

1. The following table summaries the time, 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, $\sum ft^2 = 134281.25$

- Estimate the mean and standard deviation of these data. (5)
- Use linear interpolation to estimate the value of the median. (2)
- Show that the estimated value of the lower quartile is 18.6 to 3 significant figures. (1)
- Estimate the interquartile range of this distribution. (2)

The person timing the exam made an error and the student 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

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

This image shows a full page of blank white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page, providing a template for writing or drawing. There are no margins, text, or other markings present.

Solutions

1a.

$\sum ft = 4837.5$	M1
$\text{Mean} = \frac{4837.5}{200}$	M1
$\text{Mean} = 21.1875$	M1
$\sigma = \sqrt{\frac{134281.25}{200} - \left(\frac{4837.5}{200}\right)^2}$	M1
$\sigma = 9.2923$	M1

1b.

$Q_2 = [20.5] + \frac{\frac{100}{100.5-62}}{88} \times 5$	M1
$Q_2 = 22.659.... - 22.7$	M1

1c.

$Q_1 = [10.5] + \frac{\frac{50}{50.25}}{62} \times 10$	M1
$Q_1 = 18.56$	M1

1d.

$Q_3 = 25.5$	M1
$\text{IQR} = 6.9$	M1

1e.

The mean and standard deviation remain the same	M1
The median and the quartiles would decrease	M1
The IQR would remain unchanged.	M1

