



AQA AS-Level Further Maths 2026 **Paper 2S (Statistics)**

Do not turn over the page until instructed to do so.

This assessment is out of 40 marks and you will be given 45 minutes.

When you are asked to by your teacher write your **full name** below

Name:

Total Marks: **/ 40**

- 1 The discrete random variable X has probability distribution

$$f(x) = \begin{cases} 0.2 & x = 2 \\ 0.35 & x = 4 \\ 0.4 & x = 6 \\ 0.05 & x = 8 \end{cases}$$

What is the mode of X ?

6

4

0.4

0.05

[1 mark]

- 2 The continuous random variable X has $E(X) = 3$.

The discrete random variable Y is independent of X and such that $E(Y) = 2$.

What is $E(X - Y)$

1

5

6

13

[1 mark]

- 3 A binomial hypothesis test is carried out at the 5 % level of significance with the hypotheses

$$H_0: p = 0.4$$

$$H_1: p < 0.4$$

A sample of size 40 was used to carry out the test.

Find the probability that a Type I error was made.

Circle your answer.

1.6 %

3.8 %

7.1 %

3.5 %

[1 mark]

- 4 A random variable X has a normal distribution with known variance 6.8.

A random sample of size n is taken from X and the sample mean is found to be 56.2.

A 96 % confidence interval is constructed.

- a) Given that the interval is (55.730, 56.670) find the value of n .

[4 marks]

- b) Tom claims that the true mean is 55.9.
Does the confidence interval support this claim? Give a reason for your answer.

[1 mark]

5 An insurance company models the number broken phone claims it receives in one day by a Poisson distribution with parameter $\lambda = 50$.

a) Suggest why a Poisson distribution could be a suitable model for this situation?

[1 mark]

b) Find the probability that the company receives at most 40 claims for broken phone screens on a randomly selected day.

[1 marks]

c) (i) Customers can only make a claim by phoning a line that is open for 10 hours per day.

What is the probability of the line receiving 6 calls in a given hour?

[1 mark]

- (ii) Jess records how many calls were received in hour periods for 10 days.

What is the probability that at least 6 of the 10 days had an hour where 6 calls were received.

[2 marks]

- d) The company also handles claims for broken watch screens.

Assuming that the number of watch claims is independent of phone claims and that the number of watch claims per day can also be modelled by a Poisson distribution, this time with parameter $\lambda = 25$.

What is the standard deviation of the random variable which represents the total number of watch and phone claims per day?

[2 marks]

6 A random variable, X , has probability density function

$$f(x) = \begin{cases} -kx(x - 4) & 0 \leq x < 4 \\ 0 & \text{otherwise} \end{cases}$$

where k is a positive constant.

a) Find the value of k .

[2 marks]

b) Is the median of $f(x)$ greater than the mean of $f(x)$?

Fully justify your answer.

[3 marks]

- 7 Two examiners A and B are marking maths papers for an awarding organisation.

The number of marking errors per day for each examiner during a 50 day period was recorded.

		Number of Errors				Total
		0	1	2	3 or more	
Examiner	A	5	17	24	4	50
	B	22	10	16	2	50
	Total	27	27	40	6	100

The awarding organisation claim there is an association between examiner and number of errors pay day.

- a) Complete the table of expected values

	0	1	2	3 or more
A	13.5			3
B	13.5	13.5		3

[1 marks]

- b) Test the awarding organisation's claim, at the 1 % significance level.

[5 marks]

- c) By considering observed and expected frequencies, interpret in context the association between examiner and the number of errors made per day.

[2 mark]

8 The discrete random variable X has probability distribution

x	1	2	3	4
$P(X = x)$	0.3	a	0.25	b

a) Given that $E(X) = 2.45$ and $\text{Var}(X) = 1.3475$ find a and b .

[3 marks]

b) Given that the random variable Y is defined to be $Y = 2X + 3$, find

(i) $E(Y)$

(ii) $\text{Var}(Y)$

[2 marks]

c) The random variable Z has a discrete uniform distribution where $z = 1, 2, \dots, 10$.

Prove that $E(Z) = \frac{n+1}{2}$ and $\text{Var}(Z) = \frac{n^2-1}{12}$.

[3 marks]

- d)** Given that Z is a discrete distribution with parameter $n = 85a$ where a is the value found in (a), find $E(X) + E(Y) + E(Z)$.
[2 marks]