Surname	
Other Names	
Candidate's Signature	

GCSE 9 - 1 Questions
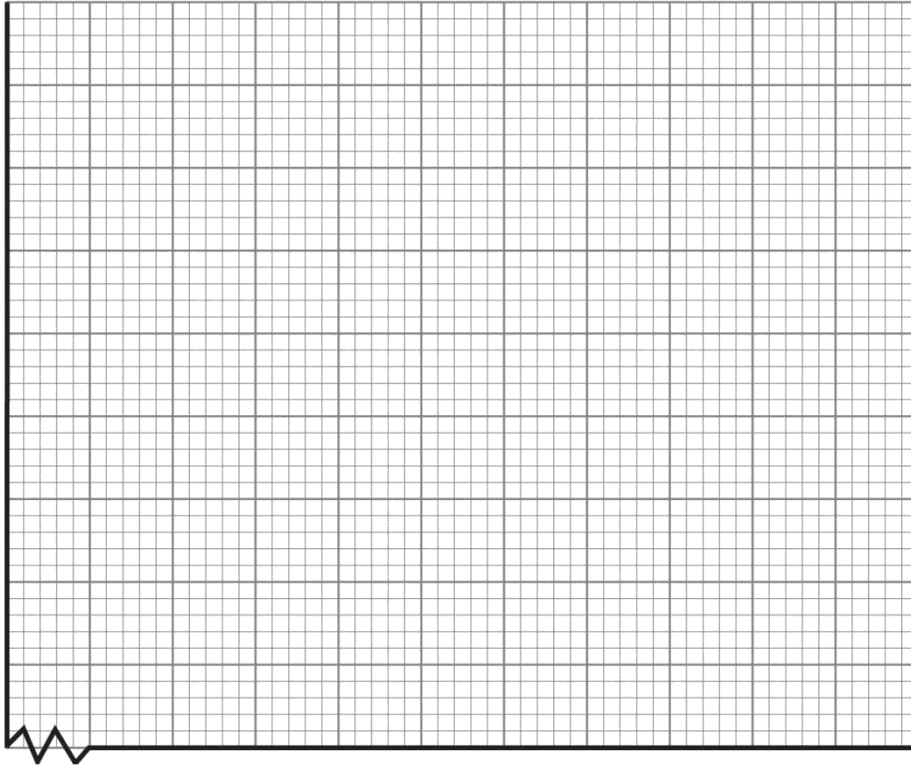
Histograms 1

Calculator Allowed

INSTRUCTIONS TO CANDIDATES

- Write your name in the space provided.

- Write your answers in the spaces provided in this question paper.

- Answer ALL questions.

- Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.

- You should have a ruler, compass and protractor where required.

Total Marks :

1) The table gives the times 120 athletes took to complete a race. Display the information in a histogram. [3]

Time (t minutes)	$15 < t \leq 25$	$25 < t \leq 28$	$28 < t \leq 30$	$30 < t \leq 32$	$32 < t \leq 35$
Frequency	9	21	40	32	18

2) **Ages of Residents on Polyon Island**

Age in years	Frequency
0 – 4	12
5 – 14	53
15 – 29	45
30 – 44	90
45 – 64	70
65 – 84	50

(a) On the grid opposite, draw a histogram to show the distribution of ages from the table above. [3]

(b) A stratified sample of 48 residents is chosen for a travel survey. How many residents over 44 years old are chosen for the sample?

Answer _____ [3]
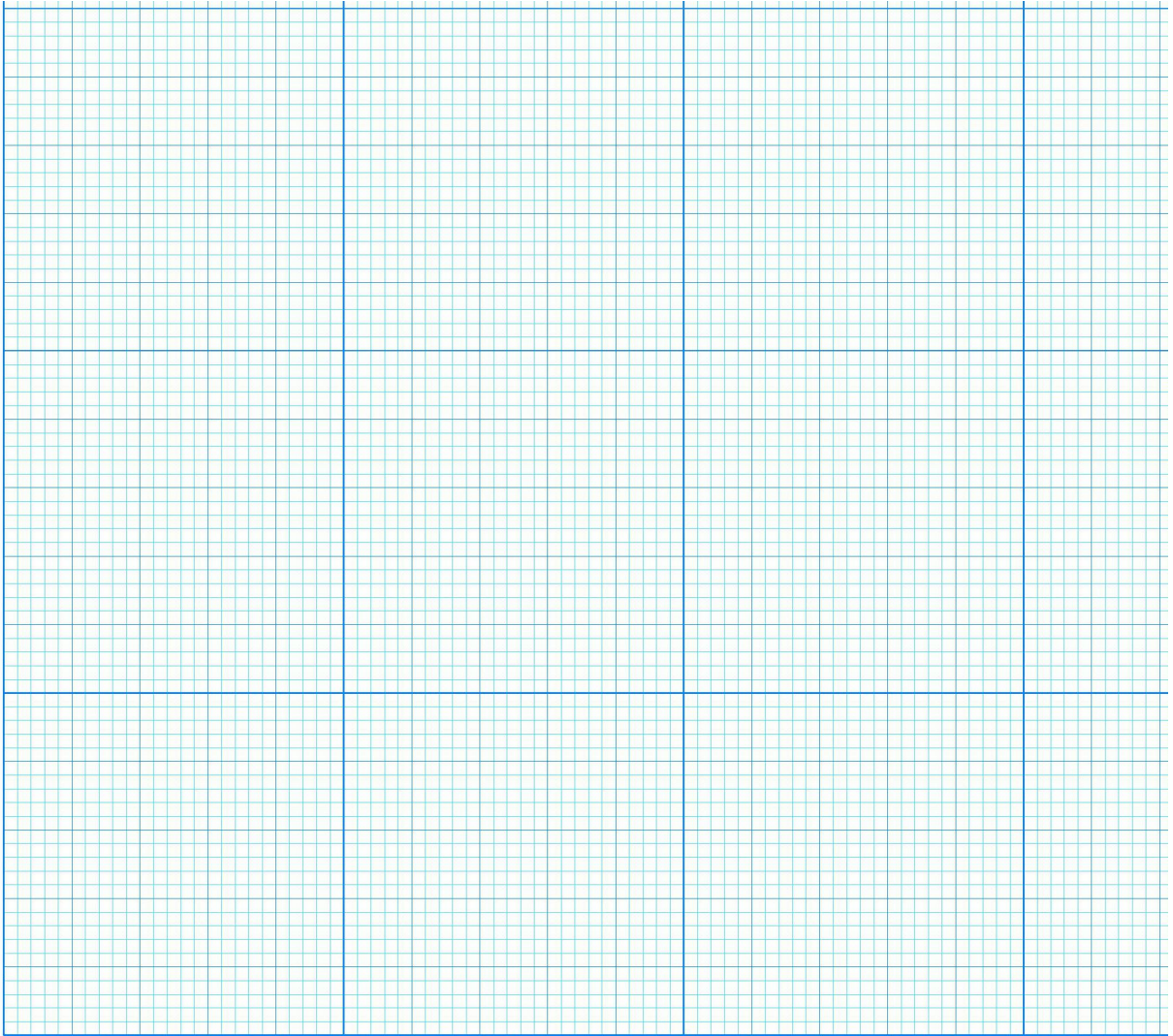
3) The histogram illustrates the journey time taken by employees to get to work.
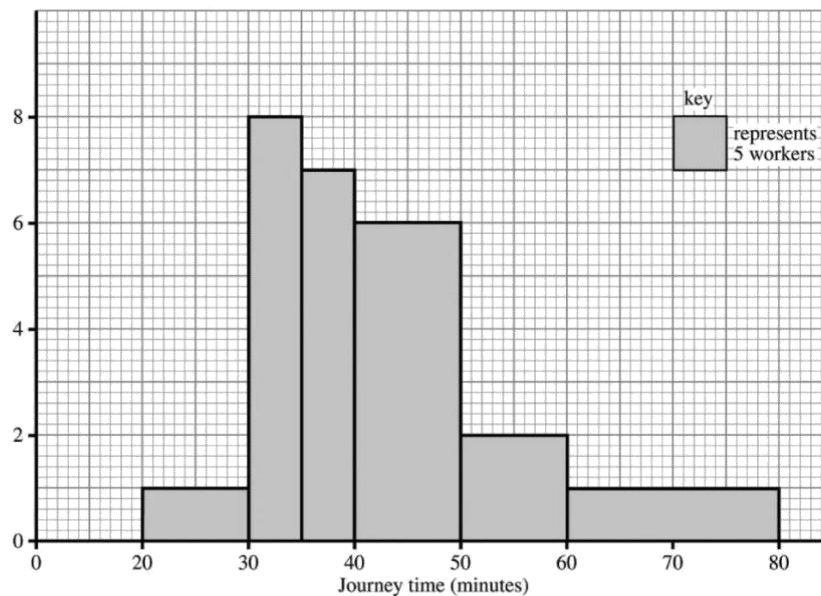
(a) How many employees are represented in the histogram?

Answer _____ [2]

(b) The manager wishes to speak to a representative sample of the employees who take less than 55 minutes to travel to work. He takes a stratified sample of 32 employees. About how many of these should be selected from the group who take between 35 and 40 minutes travelling to work?

Answer _____ [3]

4)
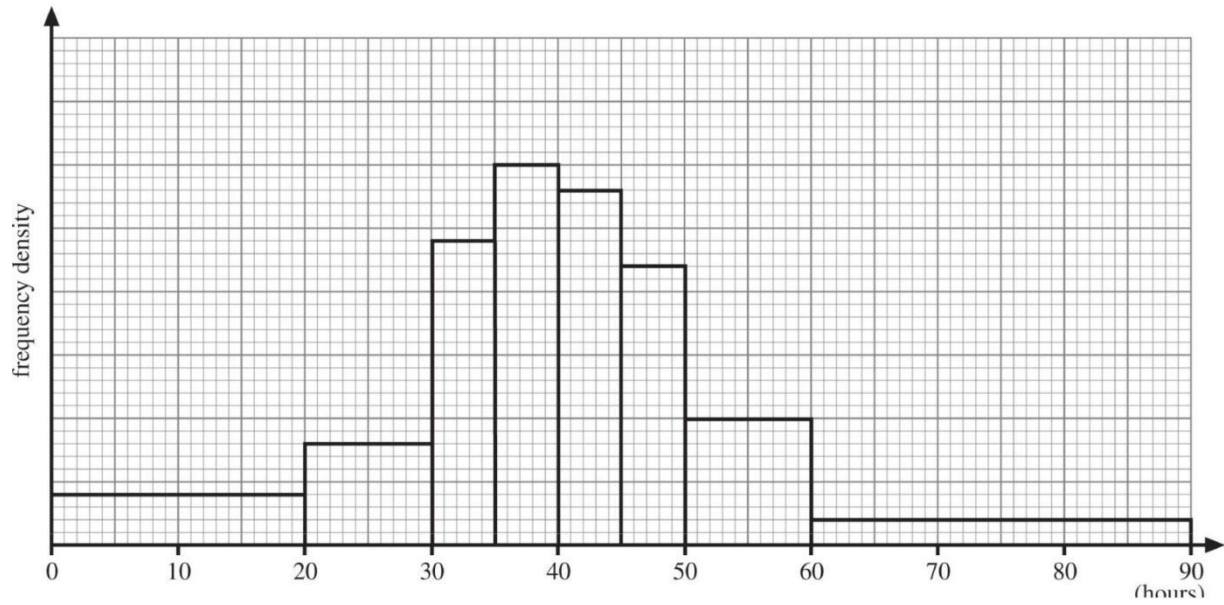
The histogram shows data about the working life of electrical components.
60 components were in the 35–40 class.
How many more components lasted less than 30 hours than lasted over
60 hours?

Answer _____ [3]

5)
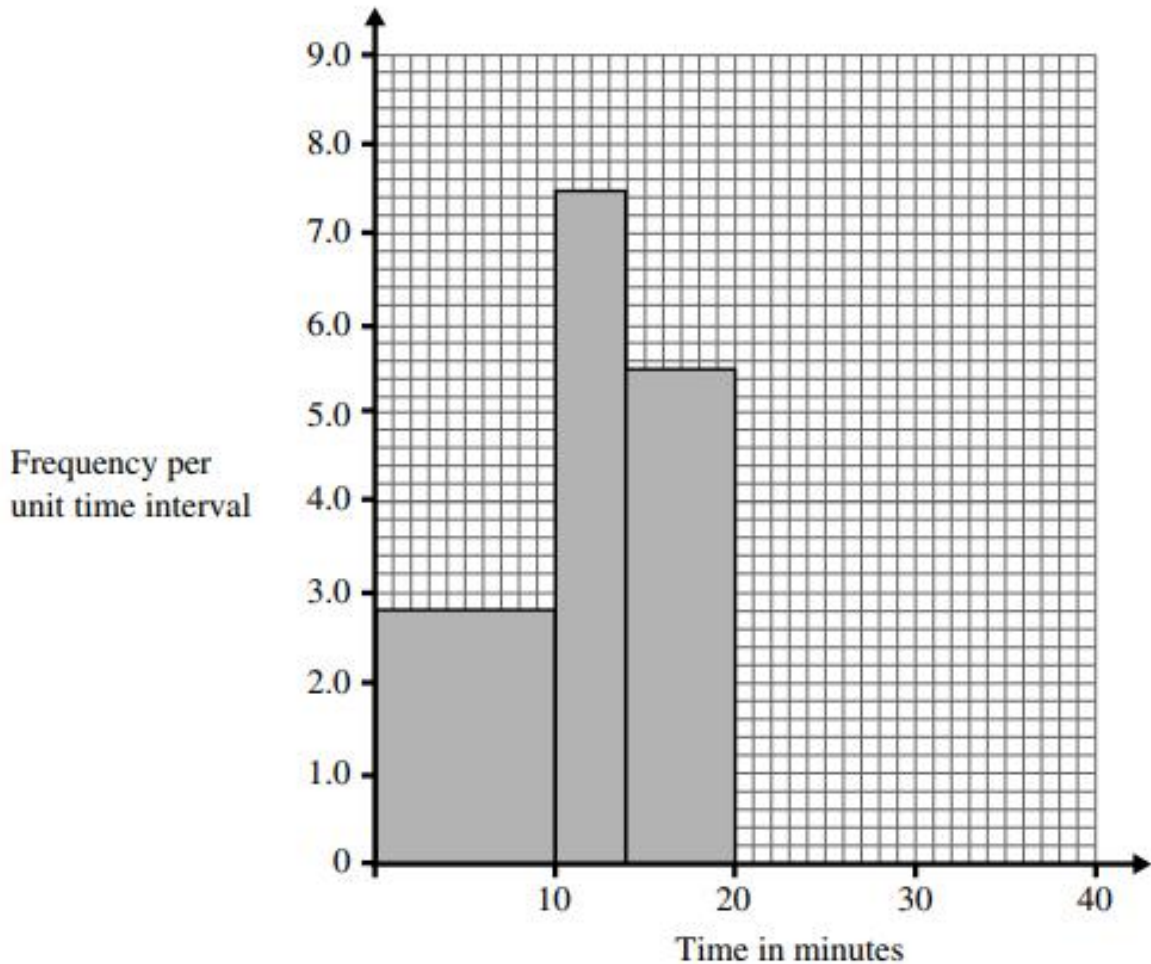
The lengths of time, in minutes, that aircraft spent waiting for clearance at a busy airport were recorded. Some of this information is shown in the table below and in the histogram opposite.

Time (x minutes)	Frequency
$0 < x \leq 10$	28
$10 < x \leq 14$	
$14 < x \leq 20$	
$20 < x \leq 25$	18
$25 < x \leq 32$	7
$32 < x \leq 36$	10

(a) Use the data displayed in the histogram to complete the table. [2]

(b) Use the data displayed in the table to complete the histogram. [2]

(c) Estimate the number of aircraft which waited for a time greater than the mid-value of the modal class.

Answer _____ [3]

6) This histogram shows the distribution of heights, in metres, of 240 trees in a wood.
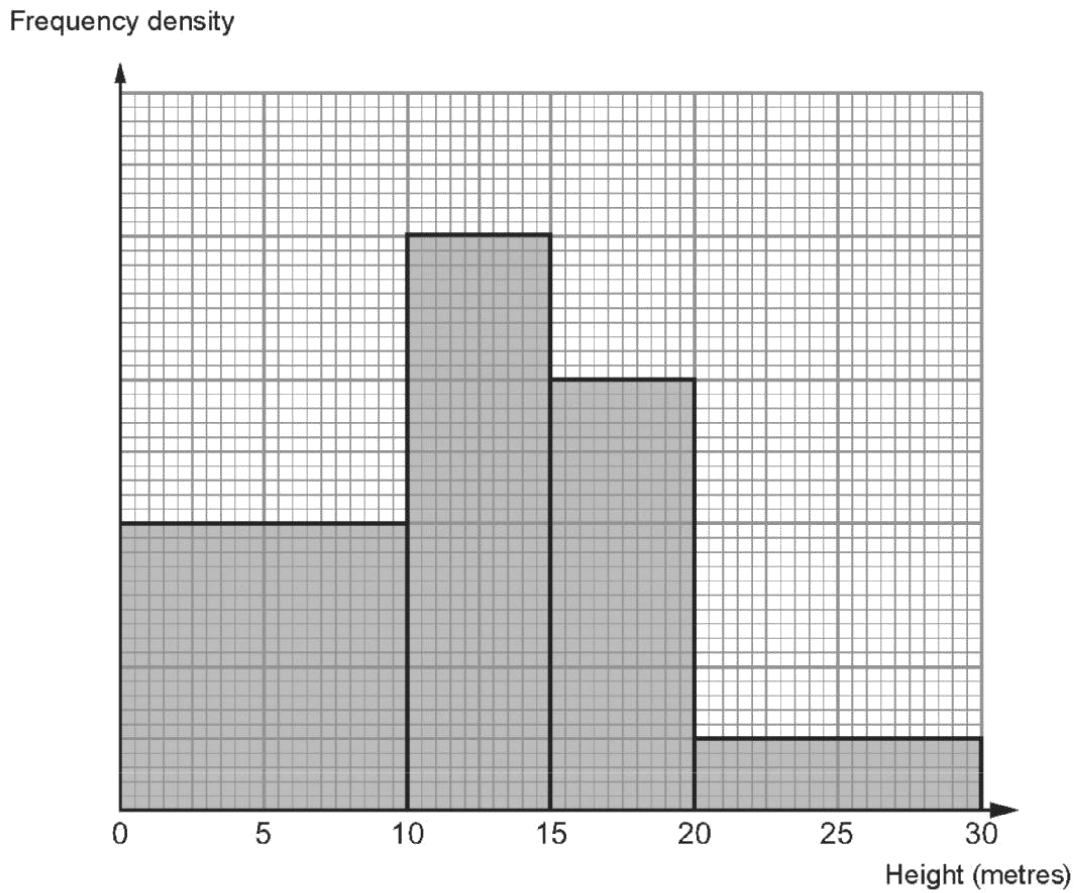
Frequency density

How many trees were between 10 and 15 metres in height? [3]

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7) The histogram below shows the speeds of motorists as they enter a tunnel between 1 a.m. and 2 a.m.

Frequency density
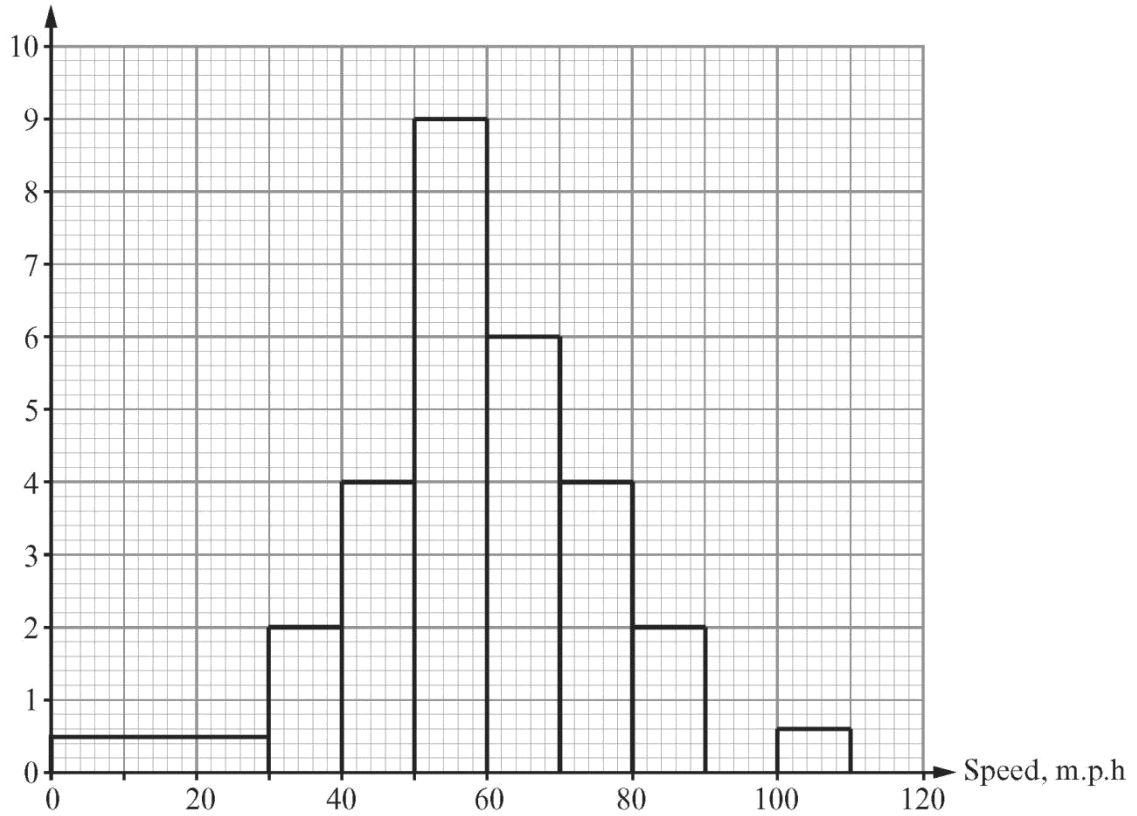
(a) The speed limit on entering the tunnel is 70 m.p.h.
How many motorists were exceeding the speed limit on entering the tunnel?

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[3]

(b) In order to compare the speeds of motorists between 1 a.m. and 2 a.m. with other 1 hour periods, it is decided to group the data in equal intervals of width 30 m.p.h., starting at 0 m.p.h.
Construct a histogram to display these results meeting this new requirement.

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[8]
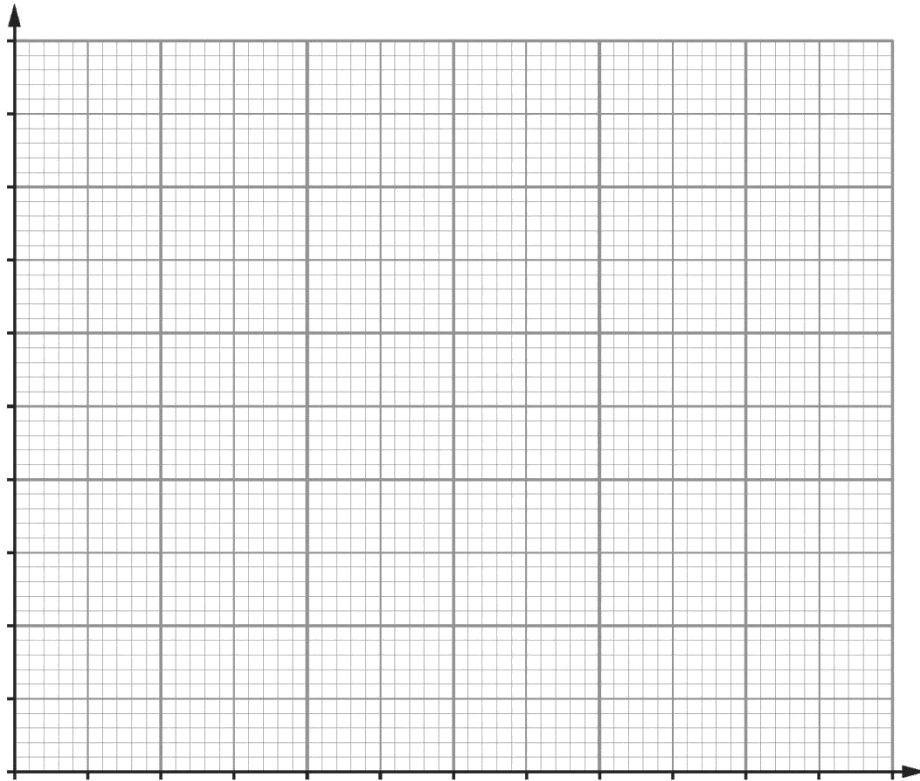
(c) Given that the speed limit is 70 m.p.h., which of the two histograms is the more appropriate for the display of the data? You must give a reason for your answer.

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[1]

8) The histogram and frequency table show some information about the time, in hundreds of hours, that a number of similar light bulbs lasted.

Time, t hundred hours	Number of light bulbs
$0 < t \leqslant 8$	48
$8 < t \leqslant 12$	....
$12 < t \leqslant 16$	40
$16 < t \leqslant 20$	....
$20 < t \leqslant 30$	20

Frequency density
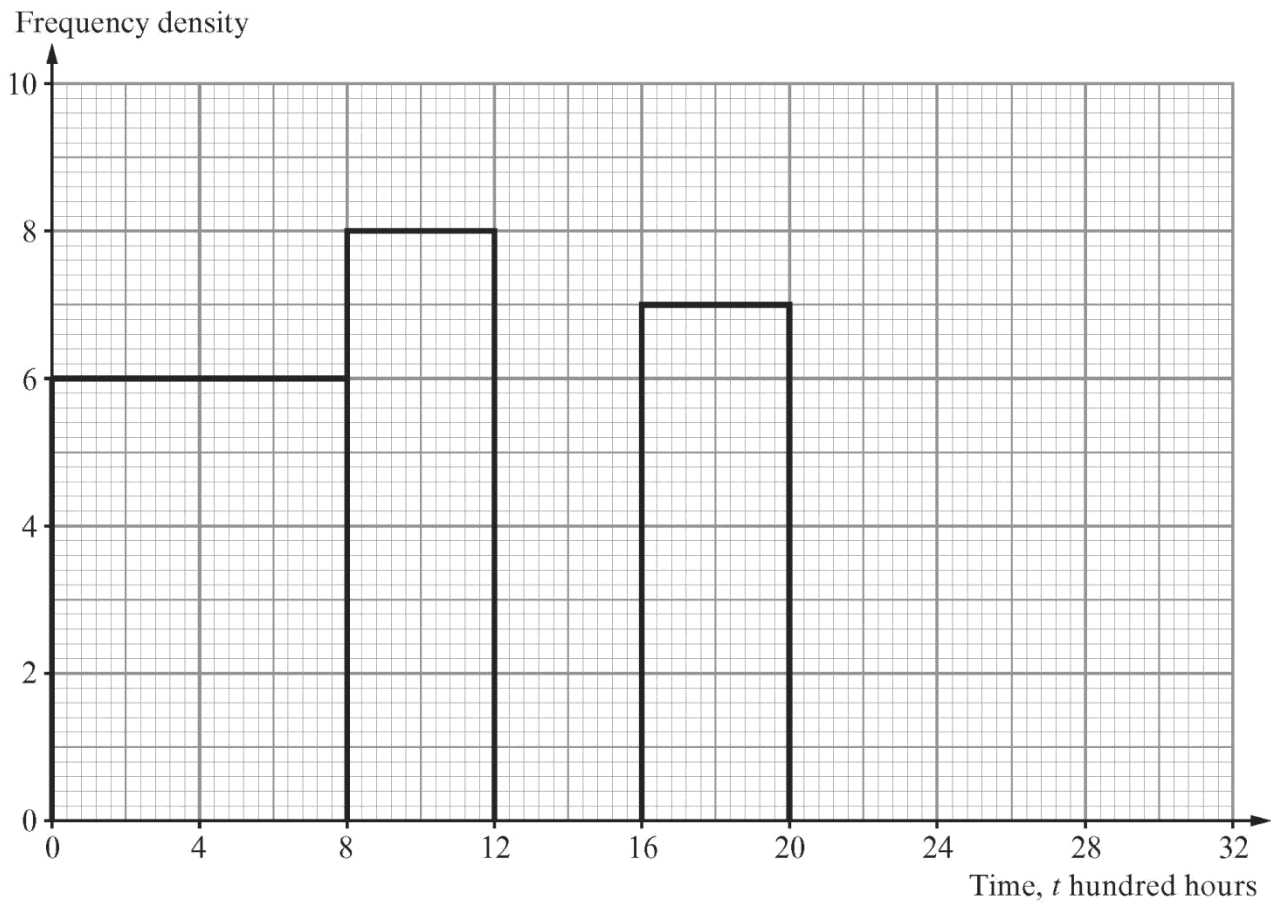
(a)   Complete the frequency table and the histogram shown opposite.

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[4]

(b)   Find the estimate for the number of light bulbs that lasted between 2000 hours and 2400 hours.

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[1]

(c)   There are 56 bulbs that lasted less than *y* hundred hours.
        Calculate an estimate for *y*.

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[3]

9) The histogram illustrates the lengths of telephone calls made to a computer helpline during one Tuesday evening.

Frequency density

Length of telephone calls in seconds
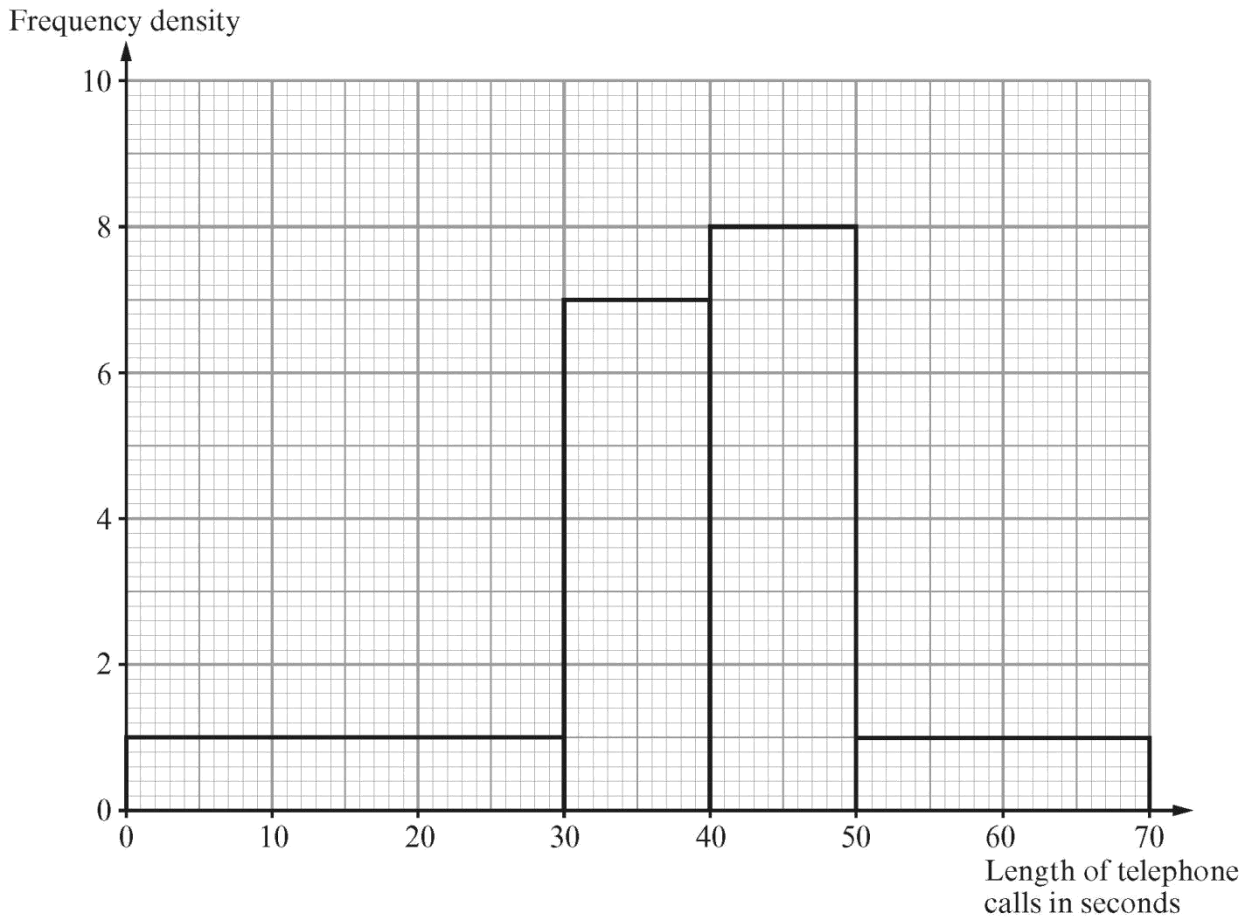
(a) Calculate how many telephone calls were made to the computer helpline during the Tuesday evening.

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[3]

(b) Estimate the median length of a telephone call made to the computer helpline during the Tuesday evening.

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[2]

10) Fifty people took part in a charity walk.
The table shows a grouped frequency distribution of the amounts of money raised, to the nearest £.

Amount a, in £	Number of people
$10 \leqslant a \leqslant 19$	2
$20 \leqslant a \leqslant 29$	18
$30 \leqslant a \leqslant 39$	29
$40 \leqslant a \leqslant 49$	1

(a) Calculate an estimate for the mean amount of money raised per person.

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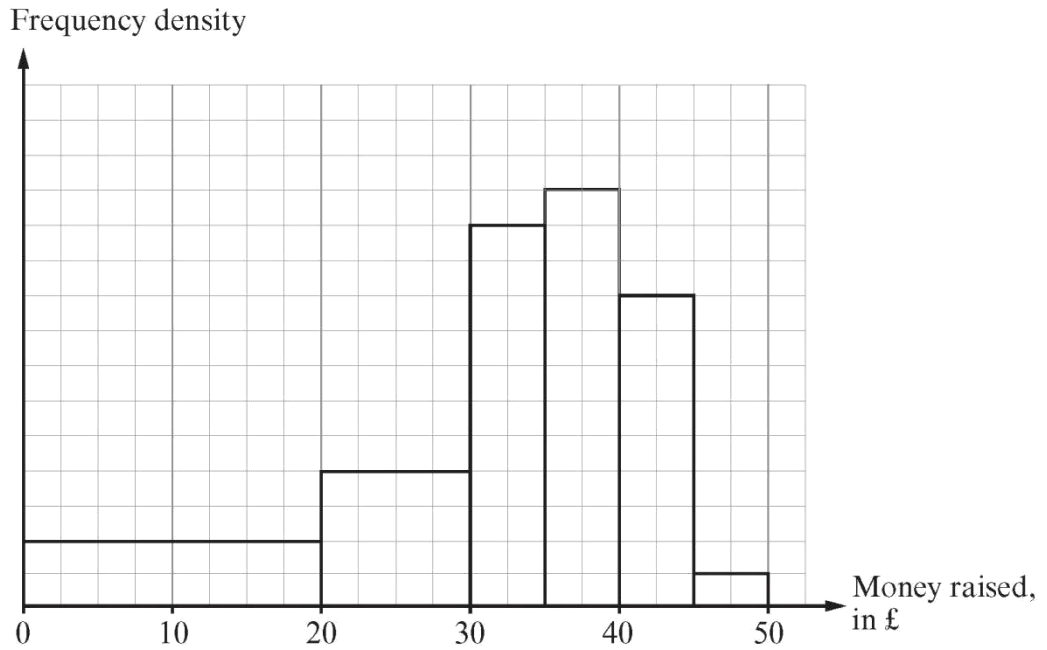
[4]

(b) Morgan arranged a charity run to raise money.
She had drawn a histogram to show the distribution of money raised from the charity run.

Frequency density

Morgan has forgotten to write the scale on the vertical axis.
She remembers that 16 people raised £30 or less.
Calculate an estimate for the total money raised.

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[6]

11) The histograms below show the total times that office workers in a company spent on the phone on 2nd August and on 2nd September.

Date: 2nd August

Frequency density

Date: 2nd September

Frequency density
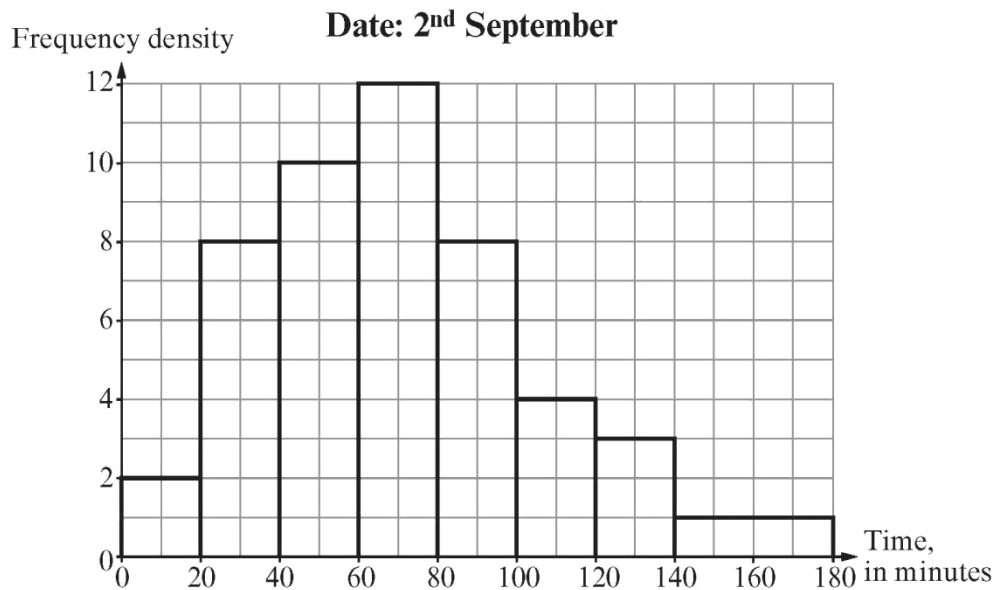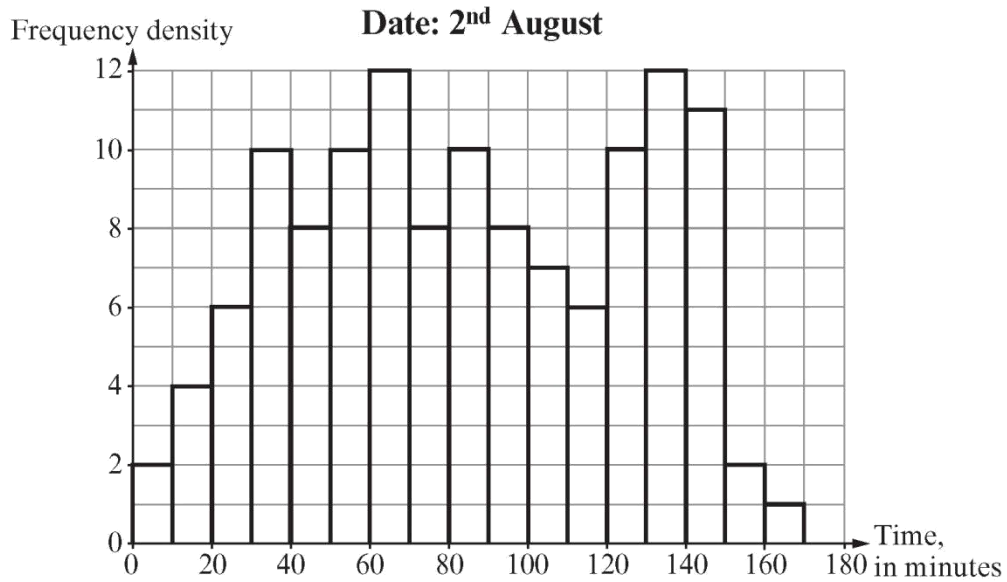
(a) Calculate the number of office workers who spent a total time of 60 minutes or less on the phone on 2nd August. [3]

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(b) Explain why it is not possible to use the histogram to calculate how many telephone calls were made on 2nd August?

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[1]

(c) Grant suggested that it is not possible to calculate exactly how many office workers spent longer than 130 minutes on the telephone on 2nd September.
Is Grant correct? You must give a reason for your answer.

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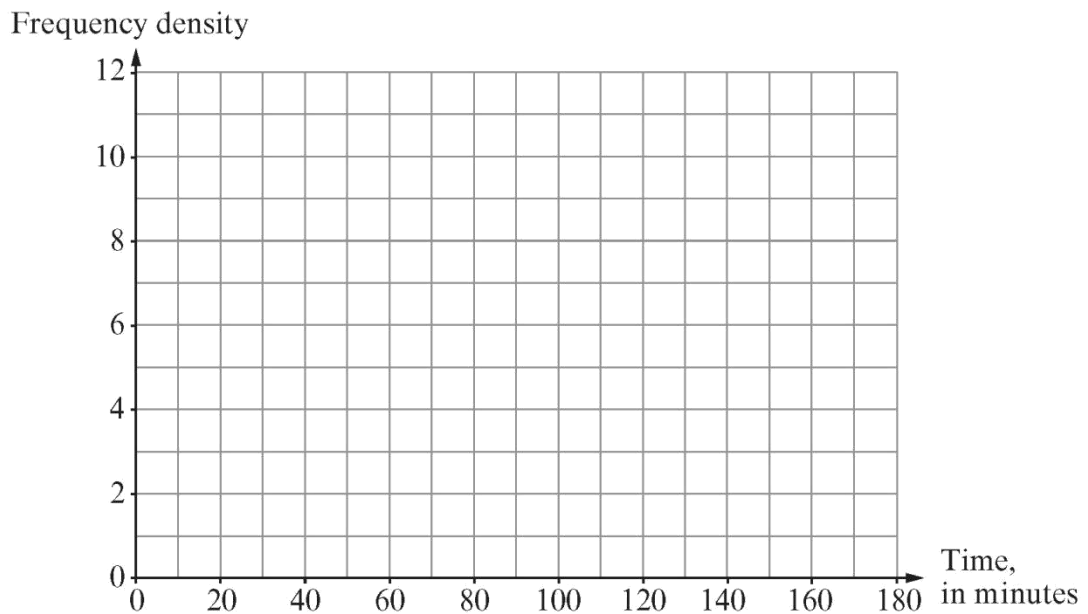
[1]

(d) Use the graph paper below to redraw the 2nd August histogram, using groups of the same width as those in the histogram for 2nd September.

[3]

Date: 2nd August

Frequency density

12) The histogram illustrates the floor areas of the offices available to let by *Office Space UK* letting agency.

Frequency density
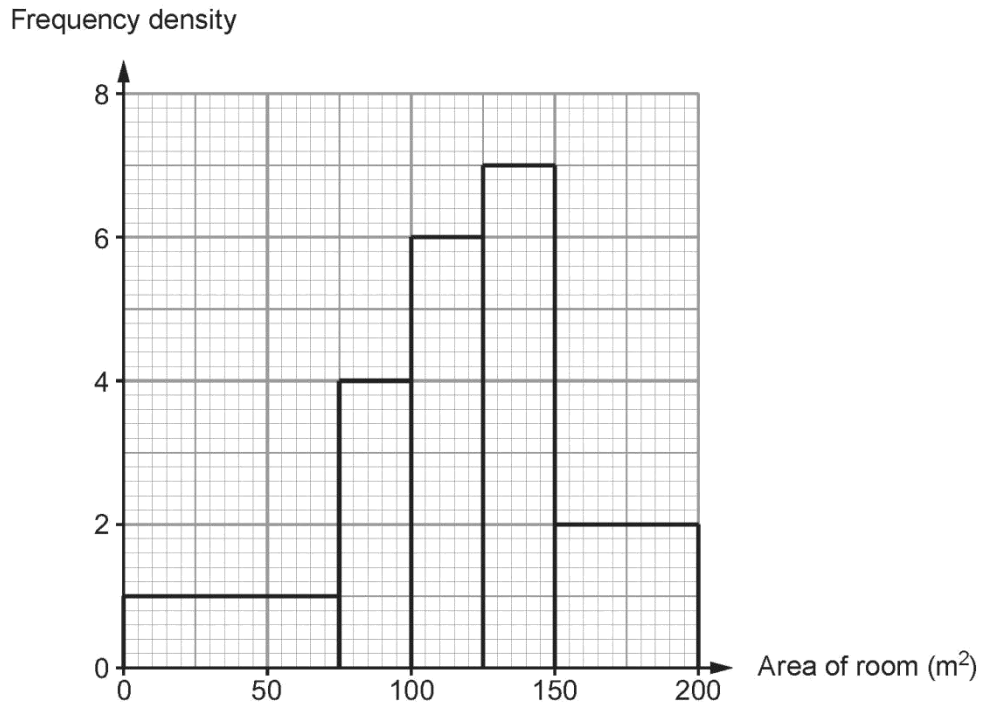
(a)   Calculate how many of the offices available to let have a floor area greater than $75\,m^2$.

[3]

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(b) *Office Space UK* charges a £200 arrangement fee when any of the offices with a floor area of up to $100\,m^2$ are let.
Assuming that all of the offices less than $100\,m^2$ are let, how much will *Office Space UK* receive in arrangement fees for these offices?
Give your answer in standard form. [4]

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(c) It is reported that the median size of office space available to let is $80\,m^2$.
Is this true for the offices that are available to let by *Office Space UK*?
You must give a reason for your answer. [2]

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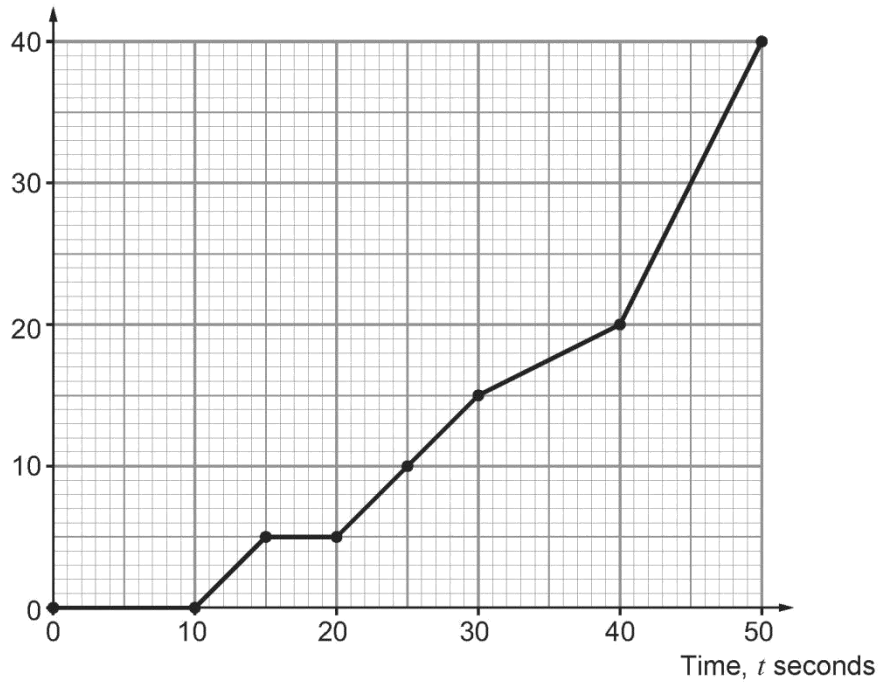..

13) The cumulative frequency diagram shows the time taken by 40 athletes to complete a trial.

Cumulative frequency

Time, t seconds

(a)   Athletes completing the trial within 20 seconds are considered to be 'outstanding'.
How many athletes are 'outstanding'? [1]

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(b)   Athletes completing the trial between 20 seconds and 40 seconds are considered to be 'excellent'.
How many athletes are 'excellent'? [1]

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(c)   Write down an estimate for the interquartile range of the times.
You must show your working. [2]

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(d) Using the same class intervals as used in the cumulative frequency diagram, draw a histogram to illustrate the time taken by the 40 athletes to complete the trial. [5]

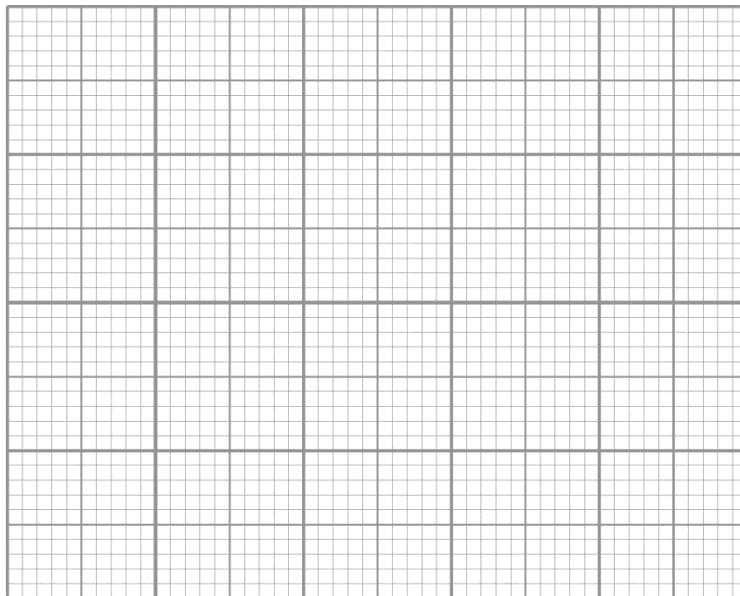..

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14) The diameters of water lilies in a pond were measured by a gardener. The results are summarised in the grouped frequency distribution below.

Diameter, d (cm)	$0 < d \leqslant 2$	$2 < d \leqslant 4$	$4 < d \leqslant 6$	$6 < d \leqslant 8$	$8 < d \leqslant 10$	$10 < d \leqslant 12$	$12 < d \leqslant 14$	$14 < d \leqslant 16$	$16 < d \leqslant 18$
Frequency	1	0	4	10	16	14	4	1	1

When reviewing the results, the gardener decides that the groups $0 < d \leqslant 2$ and $2 < d \leqslant 4$ should be combined, and so should the groups $14 < d \leqslant 16$ and $16 < d \leqslant 18$.

(i) Do you think this decision is sensible?
Give a reason for your answer. [1]

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(ii) Complete the table below and draw a histogram to display the results for the water lilies measured. [4]

Diameter, d (cm)	$0 < d \leqslant 4$	$4 < d \leqslant 6$	$6 < d \leqslant 8$	$8 < d \leqslant 10$	$10 < d \leqslant 12$	$12 < d \leqslant 14$	$14 < d \leqslant 18$
Frequency Density							

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