Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

0078478114

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/51**

Paper 5 (Core) **May/June 2019**

1 hour

Candidates answer on the Question Paper.

Additional Materials: Graphics Calculator

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
Do not use staples, paper clips, glue or correction fluid.
You may use an HB pencil for any diagrams or graphs.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** the questions.
You must show all relevant working to gain full marks for correct methods, including sketches.
In this paper you will also be assessed on your ability to provide full reasons and communicate your mathematics clearly and precisely.
At the end of the examination, fasten all your work securely together.
The total number of marks for this paper is 24.

This document consists of **7** printed pages and **1** blank page.

© UCLES 2019

Cambridge Assessment International Education

[Turn over

Answer **all** the questions.

INVESTIGATION GAMES IN A COMPETITION

This investigation looks at games played in a competition.

In a competition every team must play each of the other teams once.

Example
There are three teams, A, B and C in the competition.
Three different games are played.

These are: A against B A against C B against C

These are written as: AB AC BC

Note that AB is the same as BA.

1 (a) (i) There are now four teams A, B, C and D in the competition.

Write down the 6 different games played by these four teams.

.....

(ii) There are now five teams A, B, C, D and E in the competition.

Write down all the different games played by these five teams.

.....

© UCLES 2019

(b) Complete the table.
Use your answer to **part (a)(ii)** to help you.

Number of teams (n)	2	3	4	5	6	7
Number of games (g)	1	3	6			

(c) **(i)** The numbers of games in the second row of the table form a sequence.

Write down the mathematical name for this sequence.

.....

(ii) Write down the rule to find further terms in this sequence.

.....

.....

(d) When there are n teams in the competition the number of games played is g, where

$$g = \frac{1}{2}n^2 + kn.$$

Find the value of k.

.....

(e) Using your value of k, show that the formula in **part (d)** is correct for 8 teams.

(f) Find the number of games played when there are 20 teams in the competition.

.....

© UCLES 2019

2 There are now 8 teams in the competition, A, B, C, D, E, F, G and H.
Every team plays one game each week.
Note that AB is the same as BA.

(a) Complete the table to show the games for the first three weeks.
There are many ways of doing this. You only need to show one way.

	Game 1	Game 2	Game 3	Game 4
Week 1	AB	DG		CH
Week 2	AC			
Week 3				

(b) Write down the total number of weeks it will take to play all the games.

.....

© UCLES 2019

[Turn over

(c) Points are awarded to each of the 8 teams in the competition every time they play one of their 7 games.

A team gets

- 3 points for a win
- 1 point for a draw (when the score for each team is the same)
- 0 points for a loss.

A team plays all 7 games.

(i) Find the highest number of points that this team can get.

.....

(ii) Write down the smallest number of points that this team can get.

.....

(iii) The team wins two games, loses two games and draws the rest.

Calculate the number of points that this team gets.

.....

© UCLES 2019

(iv) Can this team finish the competition with 20 points?

Show how you decide.

(v) Find all the different ways that this team could score 9 points.

One way is 1 win and 6 draws.

© UCLES 2019

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge Assessment International Education Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cambridgeinternational.org after the live examination series.

Cambridge Assessment International Education is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which itself is a department of the University of Cambridge.

© UCLES 2019