

<u>Home</u> <u>G</u>

<u>Gameboard</u>

Maths

Sequences and Series 1i

# Sequences and Series 1i



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

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

for 
$$n \geqslant 1$$

### Part A Values

Give the values of  $u_2$ ,  $u_3$  and  $u_4$ .

Give the value of  $u_2$ .

The following symbols may be useful: u\_2

Give the value of  $u_3$ .

The following symbols may be useful: u\_3

Give the value of  $u_4$ .

The following symbols may be useful: u\_4

### Part B Behaviour

Describe the behaviour of the sequence.

	The sequence is periodic,	with a period of three	. It cycles through va	alues of $2$ , $-1$ and $1$ .
_	 ' '	•	, ,	,

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

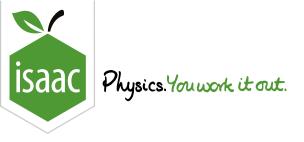
The sequence is periodic, with a period of four. The first two values that repeat are 2 and -1.

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

### Part C Sum

Find 
$$\sum\limits_{n=1}^{100}u_n$$
 .

Adapted with permission from UCLES A-level Maths papers, 2003-2017.



<u>Home</u> <u>Gameboard</u>

<u>neboard</u> Maths

Algebra

Series Arithmetic Progression 1

# **Arithmetic Progression 1**



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.

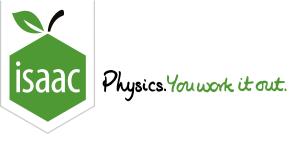
### Part C Sum of first 70 terms

Hence, find the sum of the first 70 terms.

Created for isaacphysics.org by Julia Riley.

Gameboard:

**STEM SMART Single Maths 35 - Sequences & Series** 



<u>Home</u>

<u>Gameboard</u>

Maths

Arithmetic Series 5i

# **Arithmetic Series 5i**



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

$$u_n=2n+5, \; {
m for}\, n\geqslant 1.$$

#### Values Part A

Write down the values of  $u_1$ ,  $u_2$ , and  $u_3$ .

State the value of  $u_1$ .

The following symbols may be useful: u\_1

State the value of  $u_2$ .

The following symbols may be useful: u\_2

State the value of  $u_3$ .

The following symbols may be useful: u\_3

### Part B Type of Sequence

What type of sequence is made by the terms of  $u_n$ ?

- A periodic sequence
- A Fibonacci sequence
- An arithmetic sequence (arithmetic progression)
- A geometric sequence (geometric progression)

## ${\bf Part \ C} \qquad {\bf Value \ of} \ N$

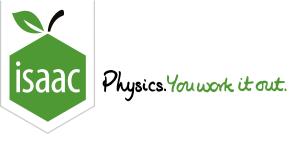
Given that 
$$\displaystyle \sum_{n=1}^N u_n = 2200$$
, find the value of  $N$ .

The following symbols may be useful: N

Adapted with permission from UCLES A-level Maths papers, 2003-2017.

Gameboard:

**STEM SMART Single Maths 35 - Sequences & Series** 



Home Gameboard

<u>imeboard</u> Maths

Algebra

Series

Arithmetic Series 1

# **Arithmetic Series 1**



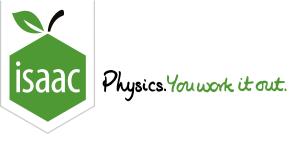
Find the sum of the arithmetic series

$$10.0 + 10.1 + 10.2 + \cdots + 12.0$$

Created for isaacphysics.org by Julia Riley.

Gameboard:

**STEM SMART Single Maths 35 - Sequences & Series** 



Home Gameboard

Maths

Arithmetic Series 2ii

# **Arithmetic Series 2ii**

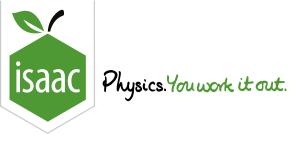


The tenth term of an arithmetic progression is equal to twice the fourth term. The twentieth term of the progression is $44$ .
Part A First Term
Find the first term.
Part B Common Difference
Find the common difference.
Part C Sum of the Series
Find the sum of the first $50$ terms.

Used with permission from UCLES A-level Maths papers, 2003-2017.

Gameboard:

STEM SMART Single Maths 35 - Sequences & Series



<u>Home</u> <u>Gameboard</u>

Maths Geometric Series 1ii

## Geometric Series 1ii



Records are kept of the number of copies of a certain book that are sold each week. In the first week after publication, 3000copies 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:

#### $20^{ m th}$ Week Part A

The number of copies that will be sold in the  $20^{
m th}$  week after publication.

#### Total copies sold in 20 weeks Part B

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

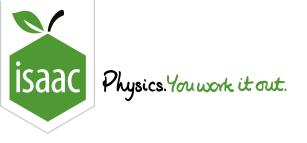
#### Total sold copies Part C

The total number of copies that will ever be sold.

Used with permission from UCLES A-level Maths papers, 2003-2017.

Gameboard:

STEM SMART Single Maths 35 - Sequences & Series



<u>Home</u> <u>Gameboard</u> Maths Algebra Series

## **Geometric Series 4**

A Level Further A

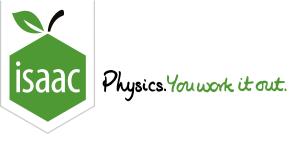
The second and fourth terms of an infinite geometric series are  $\frac{1}{2}$  and  $\frac{1}{72}$  respectively. Deduce the common ratio (given that it is positive) and the first term. Hence find the sum of the series, giving your answer in the form of an improper fraction.

Geometric Series 4

Created for isaacphysics.org by Julia Riley

Gameboard:

**STEM SMART Single Maths 35 - Sequences & Series** 



Home Gameboard

Maths

Geometric Series 2ii

## Geometric Series 2ii



Part A	Goomotric	c Progression 1	1

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

Find the common ratio.

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

Find the sum of the first twenty terms. (To three significant figures.)

## Part B Geometric Progression 2

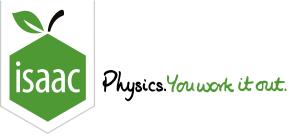
The first term of a geometric progression is 6 and the sum to infinity is 10.

Find the common ratio.

Used with permission from UCLES A-level Maths papers, 2003-2017.

Gameboard:

STEM SMART Single Maths 35 - Sequences & Series



<u>Home</u>

<u>Gameboard</u>

Maths

Geometric Series 4ii

## Geometric Series 4ii



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

#### **Sum to Infinity** Part A

Find the sum to infinity.

#### Value of nPart B

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

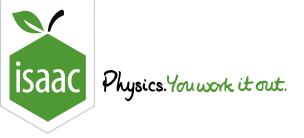
 $0.96^n < 0.008$ 

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

Used with permission from UCLES A-level Maths papers, 2003-2017.

Gameboard:

STEM SMART Single Maths 35 - Sequences & Series



<u>Home</u>

Gameboard

Maths

Arithmetic Series 1i

## **Arithmetic Series 1i**



In an arithmetic progression the first term is 5 and the common difference is 3. The  $n^{\text{th}}$  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 
$$\sum_{n=10}^{20} u_n$$
 .

### 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:  $\ensuremath{\mathsf{N}}$ 

Used with permission from UCLES A-level Maths papers, 2003-2017.