



Please write clearly in block capitals.	
Centre number	Candidate number
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Forename(s)	
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# GCSE STATISTICS



Higher tier Paper 2

Date of Exam Morning Time allowed: 1 hour 45 minutes

### **Materials**

For this paper you must have:

- a calculator
- · mathematical instruments.



### Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of the page.
- Answer all questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross out any work you do not want to be marked.

### Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper and graph paper. These must be tagged securely to this answer booklet.

	Answe	r <b>all</b> questions in	the spaces provided.		
1	Paul gives a survey to	every 5th studer	nt on the school registe	rs.	
	Circle the name for this	s type of samplir	ng.		[4
					[1 mark]
	Random	Stratified	Systematic	Quota	
2	The mean of six numb				
	The first five of the nur	nbers are			
	2	0	0 4	10	
	Circle the value which	is the median of	the <b>six</b> numbers.		
					[1 mark]
	0	2	3	5	
3	Circle the name of the continuous data.	diagram that ca	n be correctly used for	grouped	
	Continuous data.				[1 mark]
		Eroguanav			
	Bar chart	Frequency polygon	Pie chart	Bar line chart	

A doctor investigates how likely children are to have hay fever.

She collects the following information from her patients.

**Girls**have hay fever

Boys
90 have hay fever
270 do not have hay fever

32

How many times more likely is hay fever in boys compared with in girls? Circle the answer.

[1 mark]

0.5 2 2.67

Turn over for the next question

5		Jenny is doing a survey on people (tenants) who rent flats.	
		She uses two rental companies 'Letsmove' and 'Supaflat'.	
		Her hypothesis is,	
		"'Letsmove' tenants make fewer complaints than 'Supaflat' to	enants."
5	(a)	Give <b>two</b> reasons why Jenny should take a sample and not ask every tenant.	[2 marks]
		Reason 1	
		Reason 2	
5	(b)	Jenny decides to take a sample using stratification.	
5	(b) (i)	Name <b>one</b> category which she could use to stratify her sample.	[1 mark]
			[
		Answer	
			_
5	(b) (ii)	Give a reason for your answer.	[1 mark]

5 (c)	Write a question which Jenny could use to find out the number of complaints a tenant had made.	
	Include a response section.	[4 marks]
5 (d)	Jenny is considering collecting the data using either telephone interviews, door interviews or an internet survey.	to door
	Which method would you choose from her list?	
	Data collection method	
	Give <b>one</b> advantage of your method over the other two methods.	[1 mark]

6 (a)	Bag A contains 8 red and 7 blue counters.  Bag B contains 12 red and 10 blue counters.
	A bag is chosen at random.
	A counter is taken at random from the chosen bag.
	Work out the probability that it is red.  [3 marks]
	Answer
6 (b)	Bag C contains only green and yellow counters.
<b>o</b> (2)	• P (green) = $\frac{3}{4}$
	<ul> <li>There are more than 20 but fewer than 30 counters in the bag.</li> </ul>
	Work out a possible value for the number of <b>yellow</b> counters there could be in the bag.
	[2 marks]
	-
	•
	Answer

7	A company makes a metal alloy by combining three metals, A, B and C, in the
	ratio 19:4:2

The table shows the index numbers for the cost of each metal in 2016 using 2011 as the base year.

Metal	Weighting	Index
А	19	84.9
В	4	93.5
С	2	81.2

Answer
The company claims that the combined cost of the metals in the alloy has fallen by 15% between 2011 and 2016
Is the company correct?
Tick a box.  Yes No
Explain your answer. [1

8 A population pyramid is drawn to show the percentages of the UK population by age and gender in 2011

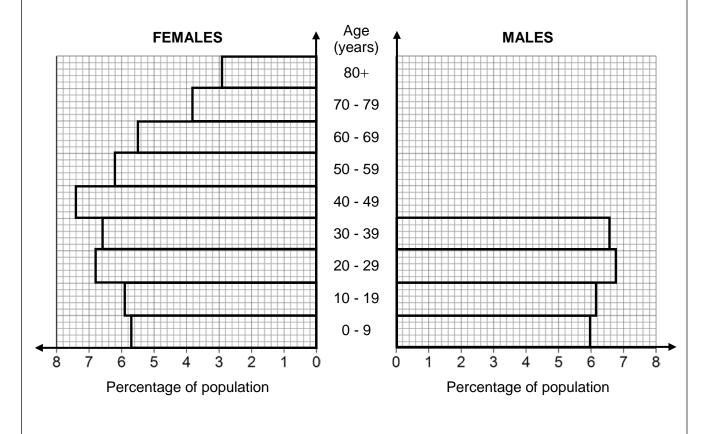
The data for females and for some of the male ages has already been drawn.

**8 (a)** Use the table to complete the population pyramid for males.

[2 marks]

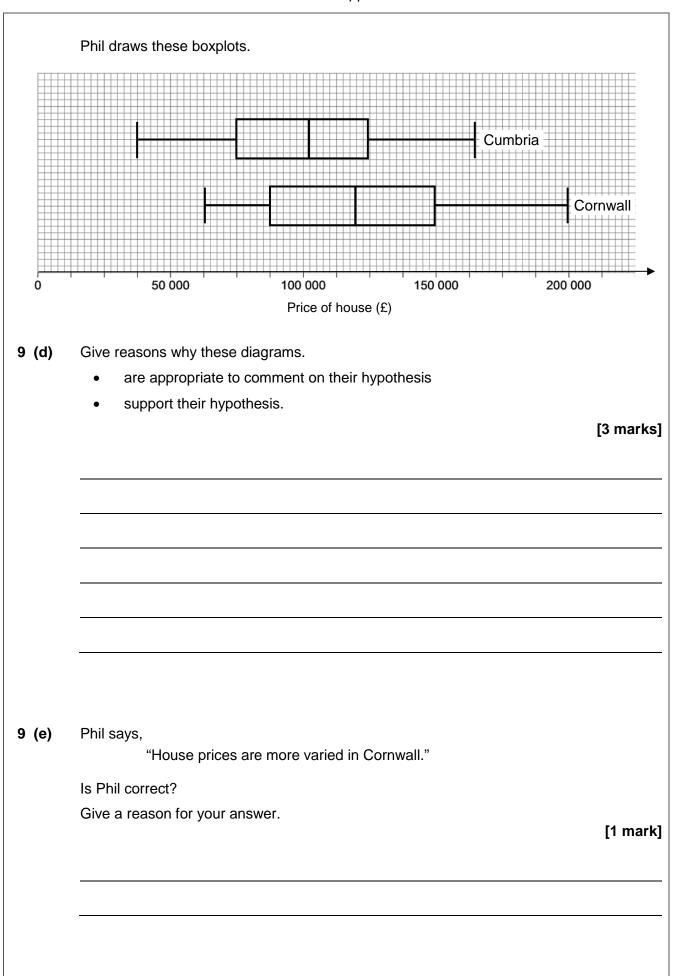
Age (years)	Percentage of population (males)
0 - 9	6.0
10 - 19	6.2
20 - 29	6.8
30 - 39	6.6
40 - 49	7.2
50 - 59	6.0
60 - 69	5.3
70 - 79	3.3
80+	1.2

[Source: Office for National Statistics]



) Wh	nat percentage of the UK population are between the ages of 20 and 39?	[2 mai
	Answer %	
In :	2011, the number of males aged 80 and over was 760 000	
Ca	lculate the number of males aged 10 – 19 years.	[2 mai
_		
	Answer	
	Turn over for the next question	
	rum over for the next question	

9	Jane and Phil are studying house prices to compare Cumbria and Cornwall.	
	They are going to send their findings to a local newspaper in Cumbria.  Their hypothesis is 'house prices in Cornwall are more expensive than house prices in Cumbria.'	
	They collect their data from a website which gives the house prices for all houses for sale in each area.	
	They sort each list into price order and then collect their samples.	
9 (a)	Jane uses the first 30 house prices from each area.	
	What is the name of this sampling method?  [1 mark]	k]
9 (b)	State <b>one</b> reason why this method will <b>not</b> produce a sample which is representative of the house prices in each area.  [1 mark	k]
9 (c)	Phil decides to use a different method to collect his sample.	_
	Describe <b>one</b> method that Phil could use to collect a sample of 30 which is likely to be more representative of the house prices in each area.	
	You should include the name of your sampling method, and a reason why a sample	
	using this method is likely to be more representative.  [4 marks	s]
		_
		_
		_



Jane calculates the mean and range for each of her two sets of data.

	Mean	Range
Cumbria	£74300	£48500
Cornwall	£64800	£50 000

Jane decides to develop her study to include the number of bedrooms each house has State <b>one</b> other variable that she could include to develop her study.	<u> </u>
Give one reason for each interpretation, write your answers so they can be understood by the readers of the local newspaper.  [4 max]  Jane decides to develop her study to include the number of bedrooms each house has State one other variable that she could include to develop her study.	Write down two different interpretations that Jane could make using these values
) Jane decides to develop her study to include the number of bedrooms each house has State one other variable that she could include to develop her study.	
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	State <b>one</b> other variable that she could include to develop her study.
	[1 ma

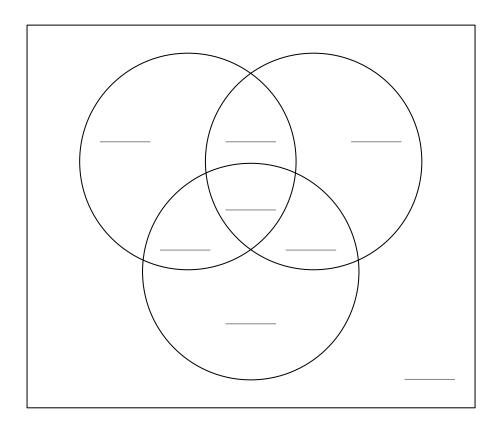
10	the number of to	feeding tomato pmatoes the plant to be set up to t	s produce.	w plant food, 'Gro	owfast', will ir	crease
	Here is a list of v	ariables that may	y be connected	to the experimer	nt.	
	B – The number C – How much s D – The colour o	ne plant is watere of tomatoes a plant sunlight the plant of the pot the tom lant food 'Growfa	ant produces. gets. atoes grow in.			
	For this experim	ent				
10 (a)	circle the explan	atory variable,				[1 mark]
	Α	В	С	D	Е	
10 (b)	circle the respon	se variable.				[1 mark]
	Α	В	С	D	E	
	In the experiment control group.	, 50 tomato plant	s are fed 'Growl	fast' and 50 toma	ato plants are	put into a
10 (c) (i)	Explain the purpo	ose of using a co	ntrol group in th	is context.		[1 mark]
10 (c) (ii	Identify <b>one</b> pos might be control		variable from th	ne list A, B, C, D,	E and state I	now this [1 mark]

11 Mike asked a sample of 100 people which of the following countries they had visited.

Spain France Italy

- 6 had visited Spain and France and Italy
- 18 had visited France and Italy
- 36 had visited Spain and France
- 4 had visited Spain and Italy but not France
- 74 had visited Spain, 56 had visited France and 24 had visited Italy
- **11 (a)** Use the data to complete the Venn diagram.

[5 marks]



**11 (b)** How many people had visited none of the three countries?

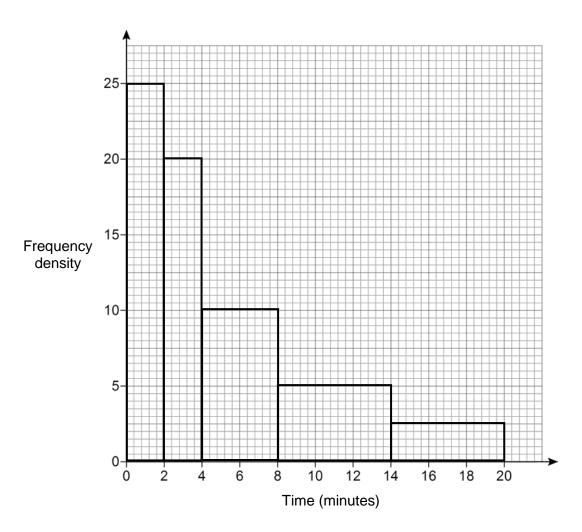
[1 mark]

Answer
--------

11	(c)	One of the 100 people is chosen at random.	
		Find the probability that the chosen person has visited	
11	(c) (i)	Spain or France but not Italy.	[2 marks]
		Answer	-
11	(c) (ii)	Spain given that they had visited Italy.	[2 marks]
		Answer	-
11	(c) (iii)	all three countries, given that they had visited at least two.	[2 marks]
		Answer	-
		Turn over for the next question	

[3 marks]

The histogram shows information about the time (minutes) that a sample of 175 passengers had to wait for a bus.



**12 (a)** Estimate the probability that a passenger, chosen at random from those who had to wait 6 minutes or more for a bus, actually had to wait 12 minutes or more.

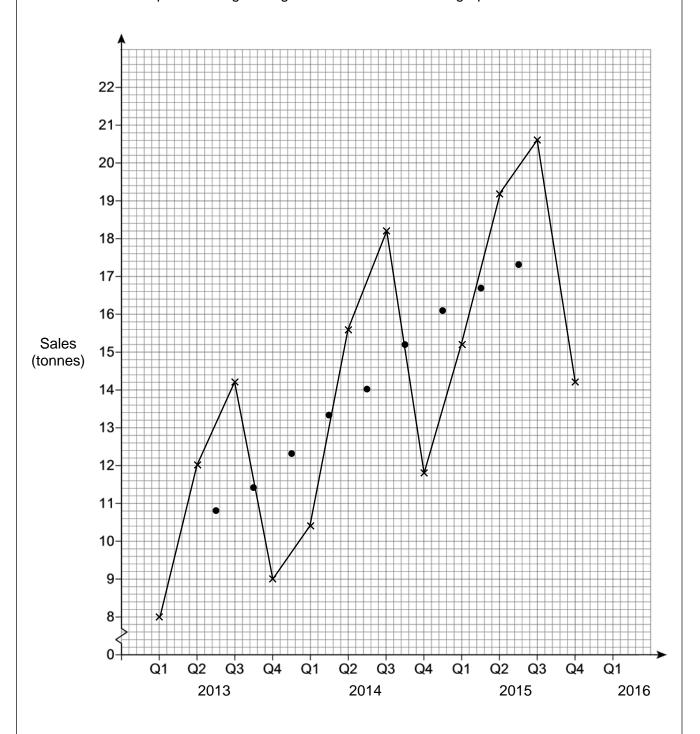
Answer \_\_\_\_\_

12 (b)	Give <b>one</b> reason why the median may be a better measure of average than the this situation.			
		[1 mark]		
	Turn over for the next question			
	rum over for the next question			

## 13 A local firm makes yoghurt.

The graph shows the sales of yoghurt, in tonnes, from Quarter 1 of 2013 to Quarter 4 of 2015

The four-point moving averages are also shown on the graph.



13 (a) Draw the trend line.

[1 mark]

13 (b)	Calculate the mean seasonal variation for Quarter 1 for the three years.	[3 marks]
	Answer	tonnes
13 (c)	Use your answer to <b>part (b)</b> and the trend line to predict the sales of yoghurt in of 2016	Quarter 1 [2 marks]
	Answer	tonnes
13 (d)	Discuss the accuracy of the prediction you made in <b>part (c)</b> .	[2 marks]

14	Each weekday morning, Jon drives to work.
	His journey includes going over a railway level crossing where on any given day there is a 25% chance he is delayed.
14 (a)	Explain why the number of days in one working week that he is delayed at the level crossing follows a binomial distribution.
	[1 mark]
14 (b)	Show that the probability, in one working week, that he is delayed exactly once is 0.40 to two decimal places.
	[2 marks]

15	Kirstie is estimating the population of fish in a lake.
	She catches some fish and marks them with an harmless dye.
	She then returns them to the lake.
	One week later she catches a smaller sample of 50 fish and sees that 6 of them are marked.
	She correctly estimates there are 1125 fish in the lake.
15 (a)	How many fish did she originally mark?  [3 marks]
15 (b)	State <b>two</b> assumptions Kirstie makes to ensure this process is valid.
( )	Evaluate <b>one</b> of these assumptions; stating clearly which one it is.
	[3 marks]
	Assumption 1
	Assumption 2
	Evaluation
	END OF QUESTIONS

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