

## Level 2 Certificate in Business Statistics



International  
Qualifications from EDI

### Annual Qualification Review

2008



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## CONTENTS

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Introduction .....	3
Pass Rate Statistics .....	3
General Strengths and Weaknesses .....	3
Teaching Points by Syllabus Topic .....	4
Further Guidance .....	7
Examples of Candidate Responses .....	8



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## INTRODUCTION

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The annual qualification review provides qualification-specific support and guidance to centres. This information is designed to help teachers preparing to teach the subject and to help candidates preparing to take the examination.

The reviews are published in September and, in this case, take into account candidate performance, demonstrated in the Series 2 2008 examination. Global pass rates are published so you can measure the performance of your centre against these.

The review identifies candidate strengths and weaknesses by syllabus topic area and provides examples of good and poorer candidate responses. It should therefore be read in conjunction with details of the structure and learning objectives contained within the syllabus for this qualification found on the website.

The review also identifies any actual or proposed changes to the syllabus or question types together with their implications.

## PASS RATE STATISTICS

The following statistics are based on the performance of candidates who took this qualification between 1 October 2007 and 30 September 2008.

Global pass rate            62.93%

Grade distributions

Pass	26.93%
Credit	25.97%
Distinction	10.03%

## GENERAL STRENGTHS AND WEAKNESSES

### Strengths

- Graphical presentation of data eg. 'Z' charts,
- Cumulative frequency diagrams and scatter graphs.
- Data analysis eg. measures of location and dispersion plus correlation.

### Weaknesses

- Survey methodology
- Basic principles of probability and interpretation of statistical diagrams
- Critique of statistical summary measures.

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## TEACHING POINTS BY SYLLABUS TOPIC

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### Detailed Comments On Each Syllabus Topic Area

#### 1.1 Graphical Presentation.

Emphasise correct drawing of histograms using frequency density.

Candidates need to ensure in each case that the correct graph is drawn. This particularly applies to various types of bar charts where frequently a simple or multiple bar chart may be constructed when the question requires use of a component or % component bar chart. (Question 3(a)).

Charts, graphs or diagrams should be correctly labelled with a suitable title, data source and scales shown where necessary. (Question 2(a)).

Histograms must reflect the use of area proportional to frequency, specifically where the data is in the form of uneven class intervals. (Question 6(a)).

Comments on graphs, charts etc. should be detailed and make full use of all the information available.

Where a chart is made up of a number of different components, comments should be made on each part. (Question 5(c)).

#### 1.2 Survey Methodology.

Develop a more detailed understanding of all aspects of survey methodology.

Candidates must be able to clearly explain and describe various methods of sampling and the circumstances under which each method should be applied. Details of how a random sample would be selected from a defined list need to be fully understood.

The role of stratification in sample design is important and must reflect both how a stratified sample is chosen and the link with other forms of statistical sampling.

Different methods of data collection should highlight advantages and disadvantages of each and be able to illustrate the circumstances under which each method would be used. (Question 3(c)).

#### 2.1- 2.3 Measures of Location and Dispersion.

Explore further calculations that develop out of estimates of measures of location and dispersion eg. use of joint means.

The distinction between grouped and ungrouped data is important.

Candidates should be aware of all the main summary measures, including the circumstances under which each would be applied.

Graphical estimates based on for example, the give or cumulative frequency curve should be correctly used when required. If candidates need to calculate any of the measures using a formula, this must be applied correctly and answers given to an appropriate level of accuracy, often a minimum 2 d.p. (Question 1b to 1e).

A number of formulae are provided with the paper but candidates need to ensure that in certain cases if reference is made to calculating a given measure then the relevant formula may not be given on the formula sheet.

Knowledge of further use of these measures is expected e.g. combining means from different distributions. (Question 6).

## **2.4 Index Numbers.**

Different methods for calculating index numbers including the circumstances under which each would be used is important. Additionally candidates must be aware of the construction of at least one major index such as the R.P.I.

Topics such as rebasing of a series and comparisons using two or more series remain a key aspect of this part of the syllabus. (Question5 (a,b)).

## **3.1 Correlation & Regression.**

The distinction between Spearman and the PMCC. is important. Candidates need to be able to apply the relevant formula in each case and to fully interpret the resultant coefficient.

The drawing of a scatter diagram is normally expected with the expectation that an initial view of the correlation present can be estimated from the distribution of points shown.

Use should be made of the regression line/equation for forecasting purposes.

An appreciation of further measures based on the correlation coefficient is also required. This specifically applies to the calculation and use of the coefficient of determination.(Question 2 ).

## **3.2 Time Series**

Graphing of time related data linked to a detailed interpretation of the pattern(s) shown is critical. Comments will often reflect an upward or downward trend and evidence of seasonal fluctuations.

Use of moving averages including identification of the correct order of average to use and the need to centre even averages is important.

Interpretation of forecasts using these methods should reflect seasonal adjustments and likely accuracy dependent on the time horizon proposed.

## **4.1 Probability**

Emphasise methods of presenting probability alternatives plus application of basic rules.

Candidates must be able to represent probability problems in a variety of forms e.g. Tree diagrams, Venn diagrams etc.

Definitions and rules e.g multiplication and addition rules need to be fully understood and correctly applied.

Candidates need to work to appropriate levels of accuracy, particularly when expressing probabilities in decimal form.(Question 4).

#### **4.2 Computers in Statistics.**

All candidates need to be aware of the storage and processing facilities available for large amounts of statistical data.

Additionally an understanding of the main graphical and spreadsheet packages in current use is also required.

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## FURTHER GUIDANCE

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No changes have been made to the original syllabus.

Questions have been developed to place more emphasis on data collection and interpretation. Additionally questions have been written to test two or more topics within the same overall question mix eg. data presentation with a further part on sampling methods. These will both relate to a central theme within the question.

- Candidates must take care in graphing of data: specifically
  - (i) Ensure correct graph drawn e.g. if asks for a cumulative % bar chart do not draw a multiple bar chart or non % component chart.
  - (ii) Graphs must be correctly labelled and scaled with a key shown (if necessary)
  - (iii) Cumulative frequency curves must be plotted as upper class limits and a smooth curve drawn through the points
  
- Interpretation questions require a proper summary of the key features of the data. In most cases it will be necessary to state differences or changes in a data set from period to period.  

A descriptive question with 3 marks allocated will normally expect 3 distinct comments.
  
- Candidates need to be more aware of different methods of sampling and data collection. It is not sufficient to reference only random methods of selection.
  
- Levels of accuracy expected also need to be addressed. For index numbers one decimal place answers are expected. For other calculations a minimum of 2 decimal places would be required.
  
- All intermediate steps in calculations should be shown. In particular candidates using calculators should show evidence of sub totals and substitutions used.
  
- In general candidates should attempt all parts to questions. It is not advisable to attempt more than the requisite number of questions stated at the front of the paper.
  
- Layout of answers should be in line with steps required to solve a given problem.
  
- Candidates are advised not to split part answers to questions. Should this happen a clear statement of the question and part to which the answer releases must be given.
  
- Answers to all graphical questions should be given on the graph paper provided.
  
- Where questions require values to be estimated from a graph e.g. median or quartiles. These should be read from the graph rather than using a given formula.

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## EXAMPLES OF CANDIDATE RESPONSES

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### Questions - high, medium, low with justification of assessment decisions

- Q1 Plotting a frequency curve instead of an ogive (low).  
Q2 Calculating a regression equation in place of 'r' (low).  
Q3 (c) Describing types of sampling correctly but not relating this to the given data (medium).  
Q4 (b) Correct tree diagram, fully labelled, including probabilities shown (high).  
Q4 (c) Confusion over which rule to apply (medium).  
Q5 (a) Failing to apply weights correctly (medium).  
Q6 (c) Use of upper or lower limits as 'x'(medium)  
Q6 (d) Simple averaging of two means (low).

The following data shows the holiday destinations chosen by customers of a travel agency in 2001 and 2006.

Destination	Number of customers	
	2001	2006
Europe	260	280
North America	375	590
Australia	140	370
Other	95	110
<b>Total</b>	<b>870</b>	<b>1350</b>

- (a) Represent this information by a percentage component bar chart using two bars, one for each of the two years 2001 and 2006. (10 marks)
- (b) Describe three changes in the travel market as shown by this data. (3 marks)

The travel agent plans to undertake a customer survey using a sample of 50 customers taken from the 1350 who used the agency in 2006.

- (c) Explain how the sample of 50 might be chosen using the following sampling methods
- (i) systematic sampling
  - (ii) stratified sampling based on the percentage of customers visiting each destination in 2006. (8 marks)

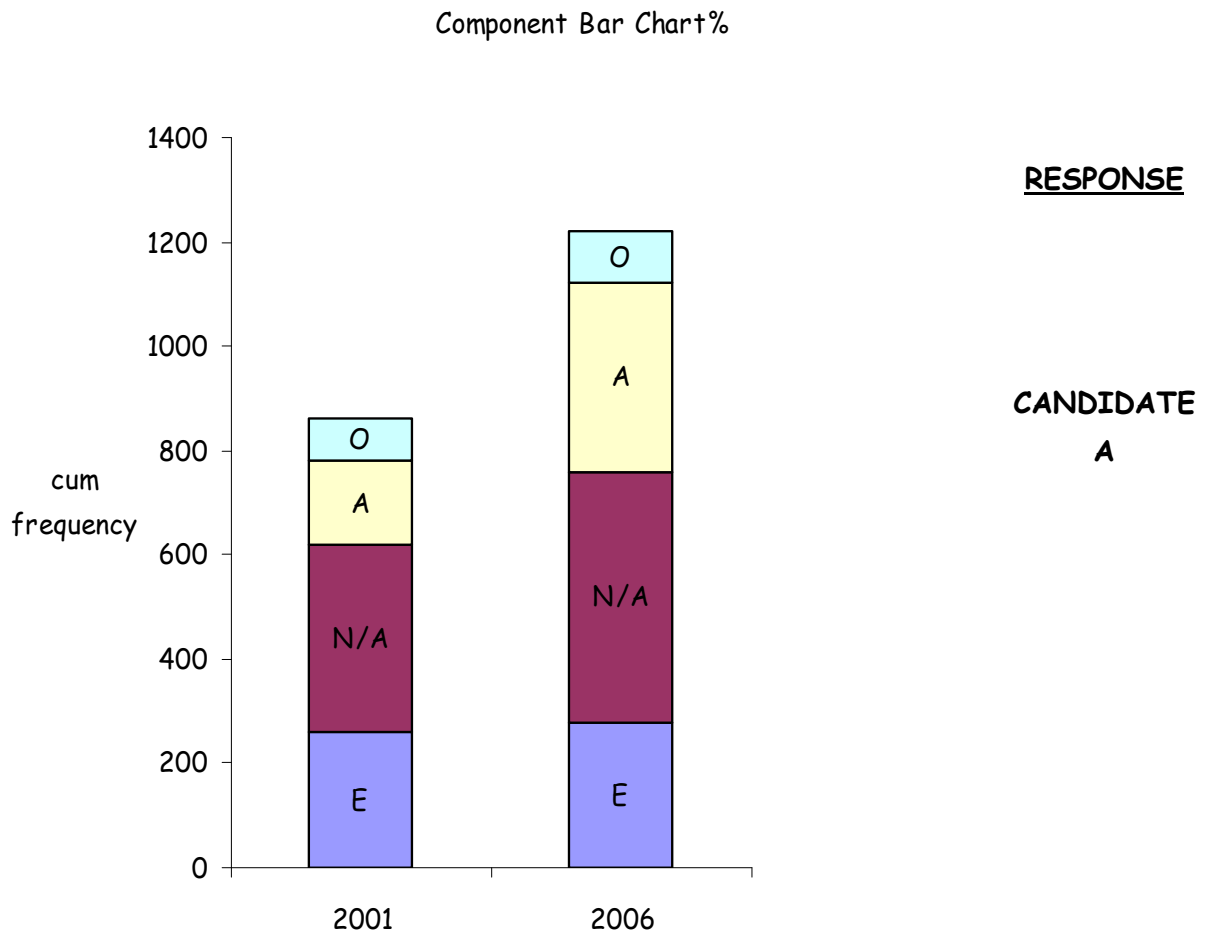
The survey data is to be collected using either a postal questionnaire or direct interviews.

- (d) Give one advantage and one disadvantage of using each of these methods. (4 marks)

**(Total 25 marks)**

## FAIL RESPONSE

Q 3(a)



### Commentary

Candidate loses first 6 marks (no reference to % component bar charts)  
Awarded 3/4 for title (1), label (1) and blocks (presentation mark)

### **Q3 (b) Responses**

- All destinations have increased
- Europe has increased the least
- Others have reduced

### Commentary

2 marks out of 3 – final point incorrect

### **Q3 (c) (i) Responses**

- Prepare a list of all customers then select 50 at random from the list.

### Commentary

Candidate awarded 1 mark only for referencing the list

**Q3 (c) (ii) Responses**

- Choose approximately 12 at random from each destination group

Commentary

1 mark only for referencing the random choice

**Q3 (d) Responses**

- Postal questionnaire is cheaper so larger sample can be taken.
- Direct interviews cost less but high response likely

1 mark only for first part - advantages referenced

1 mark only for interviews - first point wrong and second point incorrect,

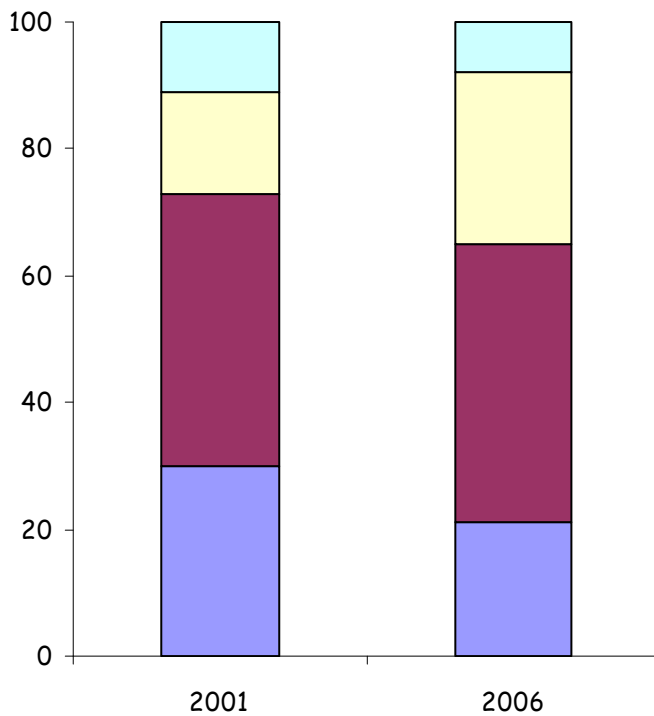
**BREAKDOWN OF MARKS FOR CANDIDATE A**

Q	3	(a)	3/10	
		(b)	2/3	
		(c) (i)	1/4	
		(c) (ii)	1/4	<b><u>FAIL</u></b>
		(d)	2/4	
		<b>Total</b>	<b>9/25</b>	

Further work required on survey method, data collection and data presentation

**PASS RESPONSE**

**Q 3(a)**



**RESPONSE**

**CANDIDATE  
B**

**Commentary**

No calculation shown (5/6 awarded)

No title or clear key but suitable chart (2/4 awarded)

**Q3 (b) Responses**

- Proportions in all groups stayed the same from 2001 to 2006
- Europe proportion increased in 2006
- Australia proportion reduced in 2006

**Commentary**

None of the above are correct statements of the changes (0/3 awarded)

**Q3 (c) (i) Responses**

- Make a list of all customers
- Find sample fraction  $1350/50 = 27$
- Take every 27<sup>th</sup> customer

**Commentary**

3 out of 4 correct statements

Misses random start

### Q3 (c) (ii) Responses

- Choose a number at random from within each group

#### Commentary

1 mark only for random choice

### Q 3 (d) Responses

- Postal Questionnaires – cheaper but not many people answer.
- Interviews – interviewer may affect the answer by leading the person being asked the question.

#### Commentary

3 out of 4 awarded – no reference to advantage of interviews

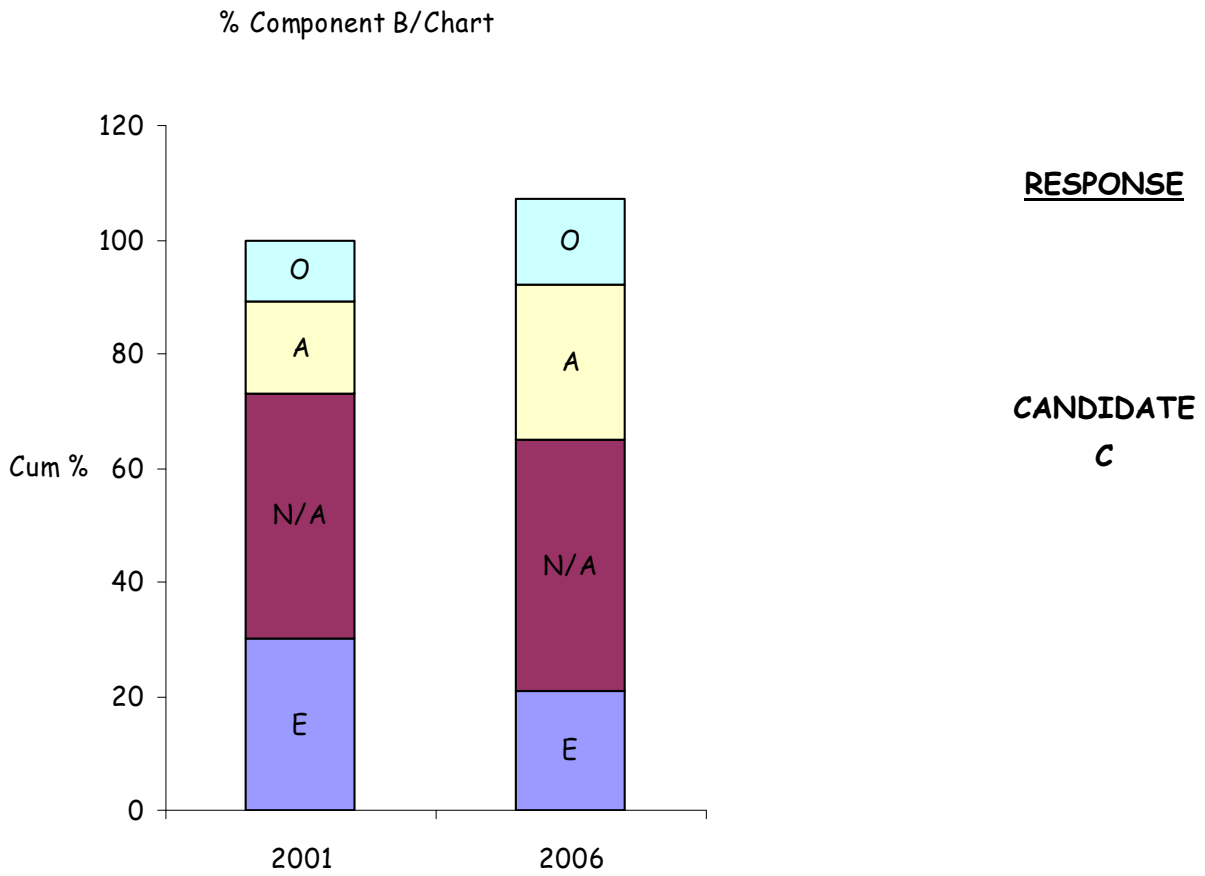
### **BREAKDOWN OF MARKS FOR CANDIDATE B**

Q	3	(a)	7/10	
		(b)	0/3	
		(c) (i)	3/4	
		(c) (ii)	1/4	<b><u>PASS</u></b>
		(d)	3/4	
		<b>Total</b>	<b>14/25</b>	

Additional work required on sampling methods and data interpretation.

**DISTINCTION RESPONSE**

Q 3(a)



**Responses**

2001	30%	43%	16%	11%
2006	21%	44%	27%	8%

**Commentary**

One plotting error but otherwise fully correct – rounded % accepted.  
9 /10 marks awarded.

**Q3 (b) Responses**

- Europe block smaller in 2006 than 2001
- Proportion in others has increased in 2006
- Number of customers has increased for all four categories

**Commentary**

2 out of 3 marks given. Second comment is incorrect even though it is clear on the bar chart that is the case (as noted that part of the chart is wrong).

### Q3 (c) (i) Responses

- Sample fraction is 1 in 27
- Then take a random start between 1 and 27 and then select every 27<sup>th</sup> person

#### Commentary

3 out of 4 marks awarded  
No reference to original listing

### Q3 (c) (ii) Responses

21% of 50 = 10.5 : 44% of 50 = 22  
27% of 50 = 13.5 : 8% of 50 = 4

### Q3 (c) (ii) Responses

Take 10.5 from Europe  
22 from N America  
13.5 from Australia  
4 from Others

Choose all at random

#### Commentary

3 out of 4 marks awarded  
Numbers should be integers

### Q3 (d) Responses

Postal surveys: cheaper, sample based  
Interviews: more people will answer

#### Commentary

2 out of 4 marks awarded  
Biased sample wrong and no disadvantage for interviews

### Breakdown of marks

Q	3	(a)	9/10	
		(b)	2/3	
		(c) (i)	3/4	
		(c) (ii)	3/4	<b><u>DISTINCTION</u></b>
		(d)	2/4	
		<b>Total</b>	<b>19/25</b>	

Only area to address is data collection method(s)

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