-SQA- SCOTTISH QUALIFICATIONS AUTHORITY

HIGHER NATIONAL UNIT SPECIFICATION

GENERAL INFORMATION

-Unit Number- **7481704**

-Superclass- **RB**

-Title- **BUSINESS STATISTICS 2**

-DESCRIPTION-

GENERAL COMPETENCE FOR UNIT: Calculating and using index numbers; using the concept and laws of probability for decision-making in relation to business and commerce.

OUTCOMES

1. calculate and use index numbers;

2. use probability theory;

3. use decision theory.

CREDIT VALUE: 1 HN Credit

ACCESS STATEMENT: Access to this unit is at the discretion of the centre. However, it would be beneficial if the candidate had a basic knowledge of statistics as evidenced by possession of National Certificate Module 91063 Mathematics: Statistics 1 or Higher National Unit 7481694 Business Statistics 1.

For further information contact: Committee and Administration Unit, SQA, Hanover House, 24 Douglas Street, Glasgow G2 7NQ.

Additional copies of this unit may be purchased from SQA (Sales and Despatch section). At the time of publication, the cost is £1.50 (minimum order £5).

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STATEMENT OF STANDARDS

UNIT NUMBER: 7481704

UNIT TITLE: BUSINESS STATISTICS 2

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

OUTCOME

1 CALCULATE AND USE INDEX NUMBERS

PERFORMANCE CRITERIA

(a) Calculation of index numbers is correct.
(b) Description of how the retail price index is constructed is satisfactory.
(c) Use of government publications to obtain the values of well-known index series is satisfactory.
(d) Use of index series is appropriate to context.

RANGE STATEMENT

Index numbers: Laspeyre and Paasche price and quantity indices.

EVIDENCE REQUIREMENTS

Calculations and written evidence that the candidate has achieved all of the performance criteria and covered the full range for this outcome.

OUTCOME

2 USE PROBABILITY THEORY

PERFORMANCE CRITERIA

(a) Construction of an appropriate probability diagram is correct.
(b) Calculation of event probabilities is in accordance with the laws of probability.

RANGE STATEMENT

The range for this outcome is fully expressed within the performance criteria.

EVIDENCE REQUIREMENTS

Probability diagrams and calculations of event probabilities.

OUTCOME

3 USE DECISION THEORY

PERFORMANCE CRITERIA

(a) Construction of pay-off table or opportunity loss table is correct.
(b) Construction of a decision tree is correct.
(c) Calculation of expected value is correct.
(d) Selection of a strategy is in accordance with the decision criterion.
(e) Calculation of the value of perfect information is correct.

RANGE STATEMENT

Decision criteria: maximise the maximum profit; maximise the minimum profit; minimise the maximum regret; maximise the expected profit.

EVIDENCE REQUIREMENTS

A pay-off or opportunity loss table and a decision tree. Calculations. Written and/or oral evidence that the candidate has covered the range for this outcome.

MERIT

A candidate who achieves all performance criteria for all outcomes will be awarded a pass. A pass with merit may be awarded to a candidate who demonstrates superior performance throughout the unit in each of the following aspects:

- consistently high level of accuracy
- outstanding skills of analysis
- consistently logical presentation of work.

Evidence which satisfies the criteria for merit may be generated by either:

- solving the problem to a level beyond that defined as pass
  or
- where this is not possible, including in the assessment a further section which would allow the candidate to demonstrate skills which satisfy the criteria for merit.

ASSESSMENT

In order to achieve this unit, candidates are required to present sufficient evidence that they have met all the performance criteria for each outcome within the range specified. Details of these requirements are given for each outcome. The assessment instruments used should follow the general guidance offered by the SQA assessment model and an integrative approach to assessment is encouraged. (See references at the end of the support notes).

Accurate records should be made of the assessment instruments used showing how evidence is generated for each outcome and giving marking schemes and/or checklists, etc. Records of candidates' achievements should also be kept. These records will be required for external verification.

SPECIAL NEEDS

Proposals to modify outcomes, range statements or agreed assessment arrangements should be discussed in the first place with the external verifier.

HIGHER NATIONAL UNIT SPECIFICATION

SUPPORT NOTES

UNIT NUMBER: 7481704

UNIT TITLE: BUSINESS STATISTICS 2

SUPPORT NOTES: This part of the unit specification is offered as guidance. None of the sections of the support notes is mandatory.

NOTIONAL DESIGN LENGTH: SQA allocates a notional design length to a unit on the basis of the time estimated for achievement of the stated standards by a candidate whose starting point is as described in the access statement. The notional design length for this unit is 40 hours. The use of notional design length for programme design and timetabling is advisory only.

CONTENT/CONTEXT Corresponding to outcomes:

1. Calculate simple price and quantity aggregative indices and weighted averages of relatives including Laspeyre and Paasche indices. Change the base year. Describe the construction of the retail price index. Use CSO and other government publications. Describe briefly other important indices. Use indices, for example: to compare increases in wages and prices, to compare the production performance of an individual company with the performance of the industry of which it forms a part.

2. Calculate probability as relative frequency. Show understanding of the use of the words NOT, OR and AND. Use the law P(NOT A) = 1 - P(A). Identify mutually exclusive events and use the addition law P(A OR B) = P(A) + P(B) for mutually exclusive events.

   Use the generalised addition law P(A OR B) = P(A) + P(B) - P(A AND B). Identify independent events and use the multiplication law
   P(A AND B) = P(A) x P(B).

   Use the generalised multiplication law P(A AND B) = P(A) x P(B/A). Draw tree diagrams or Venn diagrams and use them to calculate probabilities.

3. List decision alternatives and possible outcomes. Construct a pay-off table. Use the MAXIMIN/MAXIMAX/MINIMAX criterion to select the best strategy. If probabilities are known, calculate expected value and select the strategy which gives maximum expected value. Relationship between the decision criteria. Calculate the value of perfect information.

APPROACHES TO GENERATING EVIDENCE It is recommended that candidates be given real-life examples to illustrate the statistical concepts and techniques used in this unit. These examples could be linked to relevant vocational areas, such as:

- business and finance
- travel and tourism
- office and secretarial
- personnel
- administration

The consolidation of skills should be achieved by including investigations of a practical and vocational context and not only by mechanical exercises.

Information on the construction of the RPI can be found in the August 1987 issue of the Employment Gazette. More recent information can be found in Business Monitor MM23.

Candidates are advised to maintain a workfile. This could comprise the candidate's own notes, class handouts, worksheets, exercises, a logbook of computer activities, project notes and other relevant material.

ASSESSMENT PROCEDURES Centres may use the instruments of assessment which are considered by tutors/trainers to be most appropriate. During assessments candidates should have access to their notes and textbooks. Where appropriate they should have access to a computer and suitable software (see the reference section at the end of the support notes),

Examples of instruments of assessment which could be used are as follows:

Corresponding to outcomes:

1. Calculation exercise which demonstrates the candidate's ability to calculate the index numbers.

   Assignment in which the candidate investigates how the retail price index is constructed.

   Assignment involving the extraction and use of index numbers.

2. Graphical and calculation exercise. Two questions involving the laws of probability and two questions involving probability diagrams.

3. Graphical and calculation exercise.

EXEMPLARS

Outcome 1

Part A

A company manufactures four models of car. The yearly production and selling prices are shown in the table below. Calculate Laspeyres and Paasche price and quantity indices for 1993 with 1992 as base year.

	1992		1993	
	Production (000)	Price (£)	Production (000)	Price (£)
Model A	742	6410	750	6550
Model B	550	7500	625	7750
Model C	500	8250	490	8500
Model D	120	12500	125	13000

Part B

1. Describe the collection of data for, and the calculation of, the Retail Price Index.

2. The table shows the production (£ million) of a chemical engineering firm over the last 5 years.

Year	1989	1990	1991	1992	1993
Output	32.4	33.8	33.9	33.5	34.1

Compare the performance of this firm with the performance of the chemicals industry generally and with the performance of all production industries.

Outcome 2

1. 10% of new cars have mechanical defects, 8% have bodywork defects and 3% have both mechanical and bodywork defects. What is the probability that a new car selected at random will have no defects of either kind.

2. Every fifth item produced by an assembly line is tested and 1% of items tested are found to be defective. What is the probability that a particular item will be tested and found to be defective.

3. A factory has 173 employees of whom 21 are managerial and 62 are women. 96 of the male employees are non-managerial. A message has been received saying that one of the employees has just been admitted to hospital with acute appendicitis. What is the probability that it is one of the female managers?

4. John Brown's foreman is retiring in two year's time. The personnel manager has told John that there is a 50/50 chance of him being sent on a one-week Management Training course. If he does not go on the course, there is no chance of getting the job of foreman. If he goes on the course and successfully completes it, the chances of getting the job are 75% but if he fails it, there is only a 5% chance of getting the job. Enquiries show that 70% of people attending the Management Training course complete it successfully. What are his chances of getting the job?

Outcome 3

1. An electrical goods company is planning to build a new factory in Eastern Europe. The countries under consideration are Poland, Romania and Slovakia. The costs of building and equipping the factory are similar whichever country is chosen. The expected average annual profit over the next five years depends on the country chosen and on the state of the world economy. If the world economy is "booming" the expected average annual profits (£million) are 25 in Poland, 30 in Romania and 35 in Slovakia. If the world economy is "stable" the expected average annual profits (£million) are 10 in Poland, 15 in Romania and 10 in Slovakia. If the world economy is "in a slump" the expected average annual product in Poland is £5 million, breakeven is expected in Romania and an average annual loss of £5 million is expected in Slovakia.

   (a) Construct a pay-off table.
   (b) Use the MAXIMIN profit criterion to determine which country should be chosen.
   (c) use the MINIMAX regret criterion to determine which country should be chosen.
   (d) Use the MAXIMAX product criterion to determine which country should be chosen.

2. An art collector is considering selling a painting which he values at £120,000. He could sell it now or he could wait a year and then decide whether to sell it or keep it. If he sells now and it fetches a good price, he will get £150,000 but if it fetches a bad price he will only get £120,000. The cost of waiting a year is £15,000, but during that time there is a 60% chance that the art market will go up. If it does go up and he decides to sell and the painting fetches a good price; he will get £200,000; if it fetches a bad price, he will get £160,000. On the other hand if the art market goes down and he decides to sell and the painting fetches a good price, he will get £120,000; if it fetches a bad price he will only get £100,000. In each case the chance of fetching a good price is only one in five.

   (a) Draw a decision tree.
   (b) Use expected value to advise the art collector on his choice of decisions.
   (c) What would be the value to the art collector of knowing whether the art market is going to go up or down during the next year?

PROGRESSION

For information on how this unit relates to National Certificate mathematics provision and to other units in the Higher National mathematics framework, please refer to the following grid:

- Higher National mathematics grid for business

REFERENCES

1. Guide to unit writing.
2. For a fuller discussion on assessment issues, please refer to SQA's Guide to Assessment.
3. Information for centres on SQA's operating procedures is contained in SQA's Guide to Procedures.
4. For details of other SQA publications, please consult SQA publications list.
5. For an up-to-date list of suitable computer packages, please contact SQA's Product Development Department.

HIGHER NATIONAL MATHEMATICS GRID FOR BUSINESS