Write your name here

Surname	Other Names

AS/A Level Mathematics

Interpolation and Standard Deviation

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 Adam is measuring the heights in cm of his tomato plants.

Height (cm)	Frequency
$140 < h \leqslant 150$	7
$150 < h \leqslant 160$	10
$160 < h \leqslant 170$	15
$170 < h \leqslant 180$	19
$180 < h \leqslant 200$	9

(a) Use linear interpolation to estimate the median height. **(2)**

(b) Estimate the mean height. **(2)**

(c) Estimate the standard deviation. **(2)**

(Total for question 1 is 6 marks)

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2 A company is investigating how long it takes employees, t minutes, to get to an event.
They produce a table below of coded times, x minutes, for a random sample of 50 employees.

Coded Time (minutes)	Frequency
$0 < x \leqslant 5$	1
$5 < x \leqslant 10$	9
$10 < x \leqslant 15$	19
$15 < x \leqslant 25$	14
$25 < x \leqslant 40$	7

(a) Use linear interpolation to estimate the median of the coded times. **(2)**

(b) Estimate the standard deviation of the coded times. **(2)**

The coded data was calculated sing the formula: $x = \dfrac{t - 20}{2}$

(c) Calculate the median and the standard deviation of t. **(3)**

(Total for question 2 is 7 marks)

3 The distance travelled by 100 people to an event is summarised below.

Distance (nearest mile)	Frequency
0 – 9	4
10 – 19	19
20 – 29	41
30 – 39	26
40 – 49	9
50 – 59	1

You may use: $\Sigma fx = 2651$ $\Sigma fx^2 = 80434.25$

(a) Use linear interpolation to estimate the median height. **(2)**

(b) Estimate the mean height. **(2)**

(c) Estimate the standard deviation. **(2)**

(Total for question 3 is 6 marks)

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4 The times 12 athletes took to run 400m is summarised in the table below.

Athlete	A	B	C	D	E	F	G	H	A	I	J	K
Time (s)	45.2	46.9	46.1	46.2	45.4	45.1	47.8	45.4	45.5	46.1	46.4	45.7

(a) Find the mean time taken **(2)**

(b) Find the standard deviation for these times **(2)**

(c) Find the median, upper and lower quartiles of these data. **(3)**

(Total for question 4 is 7 marks)
