

Centre No.						Paper Reference						Surname	Initial(s)	
Candidate No.						1	3	8	9	/	1	H	Signature	

Paper Reference(s)

1389/1H

Edexcel GCSE

Statistics

Paper 1H

Higher Tier

Friday 25 June 2010 – Morning

Time: 2 hours 30 minutes

Examiner's use only

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Team Leader's use only

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Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, electronic calculator.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature. Check that you have the correct question paper.

Answer ALL the questions. Write your answers in the spaces provided in this question paper.

You must NOT write on the formulae page or any blank pages. Anything you write on these pages will gain NO credit.

If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

This question paper has 7 questions in Section A and 8 questions in Section B. The total mark for this paper is 100.

There are 24 pages in this question paper. Any blank pages are indicated.

Advice to Candidates

Show all stages in any calculations.

Work steadily through the paper. Do not spend too long on one question.

If you cannot answer a question, leave it and attempt the next one.

Return at the end to those you have left out.

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GCSE Statistics 1389

Higher Tier Formulae

**You must not write on this page.
Anything you write on this page will gain NO credit.**

Mean of a frequency distribution $= \frac{\sum fx}{\sum f}$

Mean of a grouped frequency distribution $= \frac{\sum fx}{\sum f}$, where x is the mid-interval value.

Variance $= \frac{\sum (x - \bar{x})^2}{n}$

Standard deviation (set of numbers) $\sqrt{\left[\frac{\sum x^2}{n} - \left(\frac{\sum x}{n} \right)^2 \right]}$

or $\sqrt{\left[\frac{\sum (x - \bar{x})^2}{n} \right]}$

where \bar{x} is the mean set of values.

Standard deviation (discrete frequency distribution) $\sqrt{\left[\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f} \right)^2 \right]}$

or $\sqrt{\left[\frac{\sum f(x - \bar{x})^2}{\sum f} \right]}$

Spearman's Rank Correlation Coefficient $1 - \frac{6 \sum d^2}{n(n^2 - 1)}$



SECTION A

Answer ALL the questions. Write your answers in the spaces provided.

You must write down all stages in your working.

1. A researcher caught moths in two different traps.

The two traps were put in the same part of a wood.

Two different types of moths were caught in the traps.

The two-way table shows information about the numbers of moths caught.

	Trap 1	Trap 2	Total
Moth Type A	8	16	
Moth Type B	32	12	
Total			68

- (a) Complete the table.

(2)

One of these moths was picked at random.

- (b) (i) Write down the probability that it was caught in Trap 1

.....

- (ii) Given the moth was Type B, write down the probability that it was caught in Trap 2

.....

(2)

- (c) Discuss which of the traps is best for catching moths.

.....

(2)

Q1

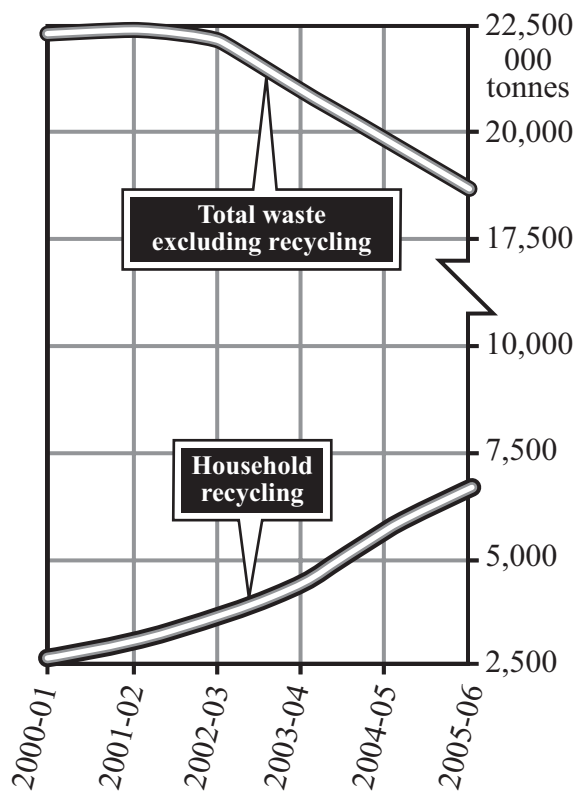
(Total 6 marks)



2. The graph gives information about regular household waste and recycling in England.

RISE IN RECYCLING

Regular household waste and recycling in England



(Source: Dept. for Environment, Food and Rural Affairs 2008)

Describe **three** features of the graph that are misleading.

- 1
-
-
- 2
-
-
- 3
-
-

(Total 3 marks)

Q2



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5
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3. The table shows the usual times taken for 9 different rail journeys in 1987 and in 2008

Journey	1987 Time (minutes)	2008 Time (minutes)
Canterbury East to Victoria	81	86
Chatham to Victoria	43	44
Lewes to Victoria	61	67
Lewes to Haywards Heath	15	20
Southend to Fenchurch St	49	54
Southend to Upminster	28	30
Canterbury East to Faversham	13	17
Haywards Heath to Gatwick	13	14
Barking to Fenchurch St	12	16

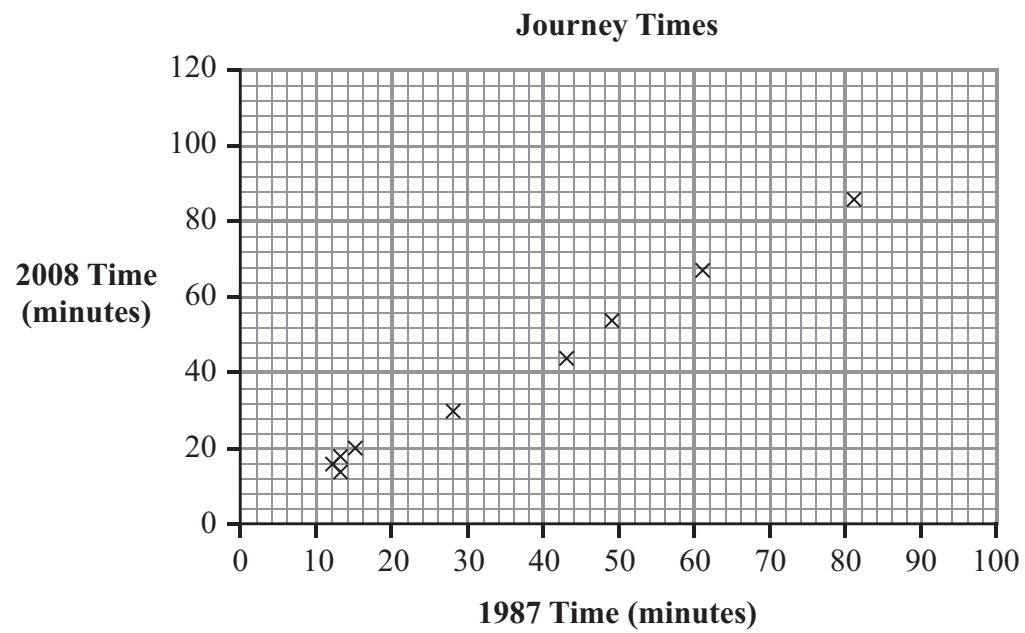
(Source: Passenger Focus)

(a) Write down what the table shows about journey times in 1987 compared to journey times in 2008

.....

(1)

The scatter diagram shows these data.



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blank

(b) Draw a line of best fit on the scatter diagram. (1)

In 1987 a train took 70 minutes to complete a journey.

(c) Estimate the time a train took to complete the **same** journey in 2008
..... minutes
(1)

In 2008 a train took 40 minutes for a journey.

(d) Estimate the time a train took to complete the **same** journey in 1987
..... minutes
(1)

In 1987 a train took 100 minutes for a journey from Doncaster to London.

The line of best fit could be used to find an estimate of the time for the journey in 2008

(e) Would this be a reliable estimate?

Give a reason for your answer.

.....
.....
.....
.....

(1)

Q3

(Total 5 marks)



4. The table shows information about the area of land used for some crops in June 2005, 2006 and 2007

Land used for arable crops (thousand hectares)

Arable Crops	June 2005	June 2006	June 2007
Cereals (total)	2429.4	2387.7	2393.1
Wheat	1748.4	1709.0	1691.0
Winter Barley	321.3	322.3	318.8
Spring Barley	274.2	242.8	258.1
Oats	65.5	93.0	102.5
Rye	5.9	6.7	6.0
Mixed Corn	2.8	2.4	1.7
Triticale	11.2	11.4	15.0
Oilseed Crops (total)	524.8	495.0	572.8
Oilseed rape – winter	455.2	446.8	549.7
Oilseed rape – spring	24.8	15.9	12.4
Linseed	44.8	32.3	10.7
Potatoes (total)	102.4	105.3	103.9
Early Potatoes	10.5	9.6	14.2
Main Crop Potatoes	91.9	95.7	89.7

(Source: Defra Survey of Agriculture–June 2007)

(a) Write down the area of land used for Wheat in June 2005

..... thousand hectares
(1)

(b) Work out the total area of land used for Barley in June 2007

..... thousand hectares
(1)

(c) Discuss the trend between 2005 and 2007 in the area of land used for Oats.

.....

(1)



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blank

In June 2005 the total area for Cereals is 2429.4 thousand hectares.

The areas of land used for the 7 types of Cereal add up to 2429.3 thousand hectares.

These two areas are not equal.

(d) Write down the reason why.

.....
.....
.....
.....

(1)

(e) Work out the percentage decrease in the area of land used for Linseed between 2005 and 2007

..... %
(3)

Q4

(Total 7 marks)



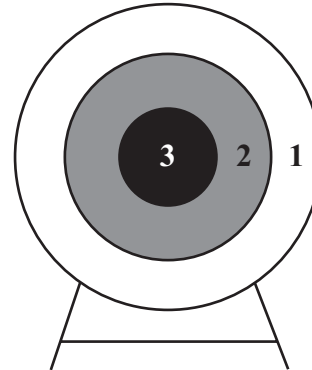
5. At the start of an archery competition there are 50 competitors.

Each competitor shoots 3 arrows at the target.

Points are scored depending on where each arrow hits the target.

The points are added together to give a total score.

The frequency table gives information about the total scores.



Total Score	0	1	2	3	4	5	6	7	8	9
Frequency	0	1	3	9	12	8	7	5	4	1

(a) For these 50 competitors

(i) write down the total score that is the mode,

.....

(ii) work out the mean total score.

.....

(3)

Two more competitors arrive for the competition.

They both get total scores of 4

(b) Write down in words the effect this has on the mean total score.
Explain your answer.

.....

(2)

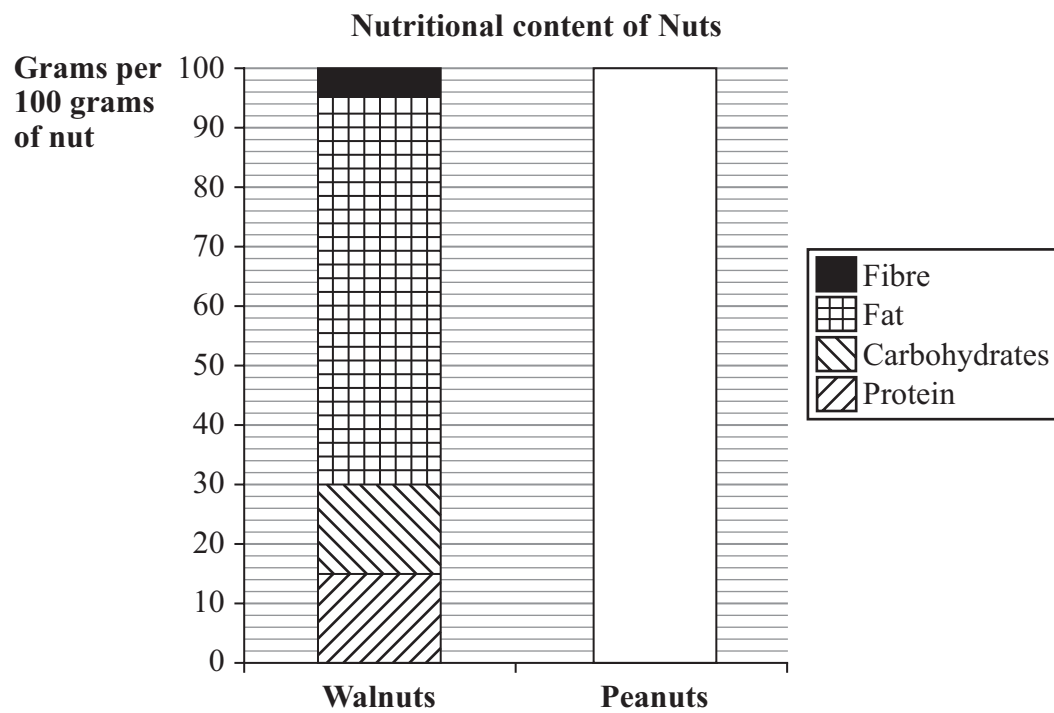
Q5

(Total 5 marks)



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6. The composite bar chart shows the nutritional content of walnuts.



(Source: adapted from *Penguin Facts*)

The nutritional content of peanuts is shown in the table.

	Grams per 100 grams of peanut
Protein	24
Carbohydrates	20
Fat	48
Fibre	8

(a) Complete the composite bar chart for peanuts.

(2)

(b) Write down the number of grams of fat in 100g of walnuts.

..... g
(1)

Michael says that a peanut has more protein than a walnut.

(c) Explain why Michael may not be right.

.....
.....

(1)

Q6

(Total 4 marks)



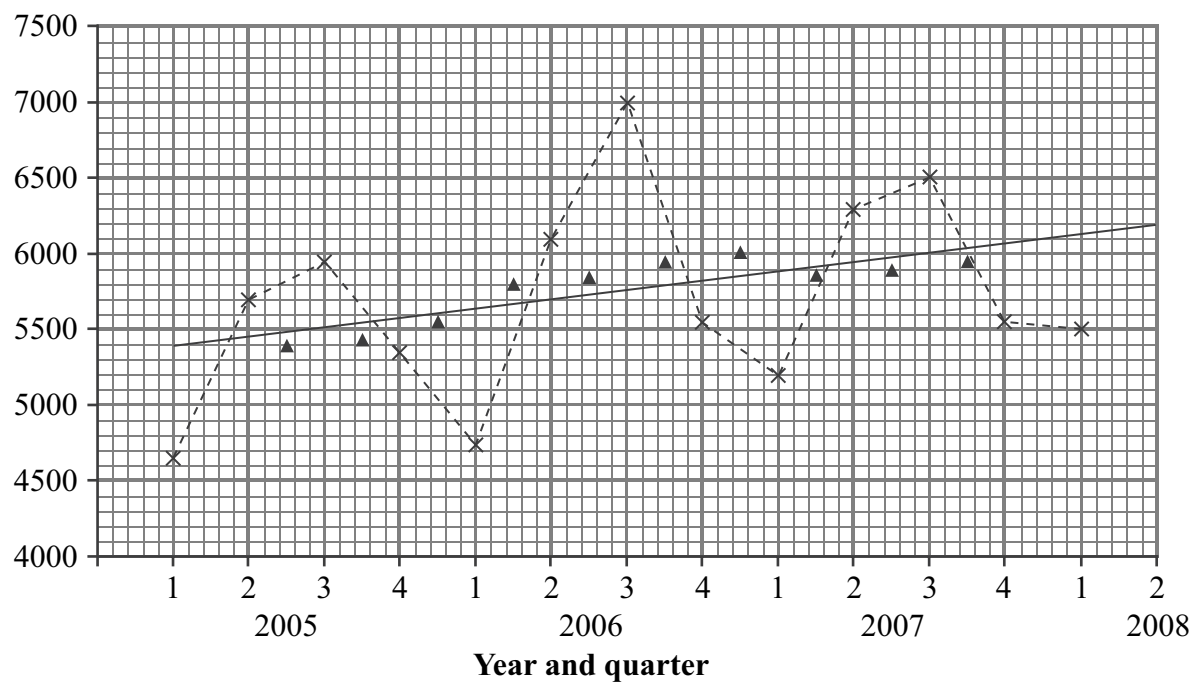
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7. The time series graph shows information about the number of visitors (in 1000s) from Europe to the UK.

The graph also shows the four-point moving averages.

A trend line has been drawn for the moving averages.

Number of visitors (1000s)



(Source: National Statistics Office)

(a) Calculate the average seasonal variation for quarter 2

.....
(3)

(b) Using your answer to part (a) find an estimate for the number of people from Europe visiting the UK in quarter 2 of 2008

.....
(2)

(Total 5 marks)

Q7

TOTAL FOR SECTION A: 35 MARKS



SECTION B

Answer ALL the questions. Write your answers in the spaces provided.

You must write down all stages in your working.

1. On two farms there are pigs that are 20 weeks old.

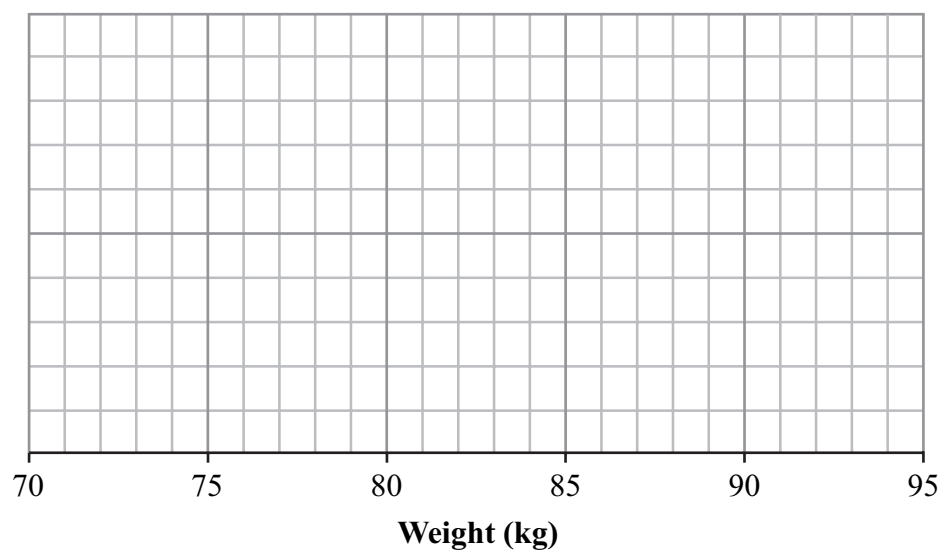
On each farm the weights of the pigs are assumed to be normally distributed.

The summary data for the weights of the pigs are shown in the table.

Farm	Mean Weight (kg)	Standard deviation
A	85	2.5
B	76.3	1.9

(Source: adapted from a Cambridge Journal)

- (a) On the grid sketch these two normal distributions for the weights of the pigs on the two farms. Label your diagrams.



(4)

A pig is picked at random from farm A.

- (b) Write down the probability that it will weigh more than 90 kg.

.....
(1)

- (c) Between what weights would you expect 95% of the pigs from farm B to lie?

.....
(1)

(Total 6 marks)

Q1



2. A researcher is going to investigate the age at which people in England get arthritis. He wants to find out if men get arthritis at a younger age than women.

(a) Suggest a hypothesis that the researcher could use.

.....
.....
.....

(1)

It would be difficult for a researcher to use a census.

(b) Write down a reason why.

.....
.....
.....

(1)

The researcher decides to use a sample.

(c) Describe the population he could use.

.....
.....

(1)

(d) Write down **one** advantage and **one** disadvantage of using a sample.

Advantage

.....
.....

Disadvantage

.....
.....

(2)



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blank

The researcher uses a questionnaire.

He does a pilot study first.

(e) Write down **two** reasons for doing a pilot study.

- 1
-
- 2
-
- (2)**

One of the questions on the questionnaire for the pilot study was

‘How old were you when you started to have arthritis?’

This question did not work well.

(f) Suggest a reason why.

-
-
-
-
- (1)**

(g) Design a better question for the researcher to use.

-
-
-
-
- (2)**

(Total 10 marks)

Q2

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3. The table shows the population and land area of 10 European countries.

Country	Land Area (km ²)	Population (millions)	Land Area Rank	Population Rank	<i>d</i>	<i>d</i> ²
Austria	83 858	8.189				
Norway	385 155	4.620				
France	551 500	60.495				
Holland	41 528	16.229				
Greece	131 957	11.119				
Switzerland	41 284	7.252				
Germany	357 022	82.689				
Italy	301 318	58.092				
UK	242 900	59.667				
Spain	505 992	43.064				

(Source: www.doheth.co.uk)

(a) Complete the table. (2)

(b) Calculate Spearman's rank correlation coefficient for these data.
.....
(2)

(c) Interpret fully your answer to part (b).
.....
.....
.....
.....
.....
.....
(2)

(Total 6 marks)

Q3



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4. A biologist is going to estimate the number of woodlice on a small patch of waste ground.

She uses the capture/recapture method.

She catches 200 woodlice and marks each one with a small spot of paint.

These woodlice are then set free on the patch of waste ground.

A few weeks later she catches 200 woodlice.

8 of them are marked with paint.

(a) Work out an estimate for the number of woodlice on the patch of waste ground.

.....
(3)

(b) Write down **two** assumptions that the biologist made when working out this estimate.

Assumption 1

.....

.....

.....

Assumption 2

.....

.....

.....

(2)

Q4

(Total 5 marks)



5. Two samples of top shells were collected on a sea shore.

Sample 1 was collected in 2005

Sample 2 was collected from the same sea shore in 2008

The width of the base of each shell was measured.

The measurements in mm for sample 1 were

12	17	18	19	19
20	20	21	22	22
23	23	24	26	26

(a) Write down

(i) the median shell base width,

.....

(ii) the lower quartile,

.....

(iii) the upper quartile.

.....

(3)

(b) Identify any outliers for 2005
You must show your working.

.....

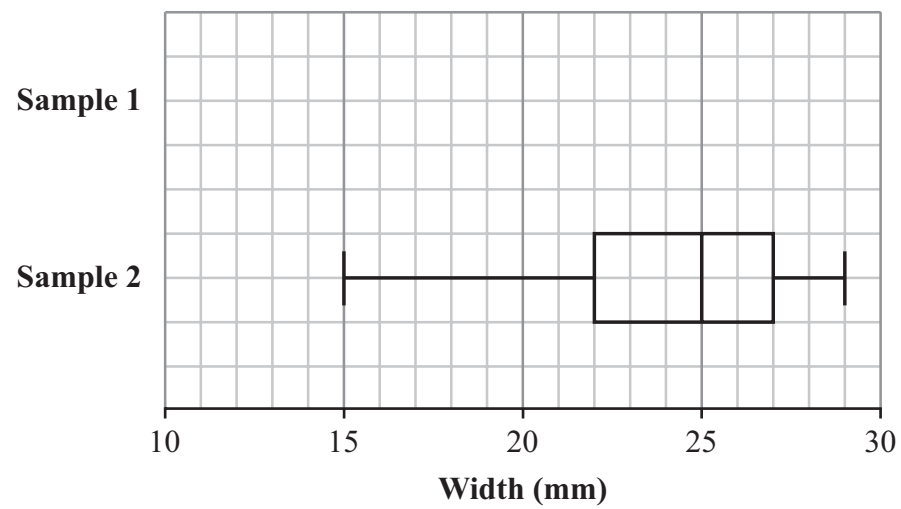
(3)



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The box plot shows the results for sample 2

(c) On this grid draw a box plot for sample 1



(Source: Collected for Biological Research)

(3)

(d) Compare fully the two distributions.

.....

.....

.....

.....

.....

(2)

(e) Write down whether or not you think there has been a change in the base widths of the top shells between 2005 and 2008
Give a reason for your answer.

.....

.....

.....

(2)

(Total 13 marks)

Q5

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6. The table shows the monthly house price indices for 2007/2008

The base month is July 1983

July 2007	Aug 2007	Sept 2007	Oct 2007	Nov 2007	Dec 2007
644.3	646.0	647.8	677.6	639.5	638.1

Jan 2008	Feb 2008	Mar 2008	Apr 2008	May 2008	June 2008	July 2008
638.4	635.9	620.1	610.7	595.5	583.9	574.0

(Source: Halifax)

(a) Write down the percentage rise in house prices between July 1983 and July 2007

..... %
(1)

(b) Describe what happened to house prices between July 2007 and July 2008

.....
.....
.....
(1)

In March 2008 the value of a house was £191 500

(c) Work out the value of this house in April 2008 based on the indices in the table.

£
(2)

(d) Work out the percentage change in prices between July 2007 and July 2008 inclusive.

..... %
(2)



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blank

The indices in the table are given monthly.

- (e) Write down the reason why it might be better to give quarterly or annual price indices if you are interested in long term changes.

.....
.....
.....
.....

(1)

Q6

(Total 7 marks)

21

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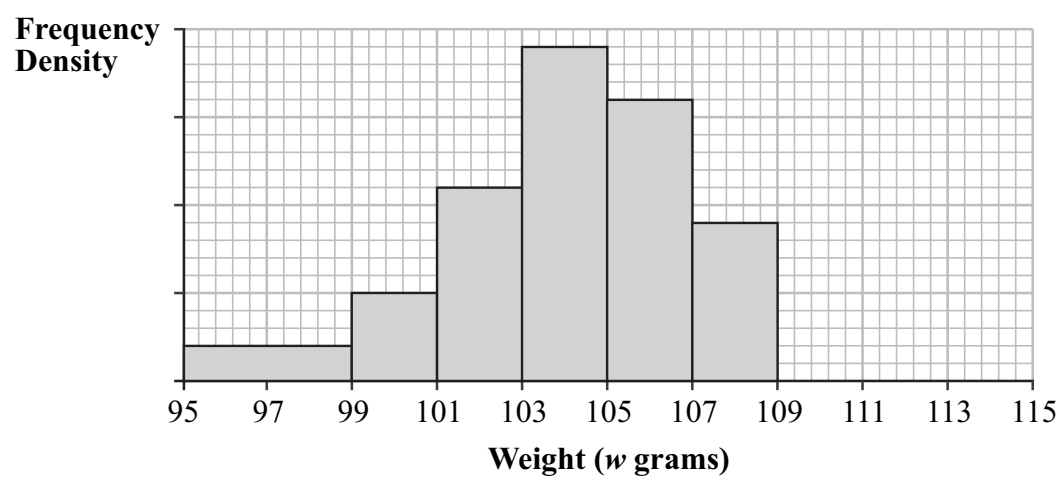


7. 150 bags of sweets are weighed.

The results are summarised in the table below.

Weight (w grams)	Frequency	
$95 \leq w < 99$	8	
$99 \leq w < 101$	10	
$101 \leq w < 103$	22	
$103 \leq w < 105$	38	
$105 \leq w < 107$	32	
$107 \leq w < 109$	18	
$109 \leq w < 111$	10	
$111 \leq w < 115$	12	

The histogram shows information about these bags of sweets.



The histogram is incomplete.

(a) Use the information in the table to complete the histogram.

(3)

(b) Work out an estimate for the mean weight of a bag of sweets.

(3)



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blank

- (c) Calculate an estimate for the standard deviation of the weights of the 150 bags of sweets.

You may use $\sum fw^2 = 1\,658\,900$

.....
(3)

It is suggested that the weights of the 150 bags could be modelled by a normal distribution.

- (d) Discuss whether or not a normal distribution is likely to be a good model.

.....
.....
.....
.....
.....
(2)

Q7

(Total 11 marks)



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blank

8. The eggs in the nests of a certain type of seagull have a 20% chance of being infertile.

(a) Write down the probability that an egg is fertile.

.....
(1)

A nest contains four eggs.

(b) (i) Write down the name of the distribution that can be used to model the number of infertile eggs.

.....

(ii) Calculate the probability that exactly one egg is infertile.
(You may use $(p + q)^4 = p^4 + 4p^3q + 6p^2q^2 + 4pq^3 + q^4$)

.....

(iii) Calculate the probability that more than two eggs are infertile.

.....
(6)

Q8

(Total 7 marks)

TOTAL FOR SECTION B: 65 MARKS
TOTAL FOR PAPER: 100 MARKS

END

