OXFORD AQA
INTERNATIONAL QUALIFICATIONS

INTERNATIONAL AS/A LEVEL
FURTHER MATHEMATICS

Further Statistics 1

Specimen paper 0X:00 GMT Time allowed: 1 hour 15 minutes

Materials
- For this paper you must have the OxfordAQA Pure Mathematics and Statistics Examination Booklet (enclosed)
- You may use a graphical calculator.

Instructions
- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.
- The **final** answer to questions requiring the use of calculators should be given to **three** significant figures, unless stated otherwise.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.

Advice
- Unless stated otherwise, you may quote formulae, without proof, from the booklet.
- Show all necessary working; otherwise, marks may not be awarded.

Copyright © 2026 OxfordAQA International Qualifications and its licensors. All rights reserved.

Answer **all** questions in the spaces provided.

1 The discrete random variable A has probability generating function

$$G_A(t) = (0.3 + 0.7t)^3$$

1 (a) Use differentiation to find $E(A)$

[4 marks]

Answer _____

1 (b) Use differentiation to find $\text{Var}(A)$

[3 marks]

Answer _____

Copyright © 2026 OxfordAQA International Qualifications and its licensors. All rights reserved.

1 (c) Find $P(A = 2)$

[1 mark]

Answer _____

1 (d) State the maximum possible value of A

[1 mark]

Answer _____

Turn over for the next question

Copyright © 2026 OxfordAQA International Qualifications and its licensors. All rights reserved.

2 A worker at a call centre receives calls from customers.

Each call is independent of all other calls.

The probability that a call is recorded as a complaint is 0.2

The random variable X represents the number of calls the worker receives up to and including the fifth complaint.

2 (a) State the distribution of X

Give the values of any parameters.

[1 mark]

Answer _____

2 (b) (i) Find the mean of X

[1 mark]

Answer _____

2 (b) (ii) Find the variance of X

[2 marks]

Answer _____

Copyright © 2026 OxfordAQA International Qualifications and its licensors. All rights reserved.

2 (c) Interpret in context the mean of X

[1 mark]

2 (d) Find $P(X = 10)$

Give your answer to four decimal places.

[2 marks]

Answer _____

Turn over for the next question

Copyright © 2026 OxfordAQA International Qualifications and its licensors. All rights reserved.

3 An internet security company has a system which determines whether emails pass or fail a security check.

To do this the system searches for particular words within the email.

The following data is collected:

- 20% of all emails fail the check
- if an email fails the check then the probability it contains a particular word is 0.85
- if an email passes the check then the probability it contains a particular word is 0.12

3 (a) An email is chosen at random.

It is given that this email contains a particular word.

Find the probability that the email passes the check.

Give your answer to four decimal places.

[5 marks]

Answer _____

Copyright © 2026 OxfordAQA International Qualifications and its licensors. All rights reserved.

3 (b) The company considers its system to have worked correctly with an email if:

- the email fails the check and contains a particular word

or

- the email passes the check and does **not** contain a particular word.

An email is chosen at random.

Find the probability that the system works correctly with this email.

[3 marks]

Answer _____

Turn over for the next question

Copyright © 2026 OxfordAQA International Qualifications and its licensors. All rights reserved.

4 The random variable J has a discrete uniform distribution where $J \sim \text{DU}(1,10)$

4 (a) (i) Find $\text{E}(J)$

[2 marks]

Answer _____

4 (a) (ii) Find $\text{Var}(J)$

[2 marks]

Answer _____

4 (a) (iii) Find $\text{P}(J > 7)$

[2 marks]

Answer _____

Copyright © 2026 OxfordAQA International Qualifications and its licensors. All rights reserved.

4 (b) The random variable K has a geometric distribution where $K \sim \text{Geo}(p)$

It is given that $\text{P}(K = 2) = 0.16$ and $p < 0.45$

4 (b) (i) Find $\text{Var}(K)$

Fully justify your answer

[4 marks]

Answer _____

4 (b) (ii) It is given that $\text{Var}(J - 4K) = 328$

Explain whether J and K are independent.

[3 marks]

Answer _____

Copyright © 2026 OxfordAQA International Qualifications and its licensors. All rights reserved.

5 A teacher is investigating whether there is an association between the time in hours a student revises each week and their mark on an exam.

The teacher randomly selects eight students.

The data for the eight students is shown in **Figure 1**

Figure 1

Student	Time spent revising each week (Hours)	Exam mark
A	3	59
B	7	71
C	2	49
D	6	65
E	9	78
F	5	58
G	4	56
H	8	75

5 (a) (i) Find Spearman's rank correlation coefficient r_s for the teacher's data.

[4 marks]

$r_s =$ _____

Copyright © 2026 OxfordAQA International Qualifications and its licensors. All rights reserved.

5 (a) (ii) The teacher claims there is a positive association between the time in hours a student revises each week and their mark on an exam.

Test the teacher's claim using the 5% level of significance.

[4 marks]

5 (b) State two conditions that must hold for Spearman's rank correlation coefficient to be a valid measure of association between two variables.

[2 marks]

Condition 1 _____

Condition 2 _____

Copyright © 2026 OxfordAQA International Qualifications and its licensors. All rights reserved.

6 Two machines *A* and *B* produce metal components.

The discrete random variable X represents the number of components with a fault produced in one hour by machine *A*

The discrete random variable Y represents the number of components with a fault produced in one hour by machine *B*

The total number of components with a fault produced in one hour by both machines is

$$T = X + Y$$

Assume that X and Y are independent.

It is given that $\mathrm{E}(X) = 1.1$ and $\mathrm{Var}(X) = 0.89$

It is also given that $\mathrm{E}(Y) = 1.2$ and $\mathrm{Var}(Y) = 1.36$

6 (a) (i) Find the mean of T

[2 marks]

Answer _____

6 (a) (ii) Find the variance of T

[2 marks]

Answer _____

Copyright © 2026 OxfordAQA International Qualifications and its licensors. All rights reserved.

6 (b) The probability distribution for X is shown in **Figure 2**

Figure 2

x	0	1	2	3
$\mathrm{P}(X = x)$	0.3	0.4	0.2	0.1

The probability distribution for Y is shown in **Figure 3**

Figure 3

y	0	1	2	3
$\mathrm{P}(Y = y)$	0.4	0.2	0.2	0.2

6 (b) (i) Find $\mathrm{P}(T = 3)$

[3 marks]

Answer _____

6 (b) (ii) Find $\mathrm{P}(T > 3 \mid Y = 2)$

[2 marks]

Answer _____

Question 6 continues on the next page

Copyright © 2026 OxfordAQA International Qualifications and its licensors. All rights reserved.

6 (c) An engineer finds that X and Y are **not** independent.

They correctly calculate that the population product moment correlation coefficient between X and Y is 0.25

6 (c) (i) Find $\text{Cov}(X, Y)$, the covariance of X and Y

[2 marks]

Answer _____

6 (c) (ii) Find the variance of T

Give your answer to two significant figures

[2 marks]

Answer _____

END OF QUESTIONS

Permission to reproduce all copyright material has been applied for. In some cases, efforts to contact copyright-holders may have been unsuccessful and Oxford AQA International Qualifications will be happy to rectify any omissions of acknowledgements. If you have any queries please contact the Copyright Team, AQA, Stag Hill House, Guildford, GU2 7XJ.

Copyright © 2026 OxfordAQA International Qualifications and its licensors. All rights reserved.