

Cambridge International AS & A Level

CANDIDATE NAME			
CENTRE NUMBER		CANDIDATE NUMBER	
MATHEMATIC	cs		9709/6
Paper 6 Probal	bility & Statistics 2		May/June 202
			1 hour 15 minute
You must answ	ver on the question paper.		
You will need:	List of formulae (MF19)		

INSTRUCTIONS

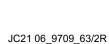
- Answer all questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do not use an erasable pen or correction 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 16 pages. Any blank pages are indicated.

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ectation and stan	dard deviation	n of the amoun	t that the suppor	ter will pay.	[5]
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	2. Following the introduction of some new signals, it is required to test whether the mean journe has decreased.
(a)	State what is meant by a Type II error in this context. [1
(b)	The mean time for a random sample of 50 journeys is found to be 1.36 hours.
	Assuming that the standard deviation of journey times is still 0.12 hours, test at the 2.5% significance level whether the population mean journey time has decreased. [5]
(c)	State, with a reason, which of the errors, Type I or Type II, might have been made in the test in part (b).

The local council claims that the average number of accidents per year on a particular road is 0.8.

3

(a)	Assu	ame that the number of accidents per year follows a Poisson distribution.	
	(i)	State null and alternative hypotheses for a test of Jane's claim.	1
	(ii)	Test at the 5% significance level whether Jane's claim is justified.	
(b)	Jane	finds that the number of accidents per year has been gradually increasing over	er recent yea
	State	e how this might affect the validity of the test carried out in part (a)(ii).	
			• • • • • • • • • • • • • • • • • • • •

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The masses, m kilograms, of flour in a random sample of 90 sacks of flour are summarised as follows.

		n = 90	$\Sigma m = 4509$	$\Sigma m^2 = 225950$	
(a)	Find unbiased estin	nates of the J	population mean	and variance.	[3]
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xplain why it was necessary to use the Central Limit theorem in answering part (b).	[1
ind the probability that the confidence interval found in part (b) is wholly above the treather the population mean.	rue value [2]

Most plants of a certain type have three leaves. However, it is known that, on average, 1 in 10 000

	nts in a random sample of 25 000 plants is denoted by X .
(a)	State, with a justification, an approximating distribution for X , giving the values of any parameter
	·
Use	e your approximating distribution to answer parts (b) and (c).
	e your approximating distribution to answer parts (b) and (c). Find $P(X \le 3)$.

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(c)	Given that $P(X = k) = 2P(X = k + 1)$, find k .	[2]
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The	number of lucky plants in a random sample of n plants, where n is large, is denoted by Y .	
(d)	Given that $P(Y \ge 1) = 0.963$, correct to 3 significant figures, use a suitable approximate distribution to find the value of n .	ting [3]
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6	Alethia models the length of time, in minutes, by which her train is late on any day by the random
	variable <i>X</i> with probability density function given by

$$f(x) = \begin{cases} \frac{3}{8000} (x - 20)^2 & 0 \le x \le 20, \\ 0 & \text{otherwise.} \end{cases}$$

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(b)	Find $E(X)$.	[4]
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(c)	The median of X is denoted by m .
	Show that m satisfies the equation $(m-20)^3 = -4000$, and hence find m correct to 3 significant figures. [4]
(d)	State one way in which Alethia's model may be unrealistic. [1]

Additional Page

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