

ADVANCED SUBSIDIARY (AS) General Certificate of Education 2012

Mathematics

Assessment Unit S1

assessing

Module S1: Statistics 1

[AMS11]



WEDNESDAY 6 JUNE, MORNING

TIME

1 hour 30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number on the Answer Booklet provided.

Answer all seven questions.

Show clearly the full development of your answers.

Answers should be given to three significant figures unless otherwise stated.

You are permitted to use a graphic or scientific calculator in this paper.

INFORMATION FOR CANDIDATES

The total mark for this paper is 75

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

A copy of the **Mathematical Formulae and Tables booklet** is provided.

Throughout the paper the logarithmic notation used is $\ln z$ where it is noted that $\ln z \equiv \log_e z$



Answer all seven questions.

Show clearly the full development of your answers.

Answers should be given to three significant figures unless otherwise stated.

1 All members of a youth club filled in a questionnaire which included a question about the amount of time spent watching television the previous week.

The results are given in **Table 1** below.

Table 1

Time (nearest hour)	2–4	5–9	10–14	15–20
Frequency	16	38	42	9

Find the mean and standard deviation for these data. [5]

2 Telephone calls at a software help centre arrive randomly at an average rate of 1 every 2 minutes.

Find the probability that in a one-minute period:

- (i) no calls arrive; [3]
- (ii) fewer than three calls arrive; [3]
- (iii) one call arrives given that fewer than three calls arrive. [3]

Find the probability that, in a five-minute period:

(iv) two or more calls arrive. [5]

3 A discrete random variable *X* has probability distribution

X	0	1	2	3
P(X=x)	0.25	а	b	0.35

where a and b are constants.

Given that E(X) = 1.7, find:

(ii)
$$Var(X)$$
. [4]

Given that Y = 3 + 2X, find:

(iii)
$$E(Y)$$
 and $Var(Y)$. [3]

4 A continuous random variable X has the probability density function f(x) defined by

$$f(x) = \frac{x^2}{9} \qquad 0 \le x \le t$$

(i) Show that
$$t = 3$$

(ii) Given that
$$P(X \le a) = 0.25$$
, find a . [3]

(iii) Similarly, given that
$$P(X \le b) = 0.75$$
, find b. [2]

(iv) Find the interquartile range of
$$X$$
. [2]

5 The heights of fir trees in a forest are Normally distributed with mean 3.2 m and standard deviation 0.8 m.

A garden centre sells these trees classified into three types according to their height. The height classification and profit made on each type is shown in **Table 2** below.

Table 2

Tree Type	A	В	С
Tree Height	Less than 3 m	Between 3 m and 4 m	4m and above
Profit	£8	£12	£15

Find the probability that a fir tree chosen at random is of:

- (i) Type A; [4]
- (ii) Type B. [4]
- (iii) Find the expected profit made per tree. [4]
- **6 (a)** Members of a sports club were asked about which flavours of fizzy drink they liked. 52% liked cola.

42% liked lemon.

20% did not like either cola or lemon.

Find the probability that a member chosen at random likes cola given that they also like lemon. [5]

- **(b)** A and B are two events where P(A) = p, P(B) = 0.5 and $P(A \cup B) = 0.8$
 - (i) If A and B are mutually exclusive events, find the value of p. [3]
 - (ii) If A and B are independent events, find the value of p. [3]

7 In the autumn Gail plants 10 snowdrop bulbs.
The probability of a bulb flowering in the spring is *p*.
If *X* is the random variable "the number of bulbs flowering in the spring", find an expression, in terms of *p*, for:

(i)
$$P(X = 1)$$
; [2]

(ii)
$$P(X = 2)$$
. [2]

It is known that P(X = 1) = P(X = 2):

(iii) find
$$p$$
; [2]

(iv) hence find the probability that at most 3 bulbs flower in the spring. [4]

THIS IS THE END OF THE QUESTION PAPER

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