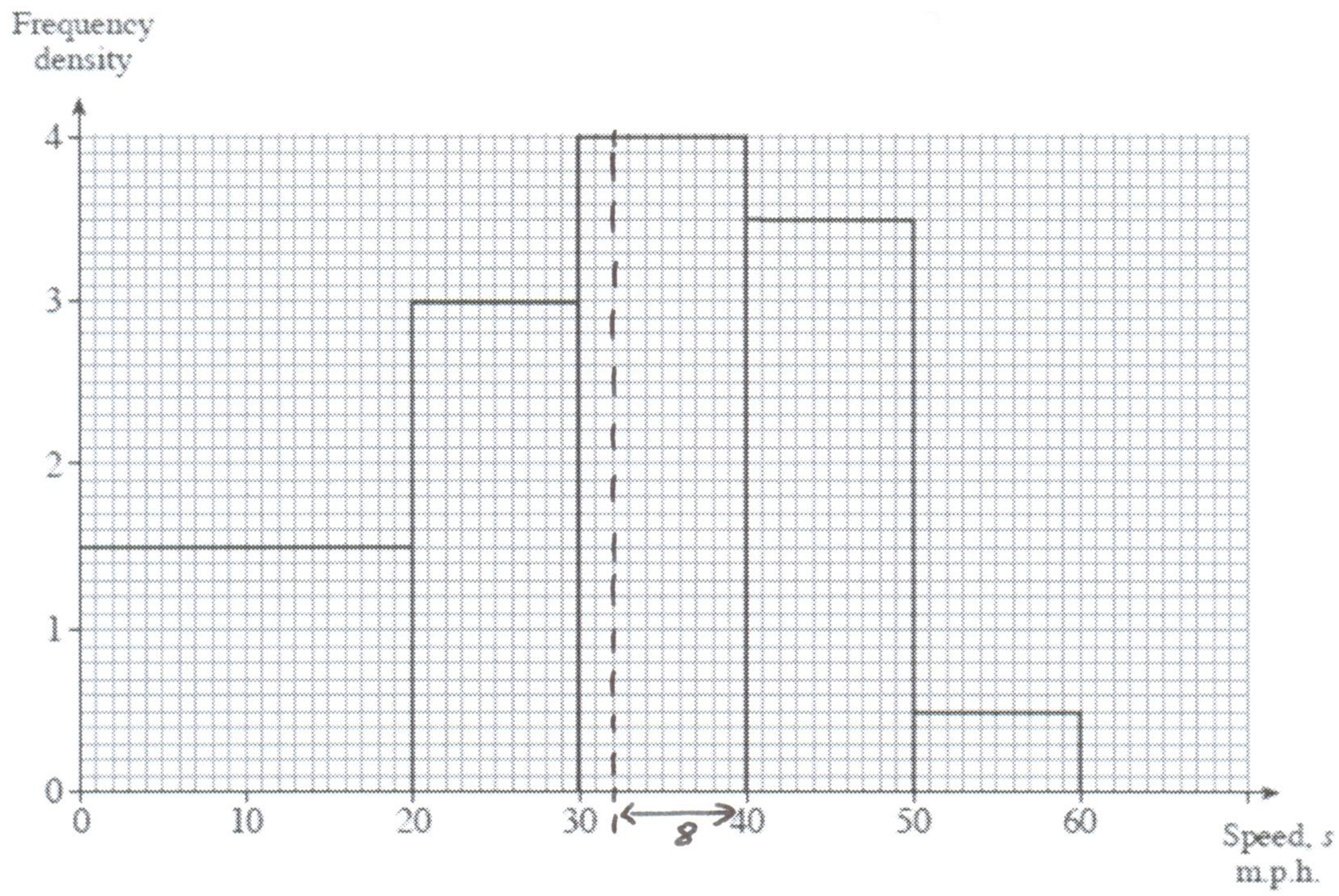
ANSWERS

Histograms – Past Paper Questions

13. A survey was carried out to record the speeds of cars entering a village. The histogram illustrates the results of the survey.



(a) Use the histogram to complete the grouped frequency table below.

Speed, s m.p.h.	$0 < s \leqslant 20$	$20 < s \leqslant 30$	$30 < s \leqslant 40$	$40 < s \leqslant 50$	$50 < s \leqslant 60$
Frequency	$20 \times 1.5 = 30$	$10 \times 3 = 30$	$10 \times 4 = 40$	$10 \times 3.5 = 35$	$10 \times 0.5 = 5$

[2] 2

(b) Calculate an estimate of the number of cars with speeds exceeding 32 m.p.h.

$32 < s \leqslant 40 \rightarrow 8 \times 4 = 32$ cars 1

So $32 + 35 + 5 = 72$ cars. 1

1

[3]

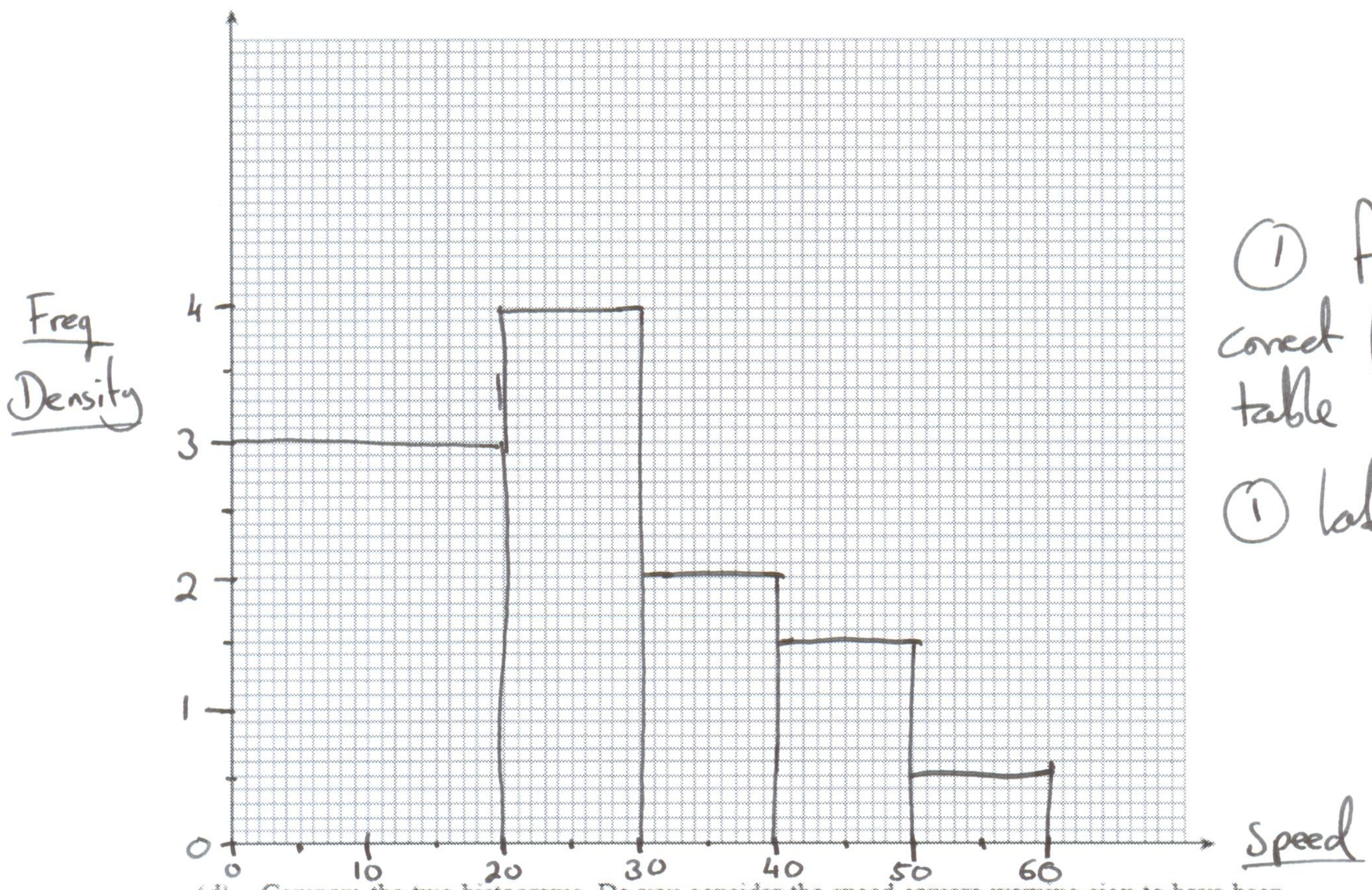
(c) A further survey was carried out after the placement of a speed camera warning sign. The results are summarised in the grouped frequency distribution below.

Speed, s m.p.h.	$0 < s \leqslant 20$	$20 < s \leqslant 30$	$30 < s \leqslant 40$	$40 < s \leqslant 50$	$50 < s \leqslant 60$
Frequency	60	40	20	15	5
Frequency density	$60 \div 20 = 3$	$40 \div 10 = 4$	$20 \div 10 = 2$	$15 \div 10 = 1.5$	$5 \div 10 = 0.5$

1

Draw a histogram to illustrate the results of this survey.

[3]



1 for bars correct from table

1 labels/axis

(d) Compare the two histograms. Do you consider the speed camera warning sign to have been effective? Give a reason for your answer.

Yes – Recorded speeds after the speed camera more grouped to l.h.s of the histogram. 1

[1]

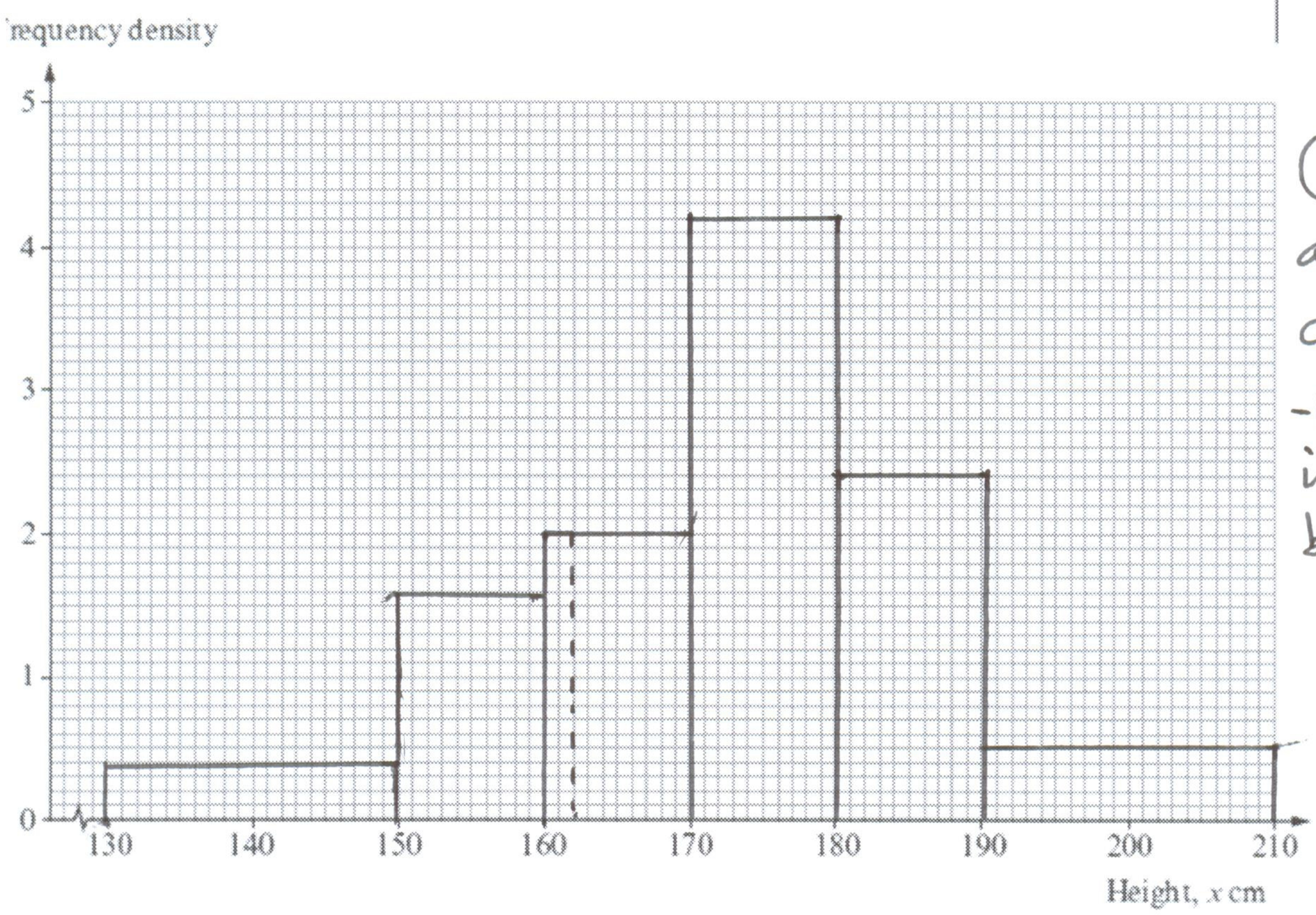
12. The heights of a group of people are summarised in the grouped frequency distribution below.

Height, x cm	Number of people		Frequency density
$130 \leqslant x < 150$	8		0·4
$150 \leqslant x < 160$	16		1·6
$160 \leqslant x < 170$	20	$20 \div 10$	2
$170 \leqslant x < 180$	42	$42 \div 10$	4·2
$180 \leqslant x < 190$	24	$24 \div 10$	2·4
$190 \leqslant x < 210$	4	$4 \div 20$	0·5

1

(a) Complete the frequency density column in the table and draw a histogram.

[3]



2 for all bars correct.
−1 for an incorrect bar.

(b) Calculate an estimate for the number of people in the group whose heights are at least 162 cm.

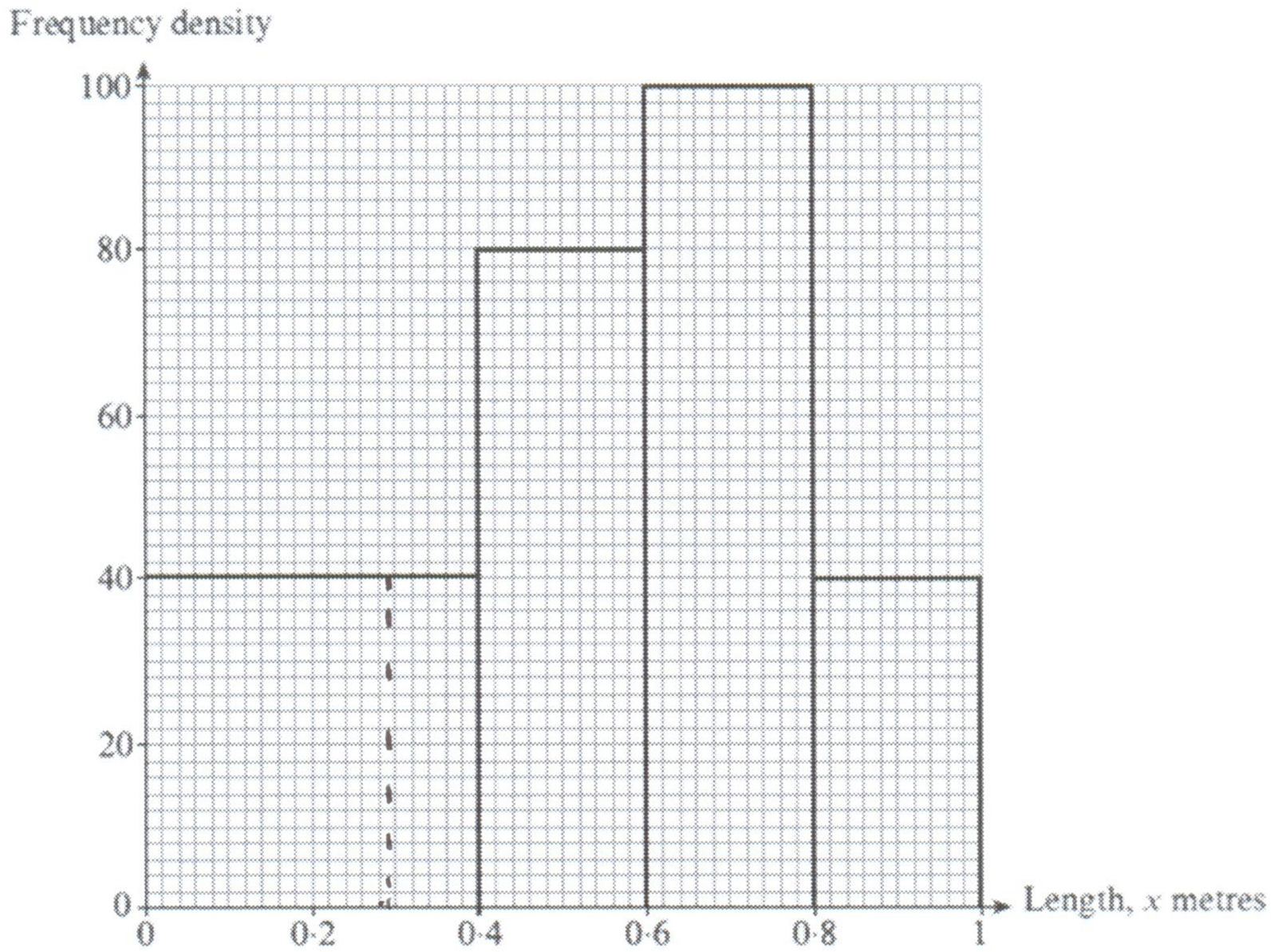
160 − 162 is ~~0.2~~ 2 × 2 = 4 people 1

So in total = 8 + 16 + 4 1

= 28 people. 1

[3]

13. *(a)* The lengths of logs in a pile were recorded.
The histogram below illustrates the results.



(i) Use the histogram to complete the grouped frequency table below.

Length, x metres	$0 < x \leqslant 0{\cdot}4$	$0{\cdot}4 < x \leqslant 0{\cdot}6$	$0{\cdot}6 < x \leqslant 0{\cdot}8$	$0{\cdot}8 < x \leqslant 1$
Frequency	0·4 × 40 = 16	0·2 × 80 = 16	0·2 × 100 = 20	8

1

(ii) Calculate an estimate of the number of logs with lengths greater than 0·3 m.

0·3 → 0·4 = 0·1 × 40 = 4 1

∴ total = 4 + 16 + 20 + 8 1

= 48 1

[4]

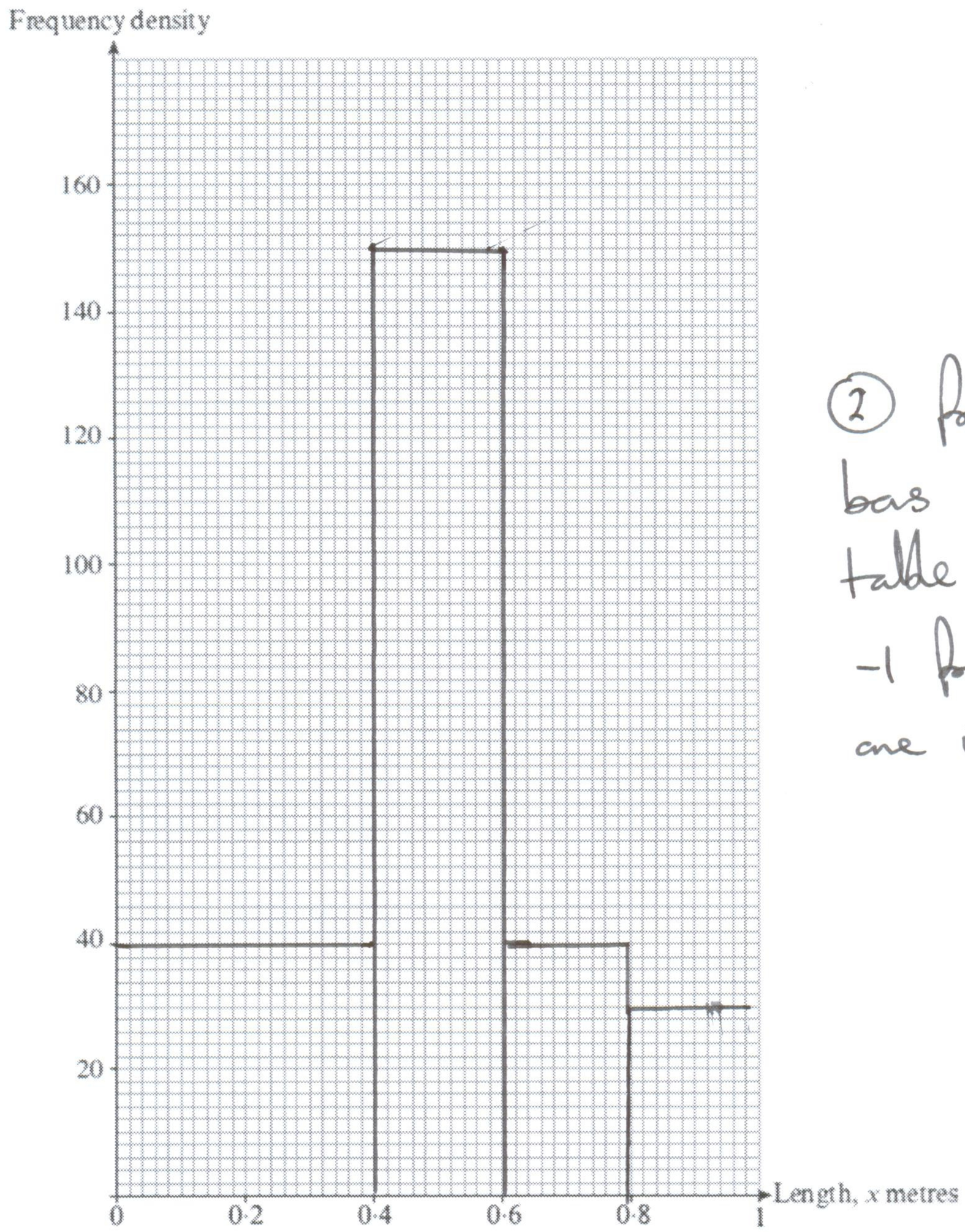
(b) The lengths of logs in a different pile were recorded.
The results are summarised in the grouped frequency distribution below.

Length, x metres	$0 < x \leqslant 0{\cdot}4$	$0{\cdot}4 < x \leqslant 0{\cdot}6$	$0{\cdot}6 < x \leqslant 0{\cdot}8$	$0{\cdot}8 < x \leqslant 1$
Frequency	16	30	8	6
Frequency density	16 ÷ 0·4 = 40	30 ÷ 0·2 = 150	8 ÷ 0·2 = 40	6 ÷ 0·2 = 30

1

Complete the frequency density row in the table and draw a histogram.

[3]



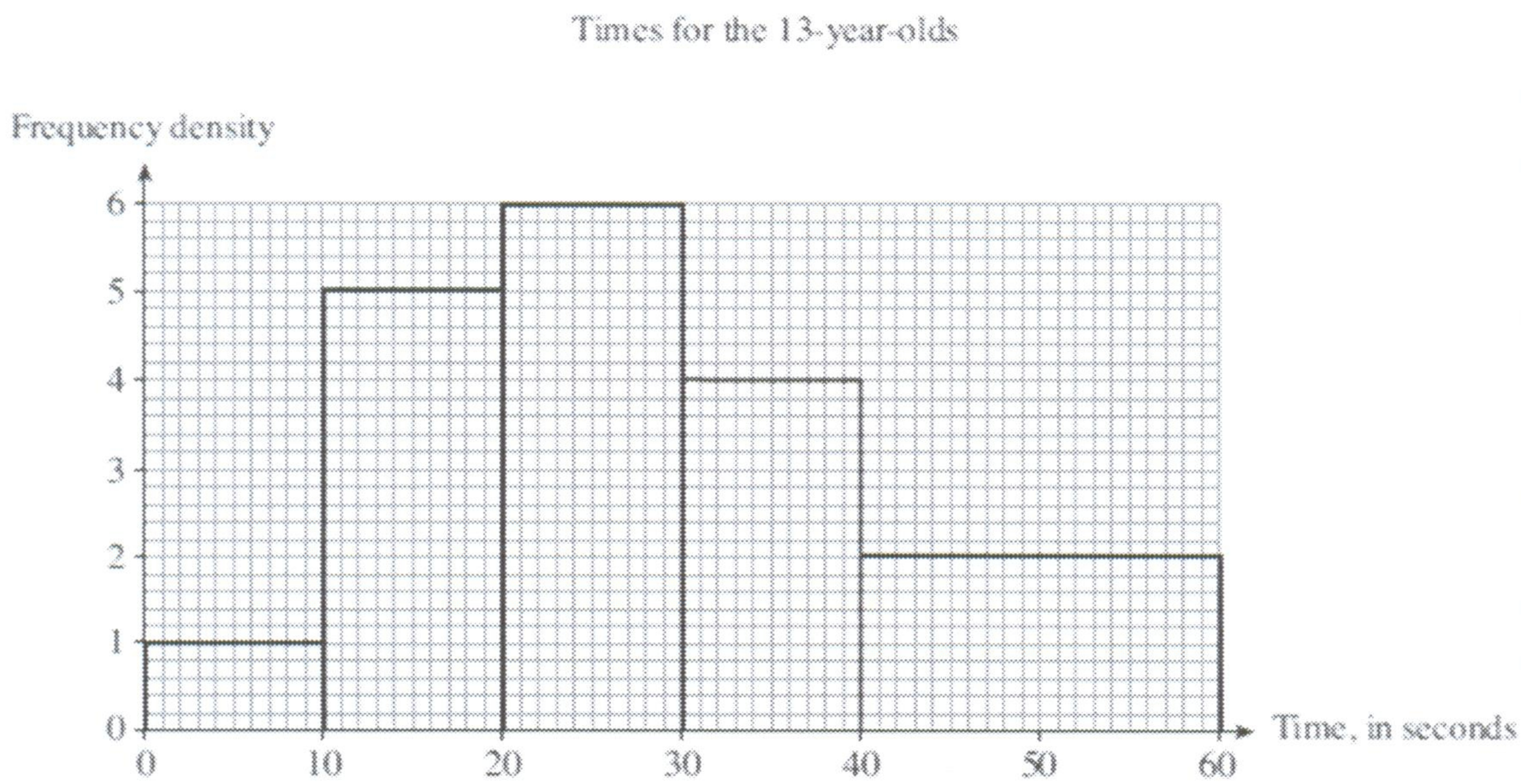
(2) for correct bars from the table.
−1 for each one incorrect.

Thomas compares the two histograms.
He states that the mean length of the logs in the first pile is greater than the mean length of the logs in the second pile.
Is Thomas correct? You must give a reason for your answer.

Yes → Majority of logs in 1st pile are greater than 0.6 m long, for 2nd pile most are less than 0.6 m long. (1) (1)

[2]

17. As part of an investigation, the time taken to complete a physical challenge in a gym was measured for each pupil in a group of thirteen-year-olds.
The histogram below illustrates the results obtained.



(a) Use the histogram to calculate the number of thirteen-year-olds in this group.

$1 \times 10 = 10$ ① for method

$5 \times 10 = 50$ ① for all correct

$6 \times 10 = 60$

$4 \times 10 = 40$

$2 \times 20 = 40$

$= 200$ students. ① total.

[3]

(b) The time taken to complete the same challenge was measured for each pupil in a group of 200 sixteen-year-olds. The following grouped frequency distribution was obtained.

Time, t seconds	$0 < t \leqslant 10$	$10 < t \leqslant 20$	$20 < t \leqslant 30$	$30 < t \leqslant 40$	$40 < t \leqslant 60$
Number of pupils	30	70	50	40	10

(i) Find an estimate for the median of this distribution.

100th student at end of $10 < t \leqslant 20$ group so estimate as $t = 20$. (1)

(ii) Draw a histogram to illustrate the distribution on the graph paper below.

$30 \div 10 = 3$ $10 \div 20 = 0.5$.

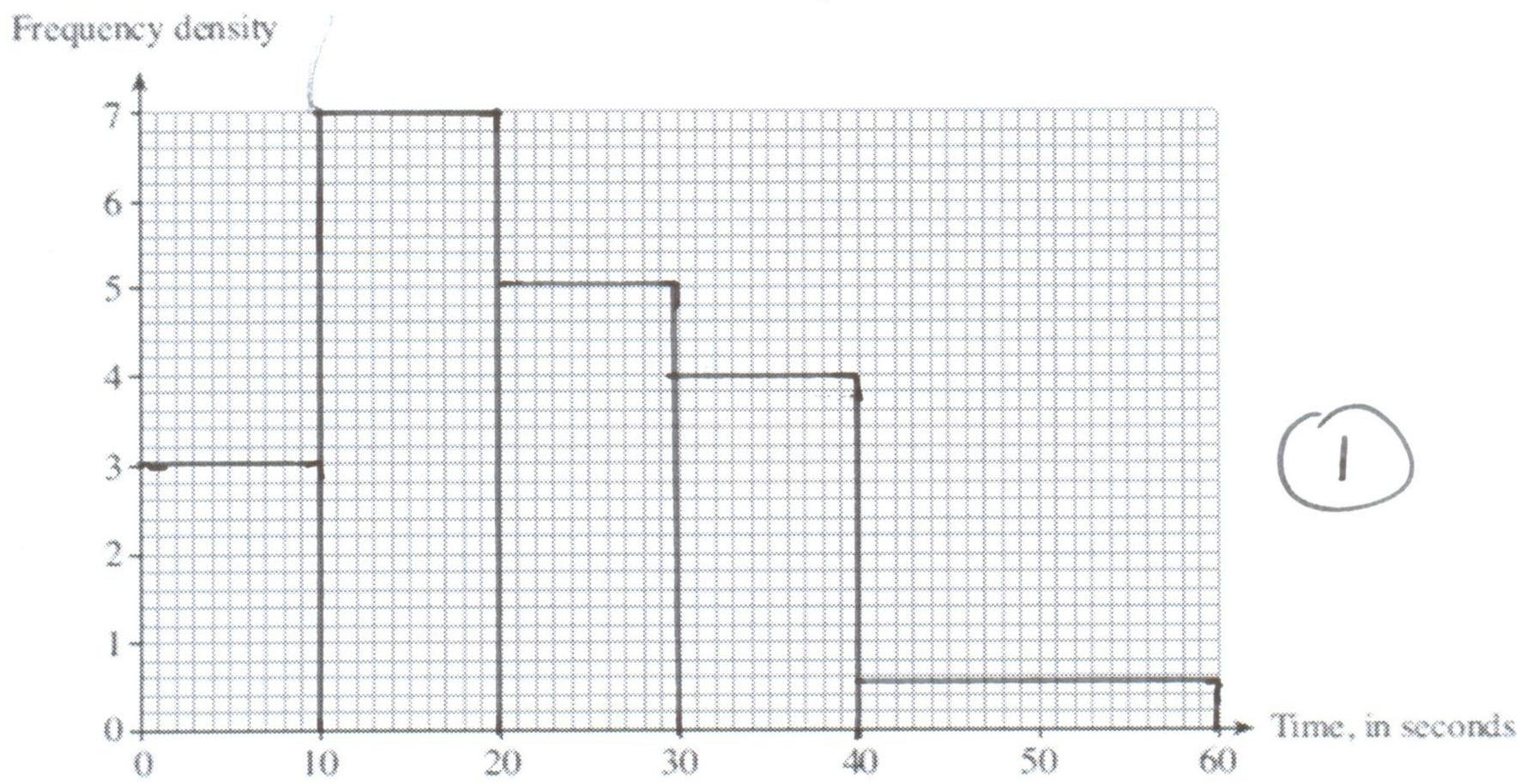
$70 \div 10 = 7$

$50 \div 10 = 5$ (1)

$40 \div 10 = 4$

[3]

Times for the 16-year-olds



(1)

(c) State, with a reason, which of the two groups is the quicker, on average, to complete the challenge.

2nd group as compared to first group fewer students at top end times. (1)

[1]