to the 20th term]
 - $7, -3, -13, \dots$ [find the sum up to the 71st term]
- Find the sum of each of the following arithmetic series:
 - $1 + 2 + 3 + \dots + 205$
 - $8 + 3 - 2 - \dots - 482$
 - $1.3 + 1.6 + 1.9 + \dots + 213.7$
- Find and simplify an expression for the sum of the first n terms of each of the following arithmetic progressions:
 - $3, 7, 11, 15, \dots$
 - $8, 4, 0, -4, \dots$
- Calculate the sum of the first n
 - even integers,
 - odd integers.
- An arithmetic progression has first term 3 and common difference 7. Given that the sum of the first n terms of the progression is 130 275, calculate the value of n .
- The first term of an arithmetic series is 38 and the tenth term is 2. Given that the sum of the first n terms of the series is 72, calculate the possible values of n .



7. Find how many terms of the arithmetic series

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

should be taken in order that the sum of the sequence should exceed 1 000 000.

8. The sum of the first ten terms of an arithmetic progression is 95, and the sum of the first 20 terms is 290. Calculate the first term and the common difference.

9. Given that the 2nd, 3rd and 4th terms of an arithmetic progression are

$$16 - x, \quad 3x - 2, \quad 2x$$

respectively, calculate the value of x and find the first term of the progression. **[HINT: Think about the key feature of an arithmetic progression that makes it arithmetic]**

10. In an arithmetic progression the sum of the first 15 terms is 615 and the 13th term is six times the second term. Find the first three terms.

11. The training programme of a pilot requires her to fly 'circuits' of an airfield. Each day she flies three more circuits than the day before. On the fifth day she flew 14 circuits.

Simplifying your answers where appropriate, calculate how many circuits she flew:

- (i) on the first day,
- (ii) in total by the end of the fifth day,
- (iii) in total by the n^{th} day,
- (iv) in total from the end of the n^{th} day to the end of the $2n^{\text{th}}$ day.

Simplify your answers.

12. John is given an interest-free loan to buy a second-hand car. He repays the loan in monthly instalments. He repays £20 the first month and the repayments continue to rise by £2 per month until the loan is repaid.

Given that the final monthly repayment is £114,

- (a) show that John will repay the loan in 48 months,
- (b) find the amount, in pounds, of the loan taken out.