

Name:

Total Marks:

A level Applied Mathematics

Paper 3A Statistics

Practice Paper 6

Time: 54 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 45.
- 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

Question 1

The following grouped frequency distribution summarises the number of minutes, to the nearest minute, that a random sample of 100 motorists were delayed by roadworks on a stretch of motorway one Monday.

Delay (minutes)	Number of motorists (f)	Delay midpoint (x)
3–6	38	4.5
7–8	25	7.5
9–10	18	9.5
11–15	12	13
16–20	7	18

(You may use $\sum fx^2 = 8096.25$)

A histogram has been drawn to represent these data.

The bar representing a delay of (3–6) minutes has a width of 2 cm and a height of 9.5 cm.

- (a) Calculate the width and the height of the bar representing a delay of (11–15) minutes. (3)
- (b) Use linear interpolation to estimate the median delay. (2)
- (c) Calculate an estimate of the mean delay. (2)
- (d) Calculate an estimate of the standard deviation of the delays. (2)

(Total for question = 9 marks)

Question 2

A bag contains 64 coloured beads. There are r red beads, y yellow beads and 1 green bead and $r + y + 1 = 64$

Two beads are selected at random, one at a time without replacement.

(a) Find the probability that the green bead is one of the beads selected. (4)

The probability that both of the beads are red is $\frac{5}{84}$

(b) Show that r satisfies the equation $r^2 - r - 240 = 0$ (3)

(c) Hence show that the only possible value of r is 16 (2)

(d) Given that at least one of the beads is red, find the probability that they are both red. (4)

(Total for question = 13 marks)

Question 3

A fair coin is spun 6 times and the random variable T represents the number of tails obtained.

(a) Give two reasons why a binomial model would be a suitable distribution for modelling T . (2)

(b) Find $P(T = 5)$ (2)

(c) Find the probability of obtaining more tails than heads. (2)

A second coin is biased such that the probability of obtaining a head is $\frac{1}{4}$

This second coin is spun 6 times.

(d) Find the probability that, for the second coin, the number of heads obtained is greater than or equal to the number of tails obtained. (3)

(Total for question = 9 marks)

Question 4

Past records show that the proportion of customers buying organic vegetables from *Tesson* supermarket is 0.35

During a particular day, a random sample of 40 customers from *Tesson* supermarket was taken and 18 of them bought organic vegetables.

(a) Test, at the 5% level of significance, whether or not this provides evidence that the proportion of customers who bought organic vegetables has increased. State your hypotheses clearly. (5)

The manager of *Tesson* supermarket claims that the proportion of customers buying organic eggs is different from the proportion of those buying organic vegetables. To test this claim the manager decides to take a random sample of 50 customers.

(b) Using a 5% level of significance, find the critical region to enable the *Tesson* supermarket manager to test her claim. The probability for each tail of the region should be as close as possible to 2.5% (3)

During a particular day, a random sample of 50 customers from *Tesson* supermarket is taken and 8 of them bought organic eggs.

(c) Using your answer to part (b), state whether or not this sample supports the manager's claim. Use a 5% level of significance. (1)

(d) State the actual significance level of this test. (1)

(Total for question = 10 marks)

Question 5

A machine hire company kept records of the age, X months, and the maintenance costs, $\text{£}Y$, of one type of machine. The following table summarises the data for a random sample of 10 machines.

<i>Machine</i>	A	B	C	D	E	F	G	H	I	J
<i>Age, X</i>	63	12	34	81	51	14	45	74	24	89
<i>Maintenance costs, Y</i>	111	25	41	181	64	21	51	145	43	241

- (a) Calculate, to 3 decimal places, the product moment correlation coefficient (1)

It is believed that there is a relationship between the age and maintenance cost of these machines.

- (b) Using a 5% level of significance and quoting from the table of critical values, interpret your correlation coefficient. Use a two-tailed test and state clearly your null and alternative hypotheses (3)

(Total for question = 4 marks)

TOTAL FOR PAPER IS 45 MARKS