Name:

Total Marks:

A level Applied Mathematics

Paper 3A Statistics

Practice Paper 5

Time: 52 mins

Information for Candidates

- This practice paper follows the Edexcel GCE A Level Specifications
- There are 5 questions in this question paper
- The total mark for this paper is 38.
- The marks for **each** question are shown in brackets.
- Full marks may be obtained for answers to ALL questions

Advice to candidates:

- You must ensure that your answers to parts of questions are clearly labelled.
- You must show sufficient working to make your methods clear to the Examiner
- Answers without working may not gain full credit

An estate agent is studying the cost of office space in London. He takes a random sample of 90 offices and calculates the cost, £x per square foot. His results are given in the table below.

| Cost (£x)	Frequency (f)	Midpoint (£y)
$20 \leqslant x < 40$	12	30
$40 \leqslant x < 45$	13	42.5
$45 \leqslant x < 50$	25	47.5
$50 \leqslant x < 60$	32	55
$60 \leqslant x < 80$	8	70

(You may use $\sum f y^2 = 226\,687.5$)

A histogram is drawn for these data and the bar representing 50 ≤ x < 60 is 2cm wide and 8cm high.

(a) Calculate the width and height of the bar representing 20 ≤ x < 40 **(3)**

(b) Use linear interpolation to estimate the median cost. **(2)**

(c) Estimate the mean cost of office space for these data. **(2)**

(d) Estimate the standard deviation for these data. **(2)**

(Total for question = 9 marks)

Question 2

The Venn diagram shows three events *A*, *B* and *C*, where *p*, *q*, *r*, *s* and *t* are probabilities.
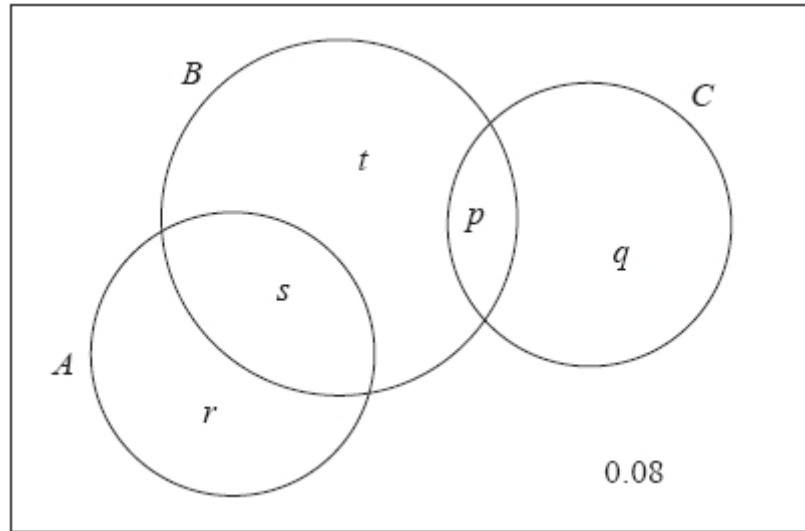
P(*A*) = 0.5, P(*B*) = 0.6 and P(*C*) = 0.25 and the events *B* and *C* are independent.

(a) Find the value of *p* and the value of *q*.   **(2)**

(b) Find the value of *r*.   **(2)**

(c) Hence write down the value of *s* and the value of *t*.   **(2)**

(d) State, giving a reason, whether or not the events *A* and *B* are independent.   **(2)**

(e) Find P($B \mid A \cup C$).   **(3)**

(Total for question = 11 marks)

Question 3

A potter believes that 20% of pots break whilst being fired in a kiln. Pots are fired in batches of 25.

(a) Let *X* denote the number of broken pots in a batch. A batch is selected at random. Using a 10% significance level, find the critical region for a two tailed test of the potter's belief. You should state the probability in each tail of your critical region.   **(4)**

The potter aims to reduce the proportion of pots which break in the kiln by increasing the size of the batch fired. He now fires pots in batches of 50. He then chooses a batch at random and discovers there are 6 pots which broke whilst being fired in the kiln.

(b) Test, at the 5% level of significance, whether or not there is evidence that increasing the number of pots in a batch has reduced the percentage of pots that break whilst being fired in the kiln. State your hypotheses clearly.   **(5)**

(Total for question = 9 marks)

Question 4

The table shows some data collected on the pressure, in pascals, of some gases (P) and the temperature ($t^0\,C$).

Pressure, (P)	45	73	81	90	102	115
Temperature,(t)	3.65	11.01	15.24	21.95	35.21	58.43

The data is coded using the changes of variable $x = P$ and $y = \log t$. The regression line of y on x is found to be $y = -0.2139 + 0.0172x$.

(a) Given that the data can be modelled by an equation of the form $t = ab^p$ where a and b are constants, find, correct to three significant figures, the values of a and b. **(3)**

(b) Explain why this model is not reliable for estimating the temperature when the pressure is 250 pascals. **(1)**

(Total for question = 4 marks)

Question 5

Data about the number of miles done by a sample of one- year- old cars and their value is collected from a dealer. The dealer believes there is negative correlation between the number of miles done and the value

Number of miles	2000	3500	4200	6500	7800
Value (£, 000)	12	9.1	8.2	7.7	6.1

(a) Test at the 2.5% level of significance the dealer's claim. State your hypotheses clearly. **(4)**

(b) State the effect that changing the level of significance to 1% would have on the dealer's conclusion **(1)**

(Total for question = 5 marks)

TOTAL FOR PAPER IS 38 MARKS