Write your name here

Surname	Other Names

AS/A Level Mathematics

Correlation Hypothesis Testing

Candidates may use any calculator allowed by the regulations of the Joint Council for Qualifications. Calculators must not have the facility for symbolic algebra manipulation, differentiation and integration, or have retrievable mathematical formulae stored in them.

Instructions

• Use **black** ink or ball-point pen.
• If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
• **Fill in the boxes** at the top of this page with your name.
• Answer **all** questions and ensure that your answers to parts of questions are clearly labelled..
• Answer the questions in the spaces provided
– there may be more space than you need.
• You should show sufficient working to make your methods clear.
Answers without working may not gain full credit.
• Answers should be given to three significant figures unless otherwise stated.

Information

• The marks for **each** question are shown in brackets
– use this as a guide as to how much time to spend on each question.

Advice

• Read each question carefully before you start to answer it.
• Try to answer every question.
• Check your answers if you have time at the end.

1 A football coach measured the heights and weights of 12 players, The data is shown below.

Height (cm)	188	194	178	175	185	175	188	193	180	190	181	169
Weight (kg)	70	100	83	69	77	58	90	86	71	94	68	61

(a) Draw a scatter graph for this information. **(2)**

(b) Give an interpretation of the correlation between the height and weight of the footballers. **(1)**

The equation of the regression line is $w = 1.37h - 173$

(c) Give an interpretation of the gradient of this regression line. **(1)**

The product moment correlation coefficient is calculated to be 0.81.

(d) Stating your hypotheses clearly test, at the 5% significance level, whether there is a positive correlation between height and weight **(4)**

(e) Determine whether you would reach the same conclusion at the 1% significance level. **(2)**

(Total for question 1 is 10 marks)

2 The temperature and the rainfall on 15 days is recorded.

(a) Suggest a null and alternative hypothesis for a two tailed test to investigate whether there is a correlation between temperature and rainfall. **(2)**

The product moment correlation coefficient is calculated to be r = 0.37.

(b) Test your hypotheses at the 10% significance level. **(2)**

(Total for question 2 is 4 marks)

3 The temperature and the number of hours of sunshine on 12 days is recorded.
The product moment correlation coefficient is calculated to be r = 0.636.

Stating your hypotheses clearly test, at the 1% significance level, whether there is a positive correlation between temperature and hours of sunshine

(Total for question 3 is 4 marks)

4 Amy wants to find out if there is a correlation between daily maximum relative humidity and daily mean pressure.

(a) Suggest a suitable null and alternative hypothesis for a two-tail test.

Amy takes a sample of 14 days and finds a product moment correlation coefficient of -0.55.

(b) Carry out the hypothesis test at the 5% significance level.

(Total for question 4 is 4 marks)