Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

8300980506

MATHEMATICS **9709/52**

Paper 5 Probability & Statistics 1 **October/November 2021**

1 hour 15 minutes

You must answer on the question paper.

You will need: List of formulae (MF19)

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- If additional space is needed, you should use the lined page at the end of this booklet; the question number or numbers must be clearly shown.
- You should use a calculator where appropriate.
- You must show all necessary working clearly; no marks will be given for unsupported answers from a calculator.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.

INFORMATION

- The total mark for this paper is 50.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **12** pages.

[Turn over

1 Each of the 180 students at a college plays exactly one of the piano, the guitar and the drums. The numbers of male and female students who play the piano, the guitar and the drums are given in the following table.

	Piano	Guitar	Drums
Male	25	44	11
Female	42	38	20

A student at the college is chosen at random.

(a) Find the probability that the student plays the guitar. [1]

.....

.....

.....

(b) Find the probability that the student is male given that the student plays the drums. [2]

.....

.....

.....

.....

.....

(c) Determine whether the events 'the student plays the guitar' and 'the student is female' are independent, justifying your answer. [2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

2 A group of 6 people is to be chosen from 4 men and 11 women.

(a) In how many different ways can a group of 6 be chosen if it must contain exactly 1 man? [2]

.....

.....

.....

.....

.....

.....

.....

.....

.....

Two of the 11 women are sisters Jane and Kate.

(b) In how many different ways can a group of 6 be chosen if Jane and Kate cannot both be in the group? [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

3 A bag contains 5 yellow and 4 green marbles. Three marbles are selected at random from the bag, without replacement.

(a) Show that the probability that exactly one of the marbles is yellow is $\frac{5}{14}$. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

The random variable X is the number of yellow marbles selected.

(b) Draw up the probability distribution table for X. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(c) Find E(X). [1]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

4 **(a)** In how many different ways can the 9 letters of the word TELESCOPE be arranged? [2]

.....

.....

.....

.....

.....

.....

(b) In how many different ways can the 9 letters of the word TELESCOPE be arranged so that there are exactly two letters between the T and the C? [4]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

5 In a certain region, the probability that any given day in October is wet is 0.16, independently of other days.

(a) Find the probability that, in a 10-day period in October, fewer than 3 days will be wet. [3]

.....

.....

.....

.....

.....

.....

.....

.....

(b) Find the probability that the first wet day in October is 8 October. [2]

.....

.....

.....

.....

.....

.....

(c) For 4 randomly chosen years, find the probability that in exactly 1 of these years the first wet day in October is 8 October. [2]

.....

.....

.....

.....

.....

.....

6 The times taken, in minutes, to complete a particular task by employees at a large company are normally distributed with mean 32.2 and standard deviation 9.6.

(a) Find the probability that a randomly chosen employee takes more than 28.6 minutes to complete the task. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(b) 20% of employees take longer than t minutes to complete the task.

Find the value of t. [3]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

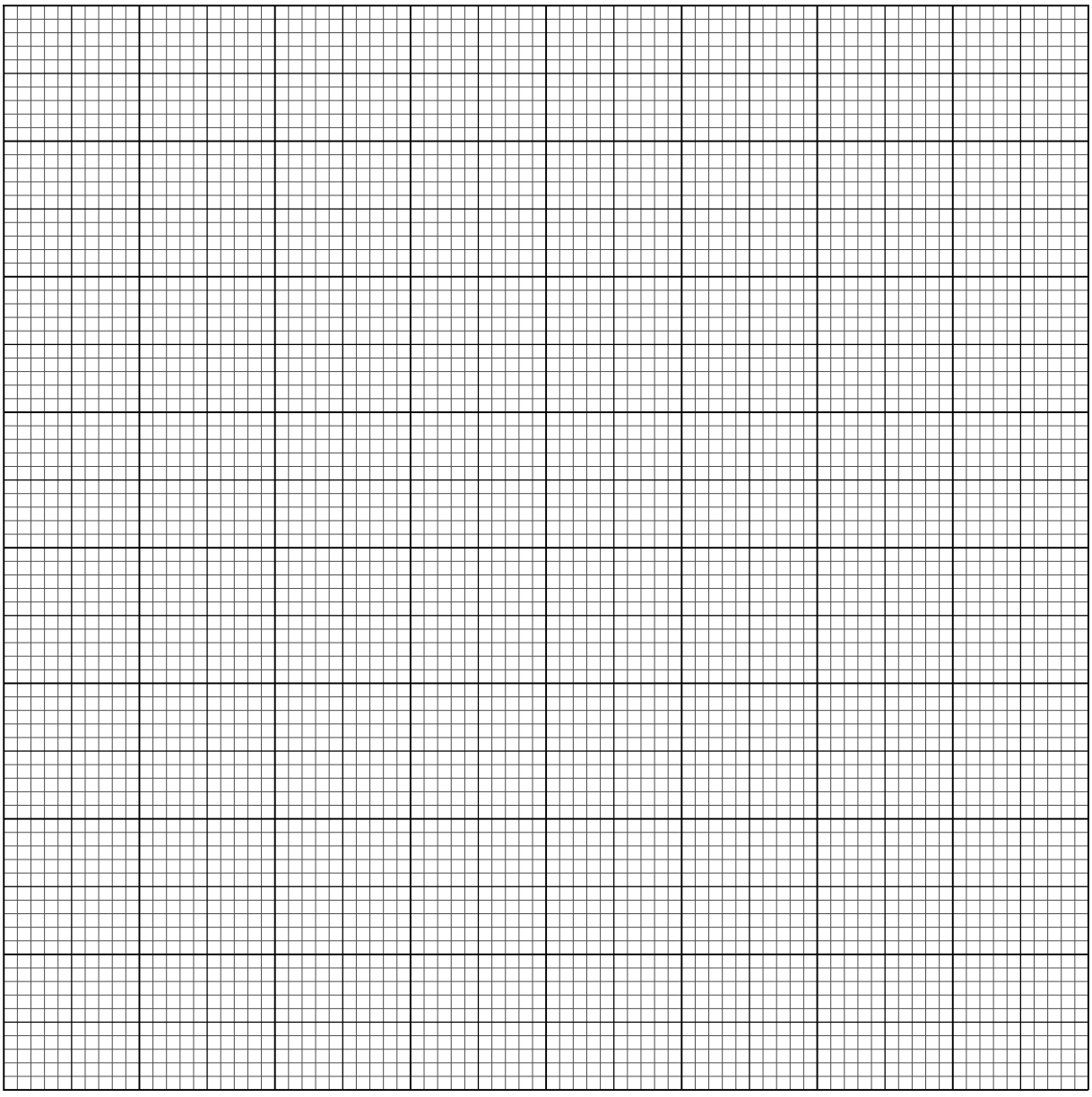
.....

(c) Find the probability that the time taken to complete the task by a randomly chosen employee differs from the mean by less than 15.0 minutes. [4]

7 The distances, x m, travelled to school by 140 children were recorded. The results are summarised in the table below.

Distance, x m	$x \leqslant 200$	$x \leqslant 300$	$x \leqslant 500$	$x \leqslant 900$	$x \leqslant 1200$	$x \leqslant 1600$
Cumulative frequency	16	46	88	122	134	140

(a) On the grid, draw a cumulative frequency graph to represent these results. [2]



(b) Use your graph to estimate the interquartile range of the distances. [2]

.....

.....

.....

.....

.....

.....

(c) Calculate estimates of the mean and standard deviation of the distances. [6]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Additional Page

If you use the following lined page to complete the answer(s) to any question(s), the question number(s) must be clearly shown.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....