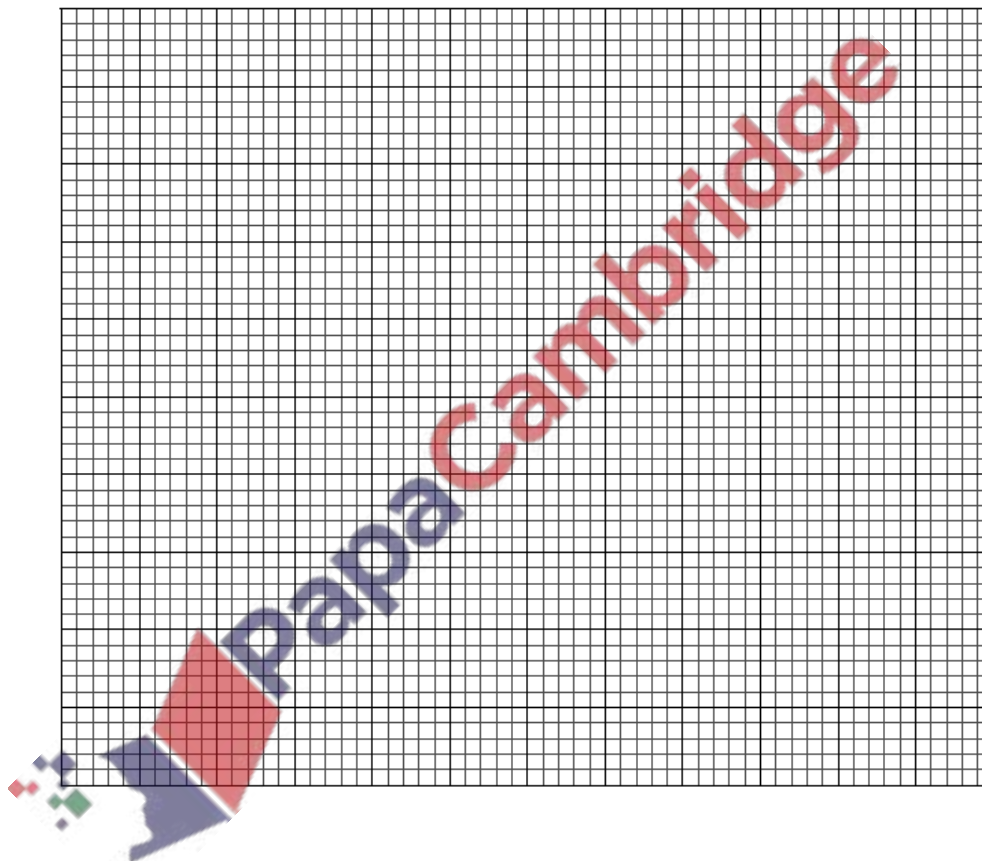1. March/2022/Paper_9709/52/No.3

At a summer camp an arithmetic test is taken by 250 children. The times taken, to the nearest minute, to complete the test were recorded. The results are summarised in the table.

Time taken, in minutes	1 − 30	31 − 45	46 − 65	66 − 75	76 − 100
Frequency	21	30	68	86	45

(a) Draw a histogram to represent this information. [4]

(b) State which class interval contains the median. [1]

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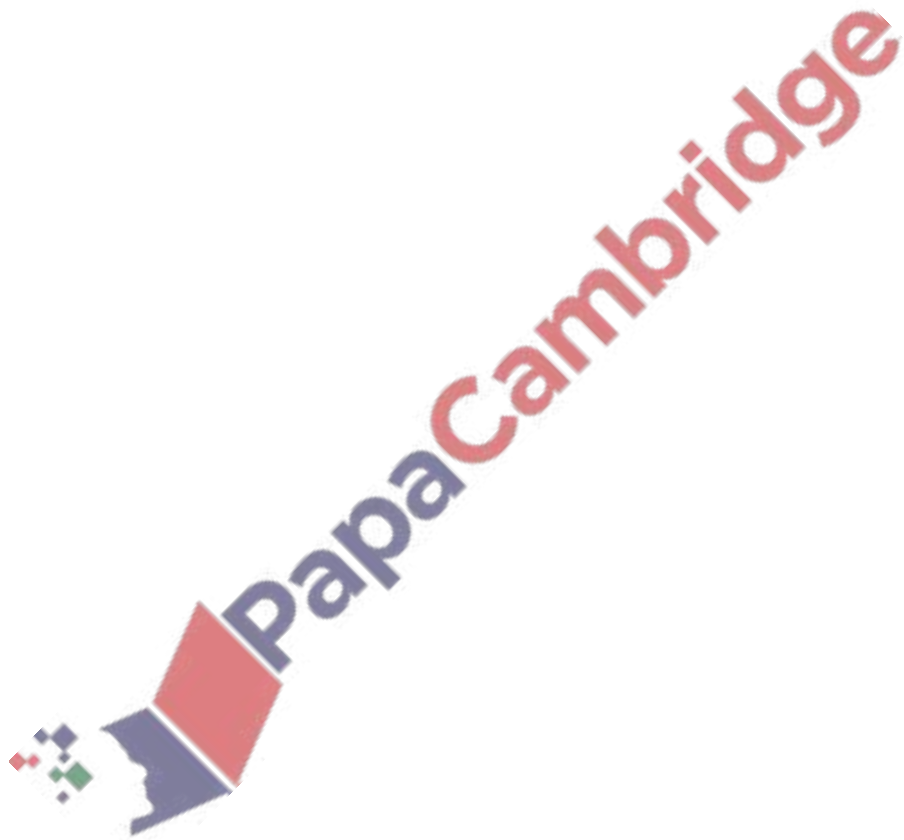
(c) Given that an estimate of the mean time is 61.05 minutes, state what feature of the distribution accounts for the median and the mean being different. [1]

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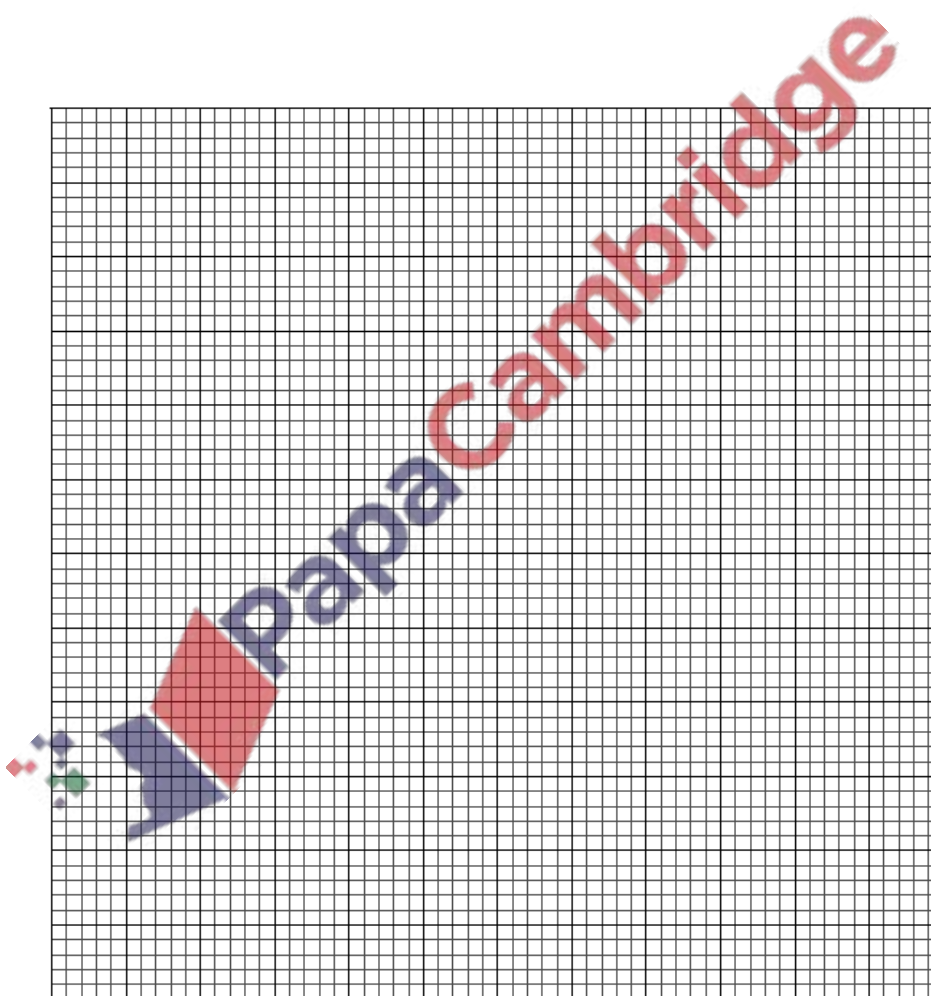
The times taken to travel to college by 2500 students are summarised in the table.

Time taken (t minutes)	$0 \leqslant t < 20$	$20 \leqslant t < 30$	$30 \leqslant t < 40$	$40 \leqslant t < 60$	$60 \leqslant t < 90$
Frequency	440	720	920	300	120

(a) Draw a histogram to represent this information. [4]

From the data, the estimate of the mean value of t is 31.44.

(b) Calculate an estimate of the standard deviation of the times taken to travel to college. [3]

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(c) In which class interval does the upper quartile lie? [1]

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It was later discovered that the times taken to travel to college by two students were incorrectly recorded. One student's time was recorded as 15 instead of 5 and the other's time was recorded as 65 instead of 75.

(d) Without doing any further calculations, state with a reason whether the estimate of the standard deviation in part **(b)** would be increased, decreased or stay the same. [1]

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The back-to-back stem-and-leaf diagram shows the diameters, in cm, of 19 cylindrical pipes produced by each of two companies, *A* and *B*.

Company A						Stem	Company B				
					4	33	1	2	8		
	9	8	3	2	0	34	1	6	8	9	9
8	7	5	4	1	1	35	1	2	2	3	
		9	6	5	2	36	5	6			
			4	3	1	37	0	3	4		
						38	2	8			

Key: $1\,|\,35\,|\,3$ means the pipe diameter from company *A* is 0.351 cm and from company *B* is 0.353 cm.

(a) Find the median and interquartile range of the pipes produced by company *A*. [3]

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It is given that for the pipes produced by company *B* the lower quartile, median and upper quartile are 0.346 cm, 0.352 cm and 0.370 cm respectively.
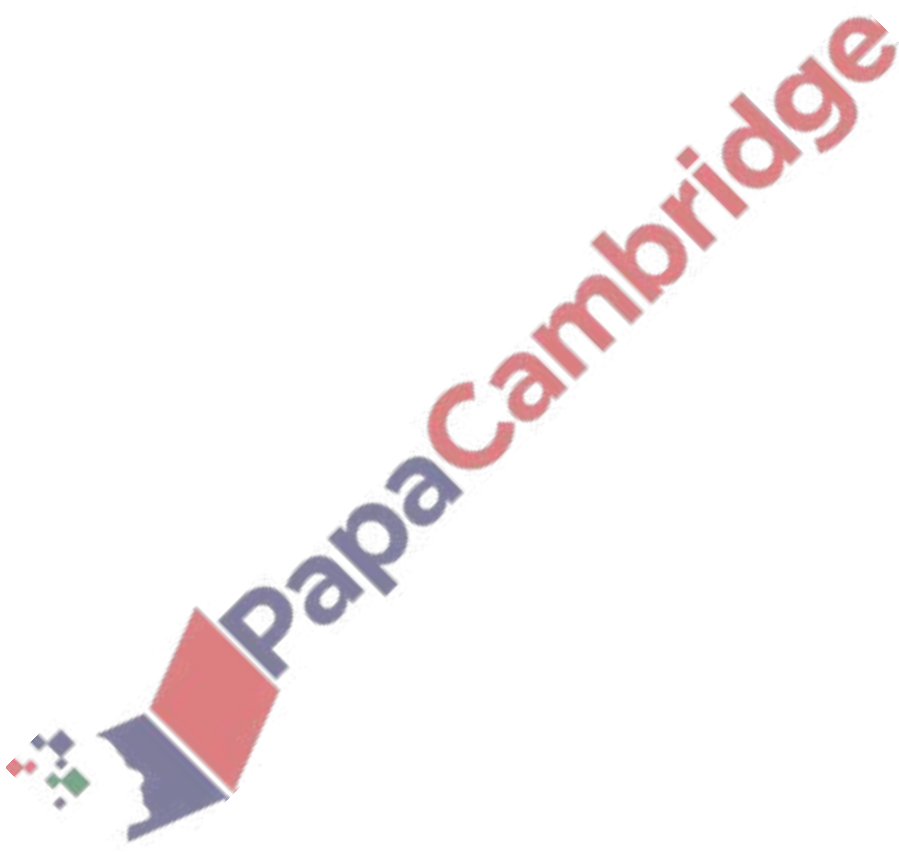
(b) Draw box-and-whisker plots for companies *A* and *B* on the grid below. [3]

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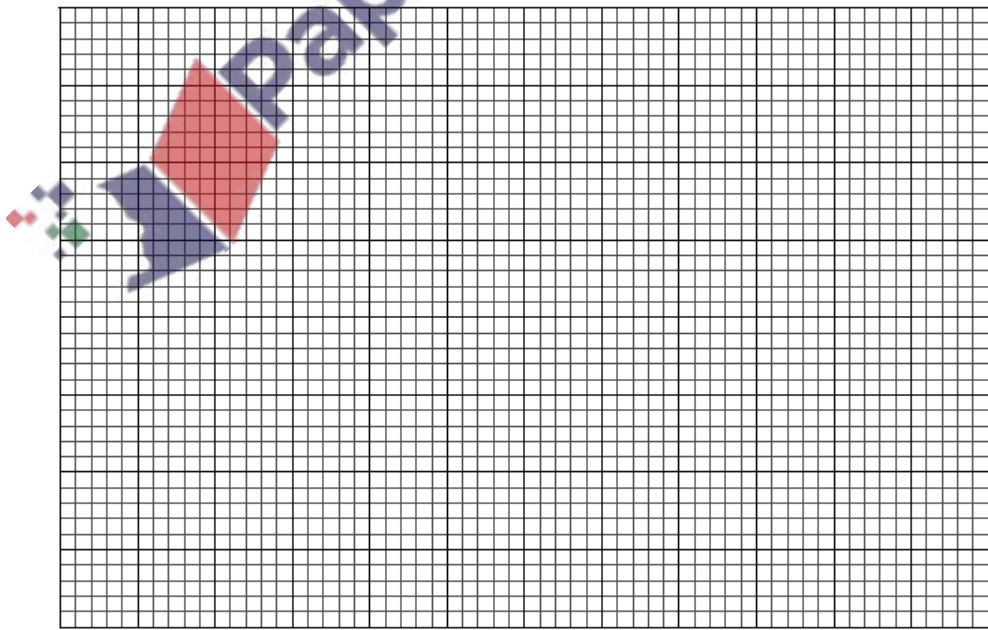
(c) Make one comparison between the diameters of the pipes produced by companies *A* and *B*. **[1]**
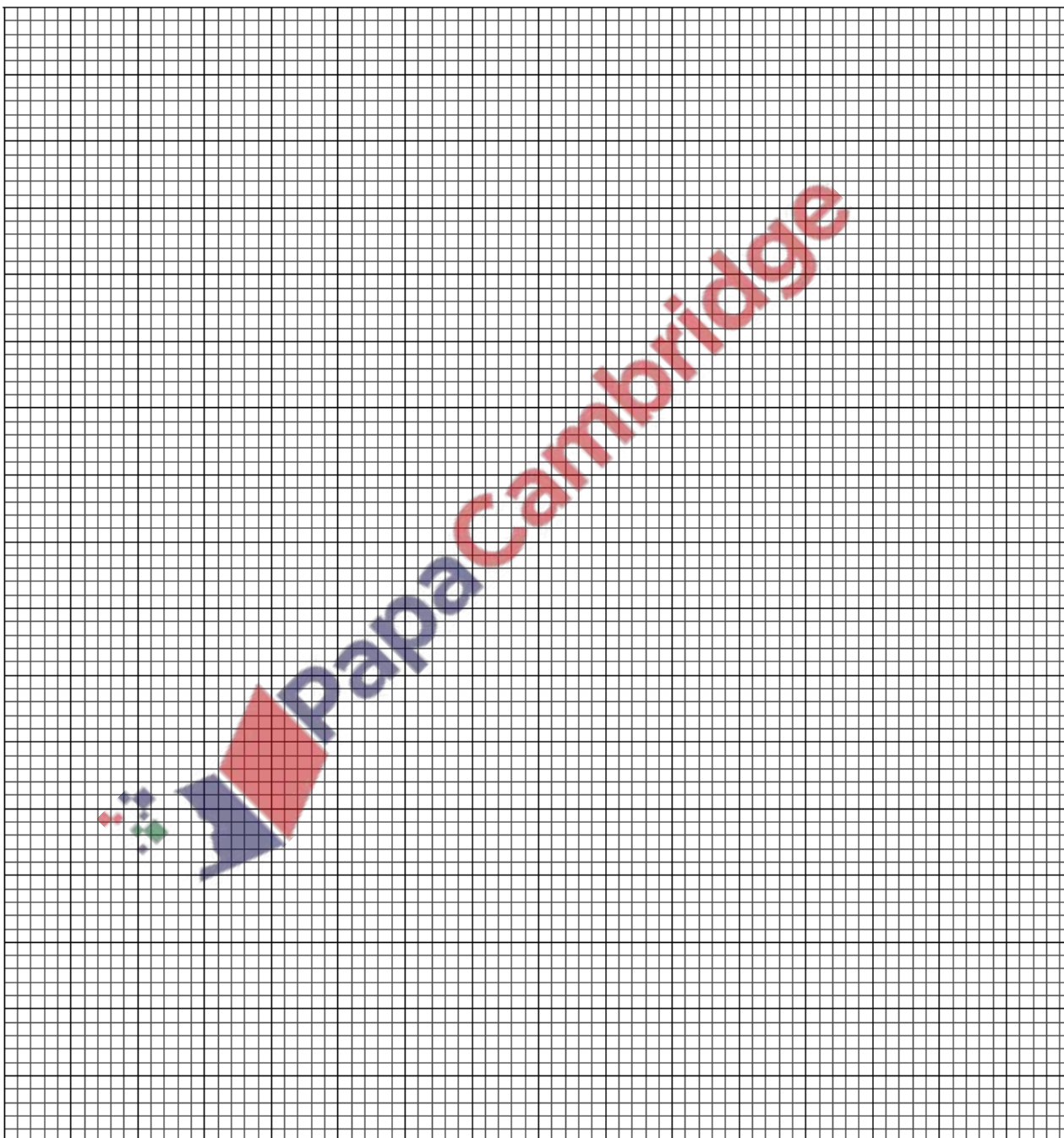
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The time taken, t minutes, to complete a puzzle was recorded for each of 150 students. These times are summarised in the table.

Time taken (t minutes)	$t \leqslant 25$	$t \leqslant 50$	$t \leqslant 75$	$t \leqslant 100$	$t \leqslant 150$	$t \leqslant 200$
Cumulative frequency	16	44	86	104	132	150

(a) Draw a cumulative frequency graph to illustrate the data. [2]

(b) Use your graph to estimate the 20th percentile of the data. [1]

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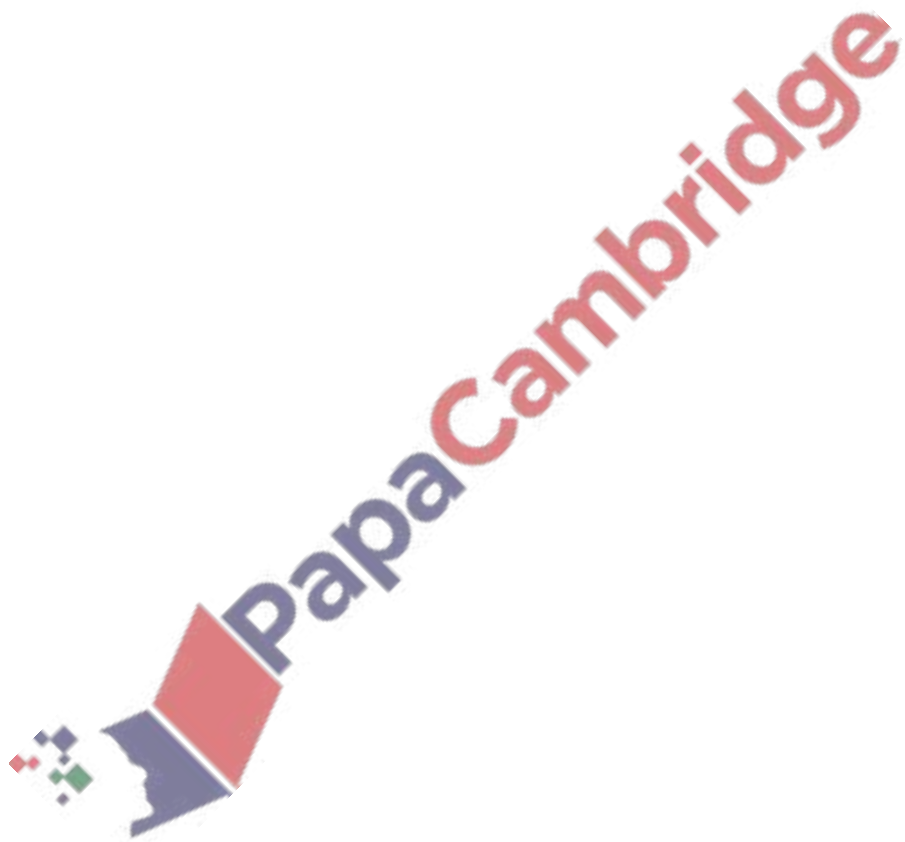
Twenty children were asked to estimate the height of a particular tree. Their estimates, in metres, were as follows.

| 4.1 | 4.2 | 4.4 | 4.5 | 4.6 | 4.8 | 5.0 | 5.2 | 5.3 | 5.4 |
| 5.5 | 5.8 | 6.0 | 6.2 | 6.3 | 6.4 | 6.6 | 6.8 | 6.9 | 19.4 |

(a) Find the mean of the estimated heights. [1]

(b) Find the median of the estimated heights. [1]

(c) Give a reason why the median is likely to be more suitable than the mean as a measure of the central tendency for this information. [1]