1. The table shows information about the heights of 40 bushes.

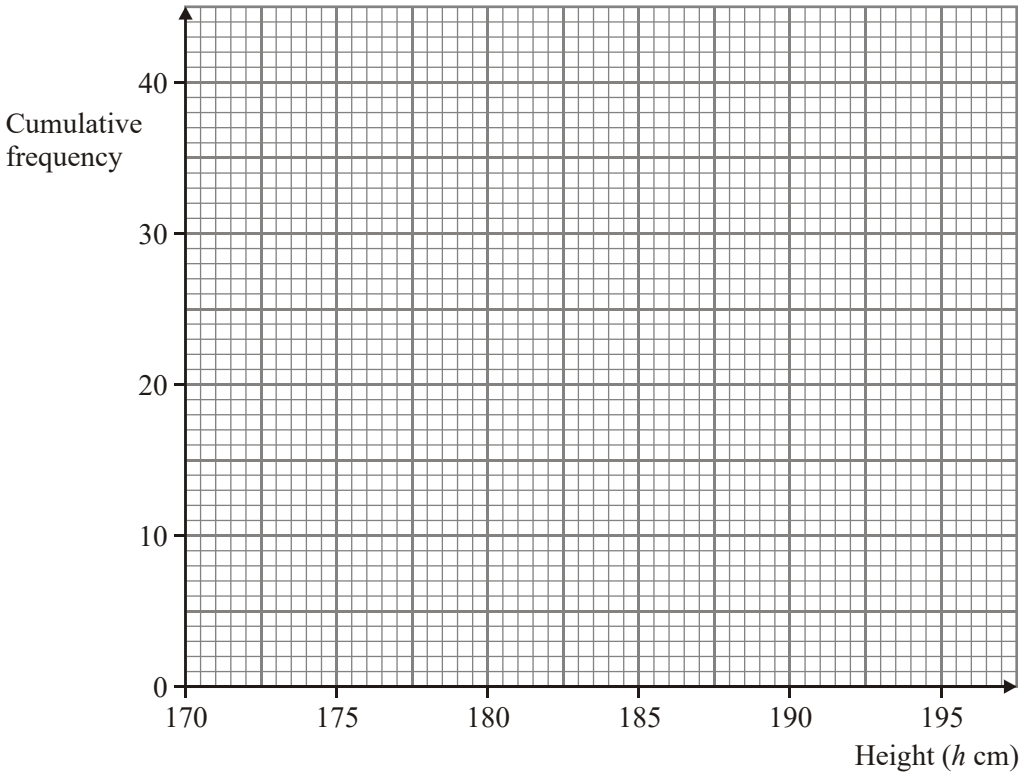
Height (h cm)	Frequency
$170 \leq h < 175$	5
$175 \leq h < 180$	18
$180 \leq h < 185$	12
$185 \leq h < 190$	4
$190 \leq h < 195$	1

(a) Complete the cumulative frequency table.

Height (h cm)	Cumulative Frequency
$170 \leq h < 175$	
$170 \leq h < 180$	
$170 \leq h < 185$	
$170 \leq h < 190$	
$170 \leq h < 195$	

(1)

(b) On the grid, draw a cumulative frequency graph for your table.



(2)

(c) Use the graph to find an estimate for the median height of the bushes.

…… cm

(1)

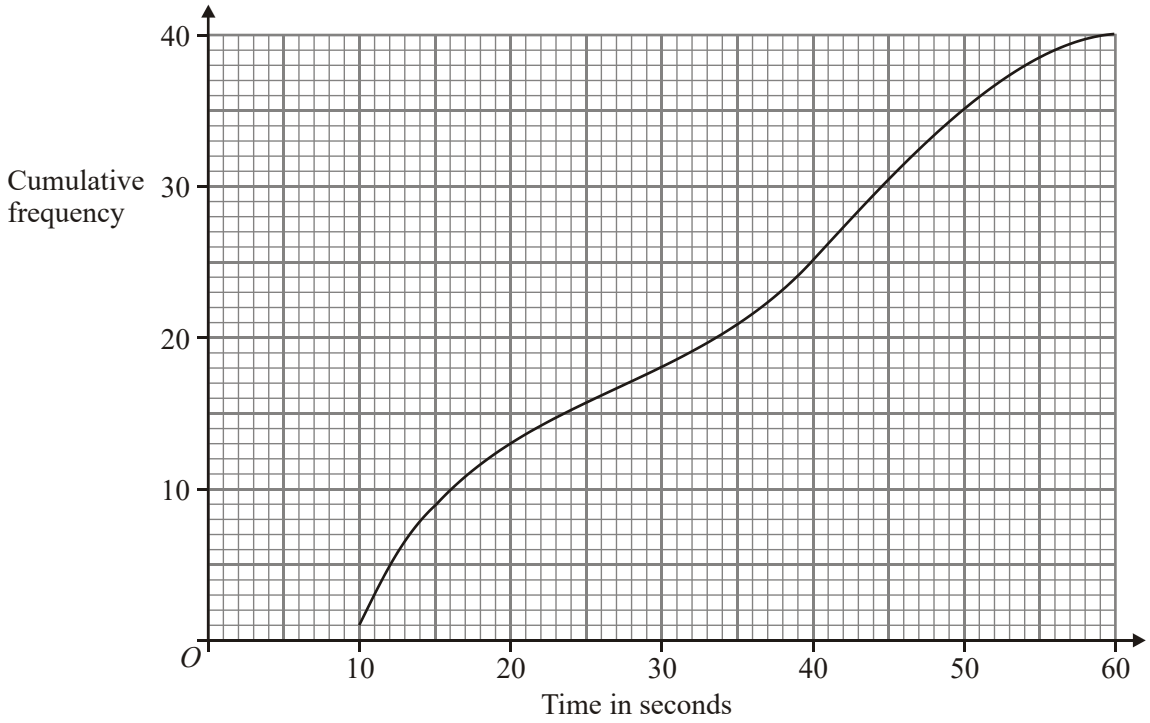
(Total 4 marks)

2. 40 boys each completed a puzzle.
The cumulative frequency graph below gives information about the times it took them to complete the puzzle.

(a) Use the graph to find an estimate for the median time

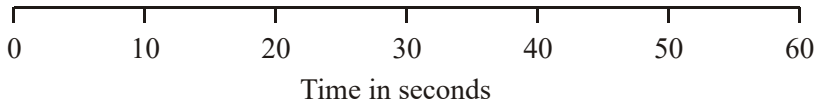
..... seconds

(1)



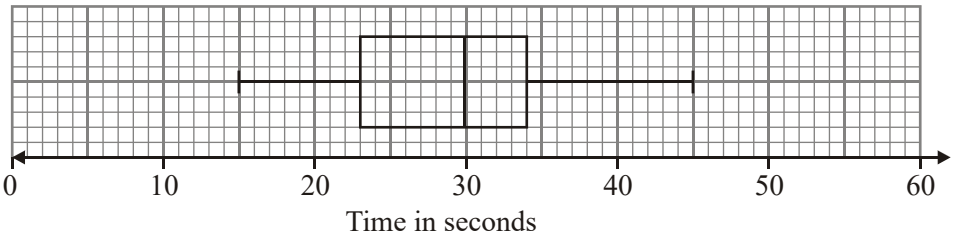
For the boys
the minimum time to complete the puzzle was 9 seconds
and the maximum time to complete the puzzle was 57 seconds.

(b) Use this information and the cumulative frequency graph to draw a box plot showing information about the boy's times.



(3)

The box plot below shows information about the times taken by 40 girls to complete the same puzzle.



(c) Make **two** comparisons between the boys' times and the girls' times.

.....

.....

(2)

(Total 6 marks)

3. The table gives information about the ages of 160 employees of an IT company.

Age (A) in years	**Frequency**
$15 < A \leq 25$	44
$25 < A \leq 35$	56
$35 < A \leq 45$	34
$45 < A \leq 55$	19
$55 < A \leq 65$	7

(a) Write down the modal class interval.

.....

(1)

(b) Complete the cumulative frequency table.

Age (A) in years	**Cumulative Frequency**
$15 < A \leq 25$	
$15 < A \leq 35$	
$15 < A \leq 45$	
$15 < A \leq 55$	

$15 < A \leq 65$	

(1)

(c) On the grid below, draw a cumulative frequency graph for your table.

(2)

(d) Use your graph to find an estimate for

(i) the median age of the employees,

..... years

(i) the interquartile range of the ages of the employees.

..... years

(3)

Another IT company has 80 employees.

The age of the youngest employee is 24 years.
The age of the oldest employee is 54 years.

The median age is 38 years.
The lower quartile age is 30 years.
The upper quartile age is 44 years.

(e) On the grid below, draw a box plot to show information about the ages of the employees.

(2)

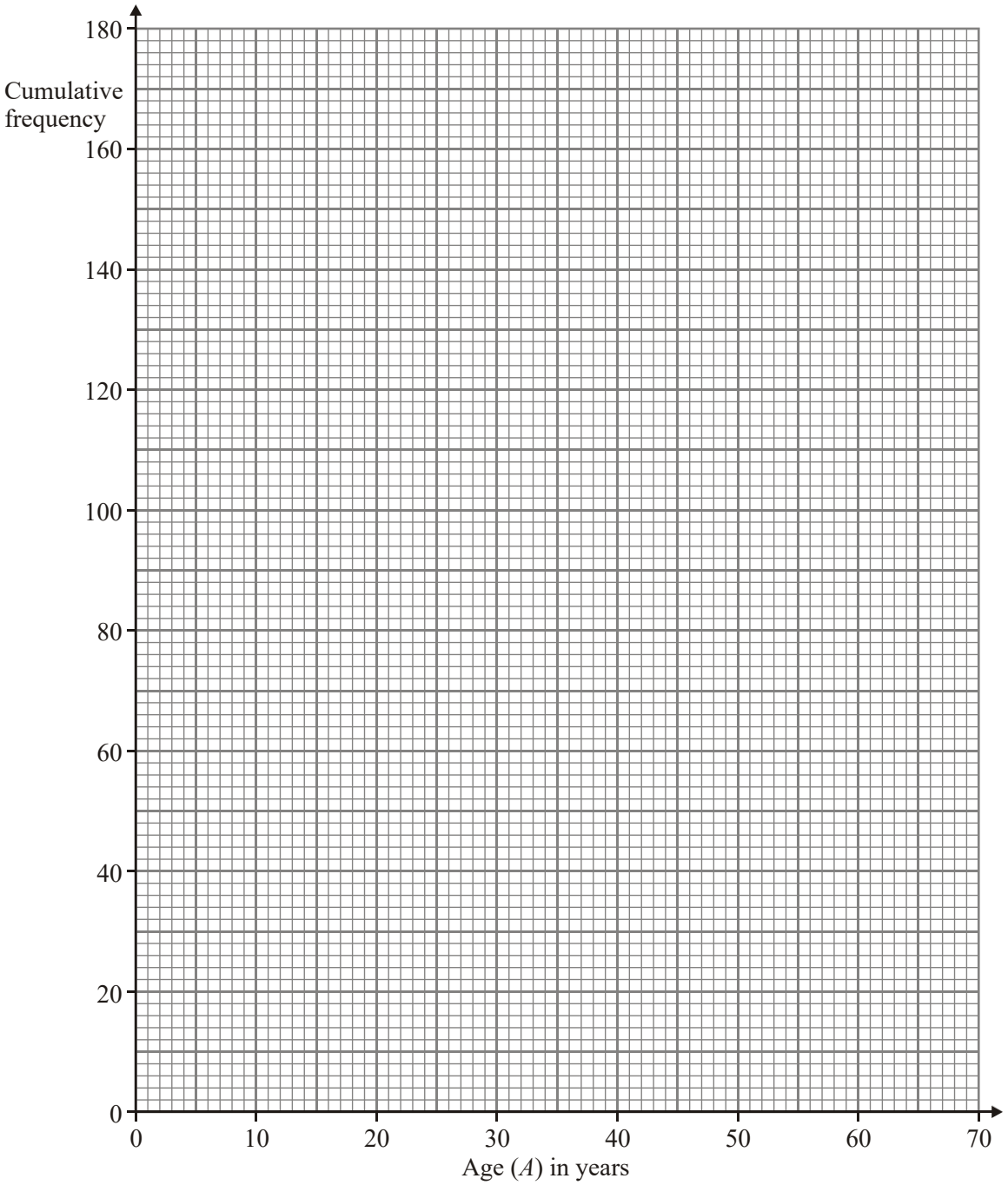
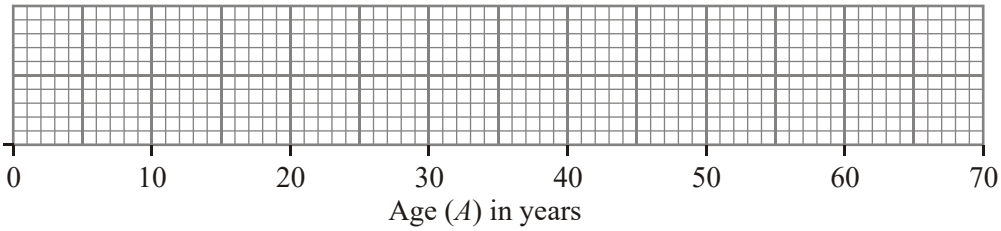

Cumulative frequency
180
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
Age (A) in years

Diagram for part (e).



(Total 9 marks)

4. The table gives information about the ages of 160 employees of an IT company.

Age (A) in years	**Frequency**
$15 < A \leq 25$	44
$25 < A \leq 35$	56
$35 < A \leq 45$	34
$45 < A \leq 55$	19
$55 < A \leq 65$	7

(a) Complete the cumulative frequency table.

Age (A) in years	**Cumulative Frequency**
$15 < A \leq 25$	
$15 < A \leq 35$	
$15 < A \leq 45$	
$15 < A \leq 55$	
$15 < A \leq 65$	

(1)

(b) On the grid below, draw a cumulative frequency graph for your table.

(2)

(c) Use your graph to find an estimate for

(i) the median age of the employees,

..... years

(ii) the interquartile range of the ages of the employees.

..... years

(3)

Another IT company has 80 employees.

The age of the youngest employee is 24 years.
The age of the oldest employee is 54 years.

The median age is 38 years.
The lower quartile age is 30 years.
The upper quartile age is 44 years.

(d) On the grid, draw a box plot to show information about the ages of the employees.

(2)

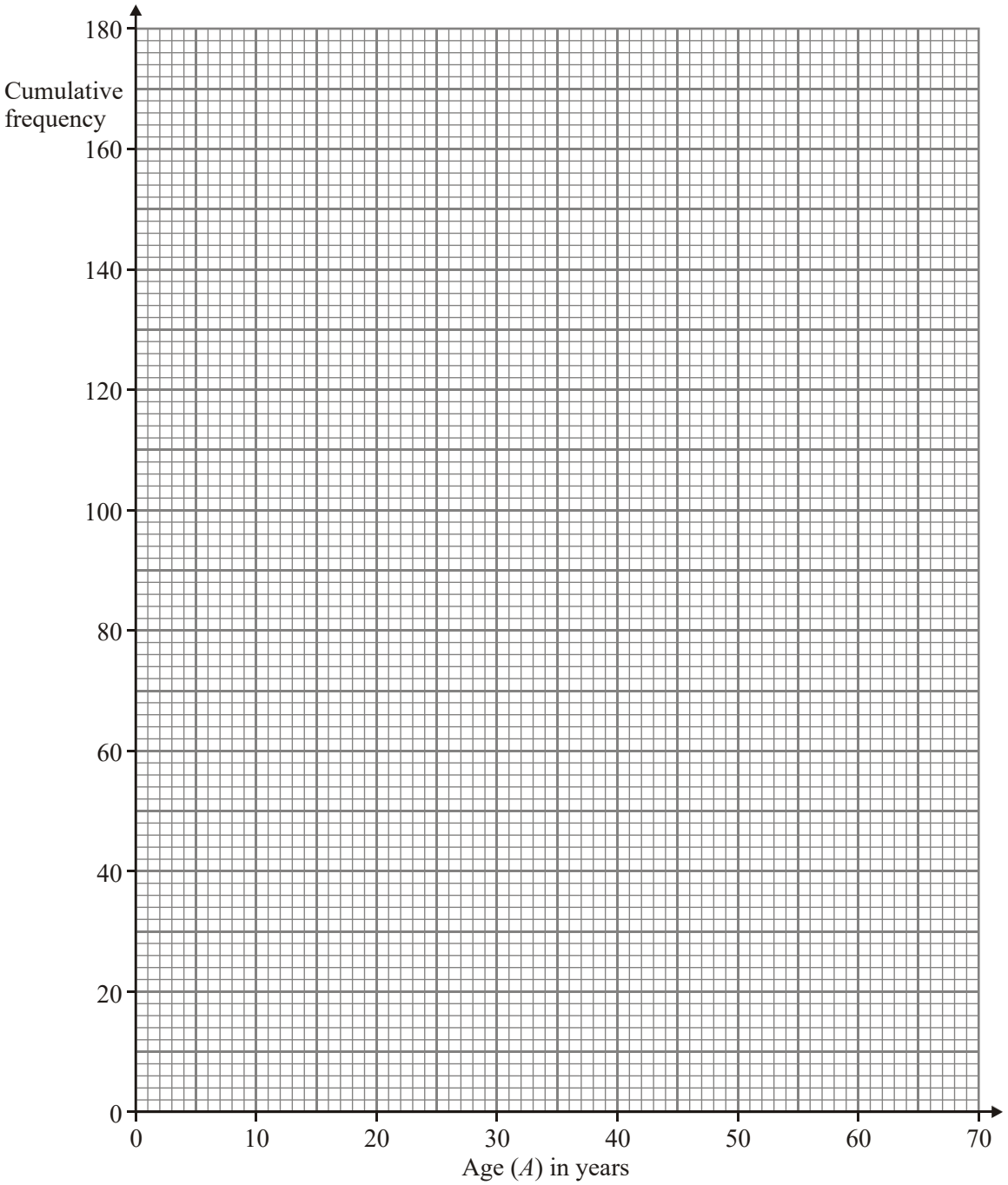
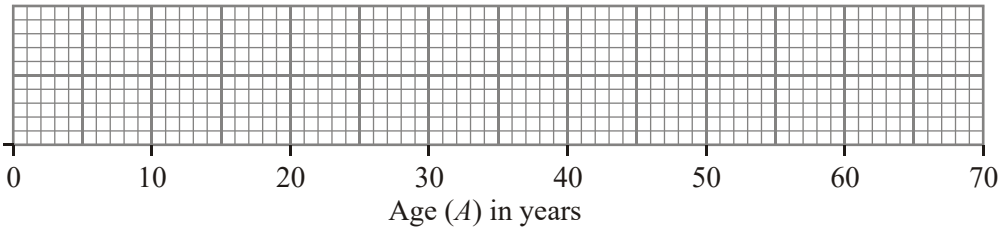

Cumulative frequency
180
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
Age (A) in years

Diagram for part (d).



(Total 8 marks)

5. The table shows information about the number of hours that 120 children used a computer last week.

Number of hours (h)	Frequency
$0 < h \leq 2$	10
$2 < h \leq 4$	15
$4 < h \leq 6$	30
$6 < h \leq 8$	35
$8 < h \leq 10$	25
$10 < h \leq 12$	5

(a) Work out an estimate for the mean number of hours that the children used a computer. Give your answer correct to two decimal places.

……hours

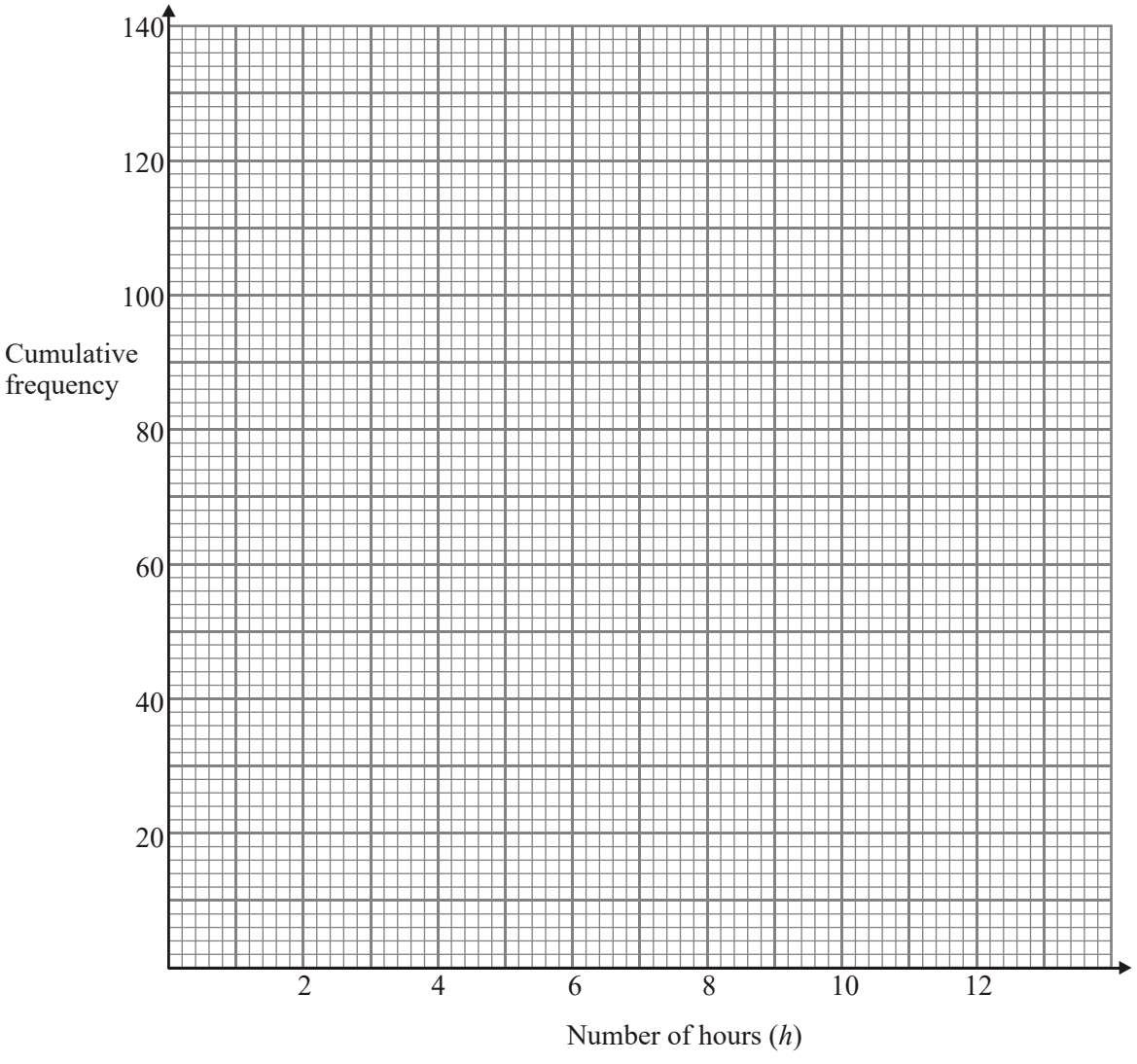
(4)

(b) Complete the cumulative frequency table.

Number of hours (h)	Cumulative frequency
$0 < h \leq 2$	10
$0 < h \leq 4$	
$0 < h \leq 6$	
$0 < h \leq 8$	
$0 < h \leq 10$	
$0 < h \leq 12$	

(1)

(c) On the grid, draw a cumulative frequency graph for your table.



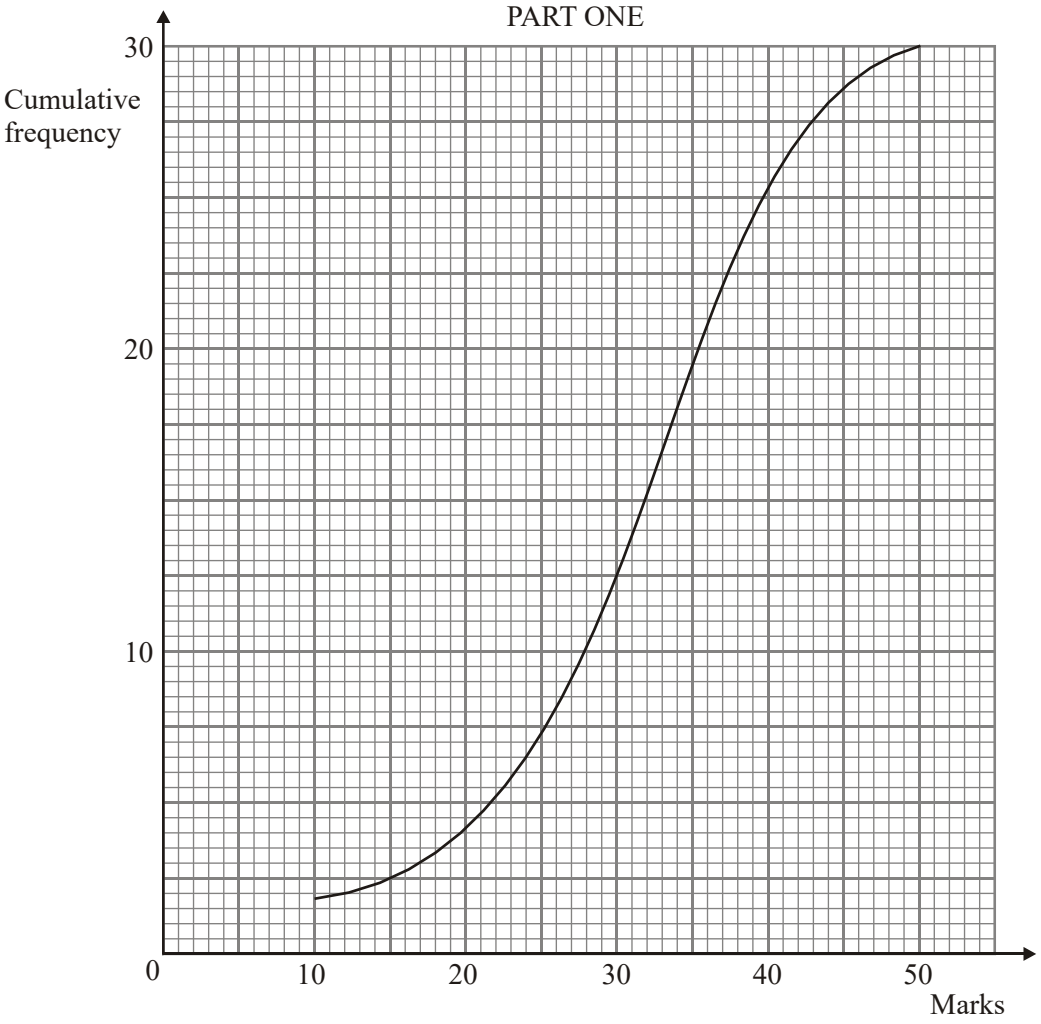
(2)

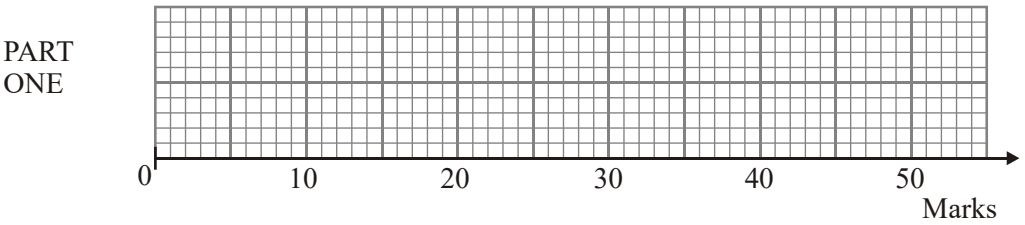
(d) Use your graph to find an estimate for the number of children who used a computer for **less** than 7 hours last week.

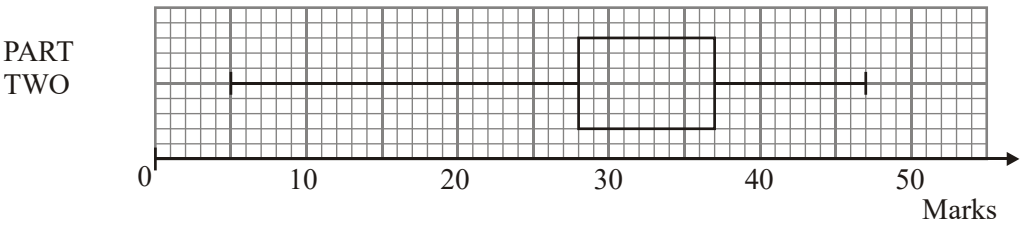
……

(2)
(Total 9 marks)

6. 30 students took part in a National Science quiz.
The quiz was in two parts.
The cumulative frequency graph on the grid below gives information about the marks scored in Part One.
The lowest mark was 5 and the highest mark was 47.







(a) In the space provided on the grid, draw a box plot using the cumulative frequency graph for the results of Part One.

(3)

The diagram also shows a box plot for the results of Part Two.
Use the box plots to compare the two distributions.

(b) Give **two** differences between them.

First difference.....

.....

Second difference.....

.....

(2)
(Total 5 marks)

7. A company tested 100 batteries.

The table shows information about the time in hours that the batteries lasted.

Time(t hours)	Frequency
$50 \leq t < 55$	12
$55 \leq t < 60$	21
$60 \leq t < 65$	36
$65 \leq t < 70$	23
$70 \leq t < 75$	8

(a) Complete the cumulative frequency table.

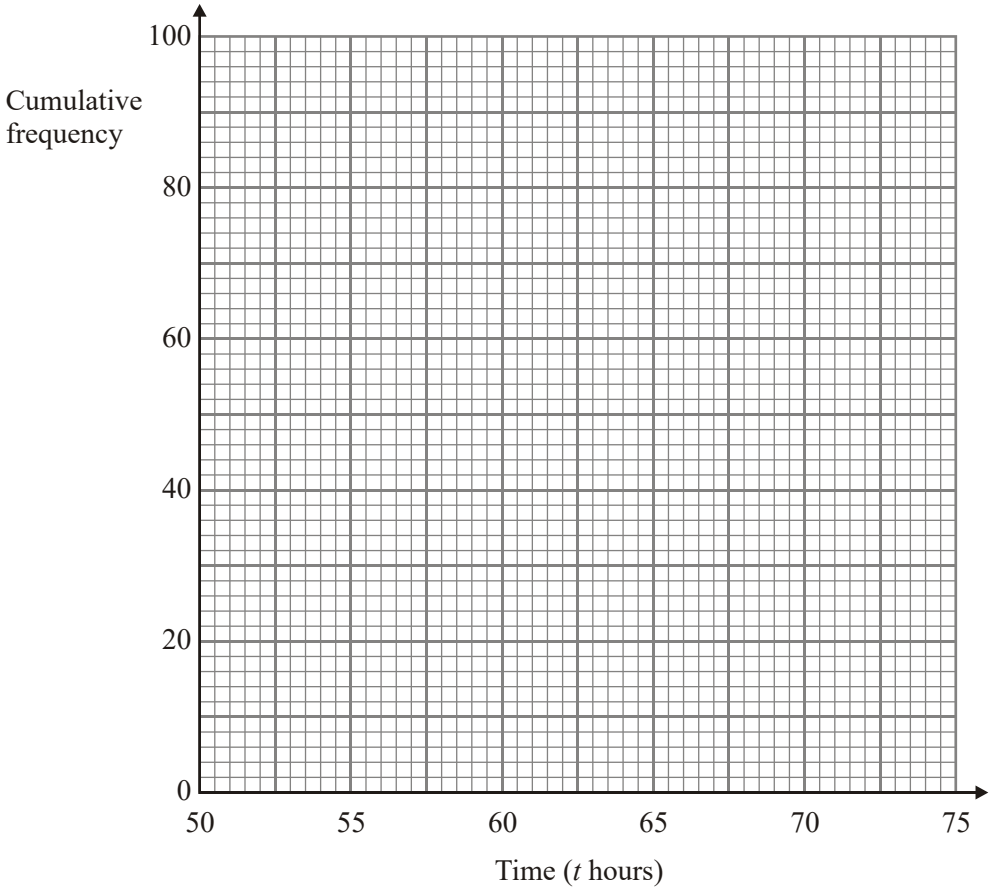
(1)

Time (t hours)	Cumulative frequency
$50 \leq t < 55$	12
$50 \leq t < 60$	
$50 \leq t < 65$	
$50 < t < 70$	
$50 \leq t < 75$	

(b) On the grid, draw a cumulative frequency graph for your completed table.

(2)

(c) Use your completed graph to find an estimate for the median time.



……hours

(1)

(Total 4 marks)

8. A company tested 100 batteries.

The table shows information about the number of hours that the batteries lasted.

Time (t hours)	Frequency
$50 \leq t < 55$	12
$55 \leq t < 60$	21
$60 \leq t < 65$	36
$65 \leq t < 70$	23
$70 \leq t < 75$	8

(a) Complete the cumulative frequency table for this information.

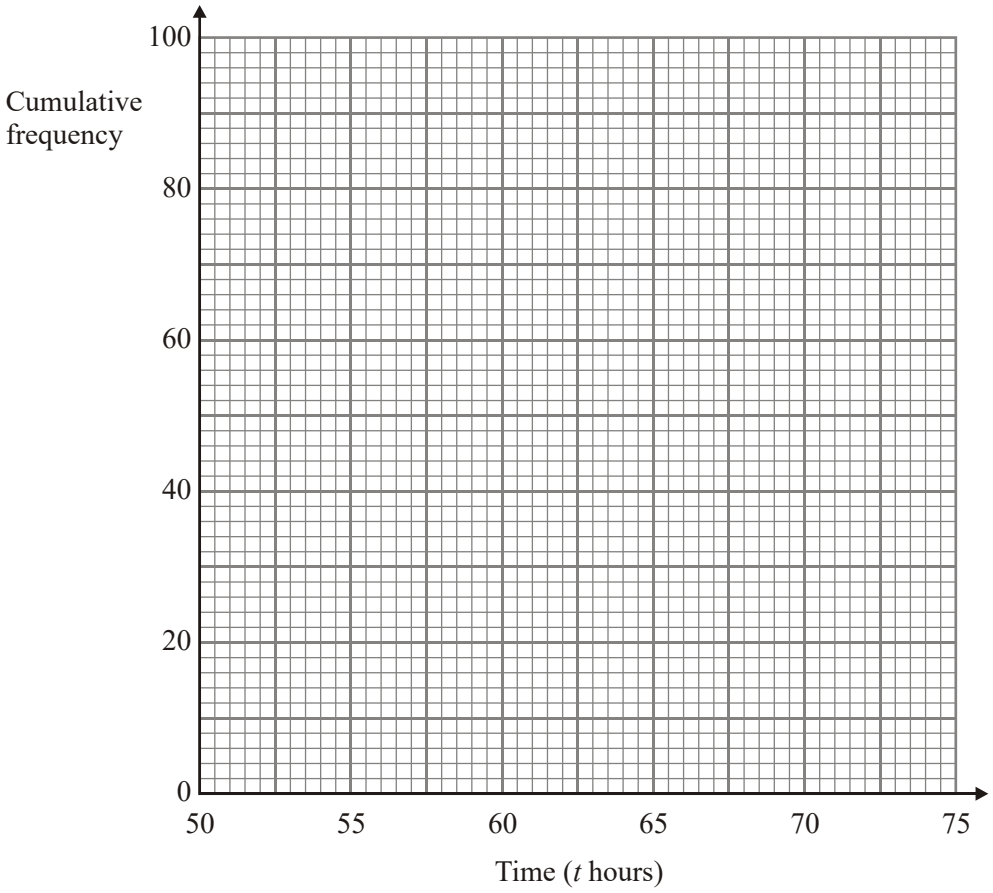
(1)

Time (t hours)	Cumulative frequency
$50 \leq t < 55$	12
$50 \leq t < 60$	
$50 \leq t < 65$	
$50 \leq t < 70$	
$50 \leq t < 75$	

(b) On the grid, draw a cumulative frequency graph for your completed table.

(2)

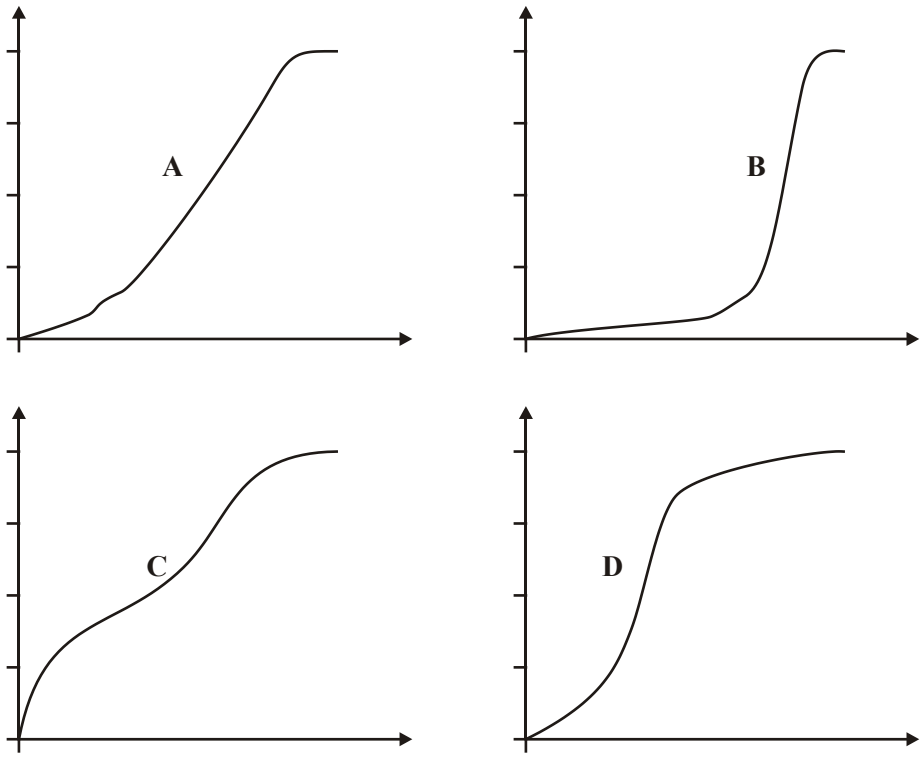
(c) Use your completed graph to find an estimate for the median time.
You must state the units of your answer.



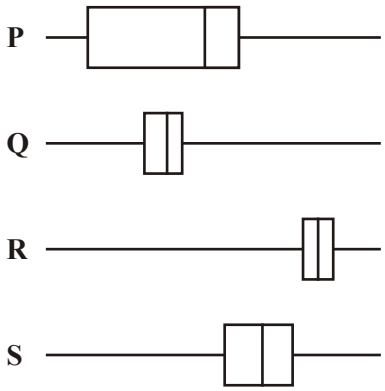
.....

(2)
(Total 5 marks)

9. Here are four cumulative frequency diagrams.



Here are four box plots.



For each box plot, write down the letter of the appropriate cumulative frequency diagram.

P and .....

Q and .....

R and .....

S and .....

(Total 2 marks)

10. The table shows information about the ages of the 240 people at a club.

Age (*t* years)	**Frequency**
$15 \leq t < 20$	95
$20 \leq t < 25$	90
$25 \leq t < 30$	35
$30 \leq t < 35$	15
$35 \leq t < 40$	5

A pie chart is to be drawn for the information in the table.

(a) Work out the size of the angle for people in the class $20 \leq t < 25$

.....°

(2)

(b) Write down the modal class.

.....

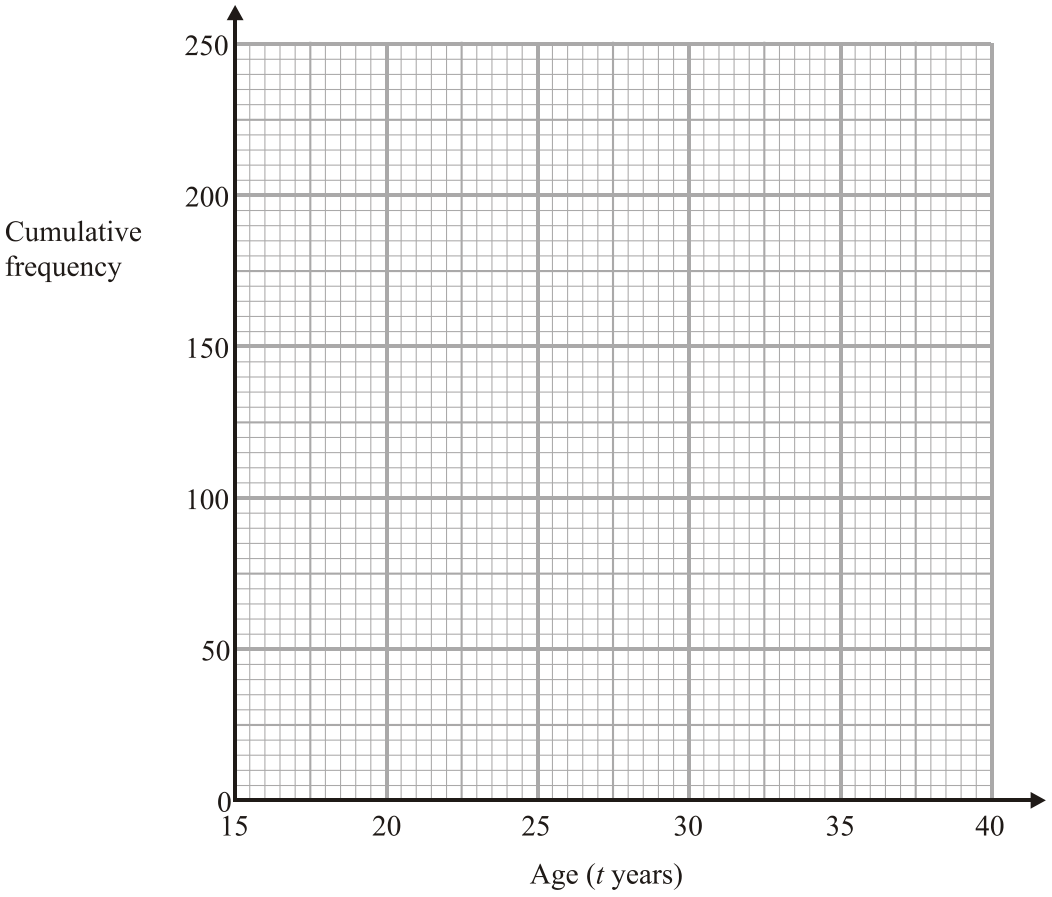
(1)

(c) Complete the cumulative frequency table.

Age (t years)	**Cumulative frequency**
$15 \leq t < 20$	
$15 \leq t < 25$	
$15 \leq t < 30$	
$15 \leq t < 35$	
$15 \leq t < 40$	

(1)

(d) On the grid, draw the cumulative frequency graph for your table.



(2)

(e) Use your graph to find an estimate for the median age of the people.

..... years

(1)

(Total 7 marks)

11. The table shows information about the ages of the 240 people at a club.

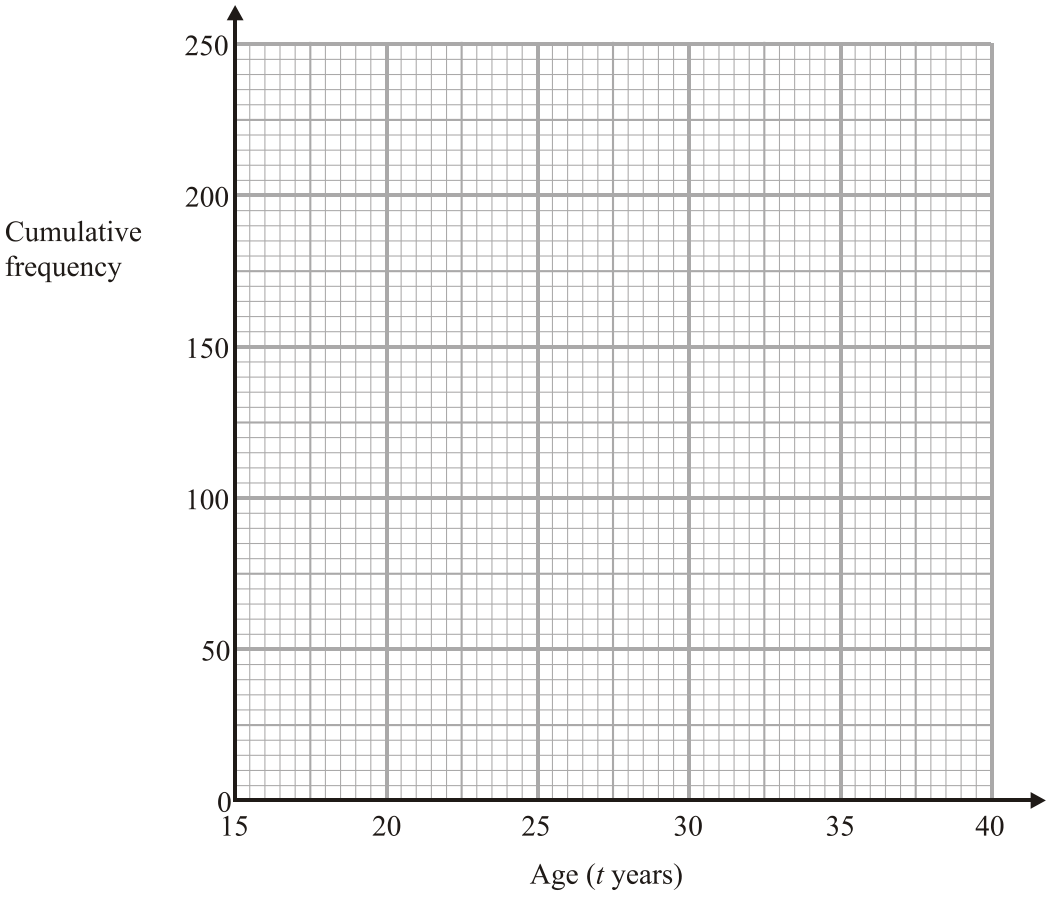
Age (*t* years)	**Frequency**
$15 \leq t < 20$	95
$20 \leq t < 25$	90
$25 \leq t < 30$	35
$30 \leq t < 35$	15
$35 \leq t < 40$	5

(a) Complete the cumulative frequency table.

Age (*t* years)	**Cumulative frequency**
$15 \leq t < 20$	
$15 \leq t < 25$	
$15 \leq t < 30$	
$15 \leq t < 35$	
$15 \leq t < 40$	

(1)

(b) On the grid, draw the cumulative frequency graph for your table.



(2)

(c) Use your graph to find an estimate for the median age of the people.

..... years

(1)

(Total 4 marks)

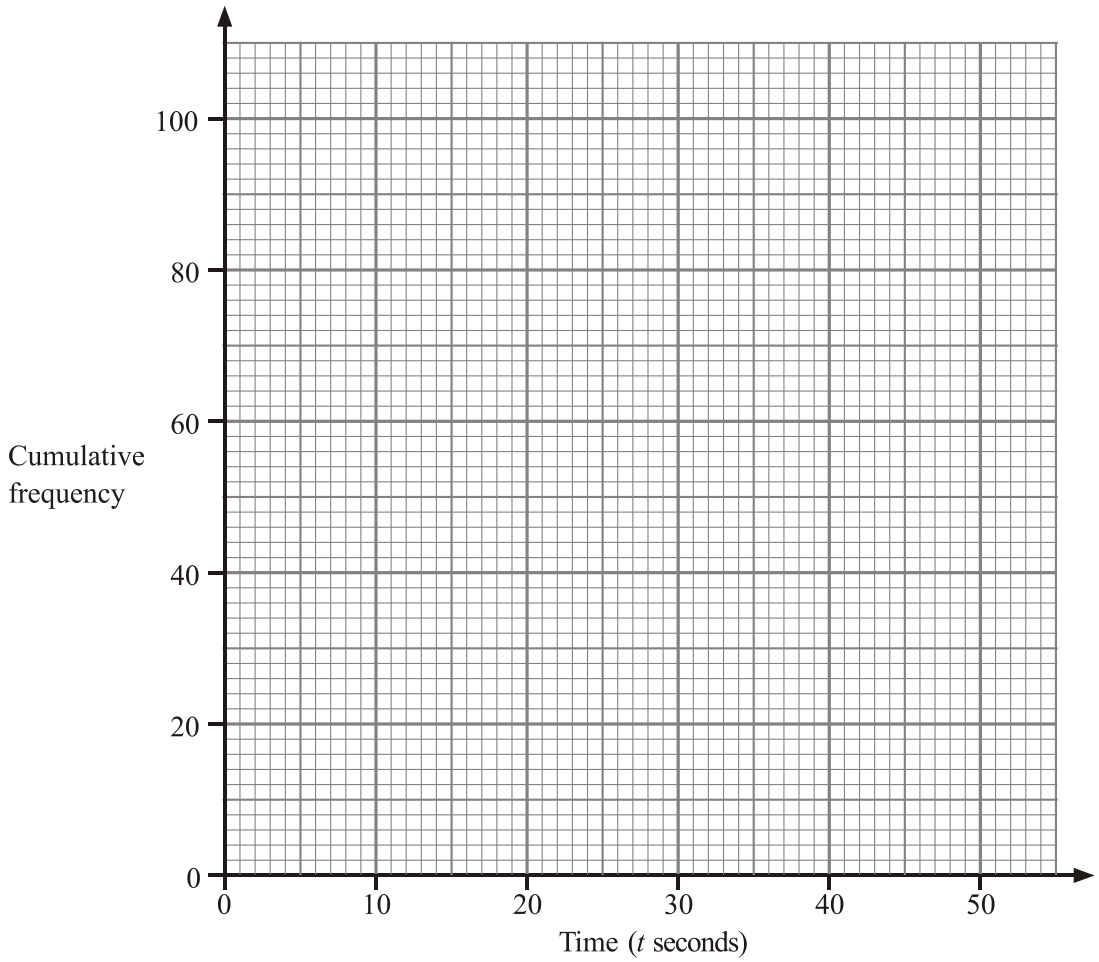
12. An operator took 100 calls at a call centre.
The table gives information about the time (t seconds) it took the operator to answer each call.

Time (t seconds)	**Frequency**
$0 < t \leq 10$	16
$10 < t \leq 20$	34
$20 < t \leq 30$	32
$30 < t \leq 40$	14
$40 < t \leq 50$	4

(a) Complete the cumulative frequency table.

Time (t seconds)	**Cumulative Frequency**
$0 < t \leq 10$	16
$0 < t \leq 20$	
$0 < t \leq 30$	
$0 < t \leq 40$	
$0 < t \leq 50$	

(1)



(b) On the grid, draw a cumulative frequency graph for your table.

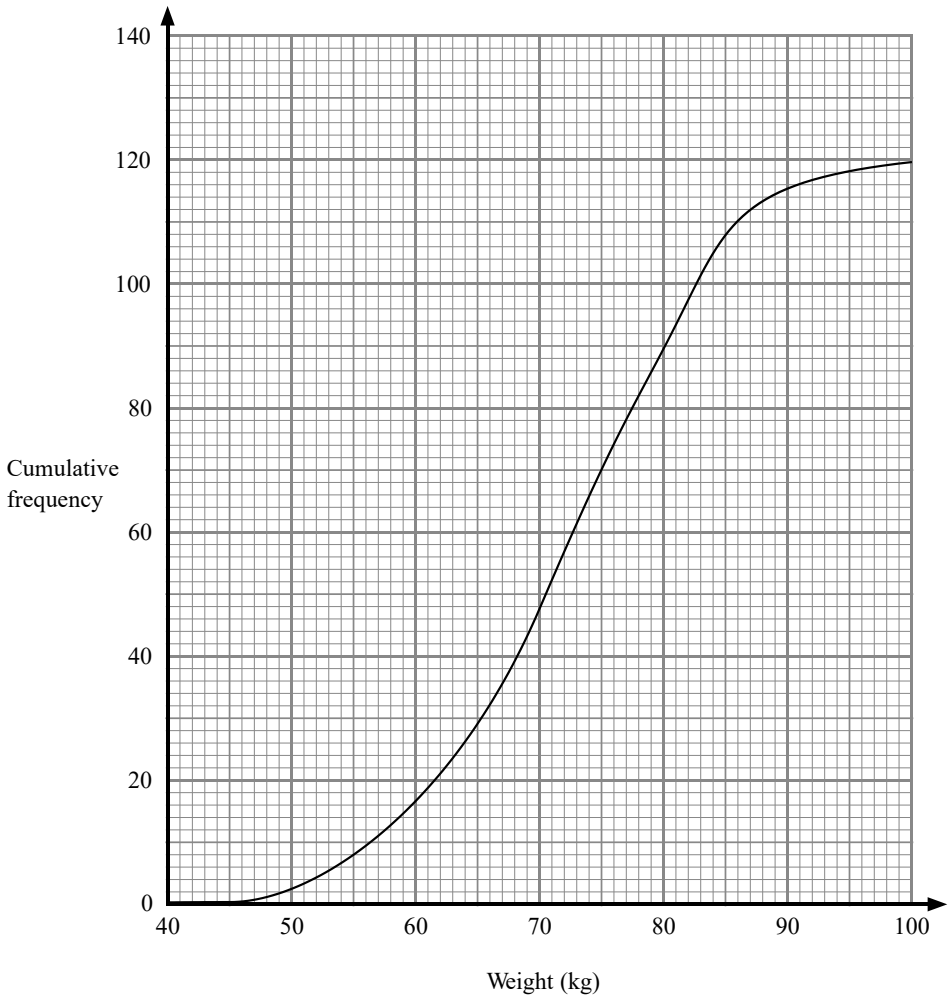
(2)

(c) Use your graph to find an estimate for the number of calls the operator took **more** than 18 seconds to answer.

.....

(2)
(Total 5 marks)

13. Here is the cumulative frequency curve of the weights of 120 girls at Mayfield Secondary School.



Use the cumulative frequency curve to find an estimate for the

(i) median weight,

..... kg

(ii) interquartile range of the weights.

..... kg

(Total 3 marks)

14. The table shows information about the amount spent by 100 customers in a supermarket.

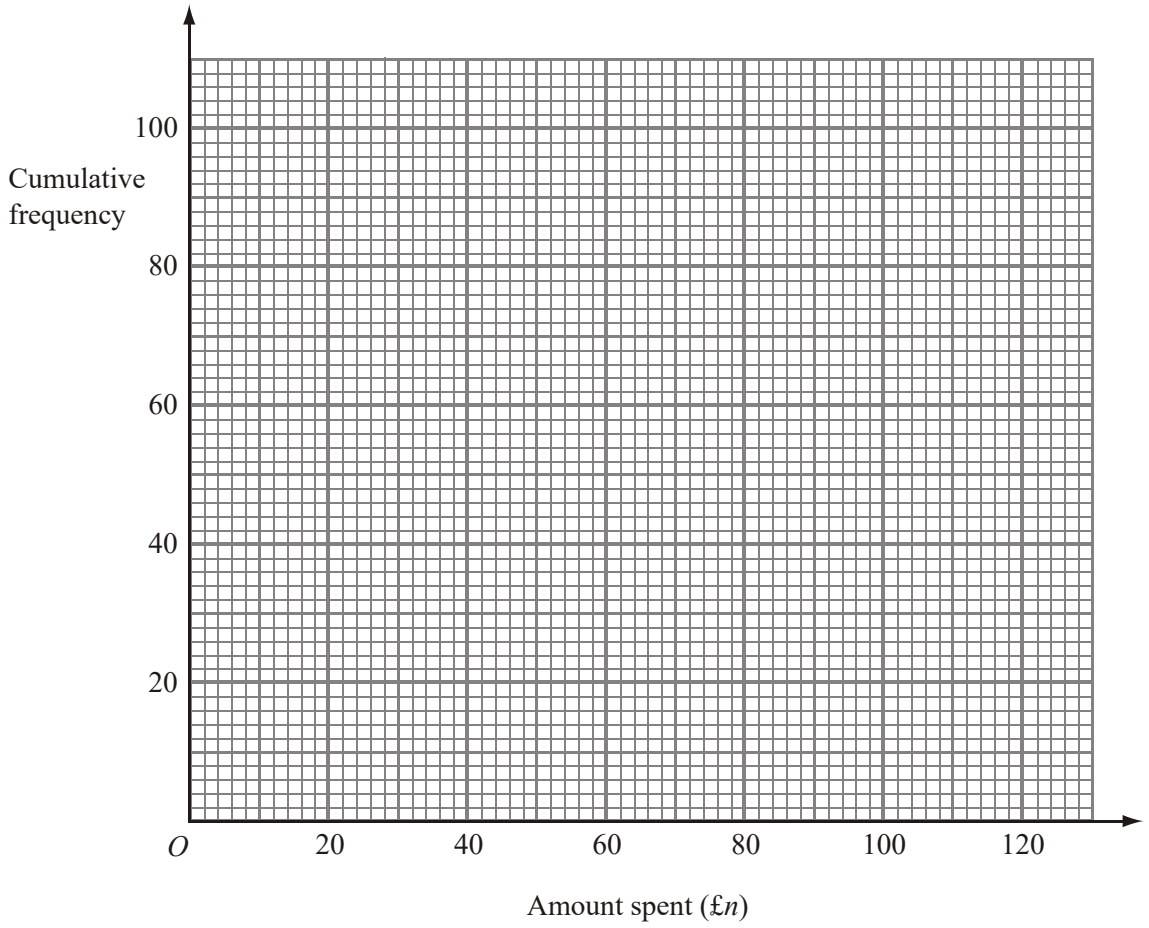
Amount spent (£*n*)	**Frequency**
$0 < n \leq 20$	18
$20 < n \leq 40$	22
$40 < n \leq 60$	35
$60 < n \leq 80$	15
$80 < n \leq 100$	8
$100 < n \leq 120$	2

(a) Complete the cumulative frequency table for this information.

Amount spent (£*n*)	**Cumulative frequency**
$0 < n \leq 20$	18
$0 < n \leq 40$	
$0 < n \leq 60$	
$0 < n \leq 80$	
$0 < n \leq 100$	
$0 < n \leq 120$	

(1)

(b) On the grid, draw a cumulative frequency graph for your table.



(2)

(c) Use your graph to find an estimate for the median amount spent.

£ .....

(1)

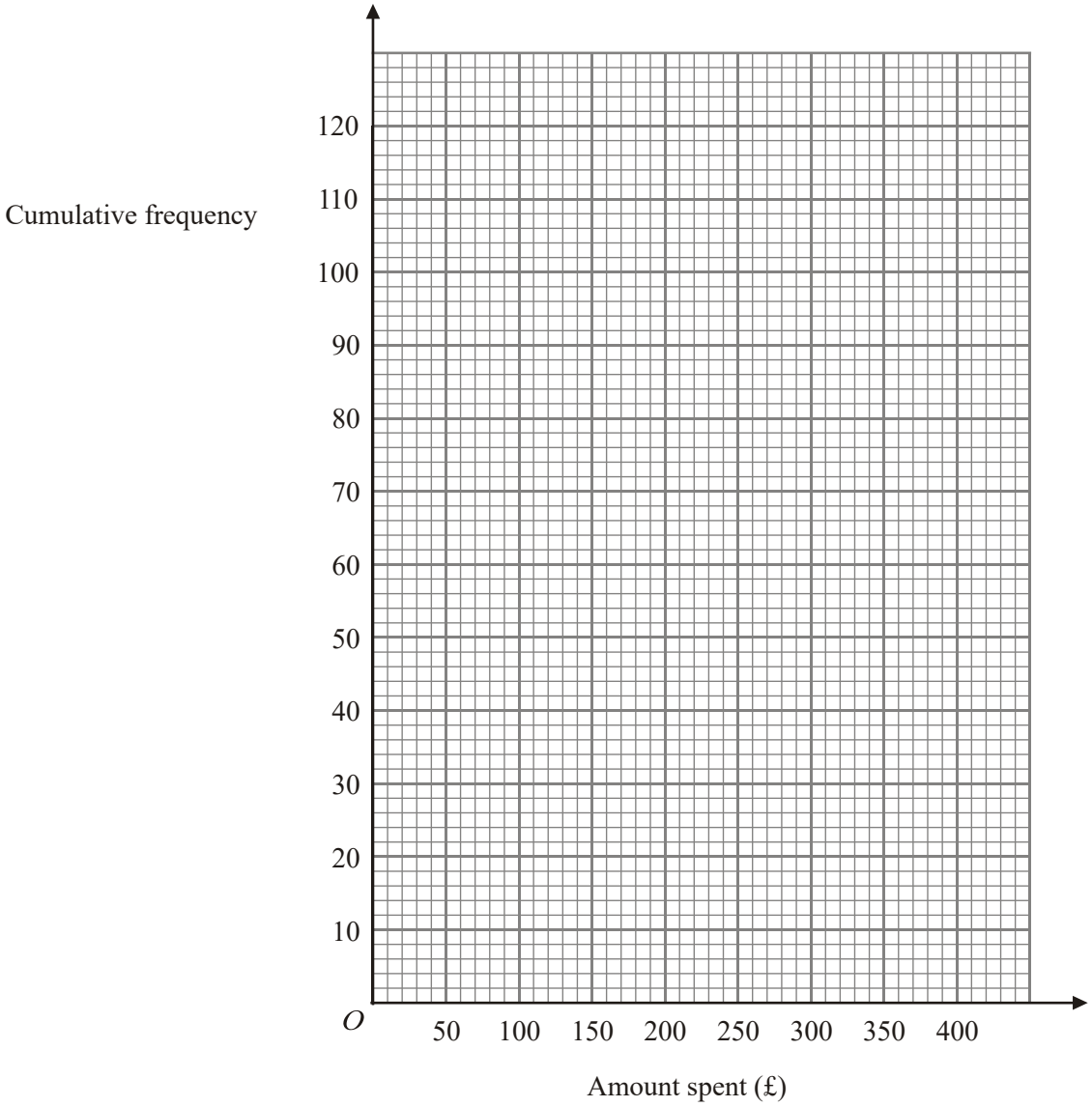
(Total 4 marks)

15. Lucy did a survey about the amounts of money spent by 120 men during their summer holidays.

The cumulative frequency table gives some information about the amounts of money spent by the 120 men.

Amount (£A) spent	**Cumulative frequency**
$0 \leq A < 100$	13
$0 \leq A < 150$	25
$0 \leq A < 200$	42
$0 \leq A < 250$	64
$0 \leq A < 300$	93
$0 \leq A < 350$	110
$0 \leq A < 400$	120

(a) On the grid, draw a cumulative frequency diagram.



(2)

(b) Use your cumulative frequency diagram to estimate the median.

£ .....

(2)

A survey of the amounts of money spent by 200 women during their summer holidays gave a median of £205

(c) Compare the amounts of money spent by the women with the amounts of money spent by the men.

.....

.....

(1)
(Total 5 marks)

16. The cumulative frequency diagram below gives information about the prices of 120 houses.

(a) Find an estimate for the number of houses with prices less than £130 000.

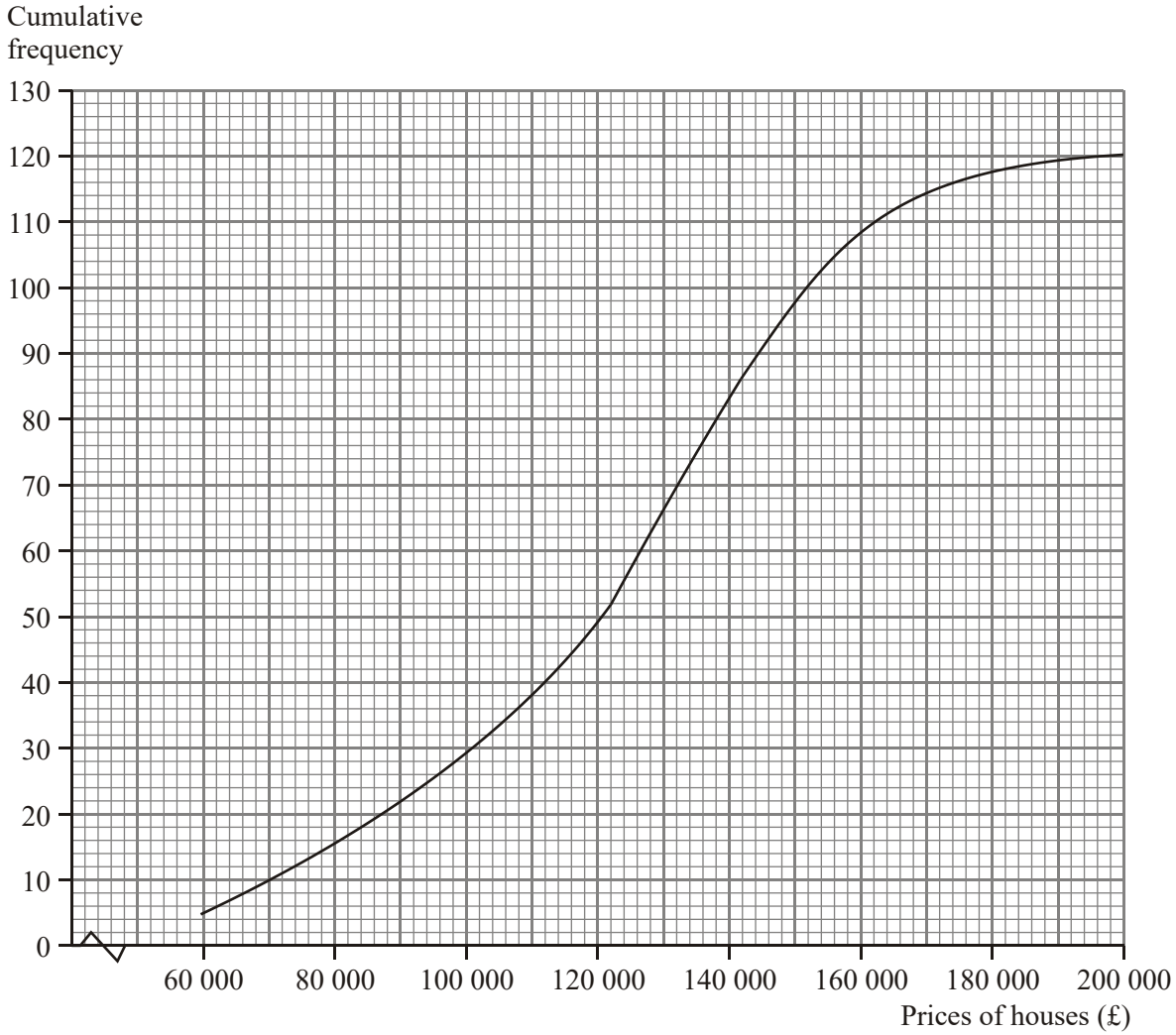
……

(1)

(b) Work out an estimate for the interquartile range of the prices of the 120 houses.

£ ……

(2)
(Total 3 marks)


Cumulative frequency
130
120
110
100
90
80
70
60
50
40
30
20
10
0
60 000
80 000
100 000
120 000
140 000
160 000
180 000
200 000
Prices of houses (£)

17. The cumulative frequency table gives information about the number of minutes 80 customers were in a supermarket.

Number of minutes (t) in a supermarket	Cumulative frequency
$0 < t \leq 10$	2
$0 < t \leq 20$	8
$0 < t \leq 30$	18
$0 < t \leq 40$	40
$0 < t \leq 50$	64
$0 < t \leq 60$	77
$0 < t \leq 70$	80

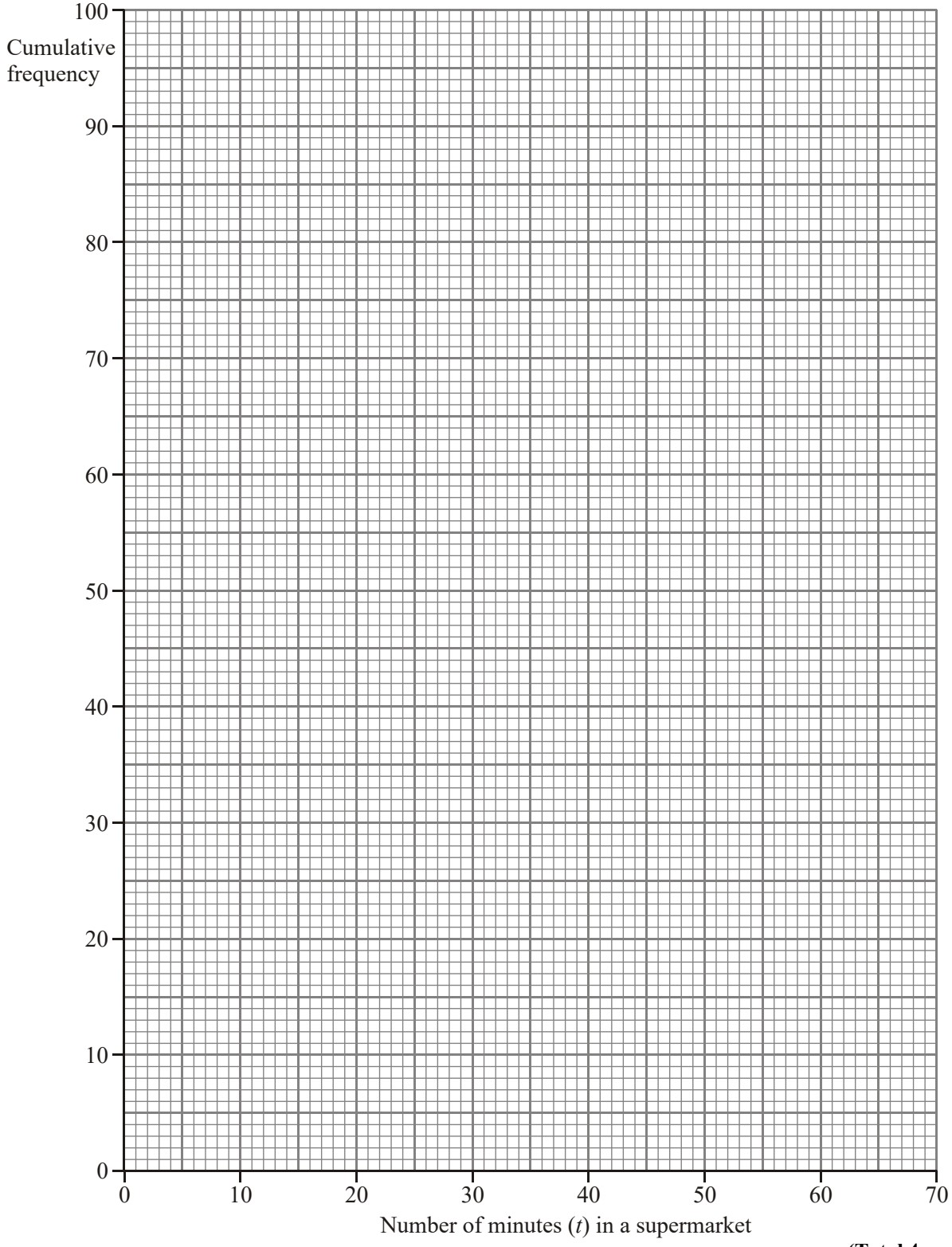
(a) On the grid below, draw a cumulative frequency graph for the data in the table.

(2)

(b) Use your cumulative frequency graph to work out an estimate for the interquartile range of the number of minutes customers were in the supermarket.

…… minutes

(2)



(Total 4 marks)

18. Daniel took a sample of 100 pebbles from Tawny Beach.
He weighed each pebble and recorded its weight.
He used the information to draw the cumulative frequency graph shown on the grid.

(a) Use the cumulative frequency graph to find an estimate for

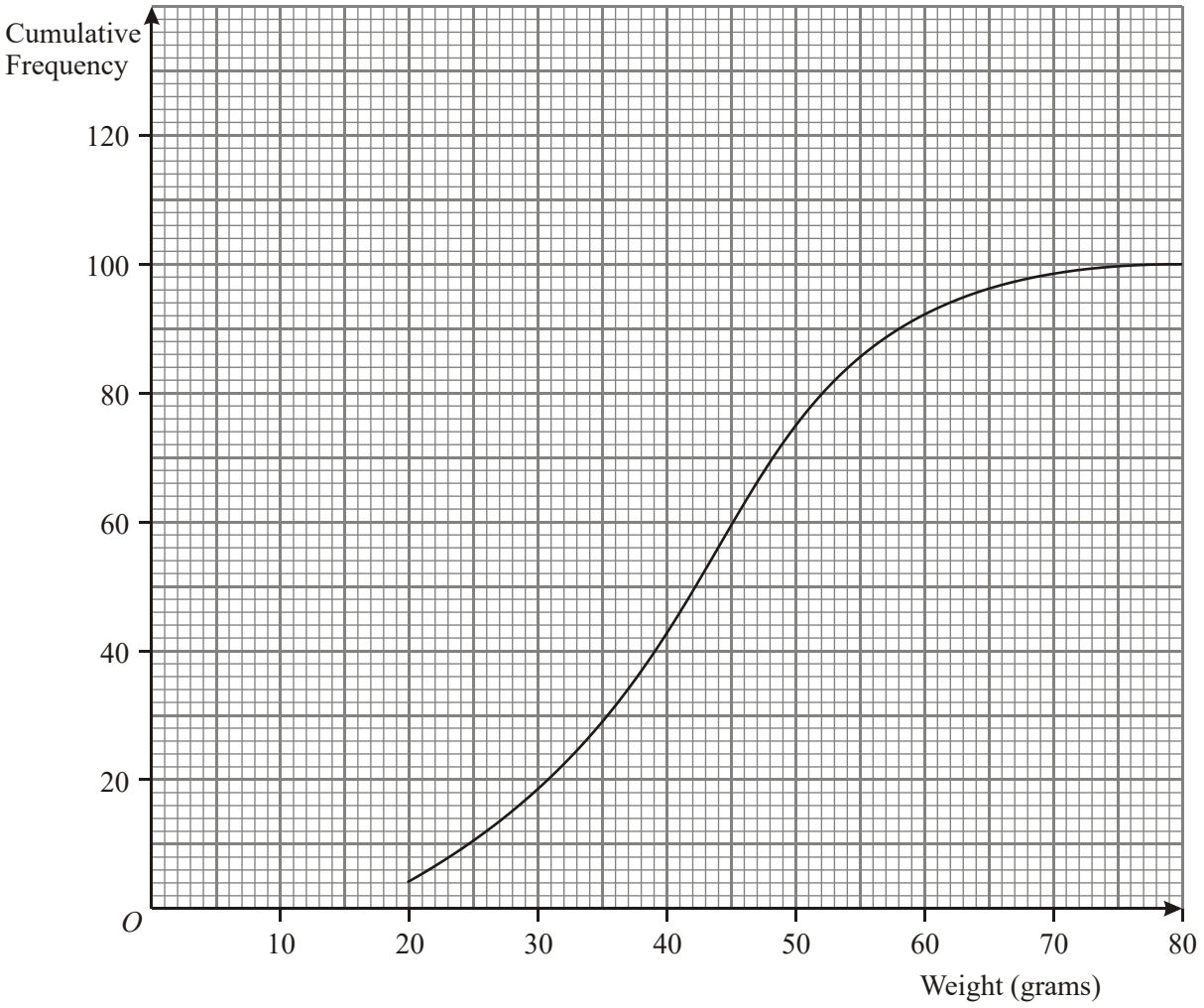
(i) the median weight of these pebbles,

..... grams

(ii) the number of pebbles with a weight more than 60 grams.

.....

(3)



Daniel also took a sample of 100 pebbles from Golden Beach.
The table shows the distribution of the weights of the pebbles in the sample from Golden Beach.

Weight (w grams)	Cumulative frequency
$0 < w \leq 20$	1
$0 < w \leq 30$	15
$0 < w \leq 40$	36
$0 < w \leq 50$	65
$0 < w \leq 60$	84
$0 < w \leq 70$	94
$0 < w \leq 80$	100

(b) On the same grid, draw the cumulative frequency graph for the information shown in the table.

(2)

Daniel takes one pebble, at random, from his sample from Tawny Beach and one pebble, at random, from his sample from Golden Beach.

(c) Work out the probability that the weight of the pebble from Tawny Beach is more than 60 grams **and** the weight of the pebble from Golden Beach is more than 60 grams.

.....

(4)
(Total 9 marks)

19. 90 students took an examination.
The grouped frequency table shows information about their results.

Mark (x)	Frequency
$0 < x \leq 10$	3
$10 < x \leq 20$	10
$20 < x \leq 30$	17
$30 < x \leq 40$	30
$40 < x \leq 50$	21
$50 < x \leq 60$	7
$60 < x \leq 70$	2

(a) Complete the cumulative frequency table.

Mark (x)	Cumulative Frequency
$0 < x \leq 10$	3
$0 < x \leq 20$	
$0 < x \leq 30$	
$0 < x \leq 40$	
$0 < x \leq 50$	
$0 < x \leq 60$	
$0 < x \leq 70$	

(1)

(b) On the grid below, draw a cumulative frequency graph for your table.

(2)

(c) Use your graph to find an estimate for the median mark.

……..

(1)

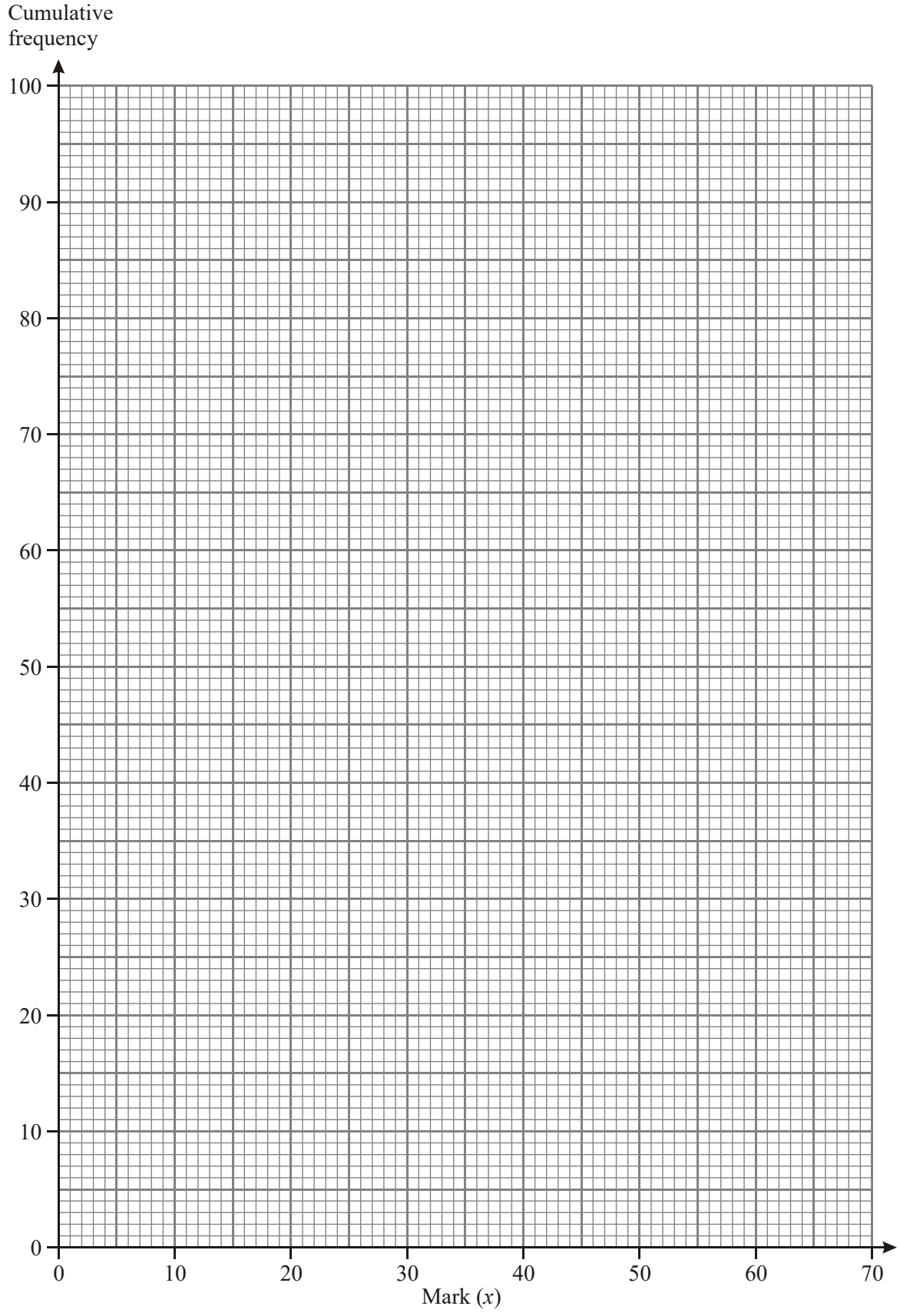
The pass mark for the examination was 28.

(d) Use your graph to find an estimate for the number of students who passed the examination.

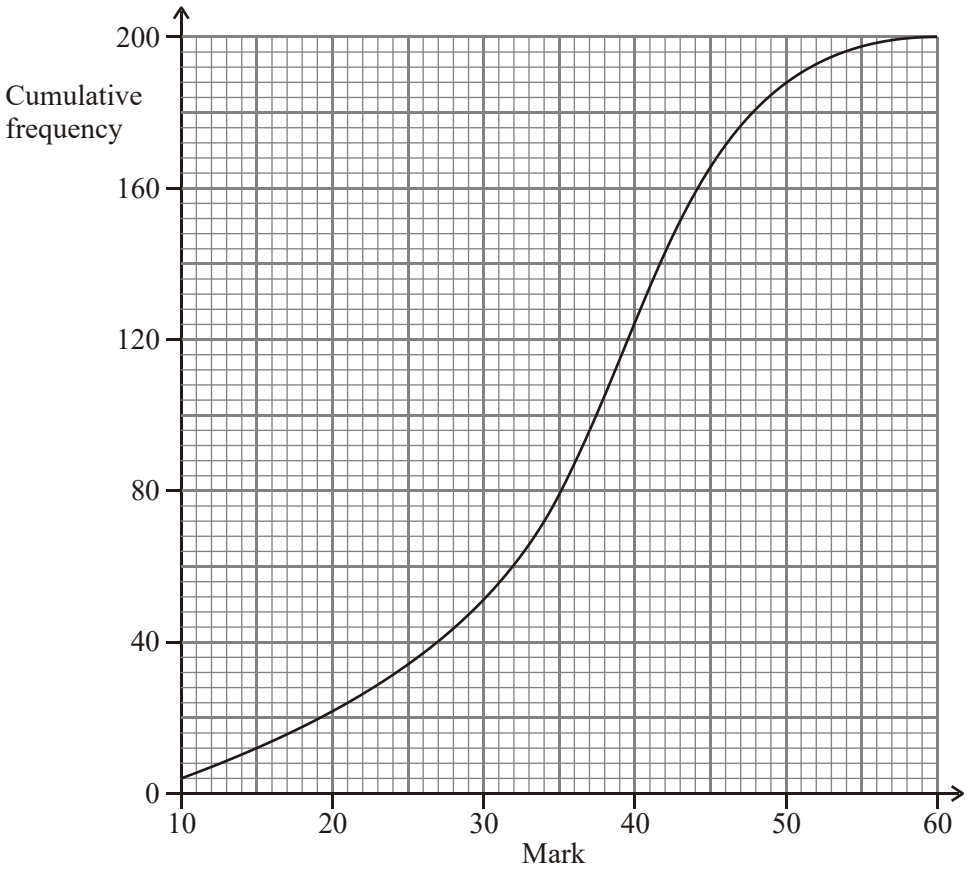
……..

(2)

(Total 6 marks)

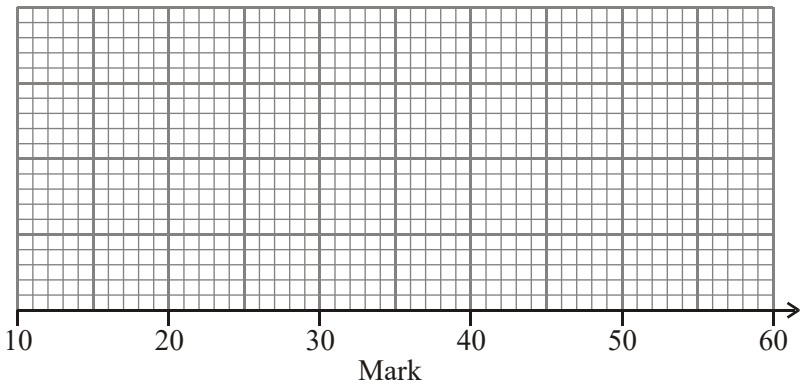

Cumulative frequency
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
Mark (x)

20. 200 students took a test.
The cumulative frequency graph gives information about their marks.



The lowest mark scored in the test was 10.
The highest mark scored in the test was 60.

Use this information and the cumulative frequency graph to draw a box plot showing information about the students' marks.



(Total 3 marks)

21. 60 office workers recorded the number of words per minute they could type.

The grouped frequency table gives information about the number of words per minute they could type.

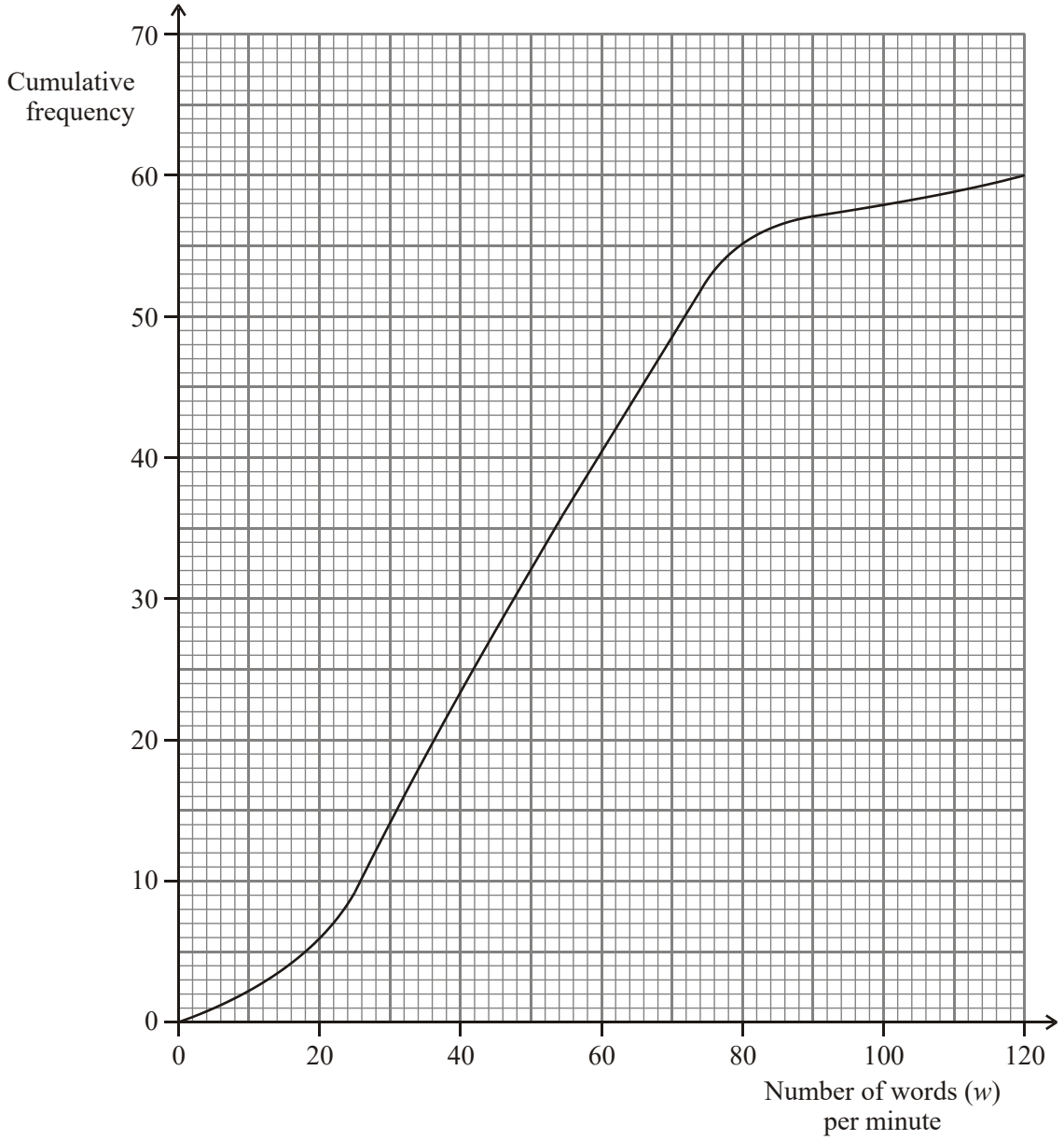
Number of words (w) per minute	Frequency
$0 \leq w < 20$	6
$20 \leq w < 40$	18
$40 \leq w < 60$	16
$60 \leq w < 80$	15
$80 \leq w < 100$	3
$100 \leq w < 120$	2

(a) Find the class interval in which the median lies.

.....

(2)

The cumulative frequency graph for this information has been drawn on the grid.



(b) Use this graph to work out an estimate for the interquartile range of the number of words per minute.

.....

(2)

(c) Use this graph to work out an estimate for the number of workers who could type **more** than 70 words per minute.

.....

(2)
(Total 6 marks)

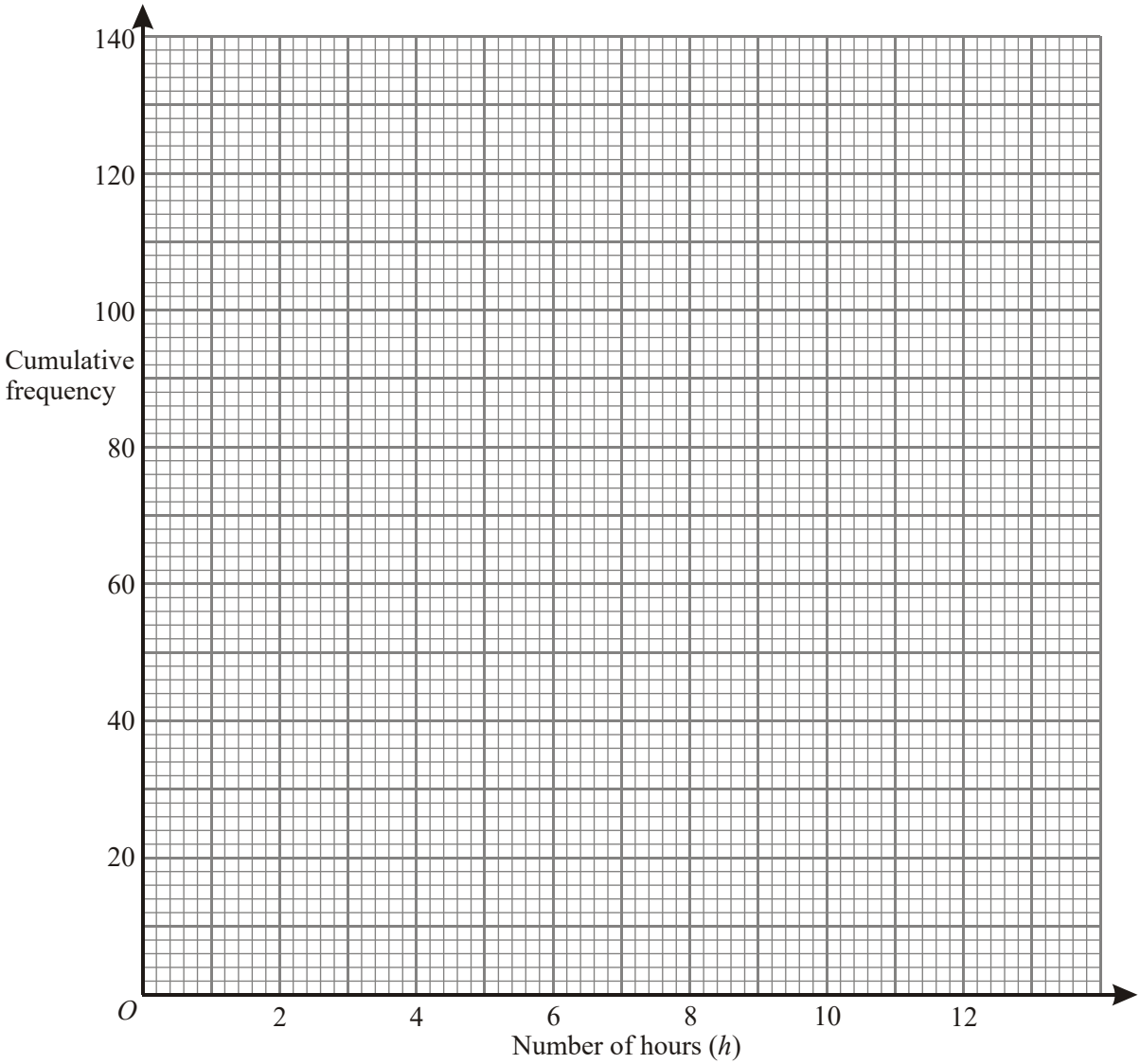
22. The table shows information about the number of hours that 120 children used a computer last week.

Number of hours (h)	Frequency
$0 < h \leq 2$	10
$2 < h \leq 4$	15
$4 < h \leq 6$	30
$6 < h \leq 8$	35
$8 < h \leq 10$	25
$10 < h \leq 12$	5

(a) Complete the cumulative frequency table.

Number of hours (h)	Cumulative frequency
$0 < h \leq 2$	10
$0 < h \leq 4$	
$0 < h \leq 6$	
$0 < h \leq 8$	
$0 < h \leq 10$	
$0 < h \leq 12$	

(1)



(b) On the grid, draw a cumulative frequency graph for your table.

(2)

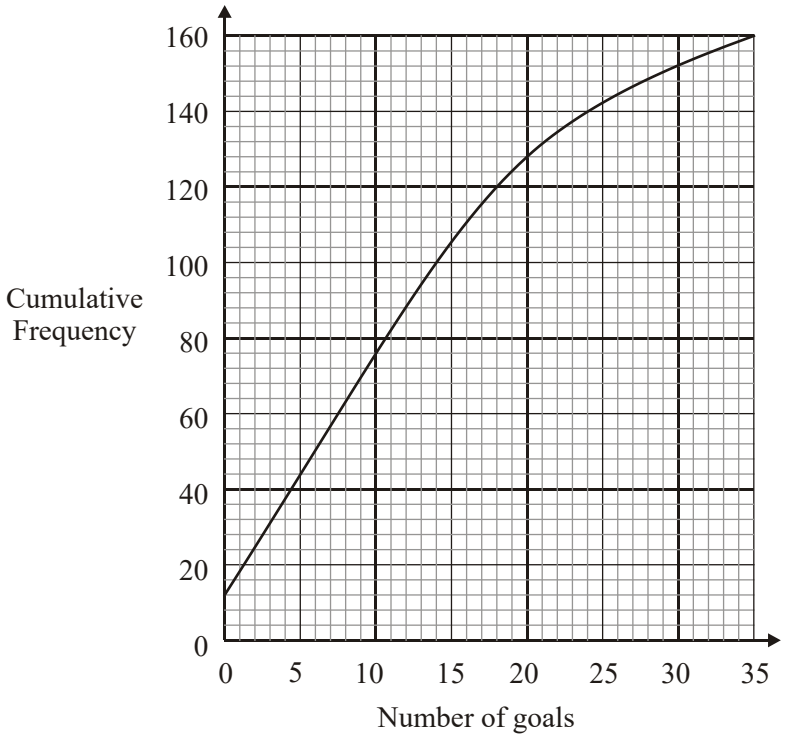
(c) Use your graph to find an estimate for the number of children who used a computer for **less** than 7 hours last week.

……...

(2)

(Total 5 marks)

23. The cumulative frequency graph shows some information about the numbers of goals scored by 160 players.



(a) Use this graph to find an estimate for

(i) the median,

..... goals

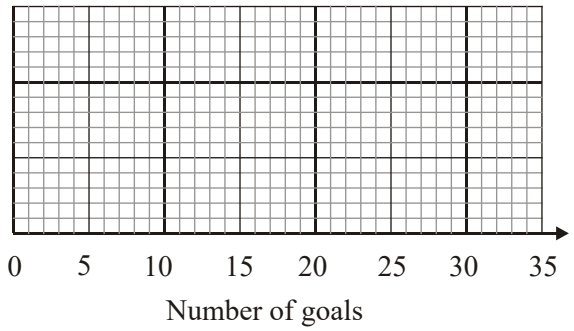
(ii) the lower quartile.

..... goals

(2)

The lowest number of goals scored was 0
The highest number of goals scored was 32

(b) On the grid, draw a box plot to show information about the numbers of goals scored.



(3)
(Total 5 marks)

24. 60 people went on a boat.

The grouped frequency table shows information about their ages.

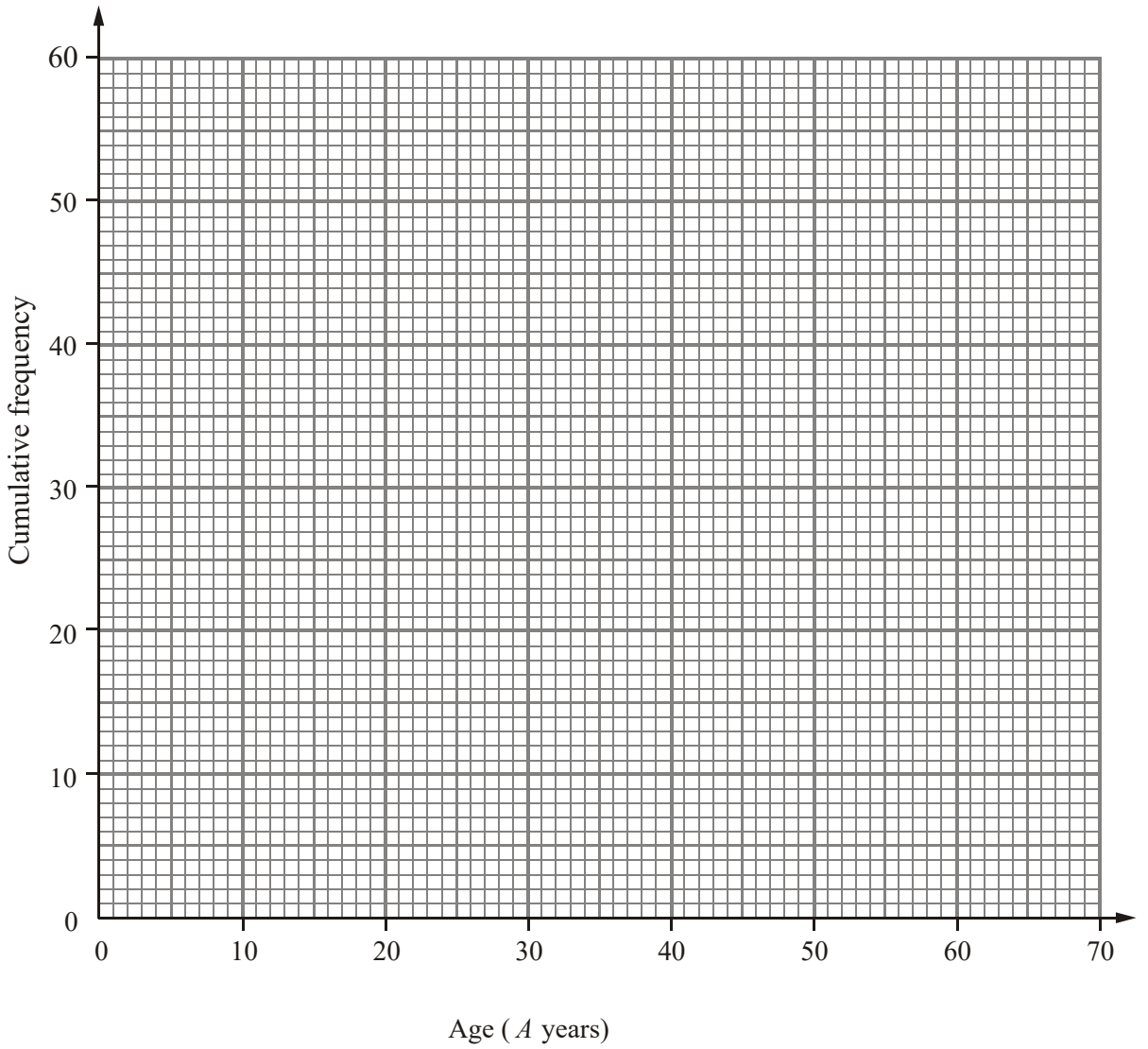
Age (A years)	**Frequency**
$0 < A \leq 10$	4
$10 < A \leq 20$	8
$20 < A \leq 30$	11
$30 < A \leq 40$	16
$40 < A \leq 50$	9
$50 < A \leq 60$	7
$60 < A \leq 70$	5

(a) Complete the cumulative frequency table.

Age (A years)	**Cumulative frequency**
$0 < A \leq 10$	4
$0 < A \leq 20$	
$0 < A \leq 30$	
$0 < A \leq 40$	
$0 < A \leq 50$	
$0 < A \leq 60$	
$0 < A \leq 70$	

(1)

(b) On the grid below, draw a cumulative frequency graph for your table.



(2)

(c) Use your graph to find an estimate for the median age of these 60 people.

..... years

(1)

(Total 4 marks)

25. The table shows some information about the heights of 40 trees.

Height of tree (h metres)	**Frequency**
$1 \leq h < 3$	3
$3 \leq h < 5$	12
$5 \leq h < 7$	15
$7 \leq h < 9$	8
$9 \leq h < 11$	2

Complete the cumulative frequency table.

Height of tree (h metres)	**Cumulative frequency**
$1 \leq h < 3$	3
$1 \leq h < 5$	
$1 \leq h < 7$	
$1 \leq h < 9$	
$1 \leq h < 11$	

(Total 1 mark)

26. The speeds of 100 cars on a motorway were recorded.
The grouped frequency table shows some information about the speeds of these cars.

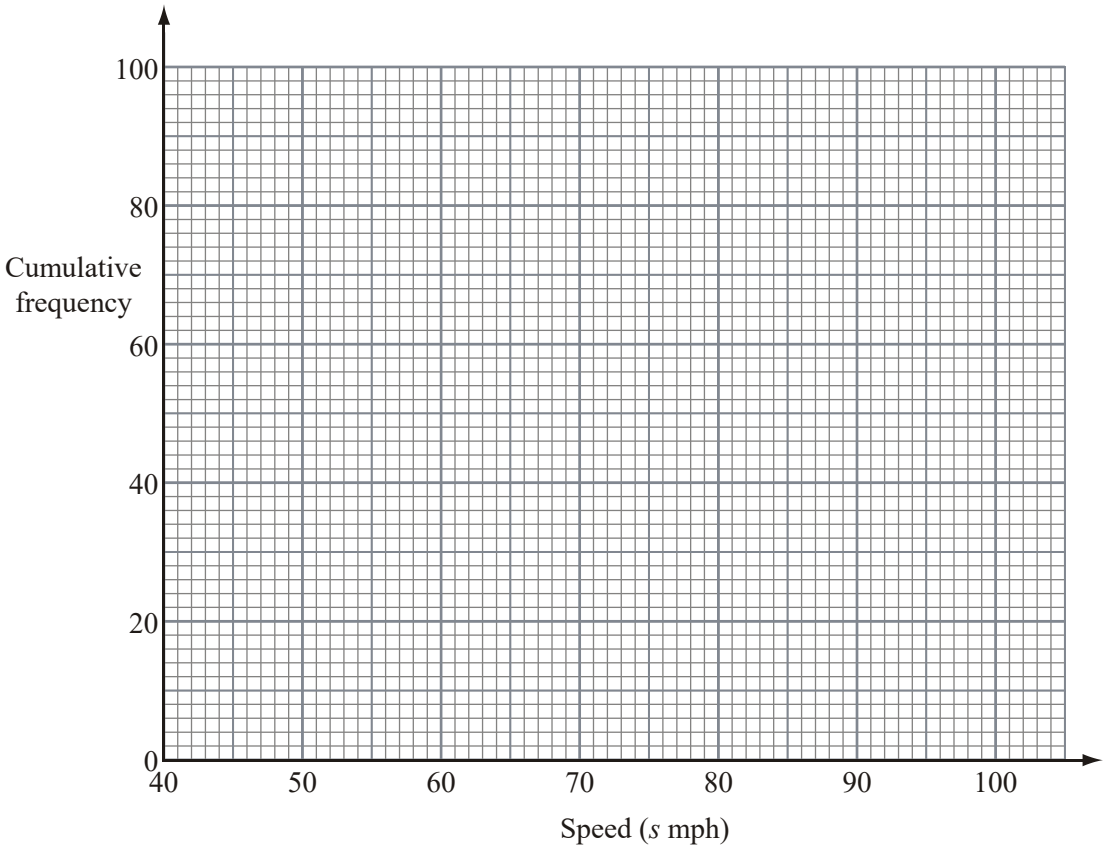
Speed (s mph)	**Frequency**
$40 < s \leq 50$	4
$50 < s \leq 60$	19
$60 < s \leq 70$	34
$70 < s \leq 80$	27
$80 < s \leq 90$	14
$90 < s \leq 100$	2

(a) Complete the cumulative frequency table.

Speed (s mph)	**Frequency**
$40 < s \leq 50$	4
$40 < s \leq 60$	
$40 < s \leq 70$	
$40 < s \leq 80$	
$40 < s \leq 90$	
$40 < s \leq 100$	

(1)

(b) On the grid, draw a cumulative frequency graph for your table.



(2)

(c) Use your graph to find an estimate for the median speed.

..... mph

(1)

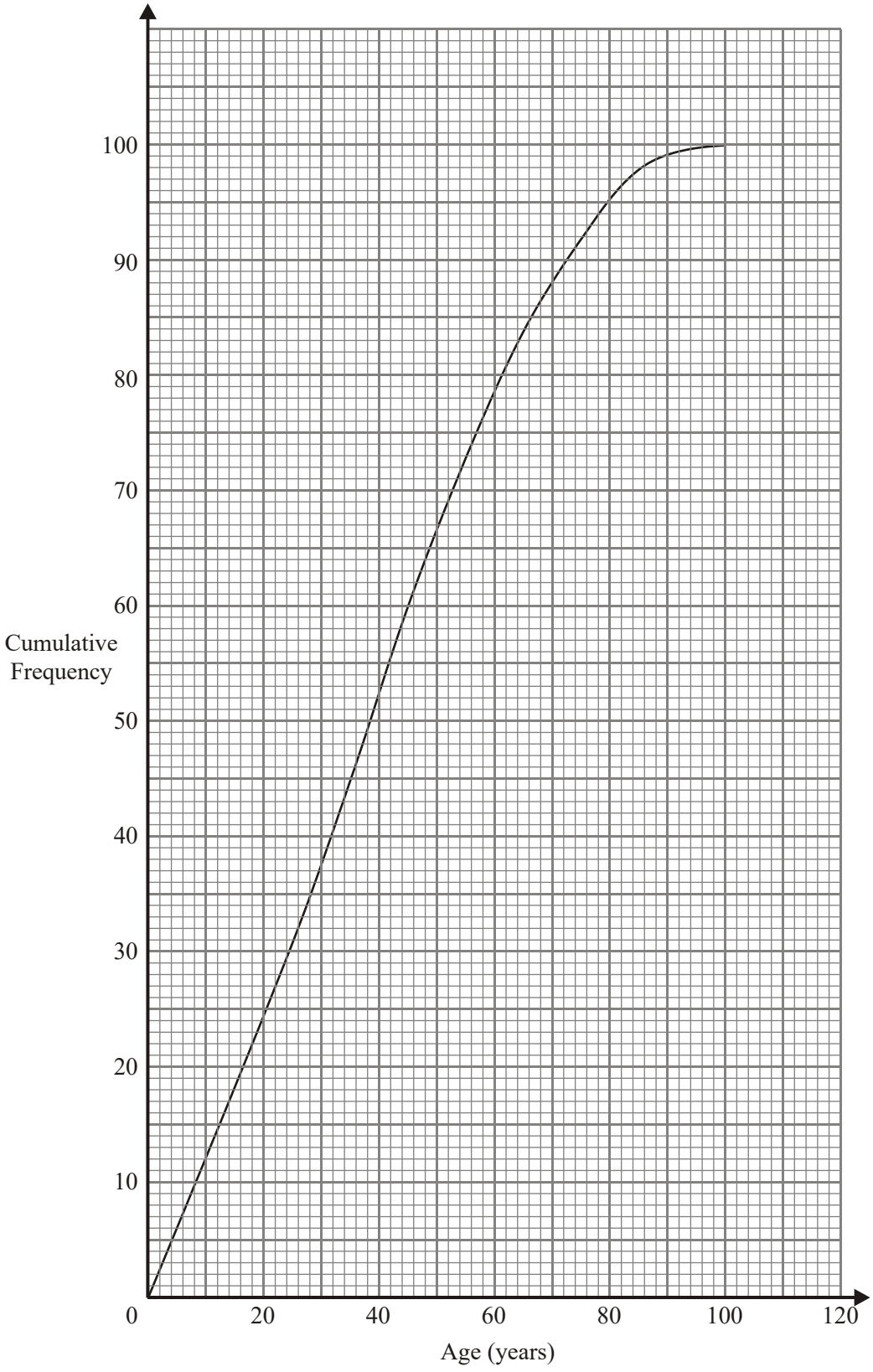
(d) Use your graph to find an estimate for the interquartile range.

..... mph

(2)

(Total 6 marks)

27. The cumulative frequency graph shows some information about the ages of 100 people.



(a) Use the graph to find an estimate for the number of these people less than 70 years of age.

.....

(1)

(b) Use the graph to find an estimate for the median age.

..... years

(1)

(c) Use the graph to find an estimate for the interquartile range of the ages.

..... years

(2)

(Total 4 marks)

28. The table shows the number of televisions sold each month by a shop.

Month	April	May	June	July	Aug	Sept	Oct
Number of televisions	163	100	118	99	63	92	74

(a) Work out the four-point moving averages for this information.
The first three have been worked out for you.

.....120..... .....95..... .....93..... .....

(2)

(b) Use the moving averages to describe the trend.

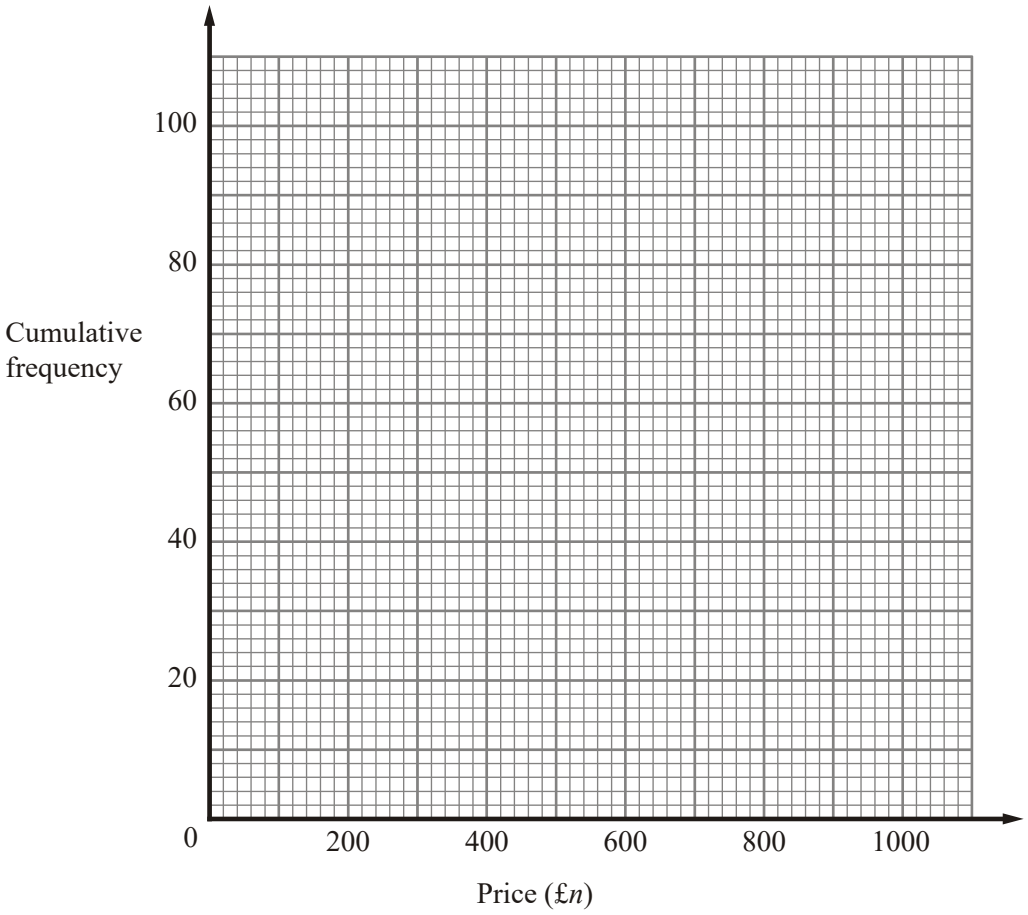
.....

(1)

The **cumulative frequency** table shows information about the prices, in £, of 100 televisions.

Price (£*n*)	**Cumulative frequency**
$0 < n \leq 200$	5
$0 < n \leq 400$	20
$0 < n \leq 600$	40
$0 < n \leq 800$	75
$0 < n \leq 1000$	100

(c) On the grid below, draw a cumulative frequency graph for the table.



(2)

(d) Use your graph to find an estimate for the median price of these televisions.

£ .....

(1)

(Total 6 marks)

29. The table gives some information about the area, in km^2, of 30 countries.

Area (n million km^2)	**Frequency**
$0.00 < n \leq 0.25$	4
$0.25 < n \leq 0.50$	9
$0.50 < n \leq 0.75$	4
$0.75 < n \leq 1.00$	5
$1.00 < n \leq 1.25$	6
$1.25 < n \leq 1.50$	1
$1.50 < n \leq 1.75$	1

(a) Write down the modal class interval.

.....

(1)

(b) Find the class interval that contains the median.

.....

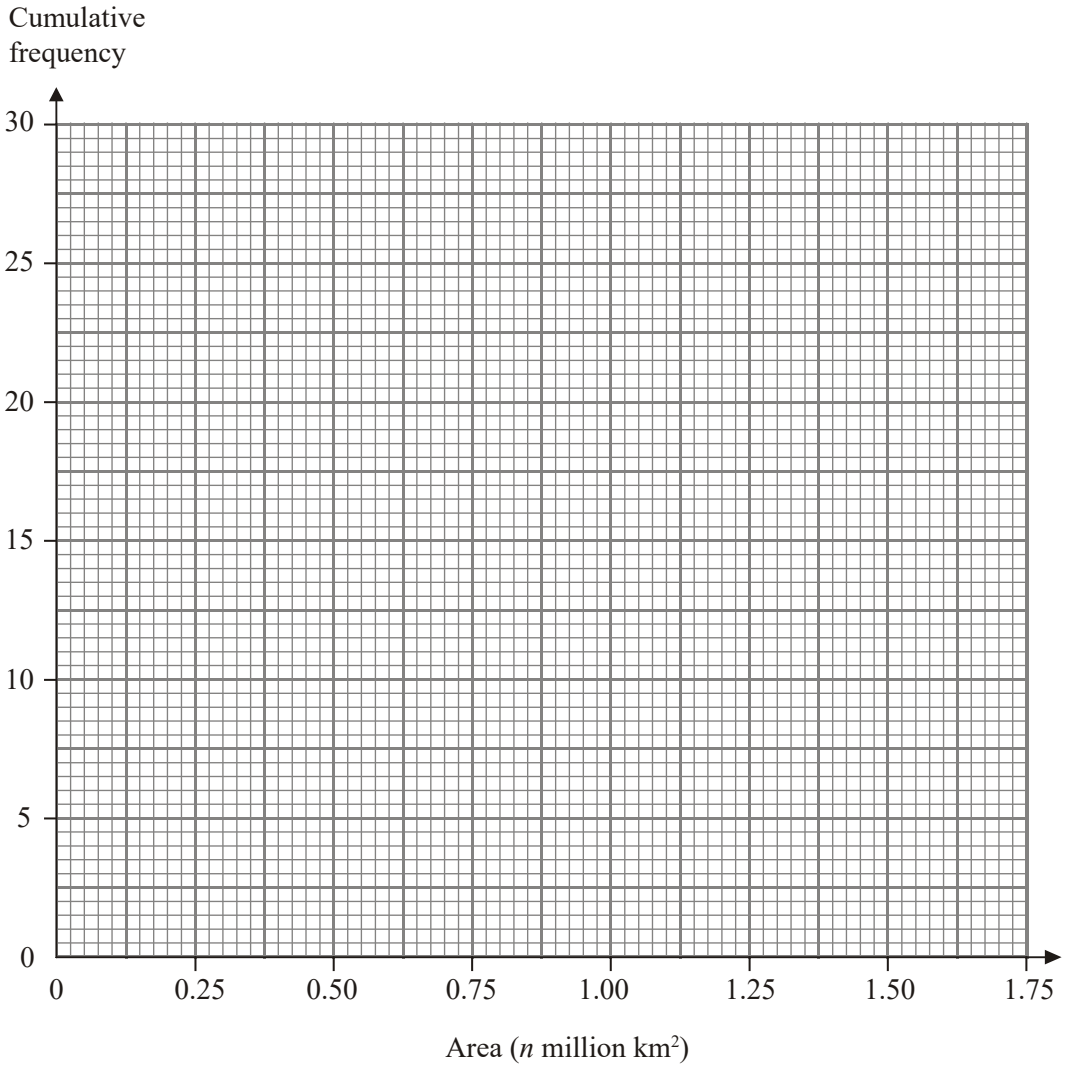
(1)

(c) Complete the cumulative frequency table.

Area (n million km^2)	**Frequency**
$0.00 < n \leq 0.25$	4
$0.00 < n \leq 0.50$	
$0.00 < n \leq 0.75$	
$0.00 < n \leq 1.00$	
$0.00 < n \leq 1.25$	
$0.00 < n \leq 1.50$	
$0.00 < n \leq 1.75$	

(1)

(d) On the grid, draw a cumulative frequency graph for your table.



(2)

(e) Use your graph to find an estimate for the number of these countries with an area greater than 0.90 million km^2.

.....

(2)
(Total 7 marks)

01. (a) 5, 23, 35, 39, 40 1

B1 for all correct

(b) Points correct
(175,5), (180,23),(185,35), (190,39) and (195,40) 2

Curve or line segments

B1 ft for at least 4 of 5 pts plotted correctly (± ½ sq) at ends of intervals dep on sensible table
B1 ft (dep on previous B1) for pts joined by curve/line segments provided no gradient is negative
*(SC:B1 ft from sensible table for 4 or 5 pts plotted not at ends but consistently within each interval **and** joined)*

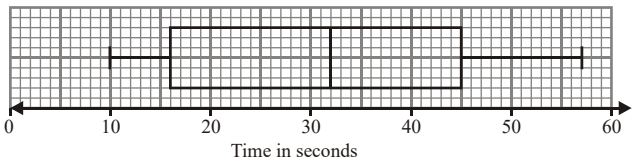
(c) ~179 1

B1 ft from cf graph using cf = 20 or 20.5

[4]

02. (a) 32 1

B1 for 32 (accept 31.5 to 33.5 inclusive)

(b) 

3

B1 for ends of whiskers at 9 and 57 (with a box)
B1 for ends of box at 16 and 45/46 (± 0.5)
B1for median marked at "32"or complete box and whisker diagram drawn with a median inside the box

(c) Median(B)>Median(G); on average boys take longer
IQR(B)>IQR(G); times for boys have a greater spread 2

B1 eg for comparison of medians (ft on diagrams)
B1 eg for comparison of (interquartile) ranges (ft on diagram)

[6]

03. (a) $25 < A \leq 35$ 1

B1 cao

(b) 44, 100, 134, 153, 160 1

B1 cao

(c) 2

B1 ft for at least 4 of 5 points plotted correctly ± ½ sq at end of interval dep on sensible table (condone 1 addition error)
B1 ft (dep on previous B1) for points joined by curve or line segments provided no gradient is negative – ignore any part of graph outside range of their points
(SC B1 if 4 or 5 pts plotted not at end but consistent within each interval and joined)

(d) (i) 30 to 32 3

Median 30 – 32

B1 ft from their cf graph $\pm \frac{1}{2}$ *sq*

(ii) 15 to 18

IQR 40 – 24

M1 ft from their cf graph identifying "120" and "40"
A1 ft ± 1sq

(e) 2

B2 if fully correct
B1 for box with median or quartiles or whiskers correct

[9]

04. (a) 44, 100, 134, 153, 160 1

B1 cao

(b) 2

B1 ft for at least 4 of 5 points plotted correctly ± ½ sq at end of interval dep on sensible table (condone 1 addition error)
B1 ft (dep on previous B1) for points joined by curve or line segments provided no gradient is negative – ignore any part of graph outside range of their points
(SC B1 if 4 or 5 pts plotted not at end but consistent within each interval and joined)

(c) 30 to 32
15 to 18 3

Median 30 – 32
IQR 40 – 24

B1 ft from their cf graph $\pm\frac{1}{2}$ *sq*

M1 ft from their cf graph identifying "120" and "40"
A1 ft ± 1sq

(d) 2

B2 if fully correct
B1 for box with median or quartiles or whiskers correct

[8]

05. (a) 6.08 4

(1 × 10) + (3 × 15) + (5 × 30) + (7 × 35) +
(9 × 25) + (11 × 5) = 730
"730" ÷ 120 = 6.08333

M1 for use of fx with x consistent within intervals (including end points)
M1 (dep) for use of midpoints
M1 (dep on 1st M1) for use of $\frac{\Sigma fx}{\Sigma f}$
A1 6.08 to 6.085

(b) (10), 25, 55, 90, 115, 120 1

B1 for all correct

(c) graph 2

B1 ft for 5 or 6 points plotted correctly ± 1 full (2mm) square at the end of interval dep on sensible table (condone 1 addition error)
B1(dep) for points joined by curve or line segments provided no gradient is negative – ignore any part of graph outside range of their points.
(SC: B1 if 5 or 6 points plotted not at end but consistent within each interval and joined)

(d) 72 – 74 2

M1 (ft dep on graph being cf) for reading from graph at 7
A1 ft ± 1 full (2 mm) square
Or B2 for 72 – 74

[9]

06. (a) Box plot drawn 3

B1 for median marked at 32.0 – 33.5
B1 for position of box with its ends at 24.0 – 26.5 and 37.0 – 39.5
B1 for position of ends of whiskers at 5 and 47

(b) Reasons given 2

B1 (ft) for "greater median" for part 2
B1 (ft) for "smaller inter-quartile range" for part 2
Accept comparisons of lower and upper quartile.

[5]

07. (a) 12, 33, 69, 92, 100 1

B1 cao

(b) *B1 ft for 4 or 5 points plotted correctly ± 1 full 2 mm square at the end of interval dep on sensible table (condone one addition error)*
B1 dep for points joined by curve or line segments provided no gradient is negative. Ignore any point of graph outside range of their points.
SC B1 if 4 or 5 points plotted not at end but consistent within each interval and joined. 2

(c) 62 – 64 1

B1 62 – 64 otherwise ft from cumulative freq graph

[4]

08. (a) 12, 33, 69, 92, 100 1

B1 cao

(b) *B1 ft for 4 or 5 points plotted correctly ± 1 full 2 mm square at the end of interval dep on sensible table (condone one addition error)*
B1 dep for points joined by curve or line segments provided no gradient is negative. Ignore any point of graph outside range of their points.
SC: B1 if 4 or 5 points plotted not at end but consistent within each interval and joined. 2

(c) 62 – 64 hours 2

B1 62 – 64 otherwise ft from cumulative freq graph
B1 for hours

[5]

09. P and C
Q and D
R and B
S and A 2

B2 for all correct
(B1 for exactly 2 or exactly 3 correct)

[2]

10. (a) $\frac{90}{240} \times 360$ 2
$= 135$

M1 for $\frac{90}{240}$
A1 for 135

(b) $15 \leq t < 20$ 1

B1 for $15 \leq t < 20$ *Accept 15 – 20*

(c) 95 185 220 235 240 1

B1 for all correct

(d) Points 2

B1 ft for at least 4 or 5 pts plotted correctly (+ 1 sq) at ends of interval dep on sensible table (cf; no more than 1 error)

curve or line segment

B1 (dep on previous B1) for pts joined by curve/line segments provided no gradient is negative
*(SC: B1 if 4 or 5 pts plotted not at ends but consistently within each interval **and** joined)*

(e) 20.5 – 22.0 1

B1 ft from a cf graph using cf = 120 (.5)

[7]

11. (a) 95 185 220 235 240 1

B1 for all correct

(b) Points 2

B1 ft for at least 4 or 5 pts plotted correctly (± 1 sq) at ends of interval dep on sensible table (cf; no more than 1 error)

curve or line segment

B1 ft (dep on previous B1) for pts joined by curve/line segments provided no gradient is negative
*(SC: B1 if 4 or 5 pts plotted not at ends but consistently within each interval **and** joined)*

(c) 20.5 – 22 1

B1 ft from a cf graph using cf = 120(.5)

[4]

12. (a) (16), 50, 82, 96, 100 1

B1 cao

(b) Cumulative freq. diag. curve/ segments
Cum. freq graph 2

B1 for 4 or 5 points plotted correctly ±1 full (2mm) square depending on sensible table (condone 1 addition error)

B1 (dep) for points joined by curve or line segments provided no gradient is negative - ignore any part of graph outside range of their points.

(SC:B1 if 4 or 5 points plotted not at end but consistent within each interval and joined)

(c) 100 – 42 = 58 2

M1 (ft dep on graph being cf) for reading from graph at 18 or 19, can be implied by answer in range 40 to 46

A1 for answer in range 56 to 60 or ft for 100 – '42' ±1 full (2mm) square

[5]

13. (i) 73 3

B1 for 72 – 74

(ii) 80 – 65 = 15

M1 for identifying 30 and 90 (check lines on diagram)

A1 for 14 – 17

[3]

14. (a) (18), 40, 75, 90, 98, 100 1

B1 for all correct

(b) 2

B1 ft for 5 or 6 points plotted correctly ±1 full (2mm) square at the end of interval dep on sensible table (condone 1 addition error)

B1 (dep) for points joined by curve or line segments provided no gradient is negative – ignore any part of graph outside range of their points

(SC:B1 if 5 or 6 points plotted not at end but consistent within each interval and joined)

(c) approx 46 1

B1 (ft dep on graph being cf) for reading from graph at 50 ± 1 full (2mm) square

[4]

15. (a) Ogive 2

B1 6 or 7 points plotted correctly ± 1 full (2mm) square

B1 (dep) for points joined by curve or line segments provided no gradient is negative – ignore any part of graph outside range of their points

(SC: B1 if 6 or 7 points plotted not at end but consistent within each interval and joined)

(b) 240 2

B2 if answer is in the range 235 – 245

OR

M1 (dep on graph being cf) for using cf = 60 or 60.5
A1 ft (± 1 square)

(c) 1

B1ft correct comment comparing money spent by men with money spent by women

[5]

16. (a) 65 houses 1

B1 for 65 or 66

(b) £45 000 2

145 – 100

M1 for use of both cf = 30 and cf = 90
A1 accept 44000 ≤ answer ≤ 46000

[3]

17. (a) Points correct
Points plotted 2

Curve or line segments

B1 for at least 6 points plotted correctly (± ½ sq) at the ends of the intervals
B1 (dep on previous B1) for points joined by curve or straight line segments provided no gradient is negative
*[SC B1 if the shape of the graph is correct and the 6 points are **not** at the ends but consistently within each interval (± ½ sq) **and** joined.]*

(b) 17 2

Reading from graph at 20 and 60 (48 – 31)
IQR =

M1(dep on cf graph in (a)) for use of either cf = 20 ¼ (or 20)
***OR** cf = 60 $\frac{3}{4}$ (or 60)*
A1 ft from a cf graph

[4]

18. (a) 42g
8 3

Median at 50.5 (50)
100 – 92

B1 for 42g to 43g

M1 for reading correctly from graph $\pm \frac{1}{2}$ *sq and subtracting from 100*

A1 for 7, 8 or 9

(b) cf 2

B1 for plots (condone one error) $\pm \frac{1}{2}$ *sq*

B1 (dep) for joining points to give cf graph
SC: B1 if points plotted consistenly within intervals (condone one error) and joined

(c) 0.0128 4

100 – 84 = 16
0.16
0.08 × 0.16

B1 for $\frac{"8"}{100}$ *oe (Tawny Beach)*

B1 for $\frac{15}{100}$ *or* $\frac{16}{100}$ *or* $\frac{17}{100}$ *oe (Golden Beach)*

M1 for multiplying two probabilities

A1 ft (dep on B2)

[9]

19. (a) table 1

13, 30, 60, 81, 88, 90

B1

(b) graph 2

B1 for plotting points correctly ± ½ sq (condone one error)
B1 (dep) for joining points to give cf graph.
SC: B1 if points plotted consistently within intervals (condone one error) and joined.

(c) 35 – 36 1

his reading at 45

B1ft. from a cf graph ± ½ sq

(d) 64 – 65 2

90 – reading at 28

M1 ft. 90 – (reading at 28)
A1 ft.

[6]

20. 3

B3 for fully correct box plot
[–1 for each incorrect : median (37 to 38 inc.) or 28.5 < lower quartile < 30 and upper quartile (43 to 44 inc.) or whiskers]

[3]

21. (a) $40 \leq w < 60$ 2

$(60 + 1) \div 2 = 30.5^{th}$ term needed

*M1 for clear use of 30.5^{th} **or** 30^{th} term or $47 \leq ans \leq 49$*
A1 cao

(b) 34 2

66 – 32

M1 clear use of graph for LQ or UQ
A1 for $34 \leq ans \leq 36$

(c) 12 2

60 – 48

*M1 read from graph **and** subtract from 60*
A1 for 11, 12 or 13

[6]

22. (a) (10), 25, 55, 90, 115, 120 1

B1 for all correct

(b) graph 2

B1 ft for 5 or 6 plotted correctly ± 1 full (2mm) square at end of interval dep. on sensible table (condone one addition error)
B1 (dep) for points joints by curve or line provided no gradient is negative – ignore any part of graph outside range of their points
(SC: B1 If 5 or 6 points plotted not at end but consistent within each interval and joined)
M1 (ft dep on graph being cf) for reading from graph at 7

(c) 72 – 74 2

A1 ft ± 1 full (2 mm) square
***OR** B2 for 72 – 74*

[5]

23. (a) (i) 12 2

B1 Accept 11 < median < 13

(ii) 5

B1 Accept 4 < LQ < 6

(b) LQ at 5, M at 12, UQ at 18.5, end of whiskers at 0 and 32 3

B1 for whiskers at 0, 32
B1 for box ending at 5, 18.5 (or ft the 5 from (aii))
B1 for median at 12 (or ft from (ai))
NB: all the above to a tolerance of ±1 full square

[5]

24. (a) (4),12, 23,39, 48, 55, 60 1

B1 for all correct

(b) c f curve 2

B1 for 5 – 7 points correctly plotted (±1 square) at the end of interval
B1 for points joined by a curve or line segments provided no gradient is negative
*(SC: B1 if 5 – 7 points plotted not at end but consistent within each interval **and** joined)*

(c) "median" 1

B1 for 34 – 36 seen or ft from their cf graph at 30 – 30.5 down (± 1 square)

[4]

25. (3) 15 30 38 40 1

B1 cao

[1]

26. (a) (4) 23, 57, 84, 98, 100 1

B1 for all correct

(b) cf curve 2

B1 for 5-6 of their points correctly plotted (± 1 square) at end of interval
B1 for points joined by a curve or line segments provided no gradient is negative.
(sc B1 if 5-6 points are plotted not at end but consistent within each interval and joined)

(c) "median" 1

B1 for 67.5 – 69.5 seen or ft (± 1 square) from their cf graph at 50 – 50.5 down (±1 square)

(d) 15 2

M1 for 60 – 62 and 75 – 77 seen or ft (± 1 square) from their c.f. graph
A1 13–17 seen or ft from their c.f. graph.

[6]

27. (a) 88 1

B1 for value in range 87 – 89

(b) 38 1

B1 for value in range 38 -39

(c) 57 – 20
37 2

B2 for 32 – 40
(B1 for using graph at 25 and 75; may be indicated by marks at 25 and 75)

[4]

28. (a) 82 2

M1 for (99 + 63 + 92 + 74) ÷ 4 or 328 ÷ 4
A1 cao

(b) Decreasing 1

B1 for decreasing oe

(c) Heights = 5, 20, 40, 75, 100

Correct cumulative frequency graph 2

B2 for fully correct cumulative frequency graph
(Ignore any part of graph outside range of points)

(B1 for 4 or 5 points plotted correctly ± 1 full (2mm) square at the end of interval

or for 4 or 5 points plotted not at end but consistent within each interval and joined)

(d) 640 – 680 1

B1 for 640 – 680 or ft (dep on graph being cf)
for reading from graph at 50 ± 1 full (2mm) square

[6]

29. (a) $0.25 < p \leq 0.50$ 1

B1 for $0.25 < p \leq 0.50$ (accept 0.25 to 0.5(0) or clearly identified on the diagram as the mode)

(b) $0.5 < n \leq 0.75$ 1

B1 for $0.5 < n \leq 0.75$ (accept 0.5(0) to 0.75 or clearly identified on the diagram as the median)

(c) 4, 13, 17, 22, 28, 29, 30 1

B1 cao

(d) cf graph 2

B2 for a fully correct cf graph (accept ogive)

[B1 for 5 or 6 consistent, correctly plotted points from a sensible cf table (increasing values) OR for a cf graph drawn through points other than the end points of each interval]

(e) 9 or 10 or 11 2

M1 for clear method to read off from a cf graph at area = 0.90, on the cf scale, can be awarded from their reading ± 1sq
A1 ft for an answer of 9 or 10 or 11
[B1 for an answer in the range 9 to 11 if M0 scored]

[7]

01. Paper 3

Part (a) was answered well by all but the weakest candidates. Many of those who completed the table correctly then gained both marks in part (b). The cumulative frequency graphs were generally drawn accurately and it was pleasing that fewer candidates than usual plotted the points at the mid-interval values of *h*. In part (c), though, many candidates failed to interpret the scale on the horizontal axis correctly.

Paper 5

This cumulative frequency question was a good source of marks for many candidates. Although the usual error of plotting at the mid-interval points was seen, by far the greatest loss of a mark was misreading the scale on the horizontal axis when answering the final part of the question.

02. Mathematics A

Paper 3

It was disappointing that less than half of the candidates estimated the median time correctly in part (a). Most candidates were able to draw a recognisable box plot in part (b) and many drew correct whiskers with the ends at 9 and 57. Candidates were much less successful, though, at finding the quartiles from the cumulative frequency graph and positioning the ends of the box at 16 and 45. Unfortunately, many of the comparisons given in part (c) only referred to the times of individuals (e.g. the fastest boy and the fastest girl) and did not make use of the median and spread to compare the distributions. Those who used the word ‘median’ often gave a correct interpretation.

Paper 5

This question on box plots was answered much better than the corresponding question last summer. Most grade B and above candidates correctly obtained an estimate for the median although some wrong reading of scales (30.2) was seen. Again in part (b) many gained at least partial credit (normally at least 2 out of 3) with a common wrong answer of plots at 10 and 60 for the ends of the whiskers. In part (c) the examiners were looking for two different comparisons between the times of boys and the times of girls rather than anything which related to single individuals. Most grade B and above candidates gained at least one of the two marks. Those who gained just one mark frequently gave ‘two’ comparisons which effectively were the same as illustrated by “the interquartile range of the boys’ times is greater”, “the girls’ times are closer together”.

Mathematics B Paper 16

Part (a) was answered correctly by 42% of the candidates.
The concept of box and whisker diagrams does now seem to be well known and understood by many, 78% gaining at least one mark, usually for the median. Many candidates confused the maximum and minimum values with the quartiles.
In part (c) very many candidates quoted exact figures from the box plots without any attempt at comparison between the boys and girls. Medians in "similar positions" or reference to means gained no marks.

03. This was a successful question for later on in the paper. Surprisingly, though, over 40% candidates were unable to identify the correct modal class interval in part (a). More than half the candidates gained the mark for completing the table in part (b) and many went on to plot the points correctly at the ends of the intervals. The first point was occasionally plotted at (25, 48) but most candidates used the scale well. Some failed to join up the points. Part (d) was answered less well. Candidates had more success finding the median than the interquartile range but many did not know how to find either. Some confused the interquartile range with one of the quartiles. Part (e) was answered well, even by some of those who could not answer any other parts..of the question, and many candidates drew a correct box plot. When only one mark was gained this tended to be for a correct box and median. More errors were made with the whiskers. Some candidates misread the scale.

04. This question was very well understood by all candidates at this tier. 94% of candidates correctly worked out the cumulative frequency and 72% were able to draw the cumulative frequency graph correctly. 60% of candidates were able then to work out the median and interquartile range from their graphs. The box plot was very well answered with 85% of candidates getting both marks.

05. Higher Tier

(a) A standard calculation of the mean of a grouped frequency table. Many candidates could do this. However, there were still many who failed to gain full marks. A common error was to use the upper end of the interval leading to an answer one hour longer than the true mean. A second incorrect approach was to find an estimate of the total number of hours taken (730) and divide by either 6 or 12. Some candidates found the median or gave the answer as a class interval. Cumulative frequency diagrams are well known and centres have been very successful in training candidates on such questions. The vast majority of candidates scored full marks. Only a few plotted the points at the mid point of the interval. Most candidates were able to find an estimate for the number of children who used a computer for less than 7 hours. A minority thought this meant drawing a line at $t = 6.8$

Intermediate Tier

Part (a) was answered poorly with many candidates having little idea how to estimate the mean of a set of grouped data. The most common response was to work out the mean of the frequencies by dividing 120 by 6. Candidates with some idea of the correct method often used the upper boundaries instead of the mid-points and even some of those who correctly obtained 730 then proceeded to divide by 6 rather than by 120. Candidates were much more successful in part (b) with two-thirds completing the table correctly. A common incorrect response was "10, 14, 20, 28, 38, 50" and some simply wrote down the frequencies. Many of the candidates who successfully completed the table were able to plot the points correctly although mistakes in plotting (4, 25), (6, 55) and particularly (10, 115) were common. It was pleasing that to see that most plotted at the ends of the intervals although some did plot at the mid-points. However, there were a significant number of candidates who either did not join the points to give a cumulative frequency graph or drew a line of best fit instead. Part (d) was well answered by those who had drawn a cumulative frequency graph.

06. Intermediate Tier

There continues to be much evidence of box plots being misunderstood. Despite clear reference to maximum and minimum values in the question many candidates gave their end points incorrectly at 10 and 50. The box part of the plot was usually drawn without any evidence of readings being taken from the graph, and in many cases appeared to have been almost at random. In part (b) most candidates failed to link their description to the *distribution,* instead comparing differences in terms of individual aspects of the box plot. Those who chose to compare median, interquartile range or quartiles needed to say *how* they compared, not just state that they were different.

Higher Tier

The median was generally found correctly. There was some difficulty with the quartiles with the values being found from a misread cumulative frequency scale.
Many candidates had read the question carefully and located the correct upper and lower values. For part (b) many candidates made sensible attempts to answer the question, with those who focussed in on the natural comparison of the medians and then the interquartile ranges being most successful.

07. Specification A

The majority of the candidates realised what was needed in the table, though some weaker candidates were unable to add the numbers up correctly. The majority of the candidates drew a correct cumulative frequency table; those who plotted the frequency table received no marks. Cumulative frequency graphs were sometimes plotted at the midpoint or the lower end of the interval. It was disappointing to see a large number of graphs in which the points were not joined. There were few errors in vertical plotting. In part (c) there were too many errors in reading off from the graphs, the most common of which was to read off 62.5 as 65.

Specification B

Many fully correct solutions were seen. Those candidates that drew a cumulative frequency graph were generally then successful at using the graph correctly to find an estimate for the median. Some students did, however, misread the scale on the horizontal axis. More students than usual plotted the cumulative frequency graph, incorrectly using 'mid-interval' rather than end of interval values on the x axis. Another common error was to plot the x values incorrectly at 52.5, 55, 57.5… A small minority of candidates drew a histogram rather than a cumulative frequency graph.

08. This question was done well by the majority of the candidates. Most candidates were able to plot their cumulative frequencies against upper class boundaries and subsequently interpret their graph to find the median. Virtually all the candidates were able to score a mark for the units. Common, but relatively infrequent mistakes, were due to plotting values against mid- interval values or drawing bar graphs. Some candidates were unable to interpret accurately the horizontal scale for the median.

09. **Specification A**

Intermediate Tier

About half of the candidates gained at least one mark in this question. Those who made use of the marks on the vertical axis of each graph tended to be the most successful.

Higher Tier

Successful candidates drew straight lines from the cumulative frequency axis from each graph to find the position of the quartiles and the median. They were then able to match correctly each cumulative frequency diagram with the corresponding box plot.

Specification B

Intermediate Tier

Candidates needed at least two correct answers here to gain any marks. This usually thwarted those who were making arbitrary guesses. Many candidates used the diagrams well to estimate the positions of the median and the quartiles.

10. The majority of candidates were not able to calculate the angle for a pie chart. Many related the number of people (240) to 360° as 2/3, or used 35 instead of 95. Working was rarely shown. The usual wrong answer in part (b) was 25 to 30 using the middle on the table. The table was usually completed correctly, but there were many examples of incorrect addition, surprising since calculators were available. Attempts are graphing were also disappointing, with a significant number of candidates showing inaccuracy in plotting, or plotting at pints other than at the top end of the class interval, a greater proportion than recently seen. Few were able to use their graphs to arrive at a value for the median, many using 150 or 125, rather than the mid-way value from their graph.

11. This was a standard higher tier question and as such was well answered with a mean mark on the paper of over 3 out of 4. Virtually everybody could complete the cumulative table and most could plot the resulting points correctly. There was the usual error of plotting the points at the middle of the interval (or even the start of the interval), but most of theses candidates went on to find the median correctly.

12. **Higher Tier**

This question was answered well by many candidates. Part (a) was generally done very well. In part (b), most candidates were able to plot their cumulative frequencies accurately, but a common error was to plot these at the mid-interval values. A small but significant number of candidates plotted their cumulative frequencies at $t = 5, 10, 15, 20, \ldots$

Another common error was to plot the end point at (50, 120).

In part (c), most candidates were able to read the cumulative frequency graph at $t = 18$, but many of these did not subtract this value from 100. Candidates should be encouraged to show their method by drawing a dotted line on the cumulative frequency graph.

Intermediate Tier

Many candidates completed the cumulative frequency table correctly in part (a). A few made a single addition error. Some clearly had no idea how to work out the cumulative frequencies. Those who completed the table correctly generally plotted the points within the required accuracy and joined them with a curve or line segments. Some had difficulty plotting the points accurately, very often with the first point (10, 16). Fewer candidates than in previous years incorrectly plotted the points at the mid-points of the classes. Some candidates did not join the points and some drew a line of best fit. Some, but relatively few, drew bar charts. In part (c) candidates often read the cumulative frequency at a time of either 18 or 19 seconds but many gave this as their final answer rather than subtract the value from 100.

13. **Higher Tier**

This question was done quite well. The majority of candidates knew the method for finding the median and interquartile range for the distribution and showed their work clearly on the grid. Unfortunately, many candidates did not appreciate that although the vertical axis went to 140 there were only 120 girls in the sample. Consequently they divided 140 into quartiles rather than 120. These candidates were generally unable to achieve a mark in (i) but could gain both marks in (ii).

Intermediate Tier

Part (i) was answered well for a question late in the paper and more than 30% of candidates were successful in finding an estimate of the median weight. Although correct answers in part (ii) were well presented with clear markings on the graph, it was not a successful question for most candidates. There were relatively few informed attempts and not many of those who showed some understanding were able to identify both the 30 and 90 values on the cumulative frequency axis. Since the cumulative frequency scale went up to 140 some took this to be the total number of girls and used 35 and 105. Some who did find the lower quartile and upper quartile wrote 65 – 80 on the answer line. Many answers came from reading the graph at a single point, e.g. giving the lower quartile only.

14. The majority of candidates were able to pick up some marks on this question. In part (a), the cumulative frequency table was usually accurate, although careless arithmetic errors were often seen. Accurate plotting was a little less well done, and a significant number of candidates failed to either plot points at the end of the intervals or in many cases drew histograms. In part (c), Many candidates read their median from the cf axis from either 50 (to give an answer of 60) or 60 (to give an answer of 75) on the horizontal axis.

15. In part (a) most candidates were able to plot the points correctly and produce an accurate cumulative frequency graph. Some candidates plotted the points correctly but drew a line of best fit and some plotted at the midpoints of the amounts spent. Part (b) was also answered well with most candidates able to find the median. Few, though, drew a horizontal line from cf = 60 so were unable to be awarded a method mark if their answer was incorrect. Some candidates believed the median to be 64 (the frequency in the middle of the table) and some wrote 0-250. Good comparisons were made in part (c) between the spending of men and women although there were some confused statements made by candidates who did not appreciate that the different numbers of men and women was not relevant when comparing the medians.

16. In part (a) many candidates were able to obtain the correct answer of 65 or 66. Some candidates then went on to do something with this result, either subtract 5 from it or subtract it from 120. In part (b) a number of candidates who read off the upper quartile at the correct position misread the scale on the horizontal axis. Other candidates argued that if the upper quartile was 90 and the lower quartile 30 then the interquartile was 60 and used this to find the corresponding value on the x axis. There were also candidates who found the quartiles based on a maximum cumulative frequency of 130 (this being the maximum value given on the y axis scale) rather than 120.

17. Construction of an accurate cumulative frequency graph was seen more often than not by all levels of ability. A few candidates plotted in the middle of each interval.
Finding the interquartile range, in part (b), proved more demanding. Many candidates found the median of 40 and often labelled the cf = 40 line as the IQR after labelling cf =20 and cf = 60 correctly.
A significant number of candidates used cf = 25 and cf = 75 as their quartiles.

18. Parts (a) and (b) were well done by the majority of candidates. In part (c) most candidates were able to write down the relevant probabilities correctly but these were then frequently added rather than multiplied. A common arithmetic error in this question was to give the answer to 100 × 100 as 1000.

19. A good number of candidates were able to gain full marks on this question. It was, however, clear that this topic had not been taught by some centres. It is important that candidates do show the examiner where they take their readings from, this is done most effectively by drawing in relevant horizontal and vertical lines on the graph. Some candidates misread part (d) and failed to subtract their reading from the graph from 90. A minority of candidates used 100 for the number of students in the question rather than 90.

20. Success, or not, at this question was centre-dependant, many able candidates clearly having not been prepared for this topic. There was evidence of quartiles and the median being accurately found on the cf graph without the knowledge to go further. Of those who understood the concept, most gained 1 mark for drawing the whiskers. Many times the quartiles were read from 60 and 140. Often boxes were drawn without an indication of the median.

21. Only about half the candidates were correctly able to identify the class interval for the median. A common error was to give the interval as $20 \leq w < 40$ as the number 30 (half the number of office workers) lay within this interval. The use of the cumulative frequency curve to find the interquartile range was poorly done; less than a third of candidates were able to gain full marks. The most common error seen was to use 70 for the number of office workers rather than 60 as quoted in the question. Likewise, in part (c) a significant number of candidates read from the graph correctly but then subtracted from 70 instead of 60. In both parts (b) and (c) some candidates had trouble coping with the scale on the horizontal axis; 30 was frequently misread as 25. Despite the word more being given in bold type in the question, a significant number of candidates gave the number of workers who could type less than 70 words per minute.

22. Over 80% of candidates gave fully correct solutions to the whole of this question. A small minority of candidates plotted their graph at 'mod-interval' rather than at the end of each interval. Candidates should be reminded to draw relevant lines on the graph to indicate where any readings are taken from.

23. The median appeared relatively easy for the candidates to read odd, but a significant minority failed to understand what was mean by a "quartile". Box plots remain misunderstood by many candidates. Incomplete boxes and failure to show any whiskers were the main errors. A failure to read off the upper quartile accurately was also an issue for some. Many candidates forgot what went where, and linked up boxes with medians, sometimes maximum points, or missed out the line for the median.

24. 83% of candidates were able to complete the cumulative frequency table in part (a) accurately. In part (b) most candidates plotted the points accurately at the upper bound of each age interval though there were a significant number who plotted at the mid point of each interval or at the ages 5, 10, 15, 20, 25, 30 and 35. Presumably, candidates who did the latter had used the midpoints of the intervals given in the cumulative frequency table. Sometimes points were not joined. However when they were joined by a curve these were generally well drawn. Bar charts, frequency polygons and lines of best fit were also commonly seen Though a standard procedure, many candidates were unable to find the median in part (c). A significant number of candidates gave the answer 30.5 (perhaps the result of using the formula $\frac{n+1}{2}$ and giving its value rather than using it to locate the median from the cumulative frequency graph).

25. This was very well done by most with nearly ¾ of the candidates getting this correct.

26. 29% of candidates scored full marks on this question. This is a pity on a question involving standard procedures. The cumulative frequency table in part (a) was completed successfully by nearly 90% of candidates. However, it is a pity that there were still many candidates who did not check that their table was consistent with the information given in the stem of the question – in this case that there were 100 cars in total. The cumulative frequency graph was quite well done but there were still a good number of candidates who did not plot the data at the upper boundary of each interval. Attempts to find the median and inter-quartile range were disappointing, with little working seen in part (d).

27. In part (a), the vast majority of candidates were able to find an estimate for the number of people less than 70 years old. Common incorrect answers here were 86, 78 and 12.

Part (b) was generally done well. Common incorrect answers here were 78 and 66.

In part (c), was done less well. Many candidates knew that they had to work with values at 25 and 75 (as evidenced by lines in the cumulative frequency diagram), but a significant number of these did not know what to do next. Common incorrect answers here were 50 (from 75 – 25), 20 and answers derived from misinterpreting the horizontal scale 56.

28. Many candidates were not aware of how to find the last moving average in (a). By far the most common error was to find a three-point moving average, with some candidates even finding the average of the moving averages given.

In part (b) many candidates did not understand what was required and commented on the number of televisions sold each month. All that was required was to say that the trend was decreasing yet many went into great detail about every number in the table. In parts (a) and (b) 29% of the candidates scored all 3 marks with a further 44% scoring 2 marks. 20% of the candidates scored no marks at all.

Many candidates were successful in parts (c) and (d) with 38% scoring all 3 marks and a further 20% scoring two marks. Quite a few candidates plotted the cumulative frequency values at 100, 200, 300, 400 and 500 thinking that the points needed to be plotted at the midpoints of the price intervals, clearly not understanding the question.

Some of these candidates did, however, go on and earn the mark in (d) for correctly reading from their graph. Some plotted the points in the correct position but then failed to join the points whilst others plotted the points correctly but then proceeded to draw a line of best fit. Nearly 20% of the candidates scored no marks at all on the final two parts of the question.

29. This cumulative frequency question was very well understood by the majority of candidates with success rates of over 75% in parts (a), (b) and (c). The most common incorrect response in part (a) was stating the frequency of 9 rather than the class interval and in (b) the incorrect responses centred on finding the median of the frequency numbers, and 0.75 – 100 as it was in the middle of the table).

Candidates were slightly less successful in part (d) where they had to draw the cumulative frequency curve. Line segments were accepted but many candidates lost a mark for poor plotting or plotting the points in the middle or at the beginning of the class interval. In part (e) the success rate dropped even more to 10%. Candidates could score 1 mark for an integer answer of 9, 10 or 11 without showing their working or for showing their working but then forgetting to take their cumulative frequency reading from 30. Candidates also struggled to interpret the horizontal scale, and it was often difficult to ascertain evidence of their line at 0.9. A small minority of candidates chose 4 for their answer, the number of groups with a value equal or higher than 0.9