

# **6. Cumulative Frequency and Box Plot**

1.

A company is considering changes to its price list for delivering parcels in a local area. The company is considering a charge based on the distance between the warehouse and the destination of the parcel. The table gives the grouped frequency distribution for the distances, measured to the nearest km, for 60 parcels.

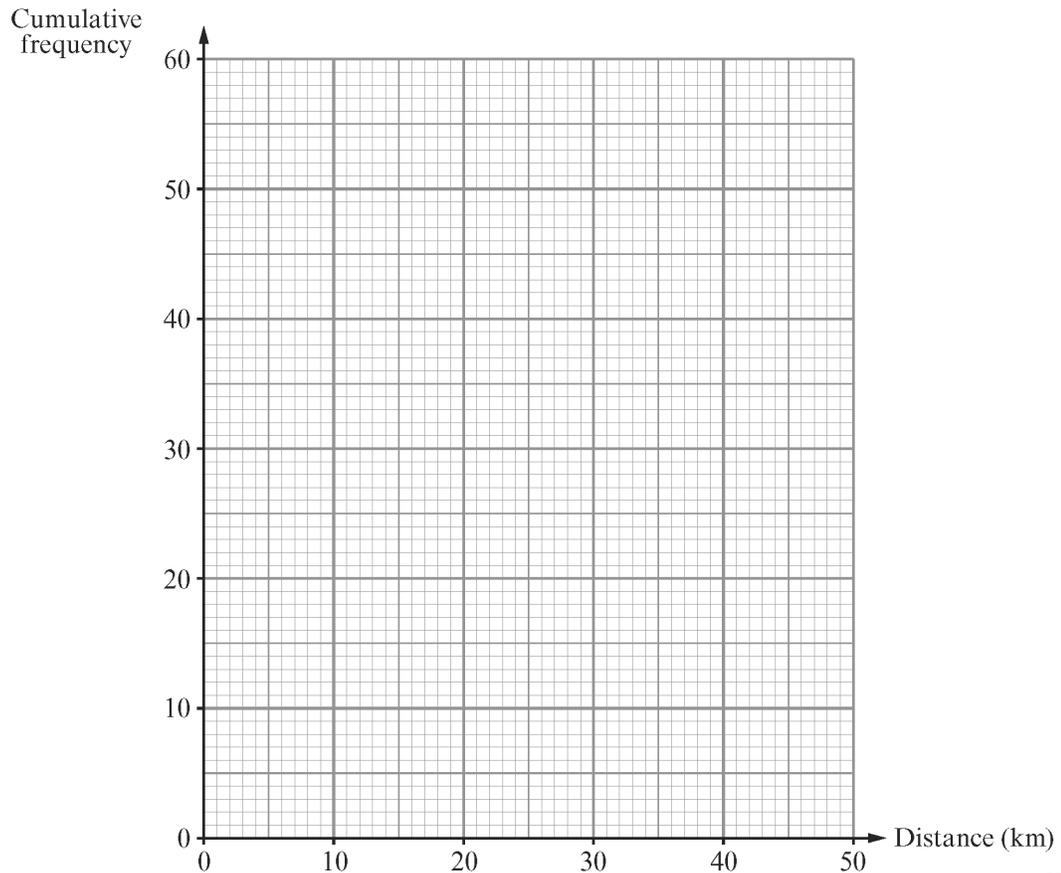
Distance, to the nearest km	1 - 10	11 - 20	21 - 30	31 - 40
Number of parcels	10	30	15	5

(a) Complete the following cumulative frequency table.

Distance (km)	<0.5	<10.5	<20.5	<30.5	<40.5
Cumulative frequency	0	10			

[1]

(b) On the graph paper below, draw a cumulative frequency diagram to show this information.



- (c) Use your cumulative frequency diagram to find an estimate for the median and the interquartile range of the delivery distances.  
You **must** show your working.

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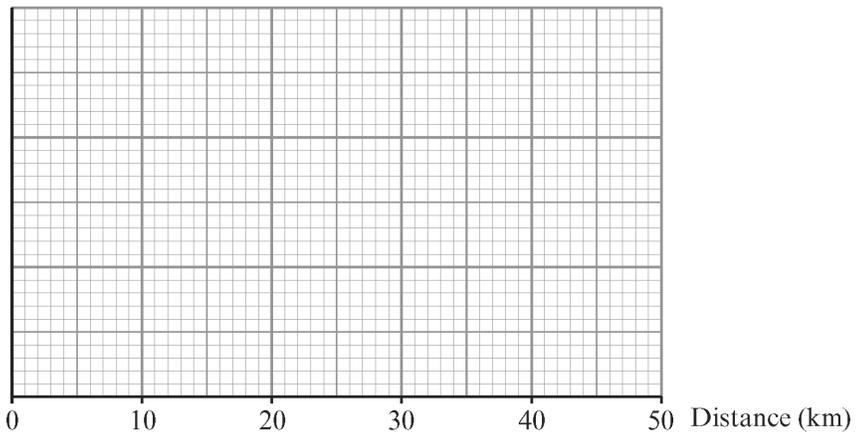
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Median ..... Interquartile range ..... [3]

- (d) For these 60 parcels, the shortest delivery distance is 2km and the longest delivery distance is 37 km.  
Draw a box and whisker diagram to illustrate this information.



[4]

- (e) Previously, the delivery charge was £2 for each parcel.  
The new pricing plan being considered is:
- free delivery for all parcels up to the median delivery distance;
  - £4 per parcel for all other deliveries.

Would you expect the company to profit from the new pricing for parcel delivery?  
Explain your answer.

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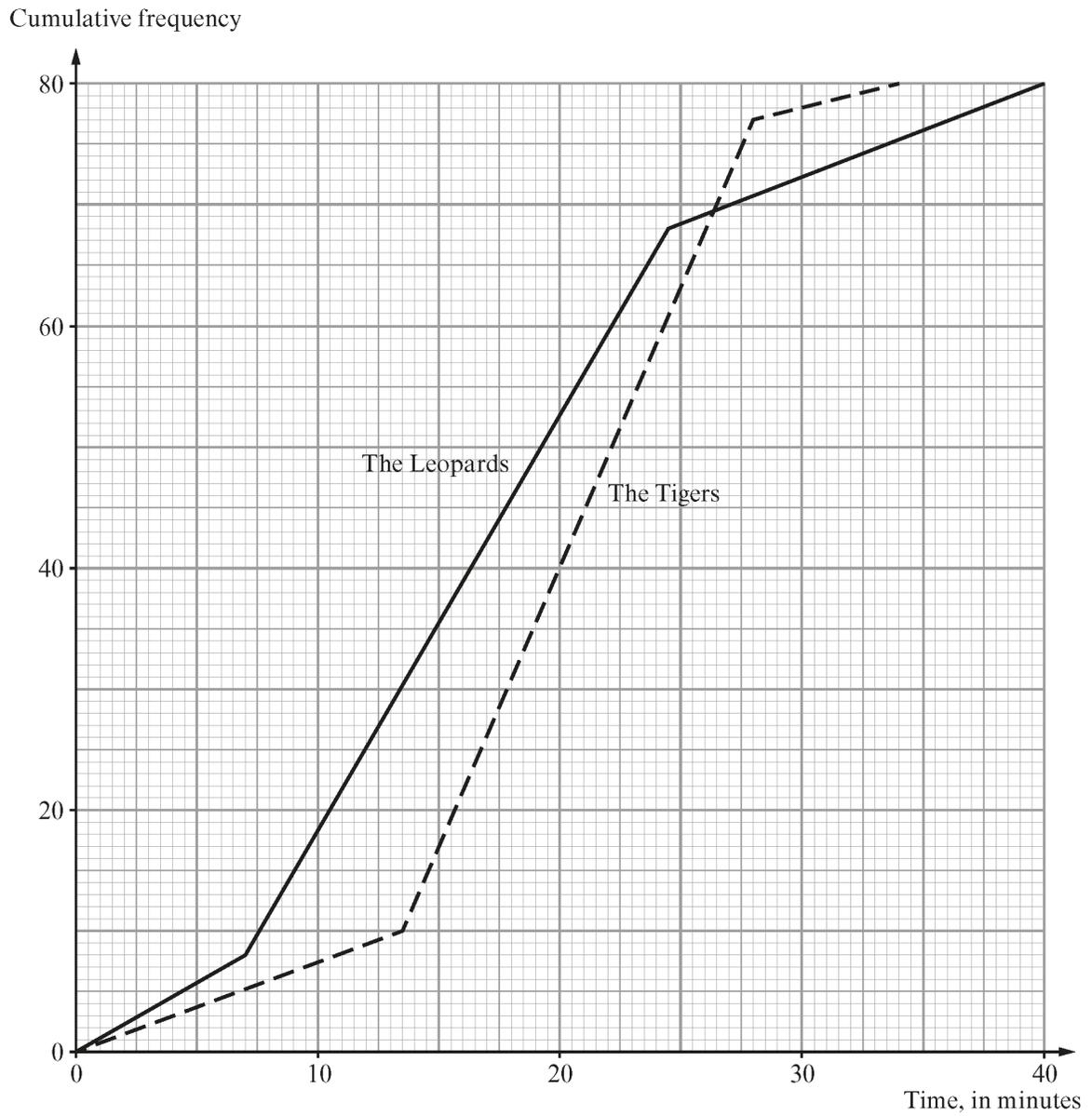
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[3]

2.

The cumulative frequency diagram shows the times taken by the members of two different clubs, The Leopards and The Tigers, to complete a fitness course. Each club has 80 members.



(a) Find the median and inter-quartile range for **The Tigers**.

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Median .....

Inter-quartile range .....

[3]

(b) State which club, The Leopards or The Tigers, was slower on average at completing the fitness course. Give a reason for your answer.

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[2]

(c) The times taken by another group of students to complete the fitness course are shown in the grouped frequency distribution table below.

Time, $t$ minutes	Number of students
$0 \leq t < 10$	2
$10 \leq t < 20$	30
$20 \leq t < 30$	45
$30 \leq t < 40$	3

Calculate an estimate for the mean time taken by these students.

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[4]

**3.**

The table gives a grouped frequency distribution of the arm lengths of 100 women each measured correct to the nearest centimetre.

Arm length, $a$ cm	156 to 158	159 to 161	162 to 164	165 to 167	168 to 170
Number of women	5	15	35	40	5

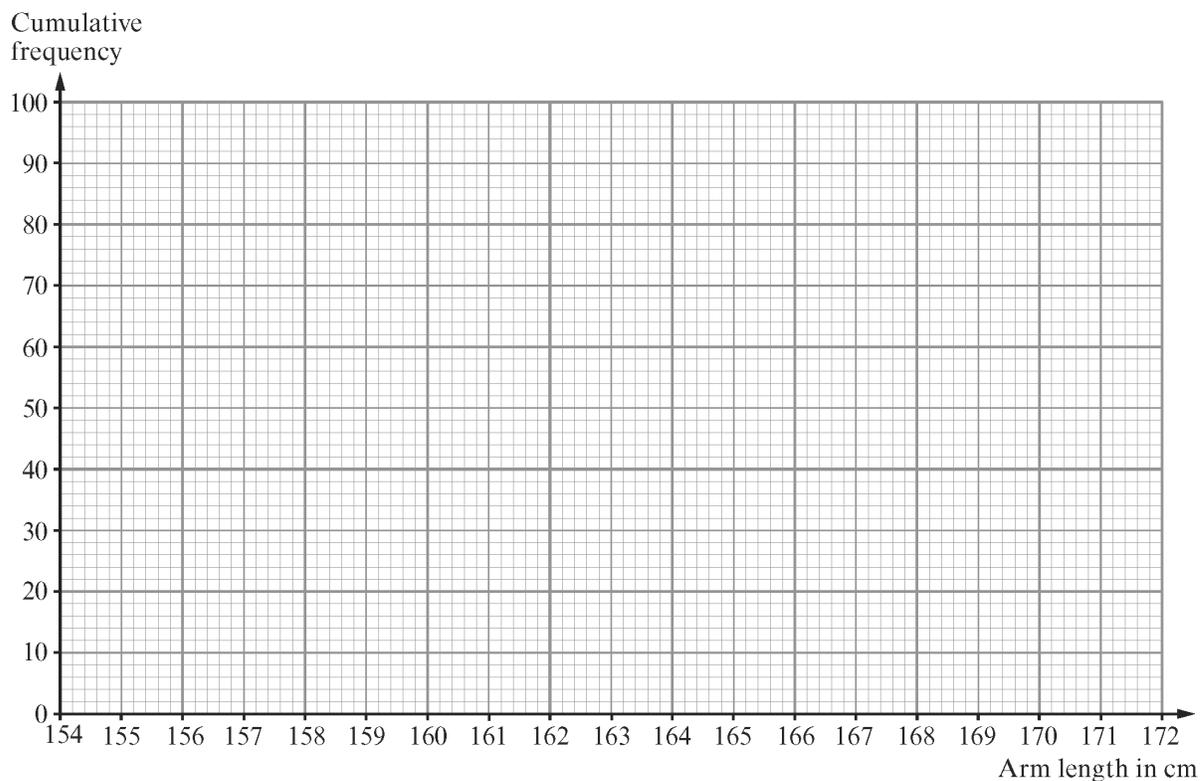
(a) Complete the following cumulative frequency table.

Arm length, $a$ cm	$a < 155.5$	$a < 158.5$	$a < 161.5$	$a < 164.5$	$a < 167.5$	$a < 170.5$
Cumulative frequency	0	5				

[1]

(b) On the graph paper below, draw a cumulative frequency diagram to show this information.

[2]



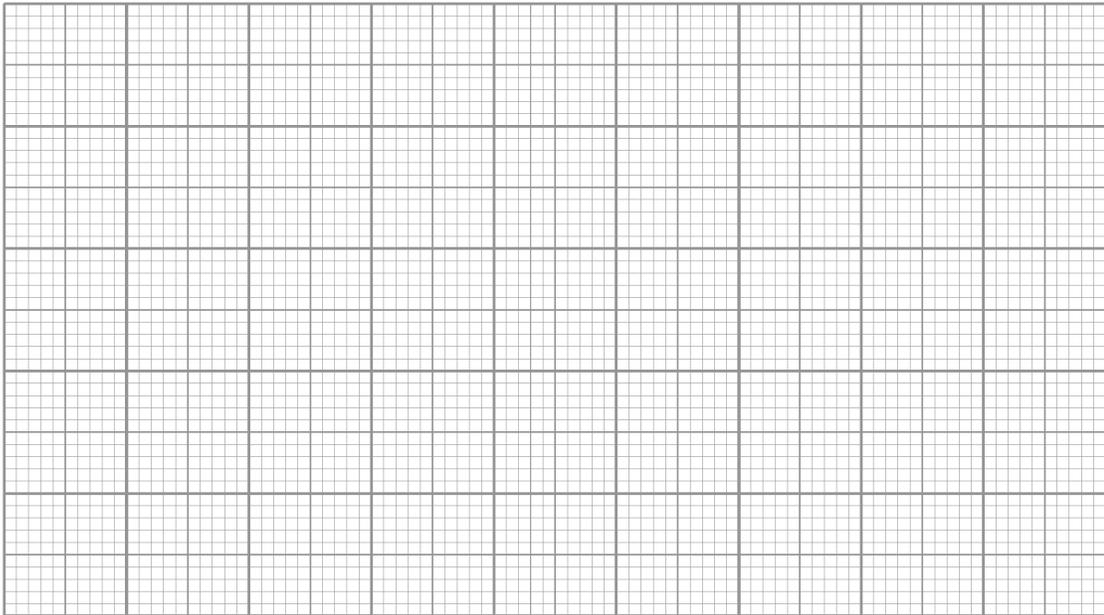
(c) Use your cumulative frequency diagram to estimate the median and the interquartile range.

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Median ..... Interquartile range .....

[3]

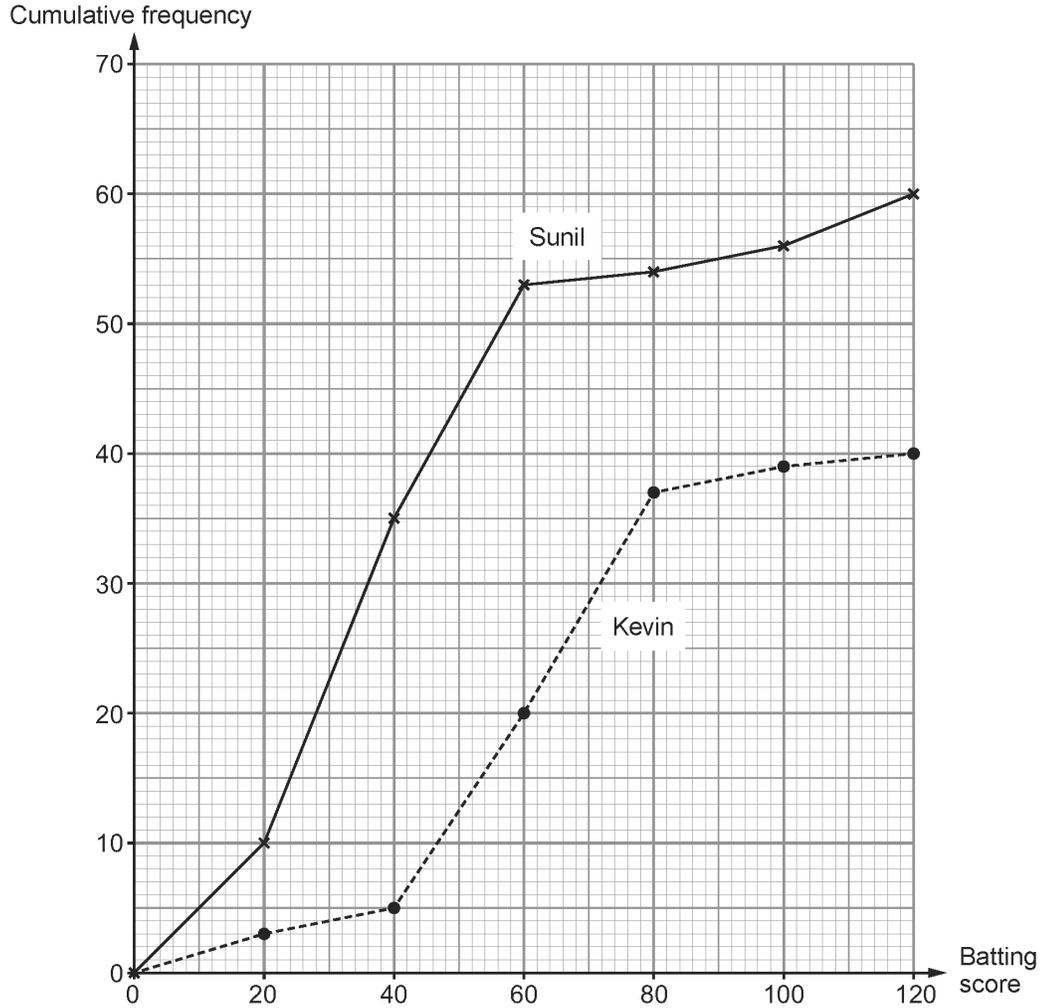
(d) Use the graph paper below to draw a box-and-whisker diagram to show these results.



[4]

4.

Two cricketers, Sunil and Kevin, keep a record of their batting scores over a season. The cumulative frequency diagram below shows their batting scores over this season.



(a) Find the interquartile range for Sunil. [2]

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(b) Who has the higher average batting score, Sunil or Kevin? Give a reason for your answer. [2]

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5.



The table gives the grouped frequency distribution for the lengths of the electrical cords of 80 toasters.

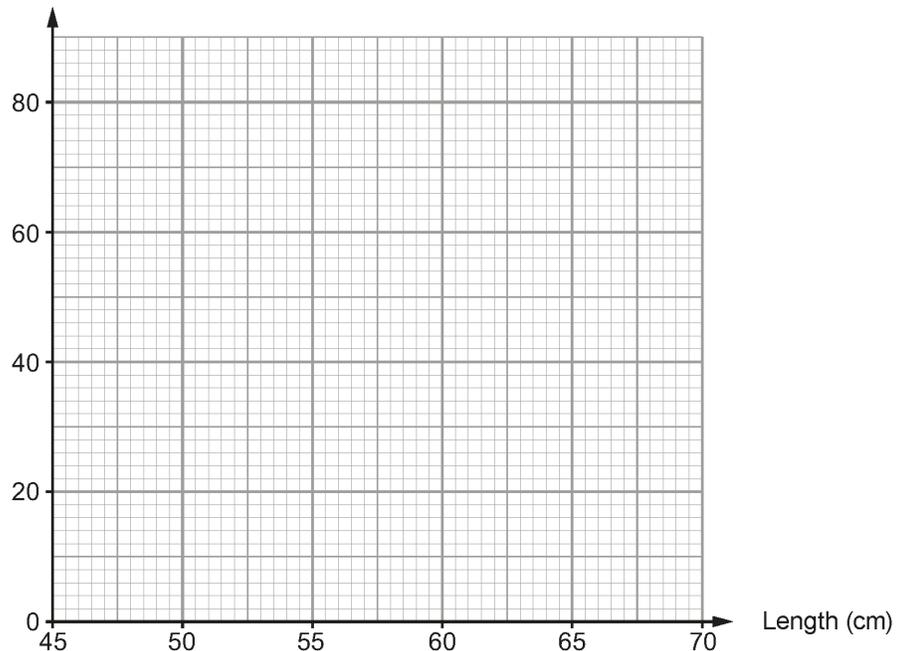
Length, to the nearest cm	49-53	54-58	59-63	64-68
Number of toasters	6	38	32	4

(a) Complete the following cumulative frequency table. [1]

Length (cm)	<48.5	<53.5	<58.5	<63.5	<68.5
Cumulative frequency	0	6			

(b) On the graph paper below, draw a cumulative frequency diagram to show this information. [2]

Cumulative frequency



- (c) Use your cumulative frequency diagram to find an estimate for the median, the lower quartile, the upper quartile and the interquartile range of the lengths of the electrical cords in centimetres. [4]

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Median	
Lower quartile	
Upper quartile	
Interquartile range	

- (d) The length of the shortest electrical cord is 50 cm.  
 The length of the longest electrical cord is 68 cm.  
 Draw a box and whisker diagram to illustrate the lengths of the electrical cords. [3]

