Cumulative Frequency Worksheet

1 **Answer the whole of this question on a sheet of graph paper.**

80 electric light bulbs of brand A were tested to find how long each bulb lasted.
The results are summarised in the table below.

Time (t hours)	$t \leq 50$	$50 < t \leq 100$	$100 < t \leq 150$	$150 < t \leq 200$	$200 < t \leq 250$	$250 < t \leq 300$	$300 < t \leq 350$	$350 < t \leq 400$
Number of bulbs	1	2	6	34	26	8	2	1

(a) Copy and complete the following cumulative frequency table.

Time (t hours)	$t \leq 50$	$t \leq 100$	$t \leq 150$	$t \leq 200$	$t \leq 250$	$t \leq 300$	$t \leq 350$	$t \leq 400$
Number of bulbs	1	3						80

[1]

(b) Using a horizontal scale of 1 cm to represent 50 hours and a vertical scale of 1 cm to represent 10 bulbs, draw a smooth cumulative frequency curve **on the next page** for these brand A bulbs[3]

(c) Use your graph to estimate

   (i)   the median, [1]

   (ii) the 10th percentile. [1]

(d) 80 brand B bulbs were also tested and a report on the test gave the following information.

3 bulbs lasted 50 hours or less.
No bulbs lasted more than 350 hours.
The median time was 250 hours.
The upper quartile was 275 hours.
The interquartile range was 75 hours.

On the same axes, draw a smooth cumulative frequency curve for the brand B bulbs. [3]

(e) Use your graphs to estimate the number of bulbs that lasted 260 hours or less

    (i) for brand A, [1]

    (ii) for brand B. [1]

(f) Which brand of bulb is more likely to last longer than 250 hours?
Justify your answer. [1]

Draw a cumulative frequency diagram to represent these results.
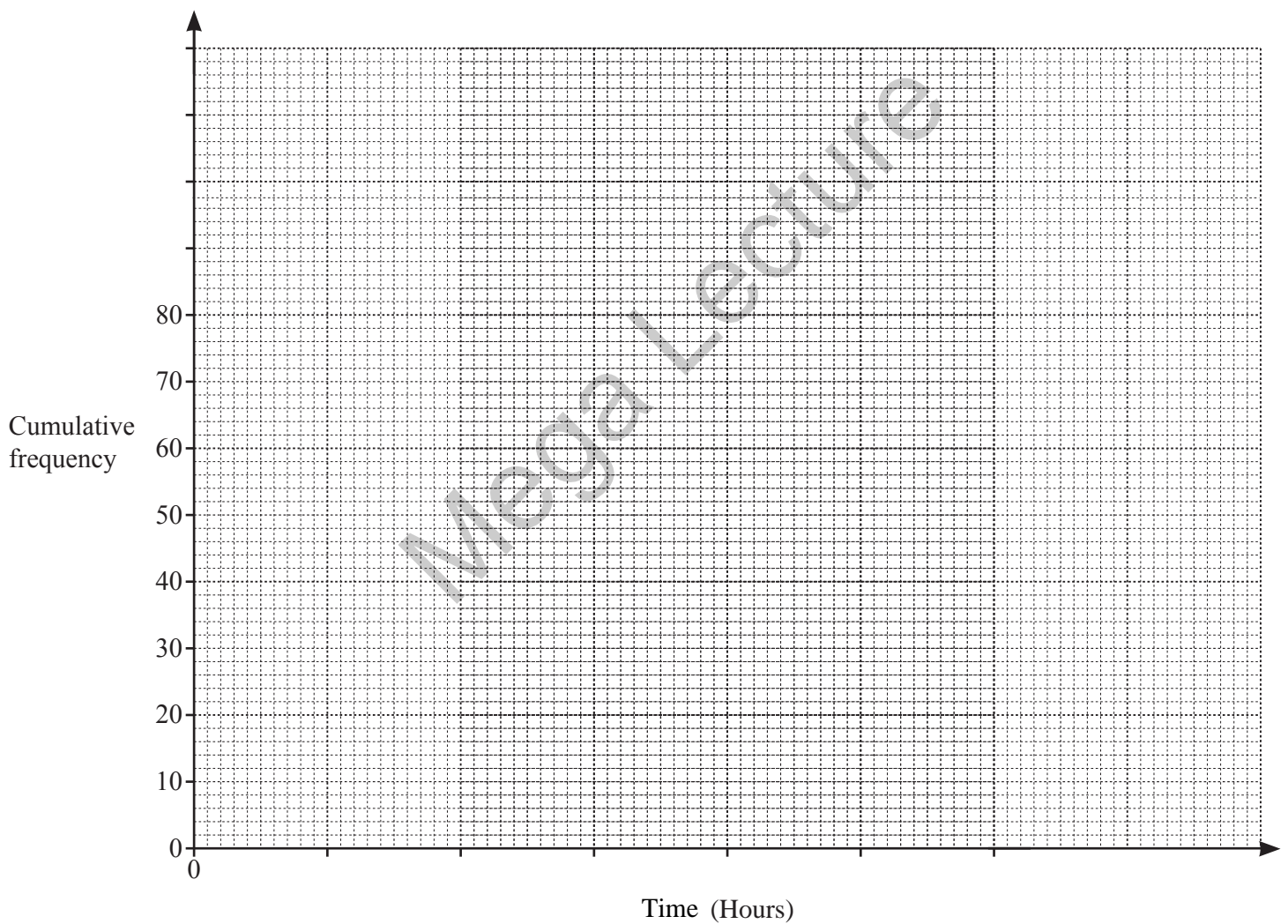
[3]

2 **Answer the whole of this question on a sheet of graph paper.**

The table below shows the marks obtained in tests of English and Mathematics by 140 students.

Mark (x)	Number of candidates	
	English	Mathematics
$0 < x \leqslant 20$	4	10
$20 < x \leqslant 40$	26	20
$40 < x \leqslant 60$	50	30
$60 < x \leqslant 80$	56	55
$80 < x \leqslant 100$	4	25

(a) Copy and complete the cumulative frequency table below.

Mark (x)	Number of candidates	
	English	Mathematics
$x = \quad 0$	0	0
$x \leqslant \quad 20$	4	
$x \leqslant \quad 40$		
$x \leqslant \quad 60$		
$x \leqslant \quad 80$		
$x \leqslant 100$	140	

[2]

(b) Using a scale of 2 cm to represent 20 marks, draw a horizontal x-axis for $0 \leqslant x \leqslant 100$.
Using a scale of 2 cm to represent 20 pupils, draw a vertical axis for values from 0 to 140.
On your axes, draw and label both smooth cumulative frequency curves **on the next page**
to illustrate this information. [3]

(c) Use your curves to find

   (i) the upper quartile mark for English, [1]

  (ii) the interquartile range for English, [1]

 (iii) the median mark for English and the median mark for Mathematics. [1]

(d) State, with a reason, which you think is the easier test. [1]

(e) One student is chosen at random.
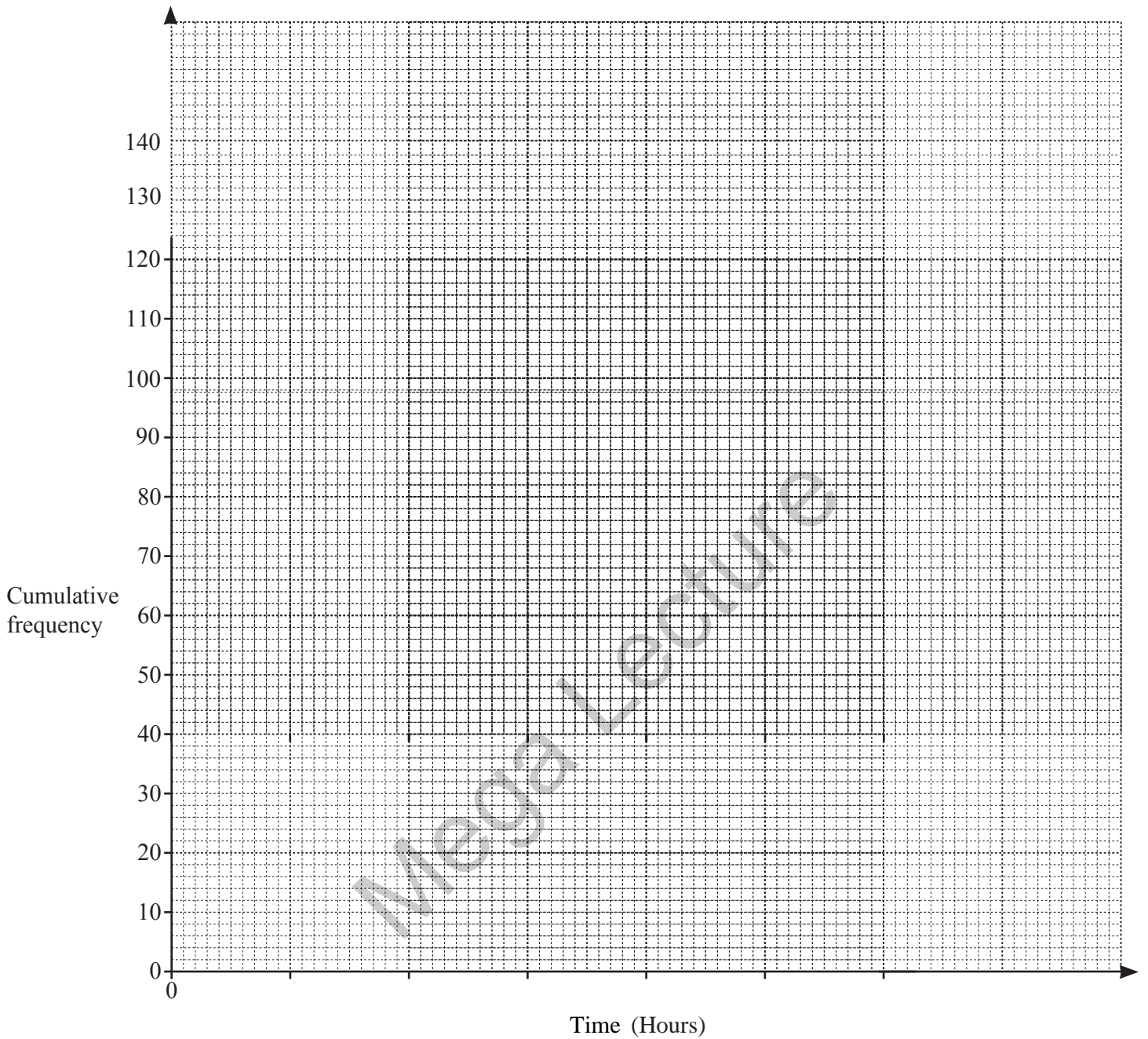It may be assumed that the marks gained in the two subjects are independent.

Expressing each answer as a fraction in its lowest terms, calculate the probability that the
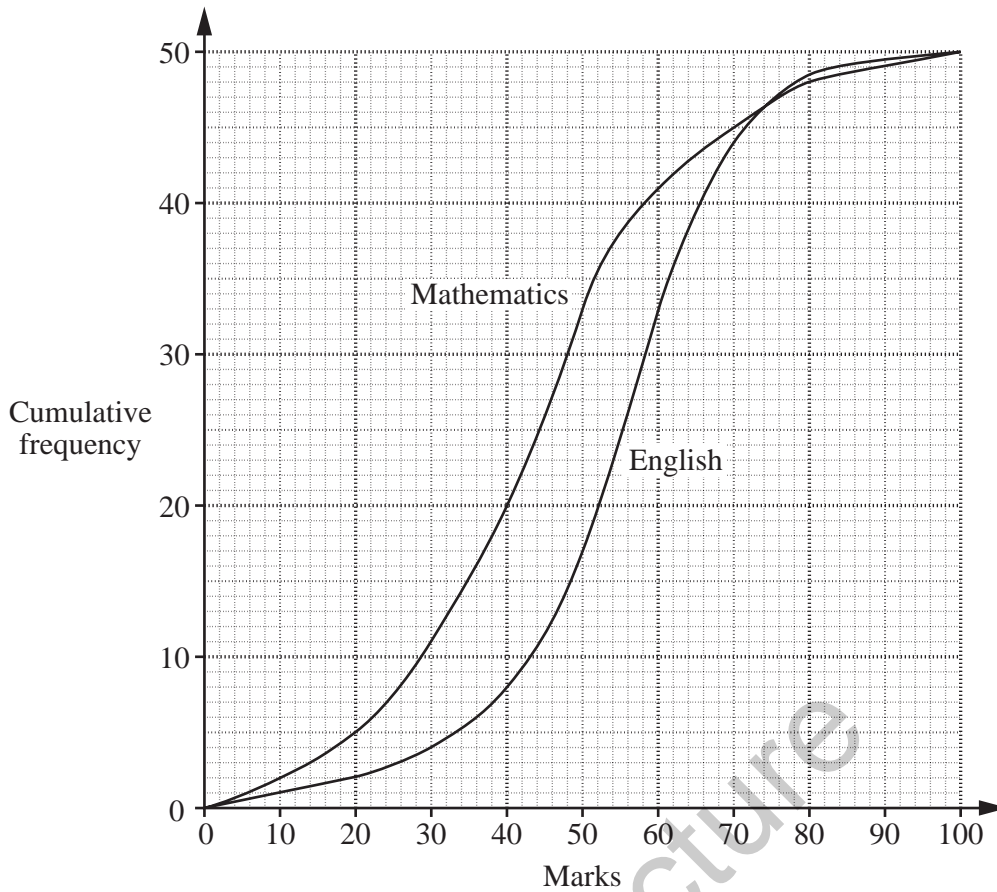student gains

   (i) more than 60 marks on both papers, [1]

  (ii) more than 80 marks on one paper, but not on the other. [2]

Time (Hours)

[3]

3

Fifty students each took a Mathematics and an English test. The distributions of their marks are shown in the cumulative frequency graph.

(a) Use the graph

    (i) to estimate the median mark in the English test,

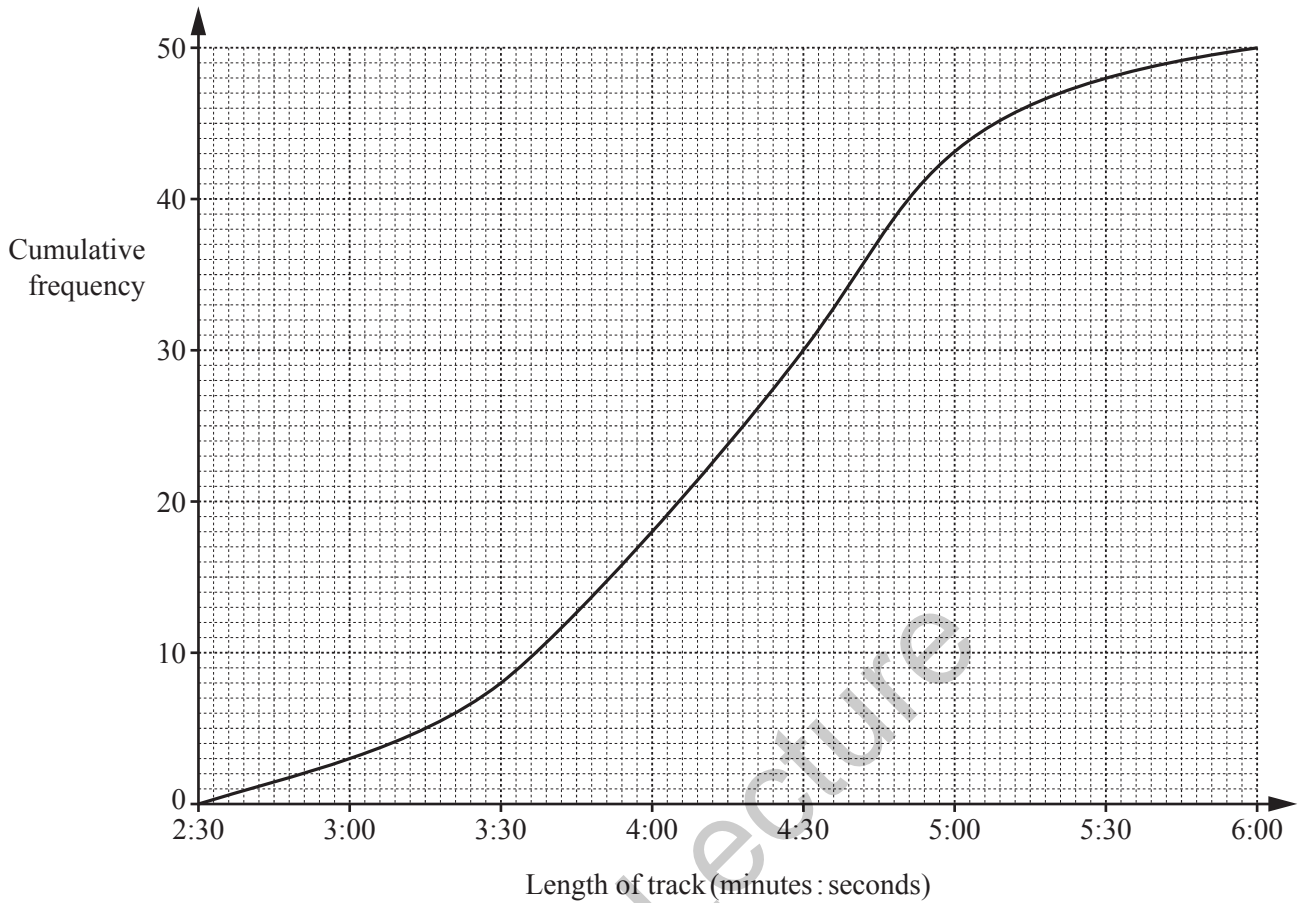   (*a*)(i) ....[1]

    (ii) to estimate the 20th percentile mark in the Mathematics test.

                                                               (*a*)(ii) ....[1]

(b) State, **with a reason**, which test the students found more difficult.

    Answer (*b*) ....

    ....

    ....

    .... [1]

9   The cumulative frequency graph for the lengths of the 50 tracks on Abi's MP3 player is shown below.

Length of track (minutes : seconds)

(a) Use the graph to find

   (i) the median,

Answer .... minutes .... seconds [1]

   (ii) the interquartile range.

Answer .... minutes .... seconds [2]

(b) Use the information on the graph to complete the frequency table for the length of the tracks.

Length (minutes : seconds)	Frequency
2:30 < length ≤ 3:00	3
3:00 < length ≤ 3:30	5
3:30 < length ≤ 4:00	
4:00 < length ≤ 4:30	
4:30 < length ≤ 5:00	
5:00 < length ≤ 5:30	
5:30 < length ≤ 6:00	

[2]

(c) Abi plays three tracks from her MP3 player with no break between them.

Given that no track is repeated, what is the maximum possible length of time taken to play these tracks?

Answer .... minutes .... seconds [2]