



Level 3 Certificate MATHEMATICAL STUDIES

Paper 2A - Statistical techniques

Date Morning Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a clean copy of the Preliminary Material (enclosed)
- · a scientific calculator or a graphics calculator
- a copy of the formulae sheet and a copy of the statistical tables
- a ruler.

Instructions

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Fill in the boxes at the bottom of this page.
- Answer all questions.
- You must answer each question in the space provided for that question. If you require extra space, use an AQA supplementary answer book; do **not** use the space provided for a different question. You do not necessarily need to use all the space provided.
- Do not write outside the box around each page.
- Show all necessary working; otherwise marks for method may be lost.
- Do all rough work in this book. Cross through any work that you do not want to be marked.
- The final answer to questions should be given to an appropriate degree of accuracy.
- You may not refer to the copy of the Preliminary Material that was available prior to this examination. A clean
 copy is enclosed for your use.

Information

- The marks for questions are shown in brackets. The maximum mark for this paper is 60.
- The paper reference for this paper is 1350/2A.

Please write clearly, in block capitals, to allow character computer recognition.									
Centre number			Candid	date nun	nber				
Surname									
Forename(s)									
Candidate signa	ature								 - /

Answer all questions in the spaces provided.

1 Ben has been asked to write a short report on the average number of text messages sent per day by students in his class.

Ben's complete report is given below.

To study the number of text messages sent and received by students, I asked my friends to count the number of messages they sent and received. To display this information clearly, I entered the 9 pieces of data into a spreadsheet, as shown below.

	А	В	С	D
1	Person	Number of messages sent	Number of messages received	Total number of messages
2	Olivia	16	28	44
3	Josh	18	5	33
4	Ava	7	18	25

Analyse Ben's report, identifying any errors.	
Suggest any improvements he could make.	
	[4 marks]

	annual salary is £66 000								
The	ne bank will lend him three times his annual salary for a mortgage.								
	s is 90% of the house price.								
	makes these notes:								
1101	nakes tross ricks.								
	3 x 66 000 = 188 000								
	188 000 x 0.9 = 169 200								
	So I can buy a house up to £169 200								
	This does not look right. What have I done wrong?								
Criti	cally analyse Peter's notes making corrections where necessary.								
Onto	daily analyse i store notes making corrections where necessary.	[

3		Use Positive spin on the Preliminary Material.	
3	(a)	The editor of the local newspaper received a letter of complaint to say the data had badly presented.	ad been
		Was the complaint justified?	[2 marks]
3	(b)	The newspaper headline for the 2014 by-election result said:	
		Half of Newark voters did not vote and UKIP made the biggest gain	
		Does the data support these claims?	[3 marks]

е
ks]

The IQ (In modelled I	_		-			-		of a stud	dent may	be be
The Princi	pal of S	ydbourne	e Colleg	e states:						
'N	/ly stude	nts have	a lower	r IQ than	student	s at Mel	ney Coll	ege.'		
The mean	IQ of th	e studer	nts at Me	elney Co	llege is '	115				
The IQs of with mean				College	may be	assume	d to folk	ow a nor	mal distri	bution
A random Their IQs	-			-		lege wa	s chosei	٦.		
112	97	119	103	108	122	96	115	107	99	
Calculate Principal's		-	c confid	ence inte	erval for	μ and	hence co	omment	on the	
Fillicipals	Statem	eni.							[7	marks]

5 Three judges at a college music competition award marks to nine singers as shown.

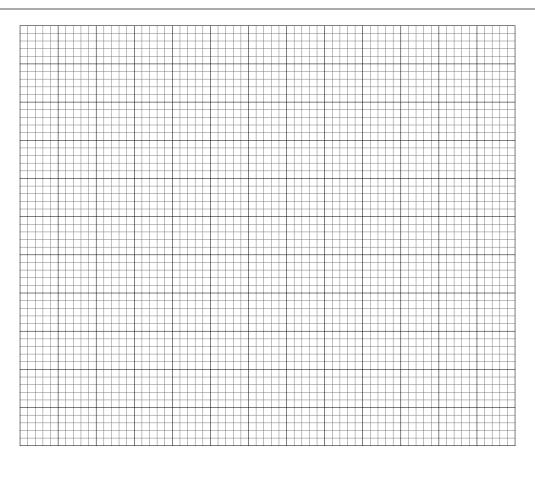
Singer Judge	A	В	С	D	E	F	G	Н	1
Will	71	72	85	63	64	70	62	79	73
Kylie	75	77	68	84	82	66	81	69	80
Ricky	75	83	64	89	84	67	73	66	78

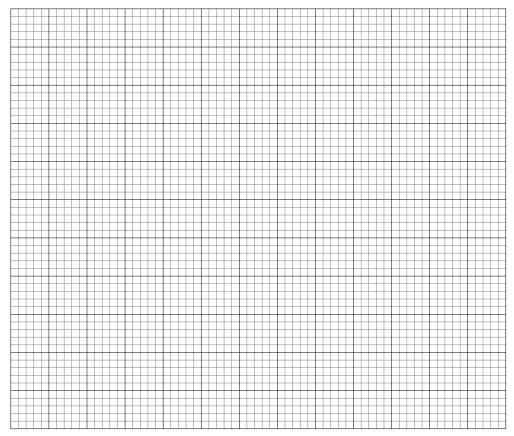
The organisers of this music competition decide to exclude the marks awarded by Will to singers in the competition.

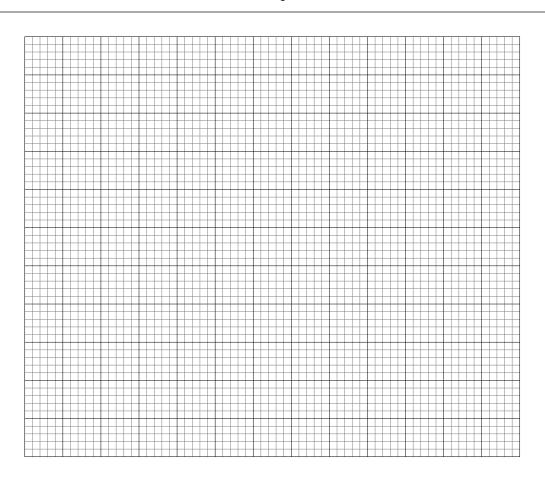
You are writing a report for the college magazine about this.

Use statistical analysis and reasoning to comment on the organisers' decision.

You may use the grids on the following pages if you wish.		
	[6 marks]	







Turn over for the next question

6	If you measure your heart rate when you are resting, it is known as your resting heart rate.
	The table below shows the resting heart rates in beats per minute (bpm) of eleven
	football players.

Resting heart rate (bpm)
47
65
69
62
71
90
67
80
52
53
61

6	(a)	Resting heart rates in the general adult population are normally distributed with mean
		71 bpm and standard deviation 12 bpm.

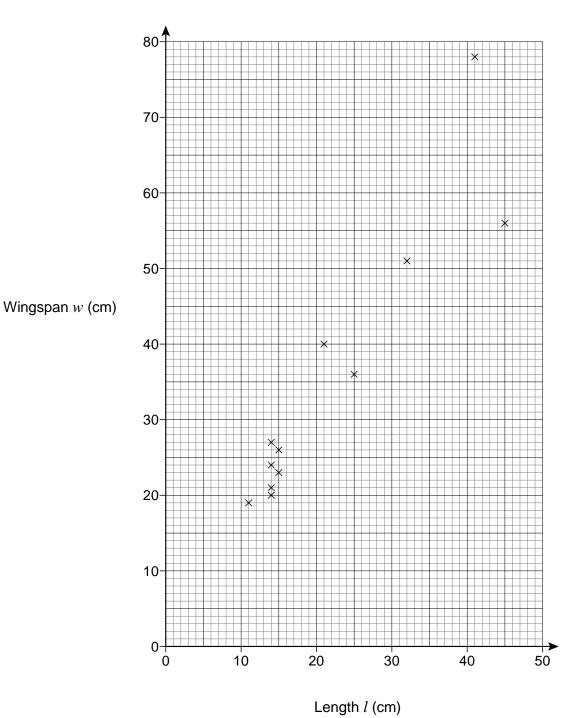
Compare the resting heart rates of these eleven football players to those of the general population.

[5 marks]

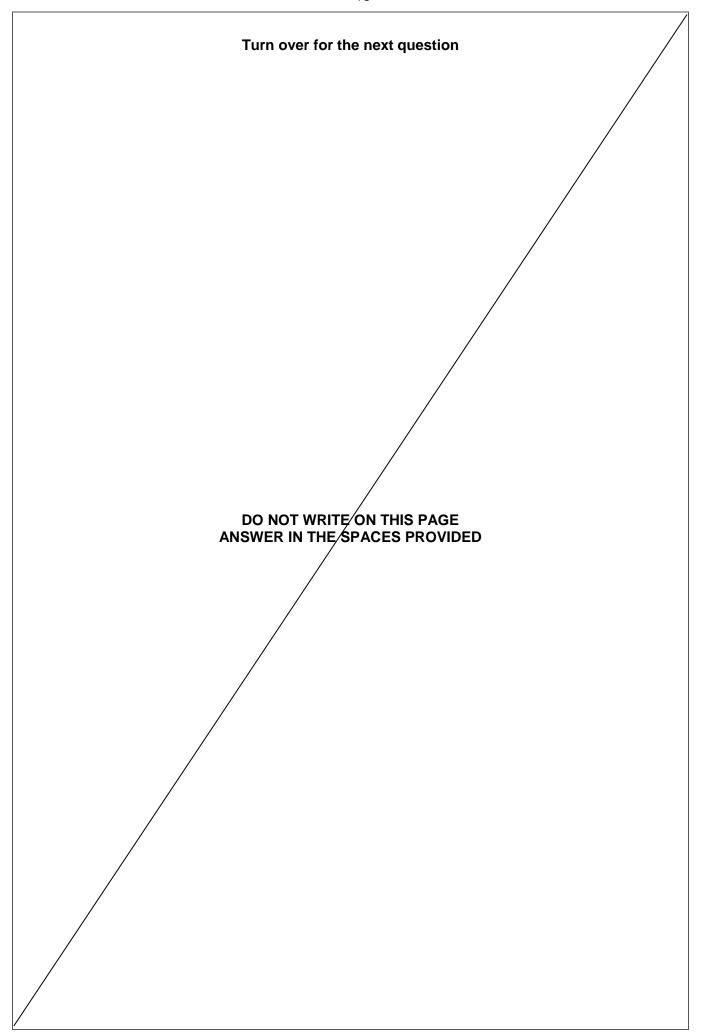
		A screening test is offered to people with a resting heart rate which is at least two standard deviations above the mean for the general population.	
6	(b)	Show that none of the football players would be offered this screening test.	2 marks]
6	(c)	There are 35 000 patients in Stokeville primary health care trust. It intends to offer the screening test to all patients who qualify for it. Each screening test costs £23.95	
		How much should the trust staff expect this testing to cost?	6 marks]

7		The scatter diagram opposite gives the length and the wingspan of the twelve most common garden birds in the UK.
7	(a)	Calculate the equation of the regression line of l on w and plot the line on the scatter graph opposite. [5 marks]





7	(b)	The 'flying dinosaur' pterodactylus had a wingspan of approximately 1.5 m and a body
•	\~ <i>j</i>	length of approximately 90cm.
		Does the data support the idea that today's birds are descended from dinosaurs?
		You must show working to justify your answer.
		[3 marks]



8 In the UK women's clothing size is usually indicated by numbers.

The British Standards Institute produced a standard set of sizes from 8 to 32

However, stores do not all use the British Standard.

Dresses with the same size number may have different measurements in different stores.

The table below shows some of the actual measurements of size 14 dresses at eight high street stores.

High Street Store	Chest (inches)	Waist (inches)
Italian Connection	37.4	31.1
Matts and Stephens	37.8	31.1
Nix	37.0	30.0
TipShop	38.2	31.2
Denise Poppins	38.2	30.7
Hollis	39.0	31.5
Weiss	39.5	32.1
Elixir	40.2	32.3

You may use the grid below if you wish.)	Describe the correlation between the chest size and waist size of the dresses.

	chest	38 inches	
	waist	31 inches	
List the stores	in order of how closely t	hey follow these recommenda	ations.
You must show	w your working to justify	your answer.	[2 m
			[3 m
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