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STEM SMART Single Maths 25 - Sequences & Series

Arithmetic Sequences and Series

A-level Maths Topic Summaries - Series

Subject & topics

Maths | Algebra | Series

Status	Stage & difficulty
Not started	A Level Practice 2

Fill in the blanks below to complete the notes on arithmetic sequences and series.

Part A
Arithmetic sequences

An example of an arithmetic sequence is

$$3 \quad 5 \quad 7 \quad 9 \quad 11 \quad 13 \quad \ldots$$

In an arithmetic sequence there is a constant difference between successive terms. If [____] is the first term in an arithmetic sequence, and [____] is the common difference,

1st term: $u_1 = a$

2nd term: $u_2 = u_1 + d = a + d$

3rd term: $u_3 = u_2 + d = a + 2d$

...

The nth term in the sequence is given by the formula

$$u_n = a + \boxed{} d$$

Items:

$\boxed{a}$ $\boxed{d}$ $\boxed{n}$ $\boxed{(n-1)}$

Part B

Arithmetic series

An example of an arithmetic series is

$$3 + 5 + 7 + 9 + 11 + 13 + \dots$$

An arithmetic series is a sum of terms in an arithmetic sequence. The sum of the first n terms, S_n, is given by

$$S_n = u_1 + u_2 + u_3 + \dots + u_n$$

$$S_n = \frac{n}{2}(\boxed{}a + \boxed{}d)$$

If the value of the last term in the series is l, this formula can also be written

$$S_n = \frac{n}{2}(a + \boxed{})$$

Items:

$\boxed{1}$ $\boxed{2}$ $\boxed{n}$ $\boxed{(n-1)}$ $\boxed{l}$

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STEM SMART Single Maths 25 - Sequences & Series

Geometric Sequences and Series

A-level Maths Topic Summaries - Series

Subject & topics

Maths | Algebra | Series

Status	Stage & difficulty
Not started	A Level Practice 2

Fill in the blanks below to complete the notes on geometric sequences and series.

Part A

Geometric sequences

An example of a geometric sequence is

$$3 \quad 6 \quad 12 \quad 24 \quad 48 \quad 96 \quad \ldots$$

In a geometric sequence there is a constant ratio between successive terms. If [____] is the first term in an geometric sequence, and [____] is the common ratio,

1st term: $u_1 = a$

2nd term: $u_2 = u_1 \times r = ar$

3rd term: $u_3 = u_2 \times r = ar^2$

...

The nth term in the sequence is given by the formula

$$u_n = a[\quad\quad]$$

Items:

$\boxed{a}$　$\boxed{r}$　$\boxed{r^n}$　$\boxed{r^{n-1}}$

Part B
Geometric series

An example of a geometric series is

$$3 + 6 + 12 + 24 + 48 + 96 + ...$$

A geometric series is a sum of terms in a geometric sequence. The sum of the first n terms, S_n, is given by

$$S_n = u_1 + u_2 + u_3 + ... + u_n$$

$$S_n = a\frac{\boxed{}}{r - 1}$$

or, equivalently,

$$S_n = a\frac{\boxed{}}{1 - r}$$

If $\boxed{}$, the sum of the terms tends to a finite limit as n tends to infinity. The sum to infinity is given by

$$S_\infty = \boxed{}$$

Items:

$$\boxed{r^n} \quad \boxed{r^{n-1}} \quad \boxed{1 - r^n} \quad \boxed{r^n - 1} \quad \boxed{\frac{a}{1 - r}} \quad \boxed{|r| < 1}$$

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Question deck:

STEM SMART Single Maths 25 - Sequences & Series

STEM SMART Single Maths 25 - Sequences & Series

Sequences and Series 1i

Subject & topics	
Maths	

Status	Stage & difficulty
Not started	A Level Practice 2

A sequence of terms u_1, u_2, u_3, ... is defined by

$$u_1 = 2 \text{ and } u_{n+1} = 1 - u_n$$

$$\text{for } n \geqslant 1$$

Part A

Values

Give the values of u_2, u_3 and u_4.

$$u_2 = \boxed{}$$

$$u_3 = \boxed{}$$

$$u_4 = \boxed{}$$

Part B
Behaviour

Describe the behaviour of the sequence.

- ○ The sequence is periodic, with a period of four. The first two values that repeat are 2 and -1.

- ○ The sequence is periodic, with a period of two. It alternates between values of 2 and -1.

- ○ It is a geometric sequence, with first term 2 and constant ratio $-\dfrac{1}{2}$.

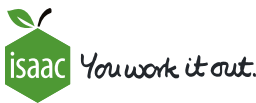- ○ The sequence is periodic, with a period of three. It cycles through values of 2, -1 and 1.

Part C
Sum

Find $\displaystyle\sum_{n=1}^{100} u_n$.

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Arithmetic Progression 1

Pre-Uni Maths for Sciences C2.2

Subject & topics

Maths | Algebra | Series

Status

Not started

Stage & difficulty

A Level Practice 2

⬡⬡⬡

In an arithmetic progression, the fifth term is 32 and the tenth term is 57.

Part A
First term

Find the first term, a.

Part B
Common difference

Find the common difference, d.

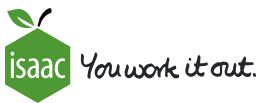## Part C
Sum of first 70 terms

Hence, find the sum of the first 70 terms.

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 You work it out.

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Arithmetic Series 2ii

Subject & topics		
Maths		

Status	Stage & difficulty	
Not started	A Level Practice 2	

The tenth term of an arithmetic progression is equal to twice the fourth term. The twentieth term of the progression is 44.

Part A
First Term

Find the first term.

Part B
Common Difference

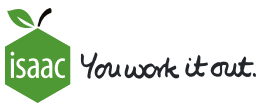Find the common difference.

Part C
Sum of the Series

Find the sum of the first 50 terms.

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Geometric Series 1ii

Subject & topics

Maths

Status	Stage & difficulty
Not started	A Level Practice 2

Records are kept of the number of copies of a certain book that are sold each week. In the first week after publication, 3000 copies were sold, and in the second week 2400 copies were sold. The publisher forecasts future sales by assuming that the number of copies sold each week will form a geometric progression with first two terms 3000 and 2400. Calculate (to the nearest number of whole books) the publisher's forecasts for:

Part A
20th Week

The number of copies that will be sold in the 20th week after publication.

Part B
Total copies sold in 20 weeks

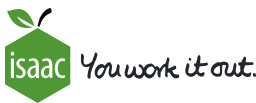The total number of copies sold during the first 20 weeks after publication.

Part C
Total sold copies

The total number of copies that will ever be sold.

Question deck:

STEM SMART Single Maths 25 - Sequences & Series

Part C
Total sold copies

The total number of copies that will ever be sold.

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Geometric Series 2ii

Subject & topics

Maths

Status	Stage & difficulty
Not started	A Level Practice 2

Part A
Geometric progression 1 - r

In a geometric progression, the sum to infinity is four times the first term.

Find the common ratio.

Part B
Geometric progression 1 - a

Given that the third term is 9, find the first term.

Part C
Geometric progression 1 - sum

Find the sum of the first twenty terms. Give your answer to 3 sf.

Part D
Geometric progression 2

In another geometric progression, the first term is 6 and the sum to infinity is 10.

Find the common ratio.

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Question deck:

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Part D
Geometric progression 2

In another geometric progression, the first term is 6 and the sum to infinity is 10.

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Geometric Series 4ii

Subject & topics	
Maths	

Status	Stage & difficulty
Not started	A Level Practice 2

In a geometric progression, the first term is 5 and the second term is 4.8.
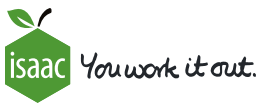

Part A

Sum to Infinity

Find the sum to infinity.

Part B

Value of n

The sum of the first n terms is greater than 124. By showing that

$$0.96^n < 0.008$$

and using logarithms, calculate the smallest possible value of n.

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Arithmetic Series 1i

Subject & topics

Maths

Status

Not started

Stage & difficulty

A Level Practice 2

In an arithmetic progression the first term is 5 and the common difference is 3. The nth term of the progression is denoted by u_n.

Part A

Value of u_{20}

Find the value of u_{20}.

The following symbols may be useful: `u_20`

Part B

Sum

Find the value of $\displaystyle\sum_{n=10}^{20} u_n$.

Part C
Value of N

Find the value of N such that $\displaystyle\sum_{n=N}^{2N} u_n = 2750$.

The following symbols may be useful: N

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Part C
Value of N

Find the value of N such that $\displaystyle\sum_{n=N}^{2N} u_n = 2750$.