A2 PURE BOOTCAMP
LESSON 1
Sequences and Series

What is an arithmetic series?

Important formulae / proofs

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Example question - complete at the same time as MW

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]

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Example question - complete at the same time as MW

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 $\mathbf{50^{th}}$ **term** of the series. [6]

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Target question - complete on your own

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]

How did you do? Arithmetic Series:

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What is a geometric series?

Important formulae / proofs

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Example question - complete at the same time as MW

(a) A geometric series has first term a and common ratio r. Prove that the sum of the first n terms is given by

$$S_n = \frac{a(1-r^n)}{1-r}$$

Given that $|r| < 1$, write down the sum to infinity of the series. [4]

(b) The sum to infinity of a geometric series is equal to 4. The sum of the first two terms of the series is 3. Find the common ratio, given that it is positive. [5]

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Example question - complete at the same time as MW

The sum of the first two terms of a geometric series is $6 \cdot 4$, and the sum to infinity of the series is 10.

(a) Given that the common ratio is positive, find its value. [5]

(b) Find, correct to three decimal places, the sum of the first eleven terms of the series. [3]

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Target question - complete on your own

A geometric series has first term a and common ratio r. The fifth term of the geometric series is 135 and the eighth term is 5.

(a) Show that $r = \frac{1}{3}$ and find the value a. [5]

(b) Find the sum to infinity of the series. [2]

How did you do? Geometric Series:

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Use of the binomial expansion at A2 - important notes and formulae

An example question:

Expand $(1-2x)^{-\frac{1}{2}}$ in ascending powers of x up to and including the term in x^2. State the range of values of x for which the expansion is valid.

Hence, by writing $x = \frac{1}{8}$ in your expansion, find an approximate value for $\sqrt{3}$ in the form $\frac{a}{b}$, where a and b are integers. [5]

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Target question - complete on your own

Expand

$$\left(1-\frac{x}{4}\right)^{\frac{1}{2}}$$

in ascending powers of x up to and including the term in x^2.
State the range of values of x for which your expansion is valid.
Hence, by writing $x = 1$ in your expansion, show that

$$\sqrt{3} \approx \frac{111}{64}$$

[5]

How did you do? Binomial Expansion: