Solutions by
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# GCSE (9-1) Grade 6 Cumulative Frequency and Box Plots

**Unfinished. Please support to inspire me on.**

**Instructions**

Use **black** ink or ball-point pen.
**Fill in the boxes** at the top of this page with your name.
Answer **all** questions.
Answer the questions in the spaces provided
- there may be more space than you need.

**Show all your working out**

**Information**

The marks for **each** question are shown in brackets.
use this as a guide as to how much time to spend on each question.
Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed

**Advice**

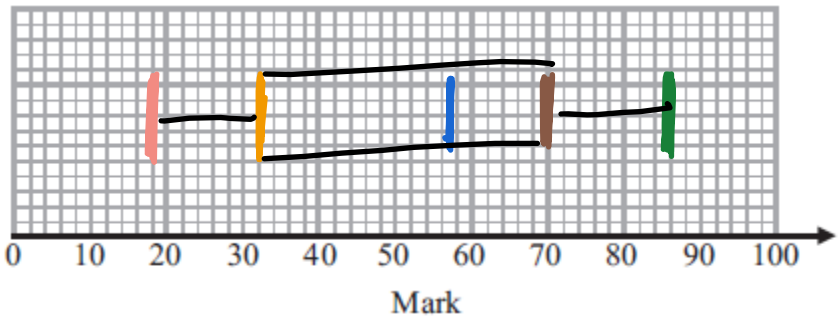
Read each question carefully before you start to answer it
Attempt every question
Check your answers if you have time at the end

**1.** All the students in Mathstown school had a test.

The lowest mark was 18
The highest mark was 86
The median was 57
The lower quartile was 32
The interquartile range was 38

32 + 38 = 70 (upper quartile)

On the grid, draw a box plot to show this information.




**(3 marks)**

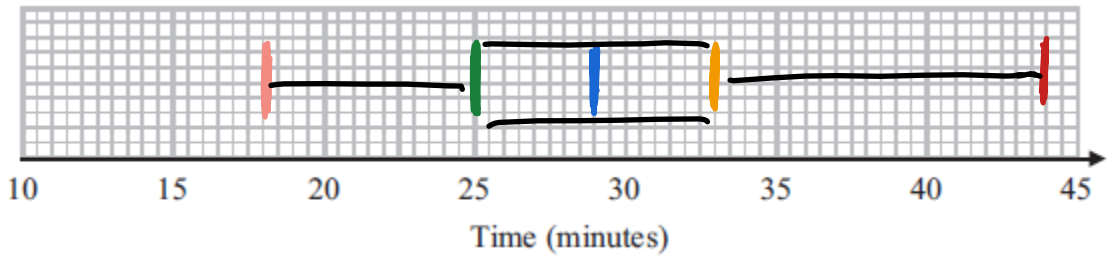
**2.** Sameena recorded the times, in minutes, some girls took to do a jigsaw puzzle.

Sameena used her results to work out the information in this table.

| | **Minutes** |
|---|---|
| Shortest time | 18 |
| Lower quartile | 25 |
| Median | 29 |
| Upper quartile | 33 |
| Longest time | 44 |

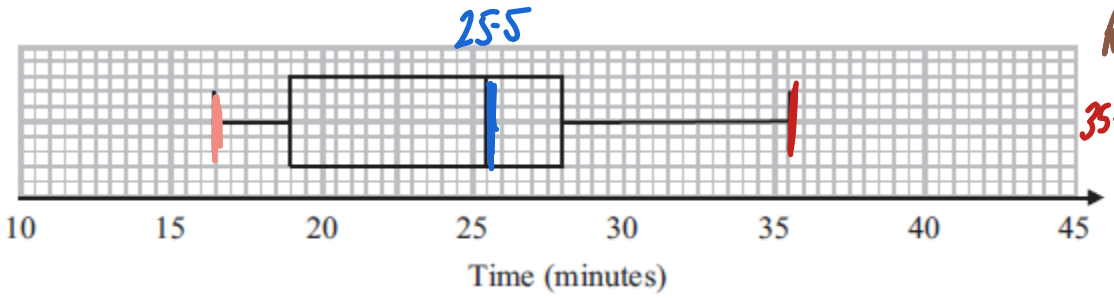
Range = 44 − 18 = 26

(a) On the grid, draw a box plot to show the information in the table.




**(2)**

The box plot below shows information about the times, in minutes, some boys took to do the same jigsaw puzzle.




Range = 35·5 − 16·5 = 19

(b) Compare the distributions of the girls' times and the boys' times.

Girls median time taken is 29 minutes. Boys median of 25·5 minutes is lower

Girls range of time taken is 19 minutes. The boys range is higher at 26 minutes.

**(2)**

**(4 marks)**

**3.** This frequency table gives information about the ages of 60 teachers.

| Age ($A$) in years | Frequency |
|---|---|
| $20 < A \leq 30$ | 12 |
| $30 < A \leq 40$ | 15 |
| $40 < A \leq 50$ | 18 |
| $50 < A \leq 60$ | 12 |
| $60 < A \leq 70$ | 3 |

(a) Complete the cumulative frequency table.

| Age ($A$) in years | Cumulative frequency |
|---|---|
| $20 < A \leq 30$ | 12 |
| $20 < A \leq 40$ | 12 + 15 = 27 |
| $20 < A \leq 50$ | 27 + 18 = 45 |
| $20 < A \leq 60$ | 45 + 12 = 57 |
| $20 < A \leq 70$ | 57 + 3 = 60 |

**(1)**

(b) On the grid opposite, draw a cumulative frequency graph for this information.

**(2)**

(c) Use your cumulative frequency graph to find an estimate for the median age.

$\frac{60}{2}$ = 30th person

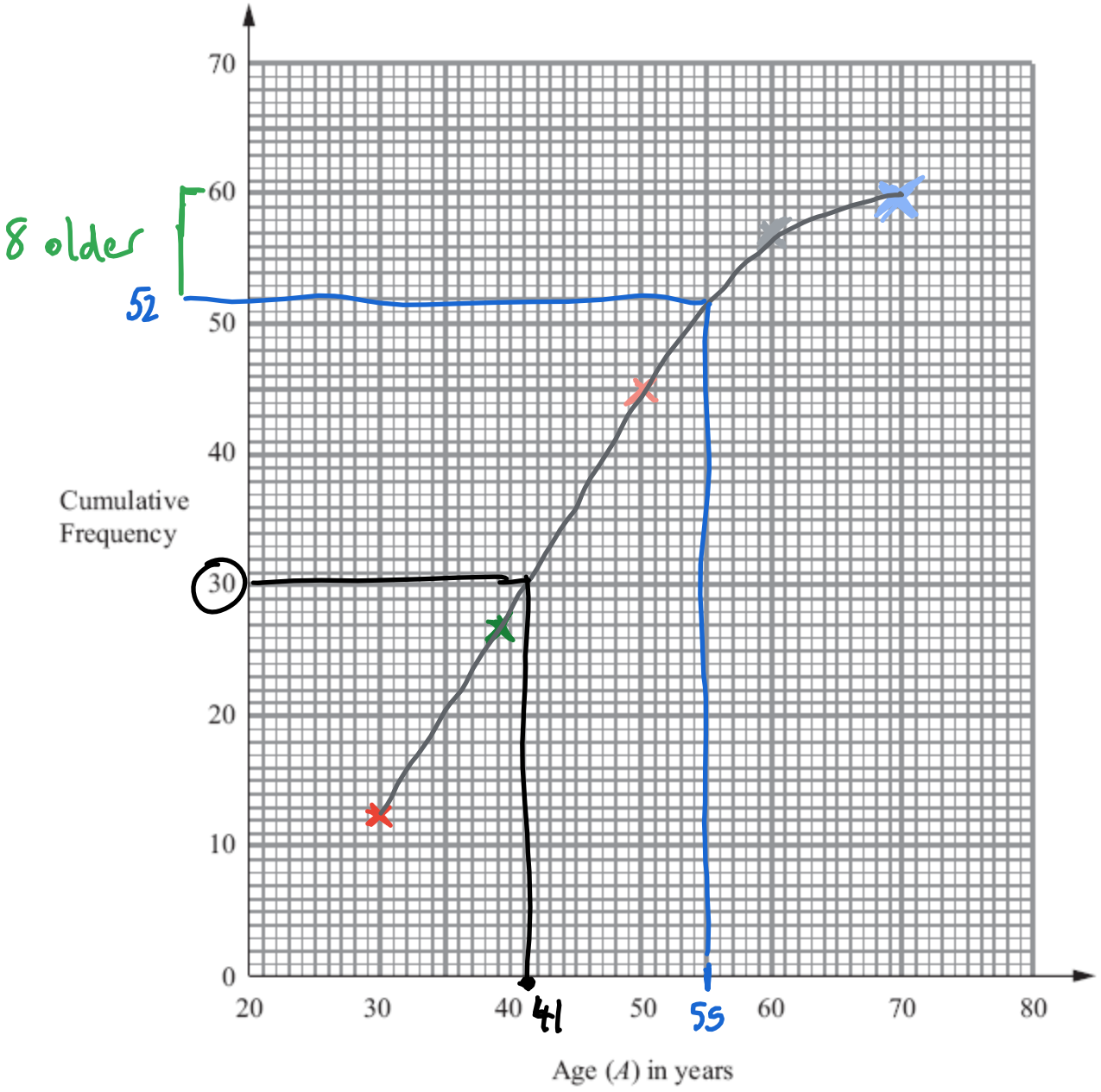
41 ..... years

**(2)**

(d) Use your cumulative frequency graph to find an estimate for the number of teachers older than 55 years.

8 .....

**(2)**


70
60
50
40
30
20
10
0
Cumulative Frequency
20
30
40
50
60
70
80
Age (A) in years
8 older
52
41
55

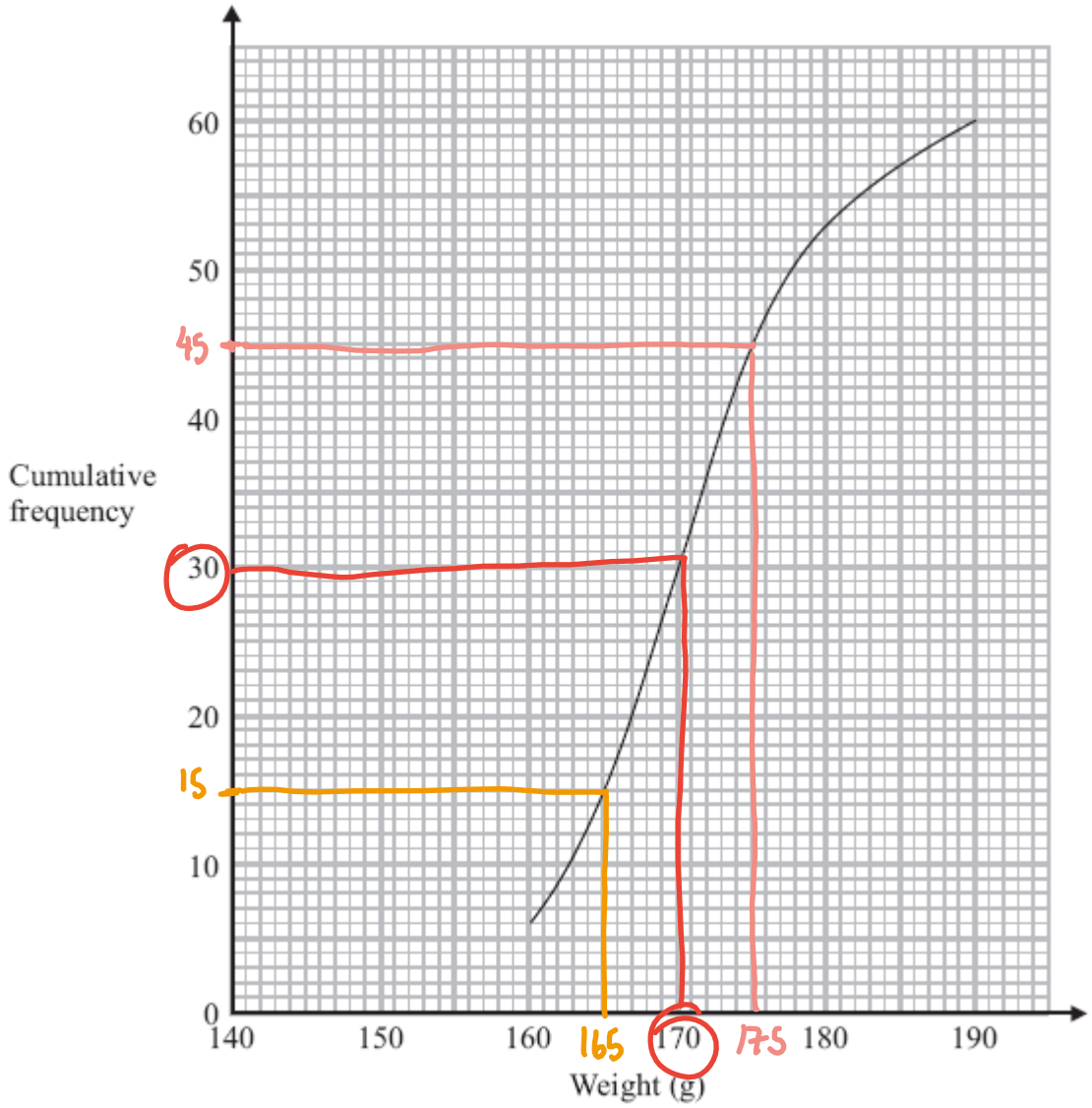
**(7 marks)**

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**4.** Harry grows tomatoes.
This year he put his tomato plants into two groups, group A and group B.

Harry gave fertiliser to the tomato plants in group A.
He did not give fertiliser to the tomato plants in group B.

Harry weighed 60 tomatoes from group A.
The cumulative frequency graph shows some information about these weights.

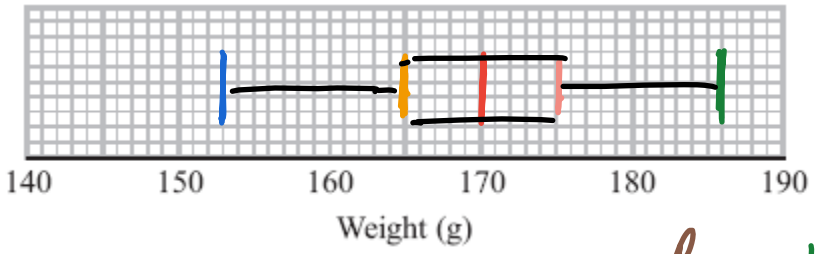



(a) Use the graph to find an estimate for the median weight.

170 ..... g
(1)

The 60 tomatoes from group A
had a minimum weight of 153 grams
and a maximum weight of 186 grams.

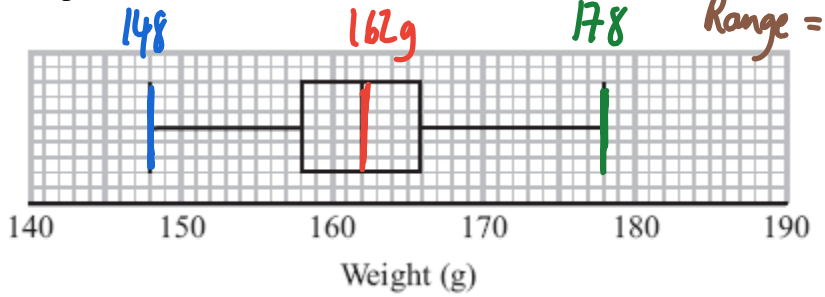
(b) Use this information and the cumulative frequency graph to draw a box plot for the 60 tomatoes from group A.




Range = 186 − 153 = 33 (3)

Harry did not give fertiliser to the tomato plants in group B.

Harry weighed 60 tomatoes from group B.
He drew this box plot for his results.




Range = 178 − 148 = 30

(c) Compare the distribution of the weights of the tomatoes from group A with the distribution of the weights of the tomatoes from group B.

The median weight for Group A was 170g which is more than the median of 162g for group B.
The range of weights for Group A was 33g and for Group B was 30g, which is lower.

(2)

**(6 marks)**

**5.** The table shows information about the speeds of 100 lorries.

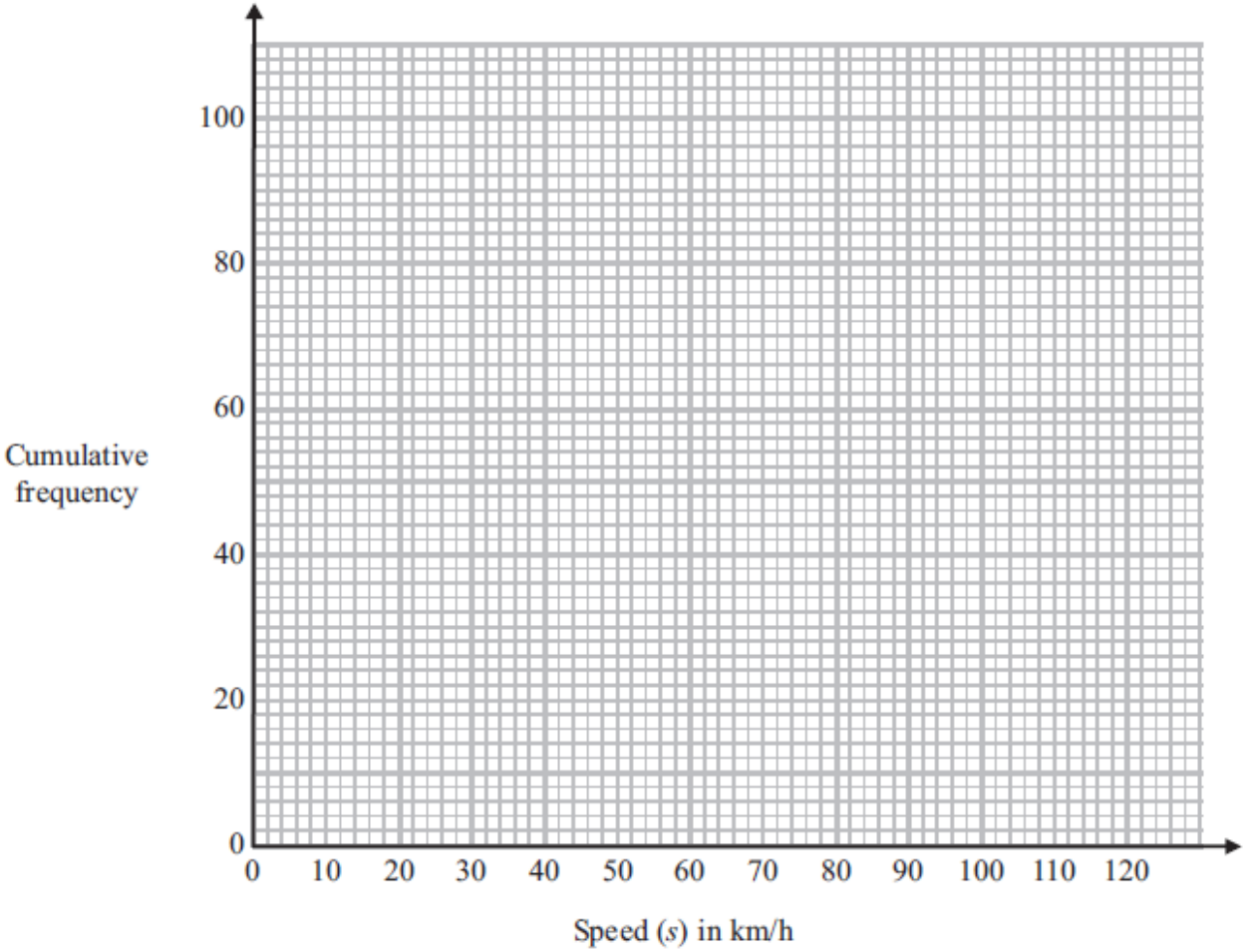
| Speed (s) in km/h | Frequency |
|---|---|
| $0 < s \leq 20$ | 2 |
| $20 < s \leq 40$ | 9 |
| $40 < s \leq 60$ | 23 |
| $60 < s \leq 80$ | 31 |
| $80 < s \leq 100$ | 27 |
| $100 < s \leq 120$ | 8 |

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

| Speed (s) in km/h | Cumulative frequency |
|---|---|
| $0 < s \leq 20$ | 2 |
| $0 < s \leq 40$ | |
| $0 < s \leq 60$ | |
| $0 < s \leq 80$ | |
| $0 < s \leq 100$ | |
| $0 < s \leq 120$ | |

**(1)**

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




**(2)**

(c) Find an estimate for the number of lorries with a speed of more than 90 km/h.

.....

**(2)**

**(5 marks)**

**6.** The grouped frequency table shows information about the weekly wages of 80 factory workers.

| **Weekly wage (£$x$)** | **Cumulative Frequency** |
|---|---|
| $100 < x \leq 200$ | 8 |
| $200 < x \leq 300$ | 15 |
| $300 < x \leq 400$ | 30 |
| $400 < x \leq 500$ | 17 |
| $500 < x \leq 600$ | 7 |
| $600 < x \leq 700$ | 3 |

(a) Complete the cumulative frequency table.

| **Weekly wage (£$x$)** | **Cumulative Frequency** |
|---|---|
| $100 < x \leq 200$ | |
| $100 < x \leq 300$ | |
| $100 < x \leq 400$ | |
| $100 < x \leq 500$ | |
| $100 < x \leq 600$ | |
| $100 < x \leq 700$ | |

**(1)**

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

**(2)**

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

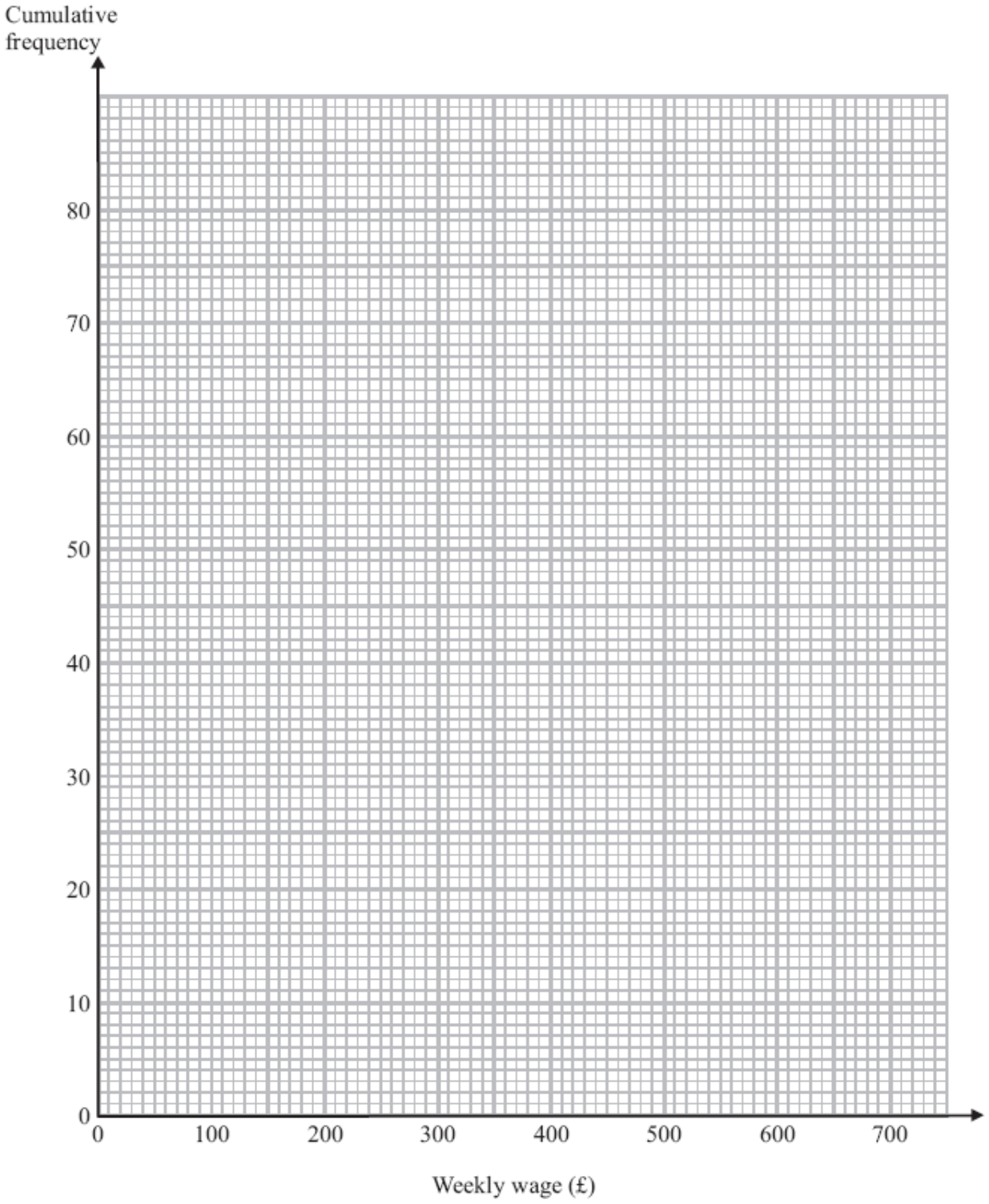
£ .....

**(2)**

(d) Use your graph to find an estimate for the number of workers with a weekly wage of more than £530

.....

**(2)**


Cumulative frequency
80
70
60
50
40
30
20
10
0
0
100
200
300
400
500
600
700
Weekly wage (£)

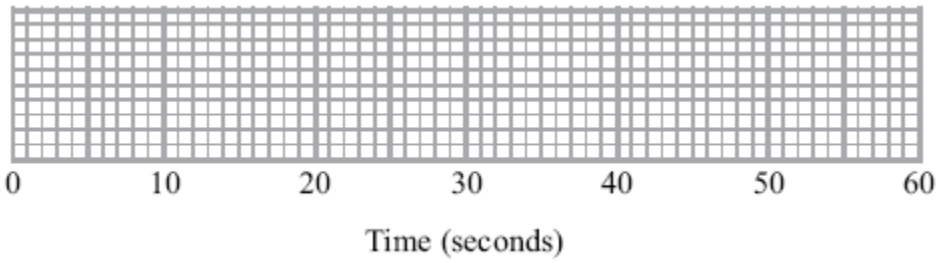
**(7 marks)**

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**7.** Here are the times, in seconds, that 15 people waited to be served at Rose's garden centre.

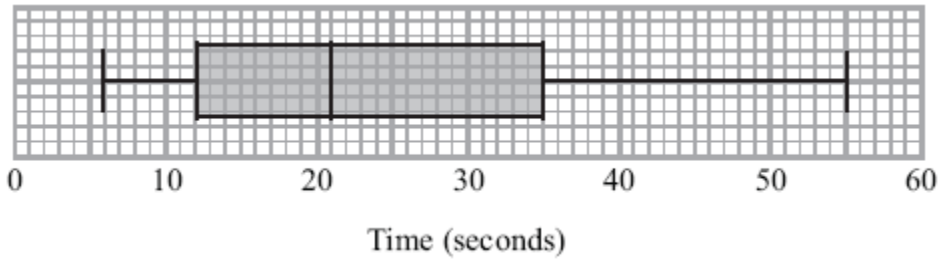
5 9 11 14 15 20 22 25 27 27 28 30 32 35 44

(a) On the grid, draw a box plot for this information.




**(3)**

The box plot below shows the distribution of the times that people waited to be served at Green's garden centre.




(b) Compare the distribution of the times that people waited at Rose's garden centre and the distribution of the times that people waited at Green's garden centre.

….....

….....

….....

….....

**(2)**

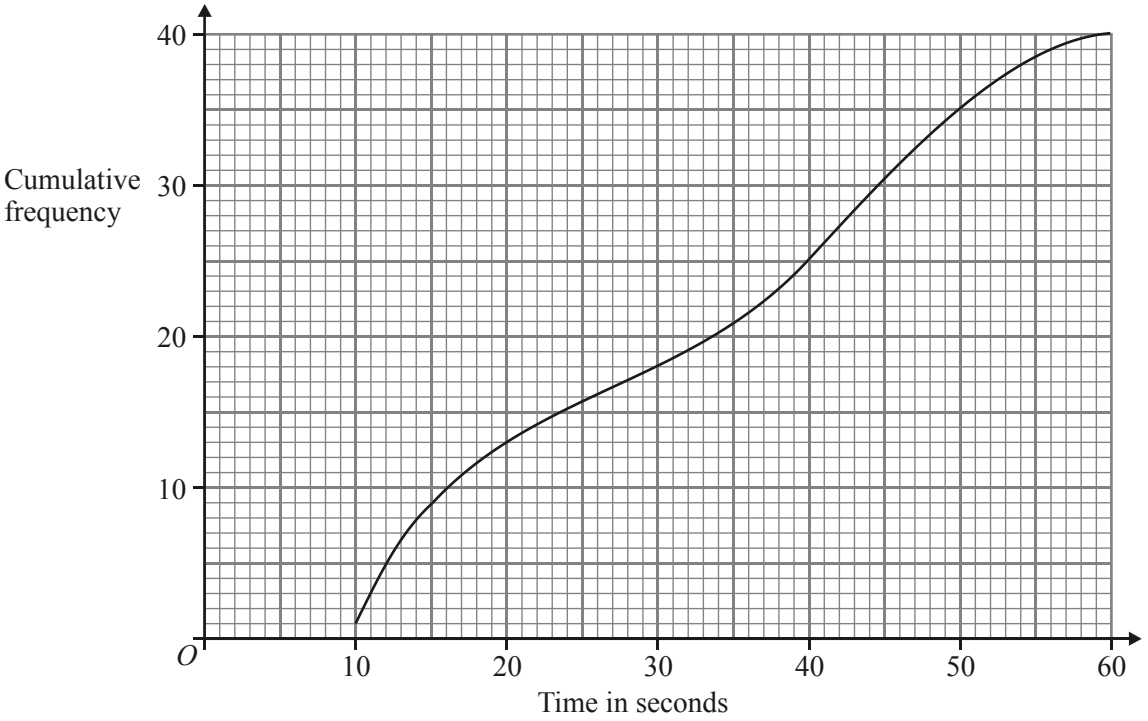
**(5 marks)**

**8.** 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

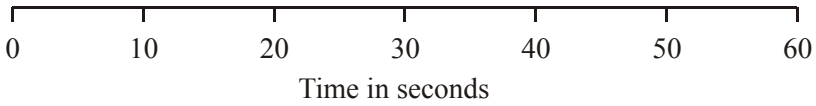
..... seconds

**(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.

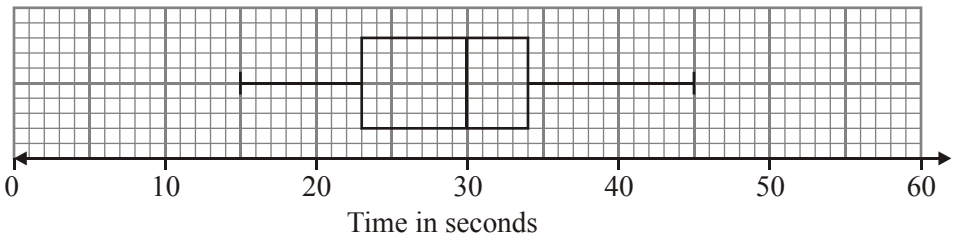
(b) Use this information and the cumulative frequency graph to draw a box plot showing information about the boy's times.




**(3)**

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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)**

**9.** 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)**

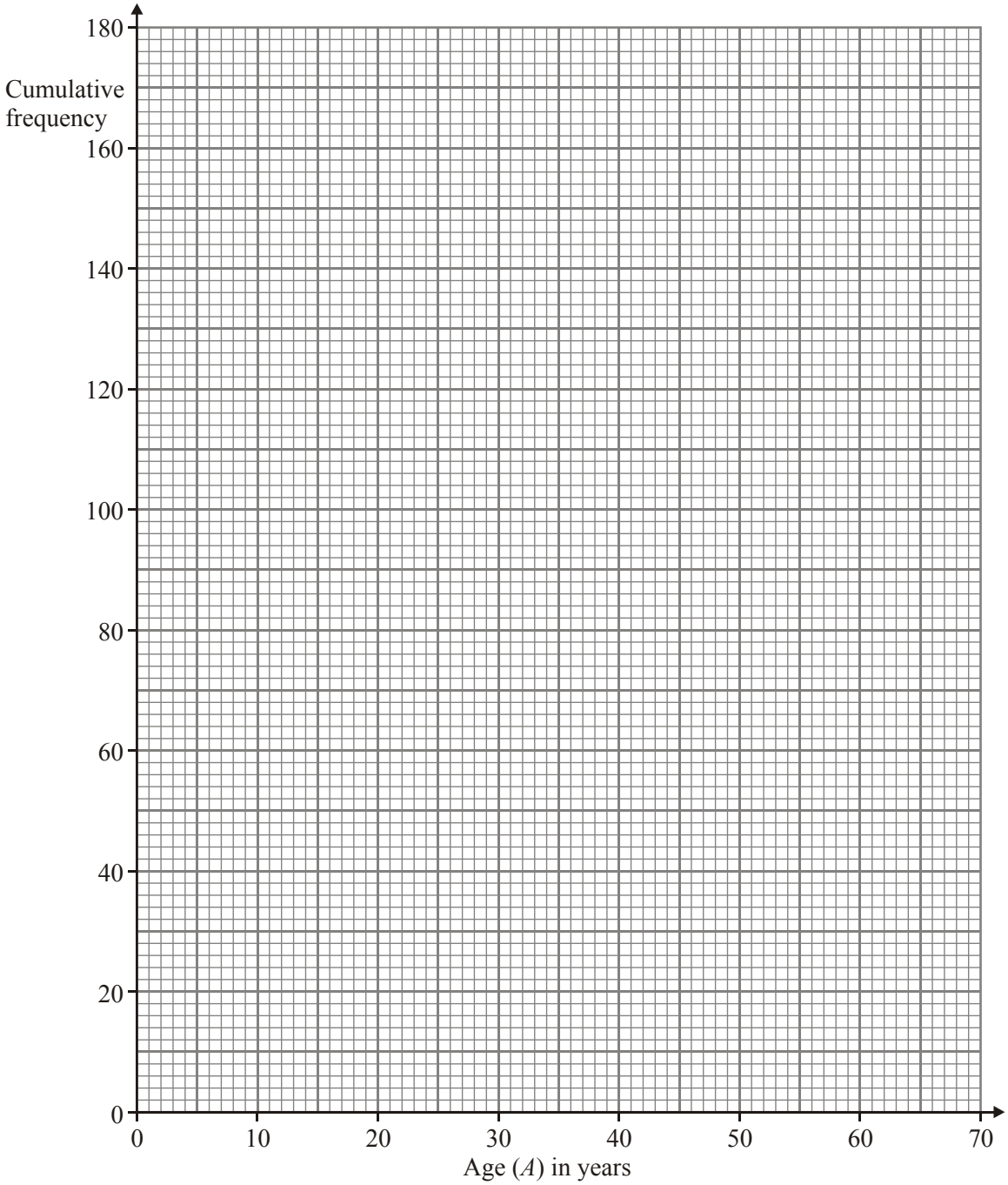
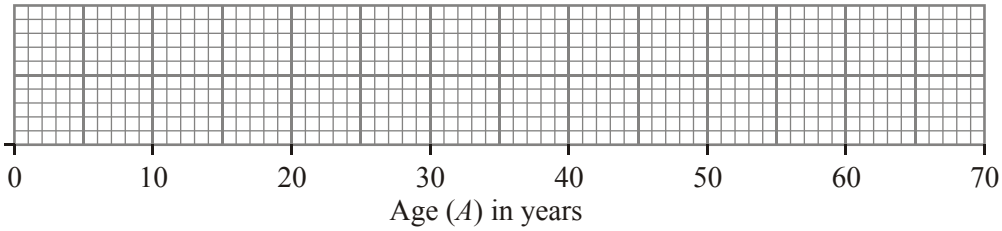


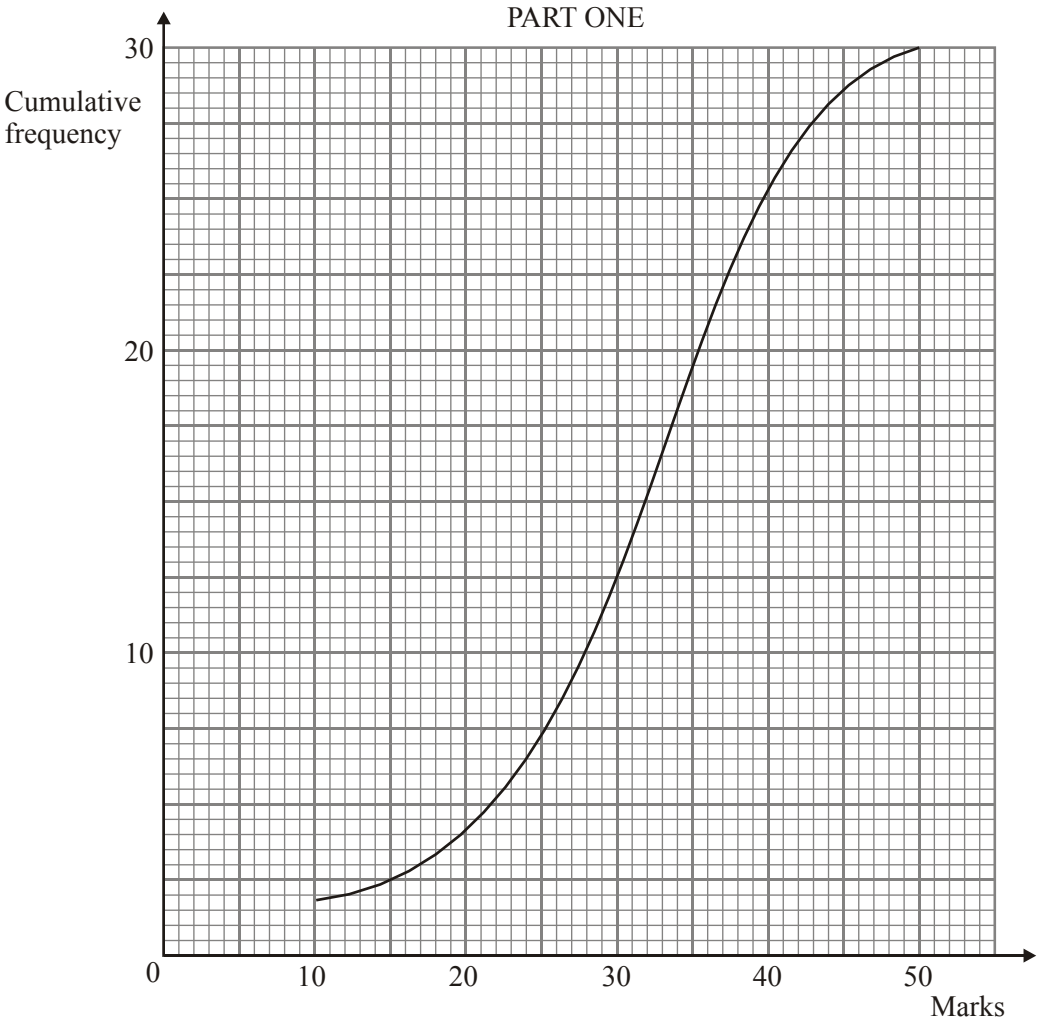

Diagram for part (e).



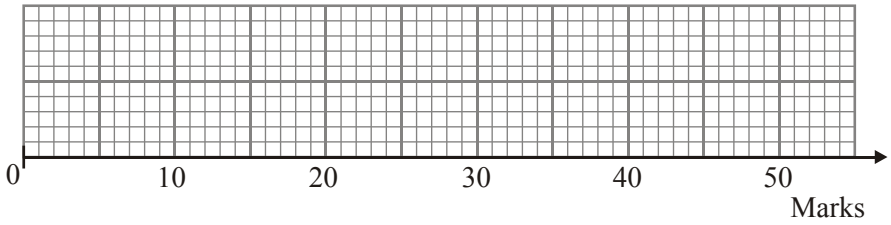

**(Total 9 marks)**

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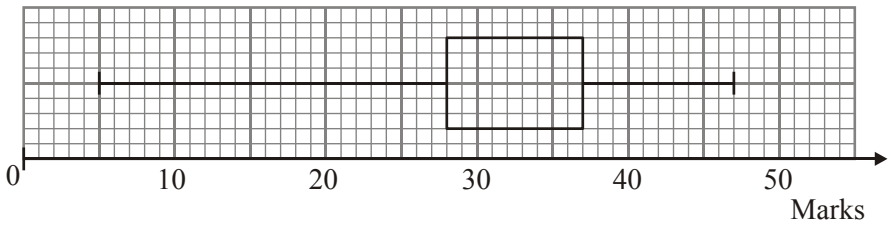
**10.** 30 students took part in a National Science quiz.
The quiz was in two parts.
The cumulative frequency graph on the grid below gives information about the marks scored in Part One.
The lowest mark was 5 and the highest mark was 47.




PART ONE




PART TWO




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(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.....

.....

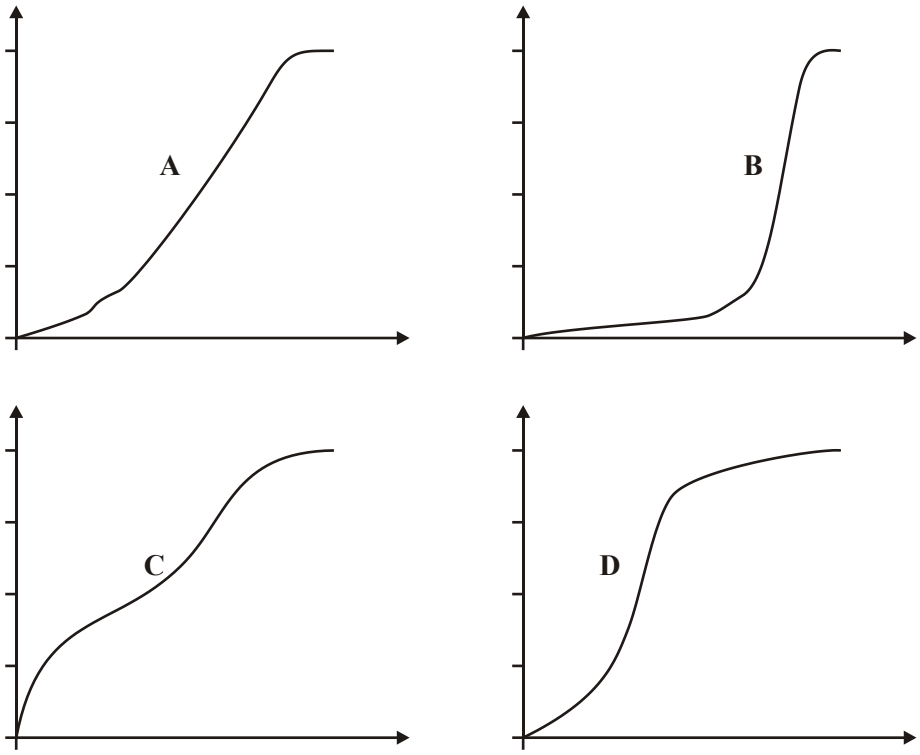
Second difference.....

.....

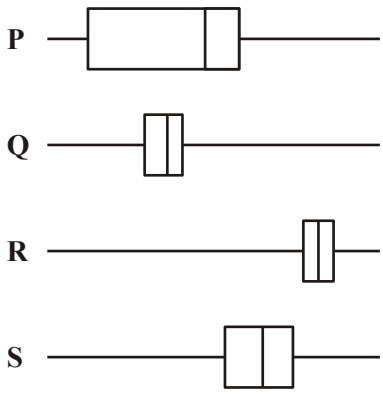
**(2)**
**(Total 5 marks)**

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**11.** 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)**

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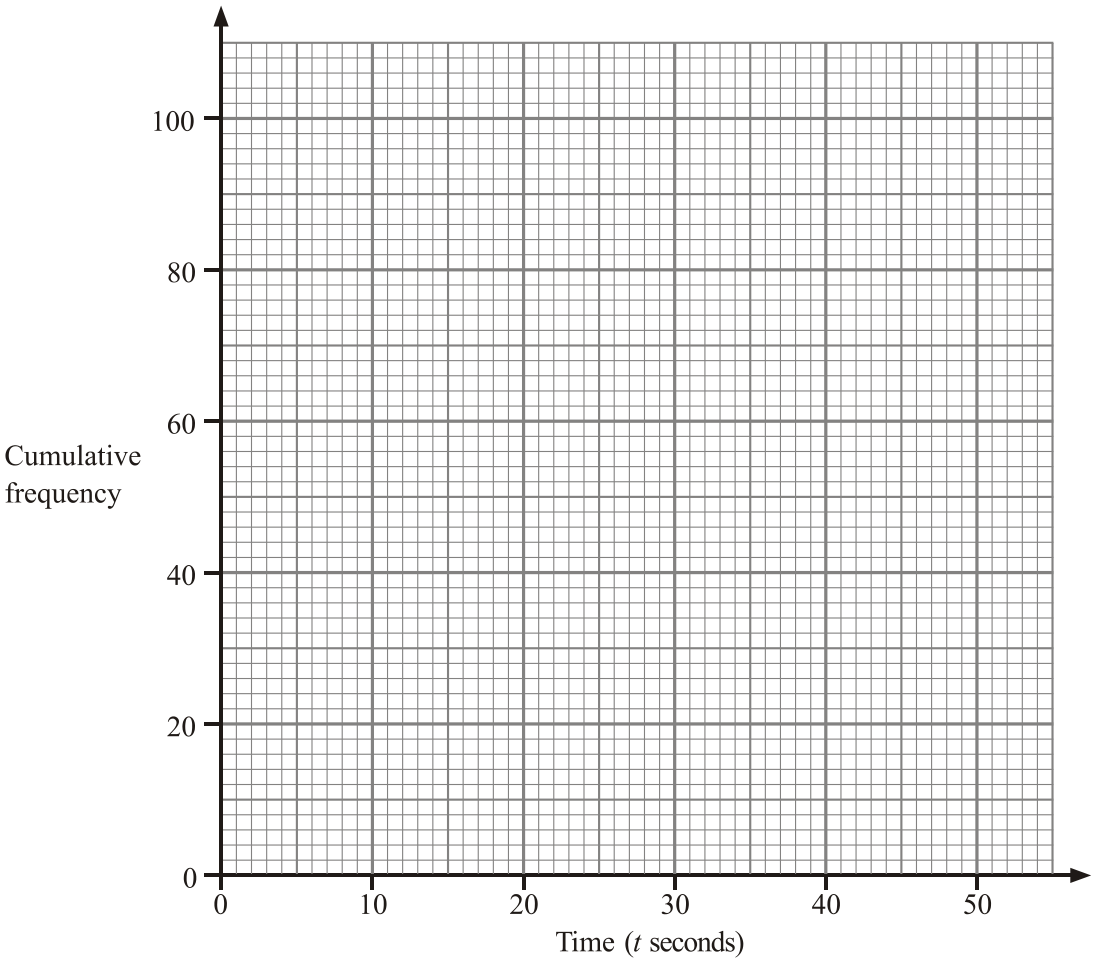
**12.** An operator took 100 calls at a call centre.
The table gives information about the time ($t$ seconds) it took the operator to answer each call.

| **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.

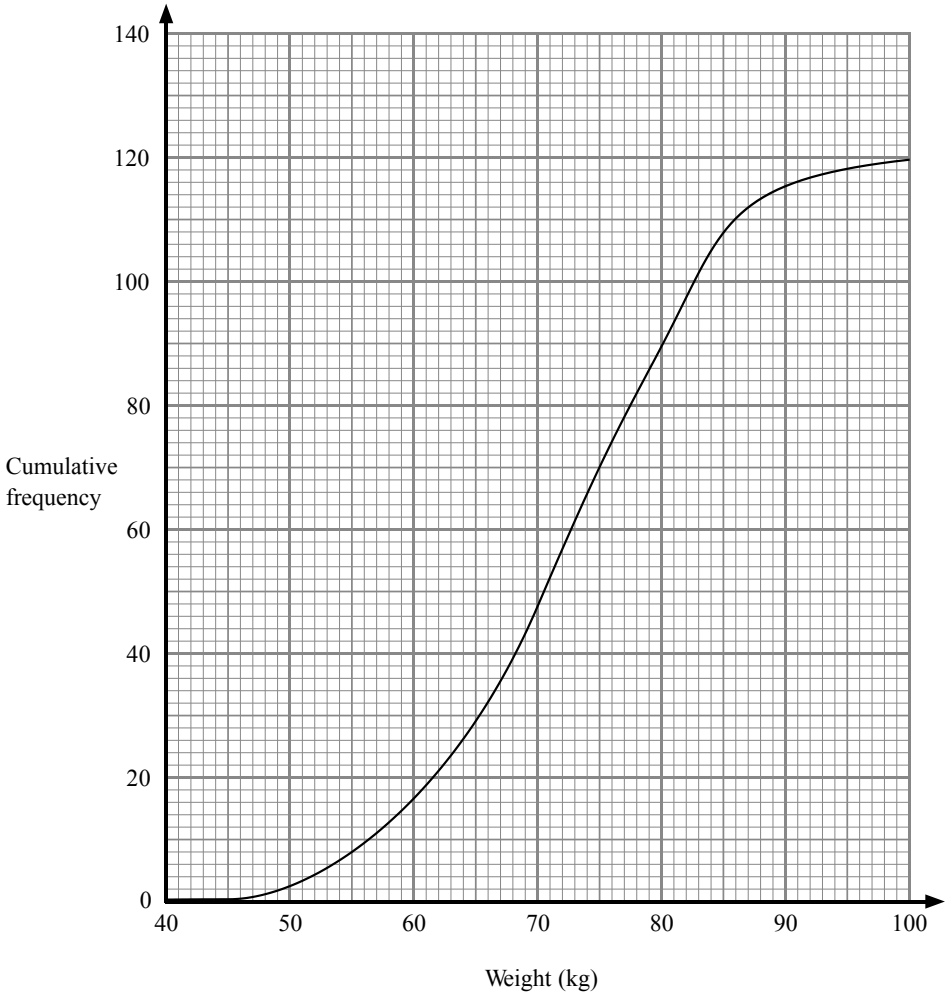
.....

**(2)**

**(Total 5 marks)**

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**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

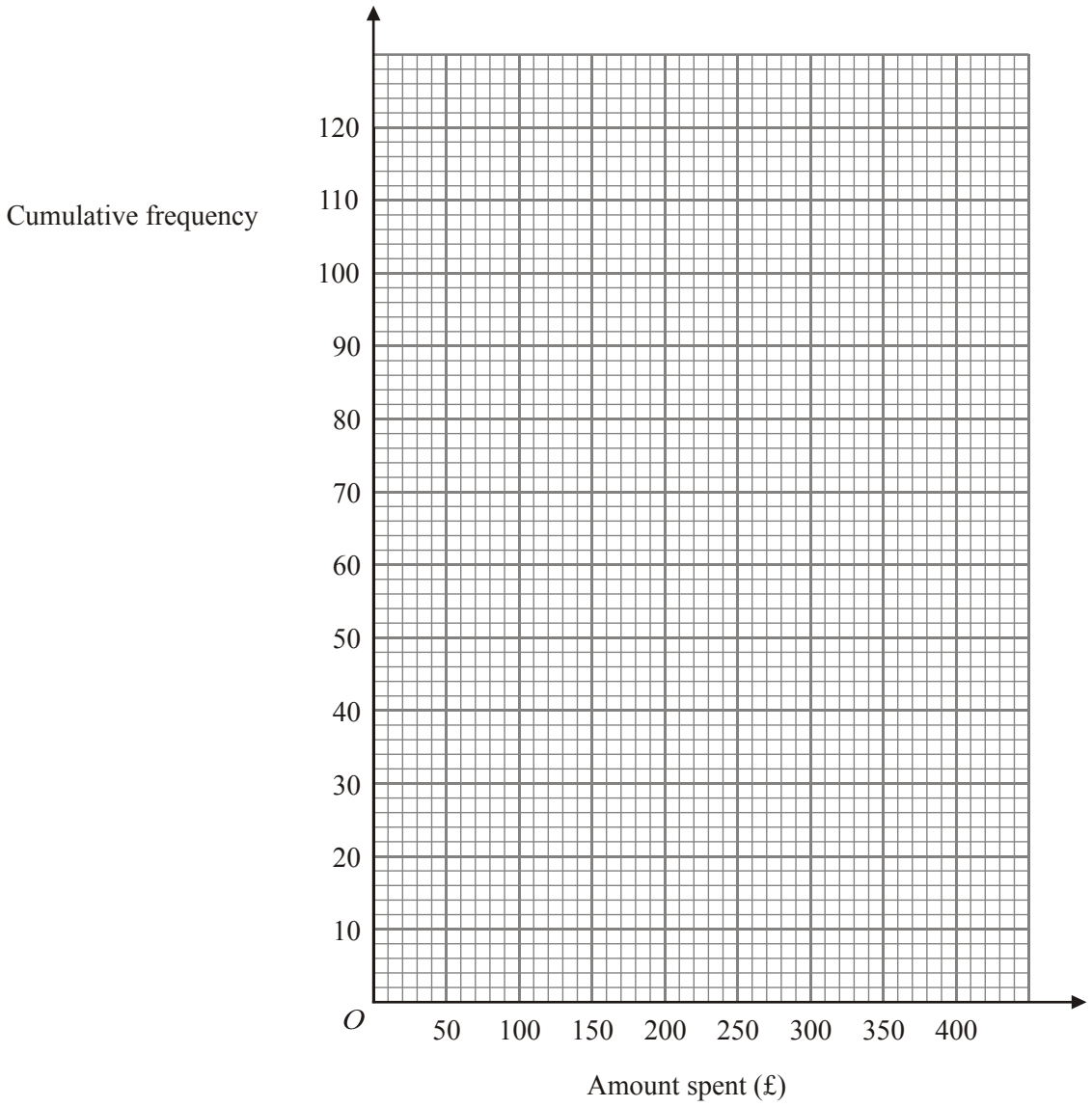
**(Total 3 marks)**

**14.** 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)**

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**15.** 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.

……

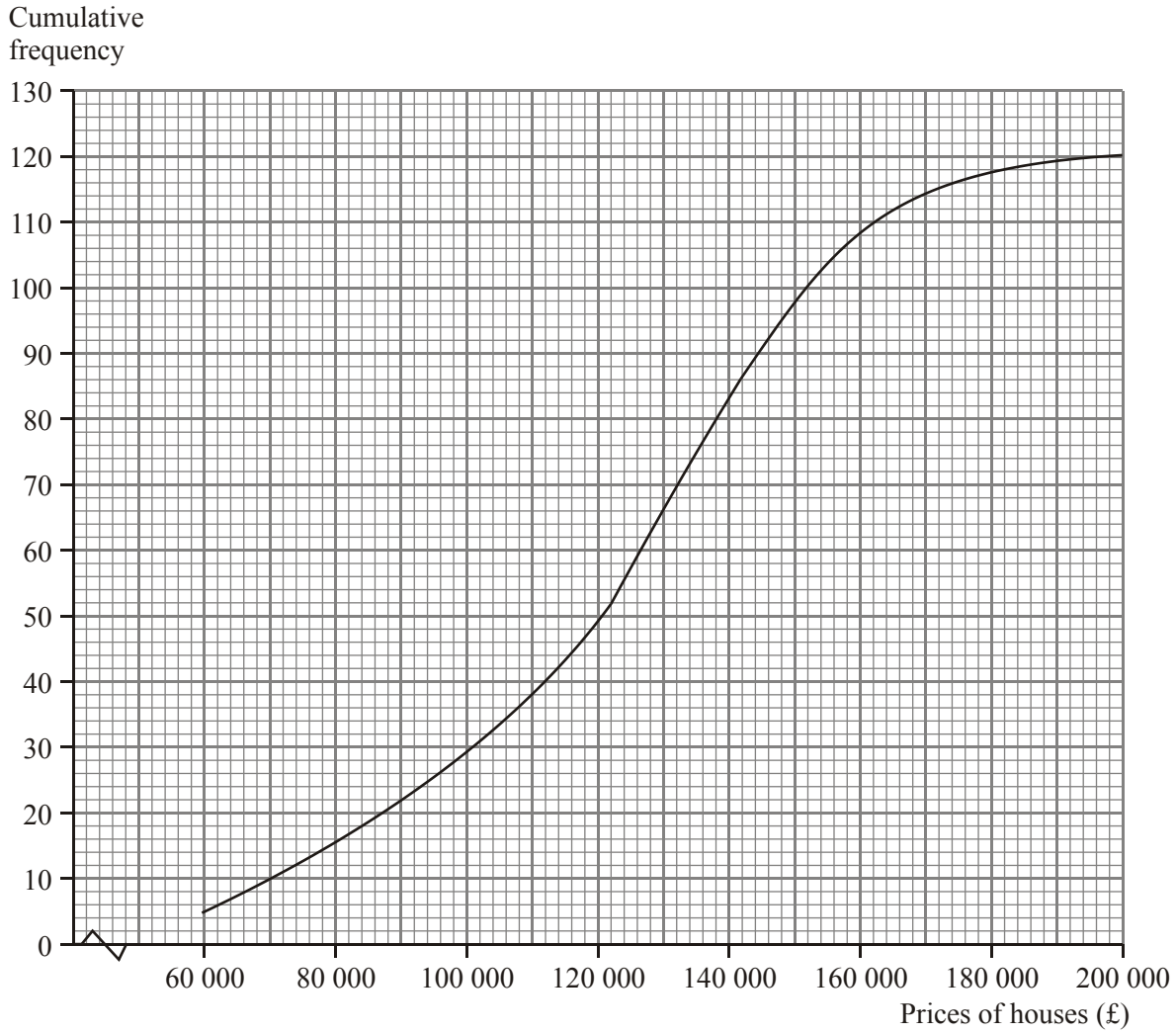
**(1)**

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

£ ……

**(2)**

**(Total 3 marks)**




**(Total 4 marks)**

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**16.** 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

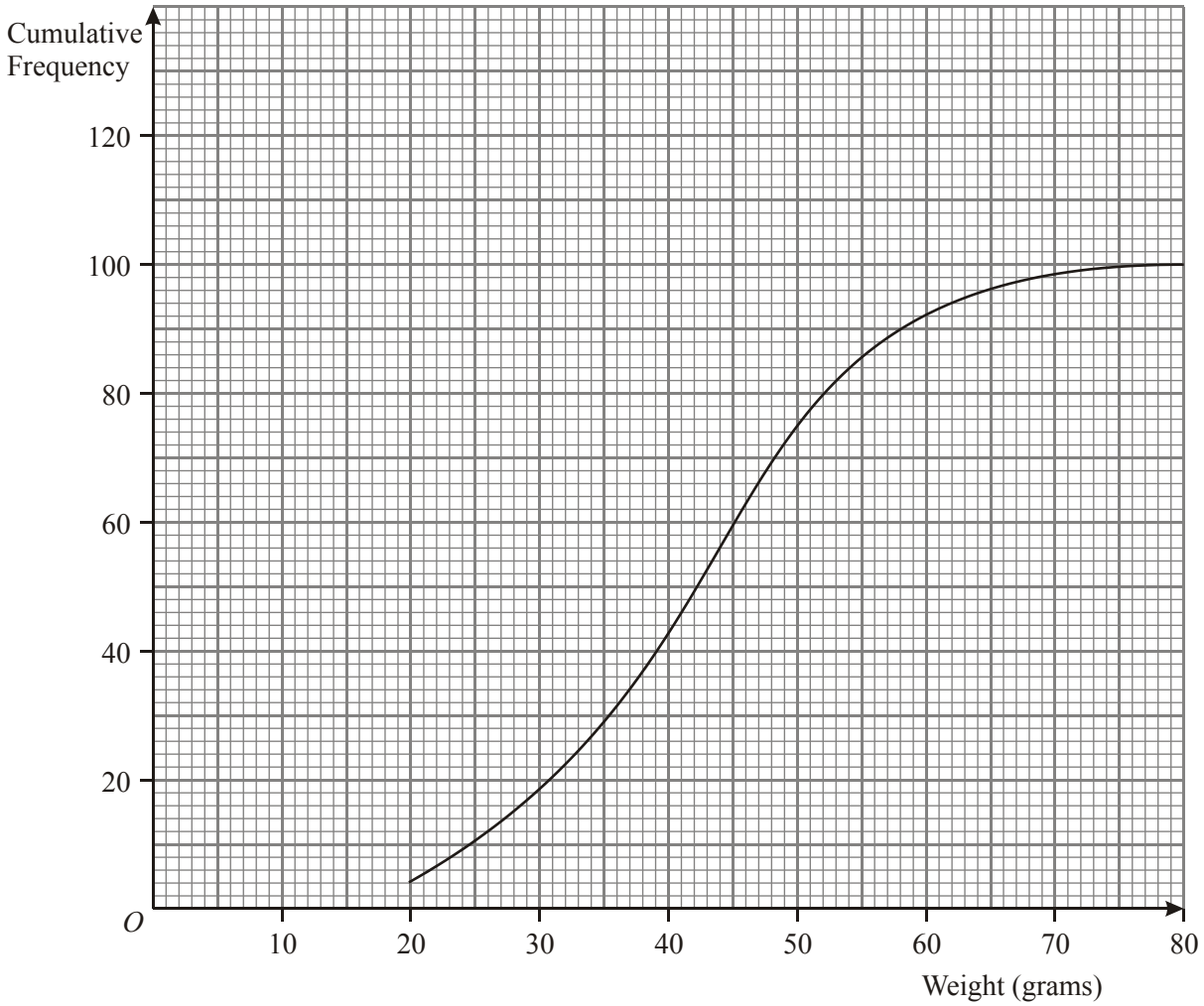
(i) the median weight of these pebbles,

..... grams

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

.....

**(3)**




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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)**

The pass mark for the examination was 28.

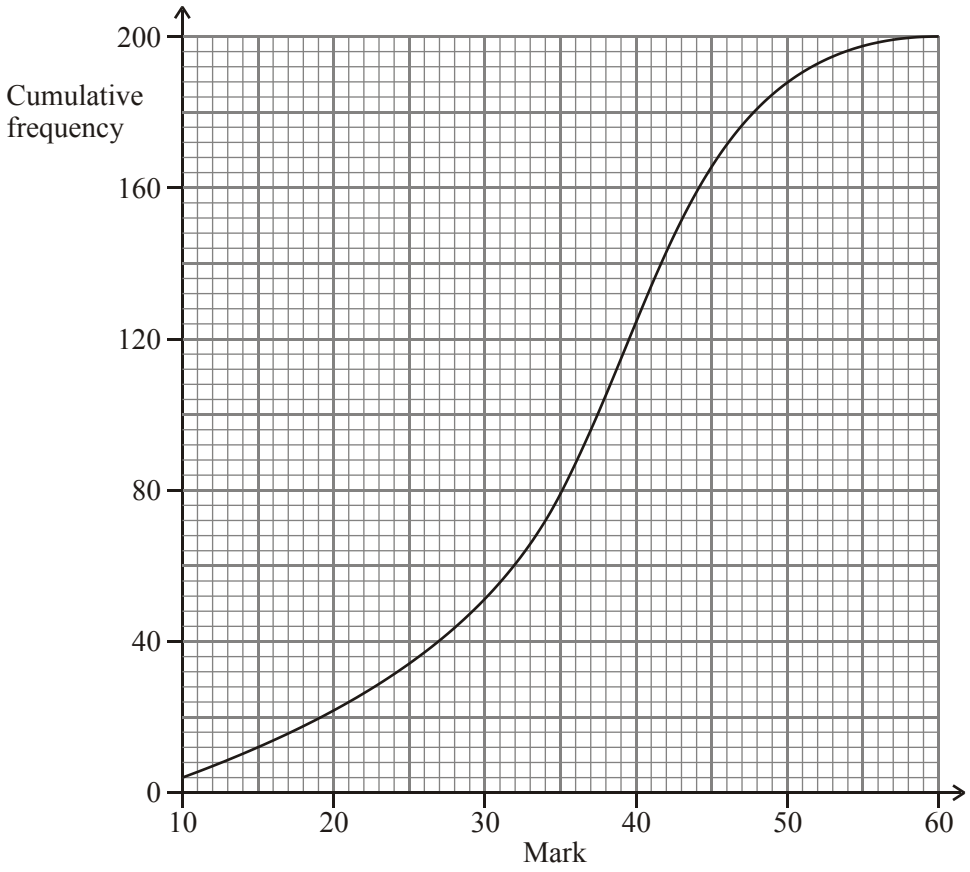
(d) Use your graph to find an estimate for the number of students who passed the examination.

……..

**(2)**
**(Total 6 marks)**

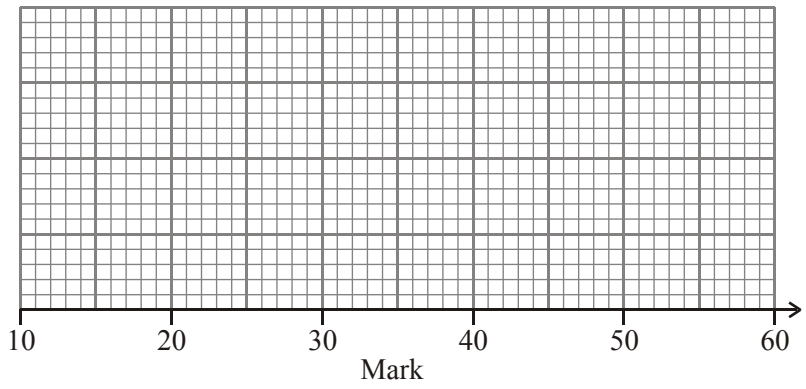
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**17.** 200 students took a test.
The cumulative frequency graph gives information about their marks.




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)**

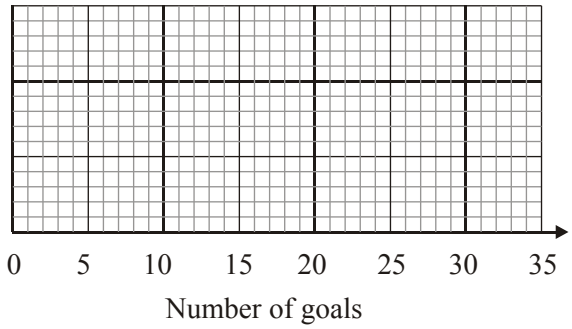
(c) Use this graph to work out an estimate for the number of workers who could type **more** than 70 words per minute.

.....

**(2)**
**(Total 6 marks)**

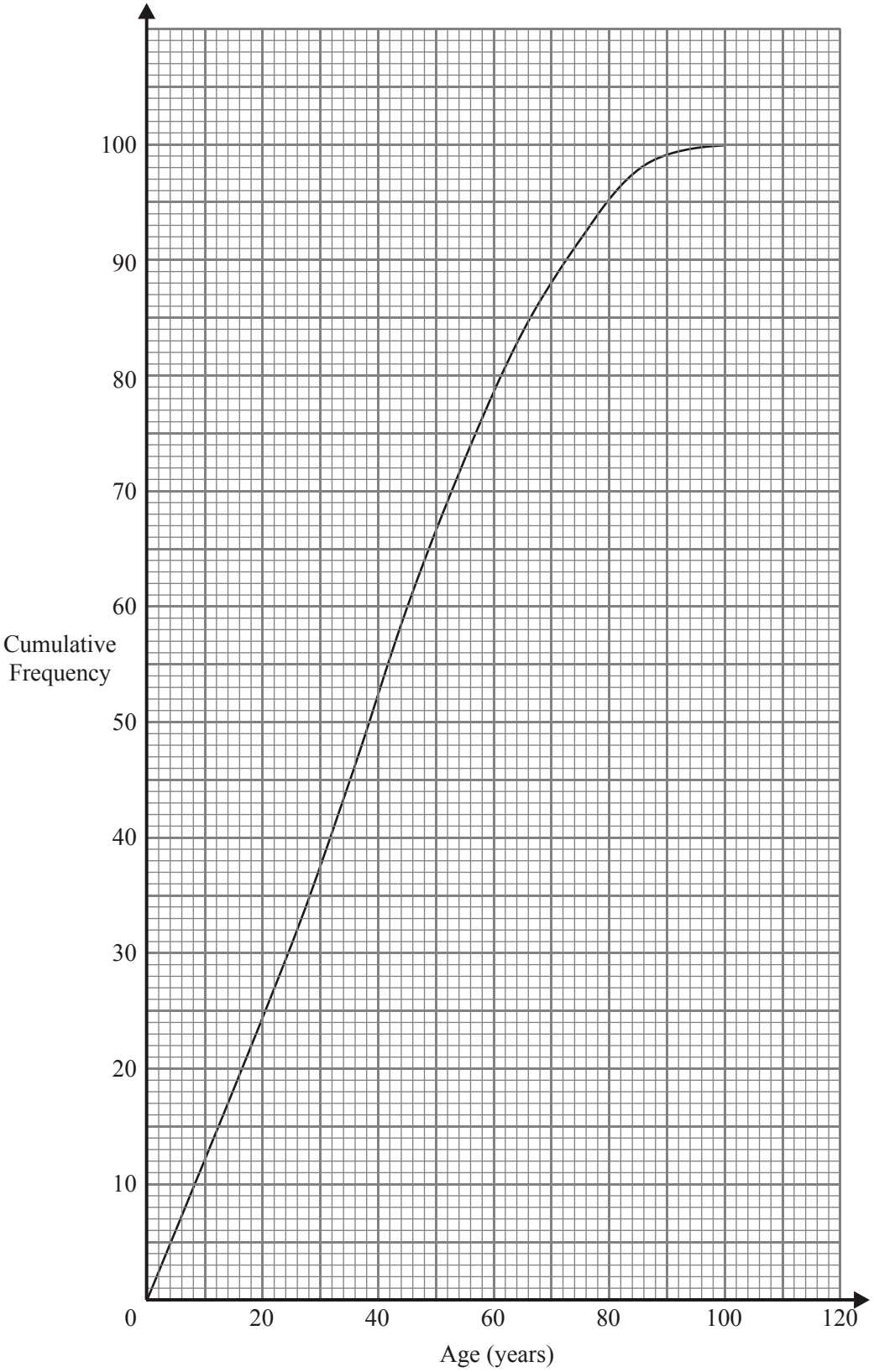
The lowest number of goals scored was 0
The highest number of goals scored was 32

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




**(3)**
**(Total 5 marks)**

**18.** 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)**

**[4]**