



Linear Interpolation Exam Questions (Edexcel)

Q1.

The following table summarises the times, t minutes to the nearest minute, recorded for a group of students to complete an exam.

Time (minutes) t	11 – 20	21 – 25	26 – 30	31 – 35	36 – 45	46 – 60
Number of students f	62	88	16	13	11	10

[You may use $\sum ft^2 = 134281.25$]

- (a) Estimate the mean and standard deviation of these data. (5)
- (b) Use linear interpolation to estimate the value of the median. (2)
- (c) Show that the estimated value of the lower quartile is 18.6 to 3 significant figures. (1)
- (d) Estimate the interquartile range of this distribution. (2)
- (e) Give a reason why the mean and standard deviation are not the most appropriate summary statistics to use with these data. (1)

The person timing the exam made an error and each student actually took 5 minutes less than the times recorded above. The table below summarises the actual times.

Time (minutes) t	6 – 15	16 – 20	21 – 25	26 – 30	31 – 40	41 – 55
Number of students f	62	88	16	13	11	10

- (f) Without further calculations, explain the effect this would have on each of the estimates found in parts (a), (b), (c) and (d). (3)

(Total 14 marks)

(Q06 6683/01, June 2013)

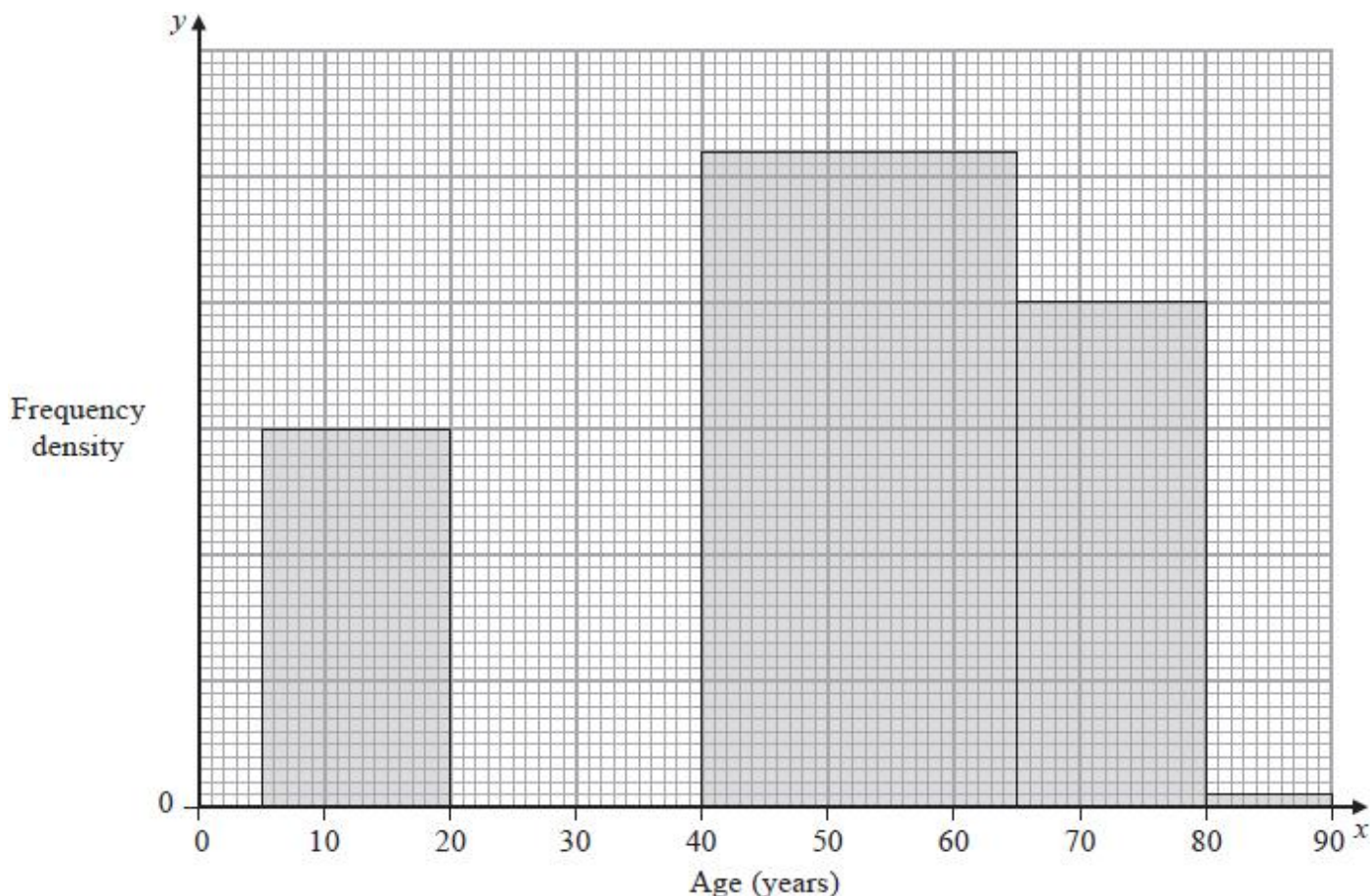
Q2.



The partially completed table and partially completed histogram give information about the ages of passengers on an airline.

There were no passengers aged 90 or over.

Age (x years)	$0 \leq x < 5$	$5 \leq x < 20$	$20 \leq x < 40$	$40 \leq x < 65$	$65 \leq x < 80$	$80 \leq x < 90$
Frequency	5	45	90			1



(a) Complete the histogram.

(3)

(b) Use linear interpolation to estimate the median age.

(4)

An outlier is defined as a value greater than $Q_3 + 1.5 \times$ interquartile range.

Given that $Q_1 = 27.3$ and $Q_3 = 58.9$

(c) determine, giving a reason, whether or not the oldest passenger could be considered as an outlier.

(2)

(Total for question = 9 marks)

(Q02 8MA0/21, Oct 2021)



Q3.

Joshua is investigating the daily total rainfall in Hurn for May to October 2015

Using the information from the large data set, Joshua wishes to calculate the mean of the daily total rainfall in Hurn for May to October 2015

(a) Using your knowledge of the large data set, explain why Joshua needs to clean the data before calculating the mean.

(1)

Using the information from the large data set, he produces the grouped frequency table below.

Daily total rainfall (r mm)	Frequency	Midpoint (x mm)
$0 \leq r < 0.5$	121	0.25
$0.5 \leq r < 1.0$	10	0.75
$1.0 \leq r < 5.0$	24	3.0
$5.0 \leq r < 10.0$	12	7.5
$10.0 \leq r < 30.0$	17	20.0

You may use $\sum fx = 539.75$ and $\sum fx^2 = 7704.1875$

(b) Use linear interpolation to calculate an estimate for the upper quartile of the daily total rainfall.

(2)

(c) Calculate an estimate for the standard deviation of the daily total rainfall in Hurn for May to October 2015

(2)

(d) (i) State the assumption involved with using class midpoints to calculate an estimate of a mean from a grouped frequency table.

(ii) Using your knowledge of the large data set, explain why this assumption does not hold in this case.

(iii) State, giving a reason, whether you would expect the actual mean daily total rainfall in Hurn for May to October 2015 to be larger than, smaller than or the same as an estimate based on the grouped frequency table.

(3)

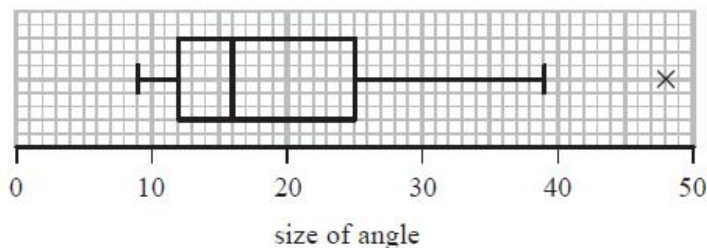
(Total for question = 8 marks)

(Q04 8MA0/21, June 2019)



Q4.

Each of 60 students was asked to draw a 20° angle without using a protractor. The size of each angle drawn was measured. The results are summarised in the box plot below.



(a) Find the range for these data.

(1)

(b) Find the interquartile range for these data.

(1)

The students were then asked to draw a 70° angle. The results are summarised in the table below.

Angle, a , (degrees)	Number of students
$55 \leq a < 60$	6
$60 \leq a < 65$	15
$65 \leq a < 70$	13
$70 \leq a < 75$	11
$75 \leq a < 80$	8
$80 \leq a < 85$	7

(c) Use linear interpolation to estimate the size of the median angle drawn. Give your answer to 1 decimal place.

(2)

(d) Show that the lower quartile is 63°

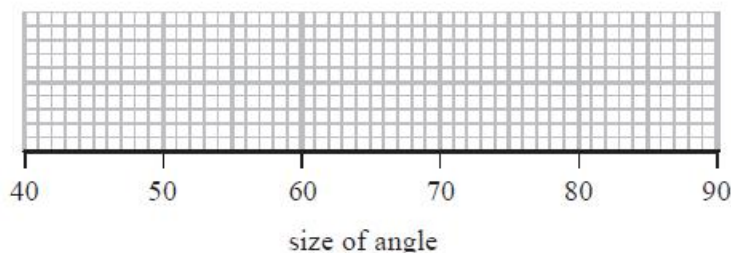
(2)

For these data, the upper quartile is 75° , the minimum is 55° and the maximum is 84°

An outlier is an observation that falls either more than $1.5 \times$ (interquartile range) above the upper quartile or more than $1.5 \times$ (interquartile range) below the lower quartile.

(e) (i) Show that there are no outliers for these data.

(ii) Draw a box plot for these data on the grid below.



(5)

(f) State which angle the students were more accurate at drawing. Give reasons for your answer.

(Total for question = 14 marks)

(Q06 6683/01, June 2015)