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Statistics

Unit 2
Higher Tier



GST22

[GST22] Assessment

Assessment Level of Control:

Tick the relevant box (✓)

Controlled Conditions	
Other	

TIME

2 hours.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Write your answers in the spaces provided in this question paper.

Answer **all ten** questions.

Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.

You **may** use a calculator for this paper.

INFORMATION FOR CANDIDATES

The total mark for this paper is 100.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

You should have a calculator, ruler, compasses and protractor.

The formula sheet is on page 2.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total Marks	

HIGHER TIER FORMULA SHEET

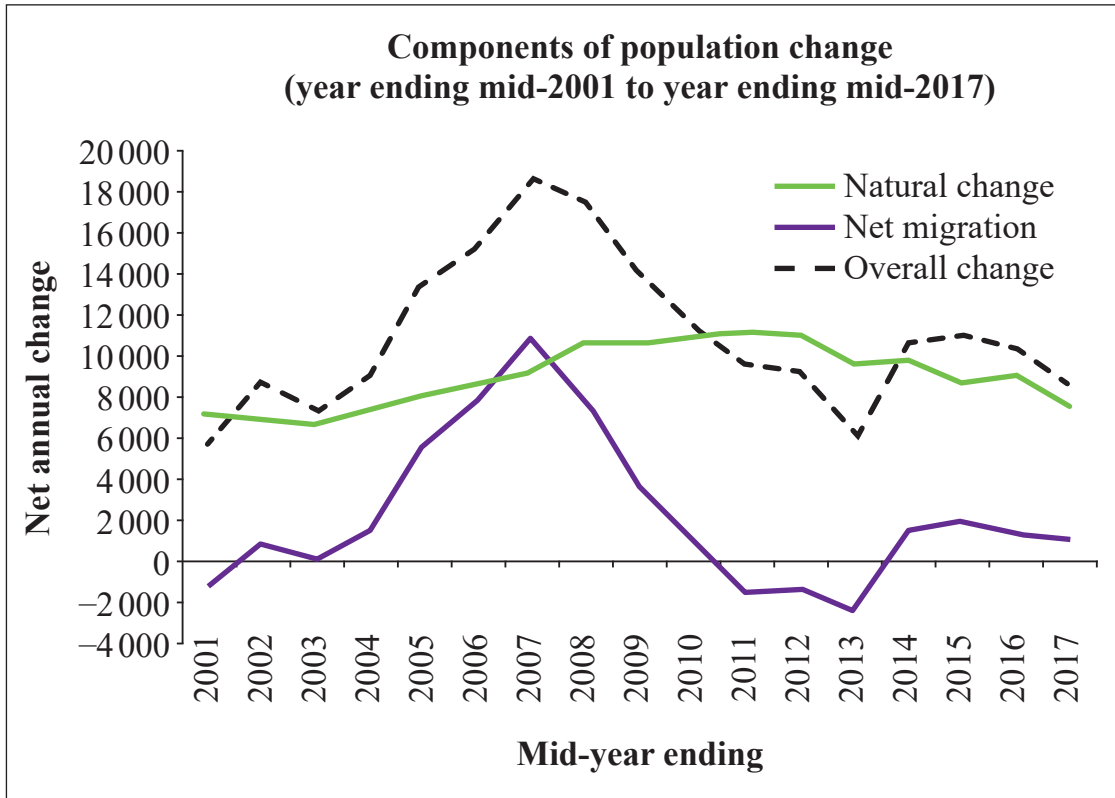
$$\text{Standard deviation} = \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f}\right)^2}$$

Spearman's Rank Correlation Coefficient

$$r_s = 1 - \left(\frac{6 \sum d^2}{n(n^2 - 1)}\right)$$

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(Questions begin overleaf)

1 The chart below shows the components of population change between mid-2001 and mid-2017



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(a) (i) Use the graph to estimate the net migration figure for mid-2013

Answer _____ [1]

(ii) Explain the meaning of this value.

 _____ [1]

(b) Describe the trend in natural change between mid-2001 and mid-2017

 _____ [2]

- 2 Sam wants to find out about the number of pets owned by the residents in Castlewellan.

She records the number of pets owned by a sample of people.

The table below shows her results.

Number of pets	0	1	2	3	4
Number of people	27	58	11	3	1

- (a) How many people were in the sample?

Answer _____ [1]

- (b) Calculate the mean number of pets per person.

Answer _____ [3]

- (c) Work out the range for this set of data.

Answer _____ [1]

Examiner Only

Marks Remark

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(Questions continue overleaf)

- 4 The table below shows the annual population estimates by age group in Northern Ireland between mid-2001 and mid-2017

**Annual population estimates by broad age groups,
Northern Ireland (mid-2001 to mid-2017)**

Mid-Year Ending	Age groups					As a proportion of all ages			
	All ages	0–15	16–64	65+	85+	0–15	16–64	65+	85+
2001	1 688 800	397 500	1 067 200	224 100	23 500	23.5	63.2	13.3	1.4
2002	1 697 500	391 700	1 079 000	226 800	23 700	23.1	63.6	13.4	1.4
2003	1 704 900	385 900	1 089 700	229 400	23 800	22.6	63.9	13.5	1.4
2004	1 714 000	381 200	1 100 600	232 200	24 400	22.2	64.2	13.5	1.4
2005	1 727 700	378 800	1 114 100	234 900	25 900	21.9	64.5	13.6	1.5
2006	1 743 100	377 100	1 127 900	238 100	27 000	21.6	64.7	13.7	1.6
2007	1 761 700	377 100	1 142 700	241 900	27 900	21.4	64.9	13.7	1.6
2008	1 779 200	378 500	1 153 200	247 500	28 900	21.3	64.8	13.9	1.6
2009	1 793 300	379 500	1 160 400	253 400	29 700	21.2	64.7	14.1	1.7
2010	1 804 800	380 000	1 165 200	259 600	30 800	21.1	64.6	14.4	1.7
2011	1 814 300	380 800	1 167 800	265 800	31 800	21.0	64.4	14.6	1.8
2012	1 823 600	382 100	1 168 700	272 800	32 700	21.0	64.1	15.0	1.8
2013	1 829 700	382 600	1 168 000	279 100	33 300	20.9	63.8	15.3	1.8
2014	1 840 500	383 800	1 170 800	285 900	34 400	20.9	63.6	15.5	1.9
2015	1 851 600	385 200	1 174 600	291 800	35 500	20.8	63.4	15.8	1.9
2016	1 862 100	388 000	1 176 400	297 800	36 500	20.8	63.2	16.0	2.0
2017	1 870 800	390 700	1 177 200	303 000	37 200	20.9	62.9	16.2	2.0

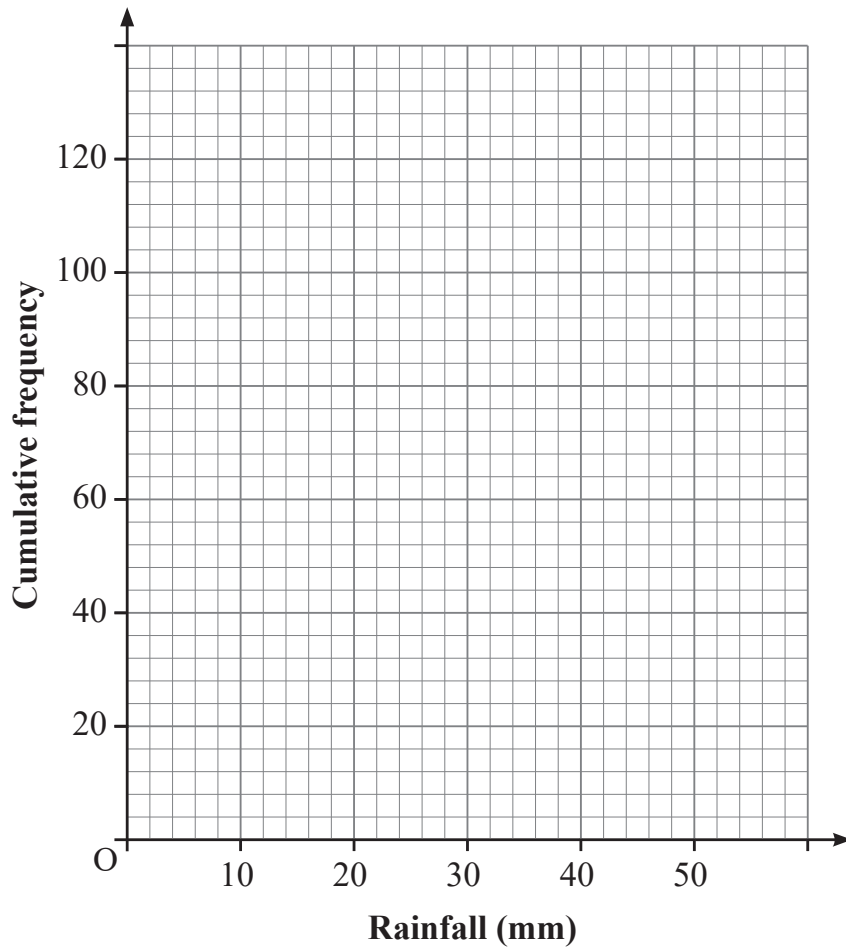
- (a) What was the estimated total population in mid-2004?

Answer _____ million people [1]

- (b) Does the information in the table suggest that the population is continuing to age? Explain your answer.

[2]

Examiner Only	
Marks	Remark



Examiner Only	
Marks	Remark

(e) Use the cumulative frequency diagram to find an estimate of

(i) the median amount of rainfall;

Answer _____ mm [1]

(ii) the interquartile range for the amount of rainfall;

Answer _____ mm [2]

(iii) the percentage of days that had more than 38 mm of rain.

Answer _____ % [3]

(f) Explain why the answers to part (e) are estimates.

[1]

Examiner Only	
Marks	Remark

- 7 Friends Emma and Ronan are tasting different types of cake to serve at their wedding.

They taste eight types of cake and give each one a score out of 20

Their scores are given in the table below.

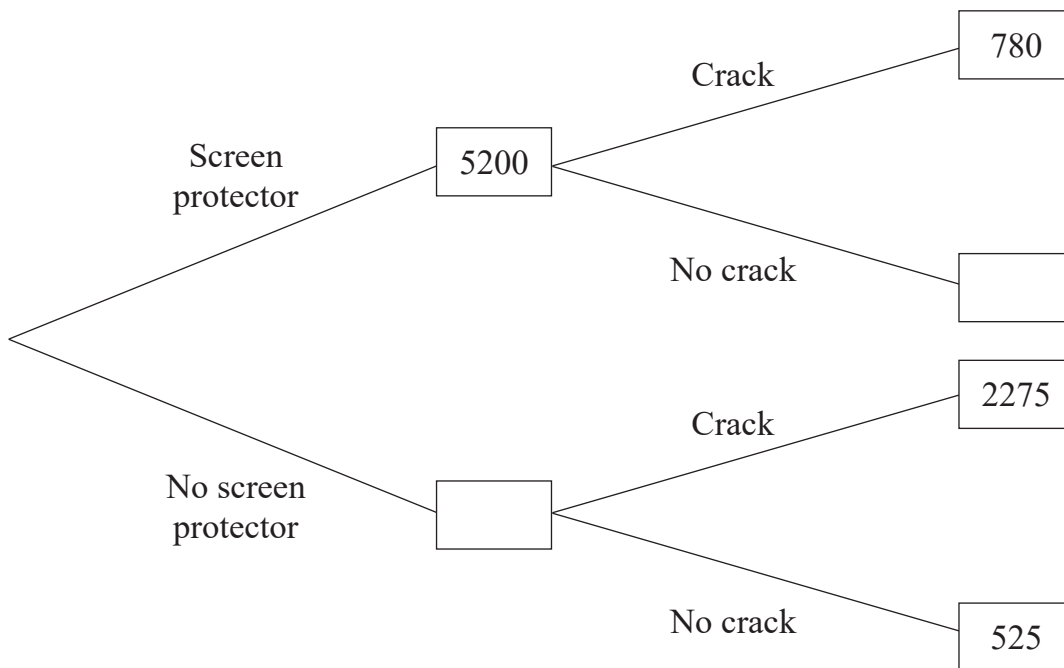
Type of cake	A	B	C	D	E	F	G	H
Emma's score	12	19	7	10	13	15	5	8
Ronan's score	14	17	10	12	18	15	7	10

- (a) Calculate Spearman's rank correlation coefficient for the data in the table.

Examiner Only	
Marks	Remark

Answer _____ [4]

- 8 The frequency tree diagram below shows the number of mobile phone owners in a small town who applied a screen protector to their phone and whether their screen had cracked after one year.



- (a) Complete the missing frequencies in the tree diagram. [2]

A mobile phone owner from the town is chosen at random.

- (b) Calculate the probability that this owner applied a screen protector and their screen had not cracked.

Answer _____ [2]

Examiner Only	
Marks	Remark

- (c) (i) Show that the risk of a mobile phone screen cracking for those who have applied a screen protector is 0.15

[2]

- (ii) Find the risk of a mobile phone screen cracking for those who have not applied a screen protector.

Answer _____ [1]

- (d) Using your answers to parts (c)(i) and (c)(ii), calculate the relative risk of a mobile phone screen cracking for those who have not applied a screen protector compared to those who have applied a screen protector.

Answer _____ [2]

- (e) Give an interpretation of your answer to part (d).

[2]

Examiner Only

Marks Remark

- 9 The grouped frequency table below shows the distribution of ages of a sample of people who live in Lisburn.

Age, A , (years)	Frequency		
$0 \leq A \leq 14$	180		
$15 \leq A \leq 29$	300		
$30 \leq A \leq 44$	105		
$45 \leq A \leq 74$	90		
$75 \leq A \leq 89$	15		
$A \geq 90$	0		

- (a) Explain why the width of the $15 \leq A \leq 29$ class is 15

_____ [2]

- (b) On the grid below, draw a histogram to illustrate the distribution of ages of the sample of people who live in Lisburn.



[4]

Examiner Only	
Marks	Remark

10 The table below shows the average house price and associated chain base index numbers between 2014 and 2018 in Northern Ireland.

The base year is 2013

Year	2014	2015	2016	2017	2018
Average house price	£110 750	£118 756	£125 059	£129 601	£136 179
Chain base index number	108.7	107.2	105.3	103.6	

(a) What was the average house price in 2013?

Answer £ _____ [3]

(b) Calculate the chain base index number for 2018

Answer _____ [2]

(c) Give an interpretation of your answer to part (b).

_____ [2]

Examiner Only	
Marks	Remark

Wayne is working on a project about house prices in Northern Ireland and he wishes to find an average figure of the five index numbers in the table.

- (d) (i)** Write down the name of an appropriate calculation Wayne could carry out.

_____ [1]

- (ii)** Find the value of the calculation you identified in **(d)(i)**.

Answer _____ [2]

Wayne extended his study by looking at the change in average price for different types of house between 2017 and 2018

Taking 2017 as the base year, Wayne collected the following data for a district in Northern Ireland.

	Detached	Semi-detached	Terraced
Index number for 2018	103.6	107.2	109.1
Number of properties sold	523	671	458

- (e)** For Wayne's data, calculate the weighted index number for the average house price for 2018

Answer _____ [3]

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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