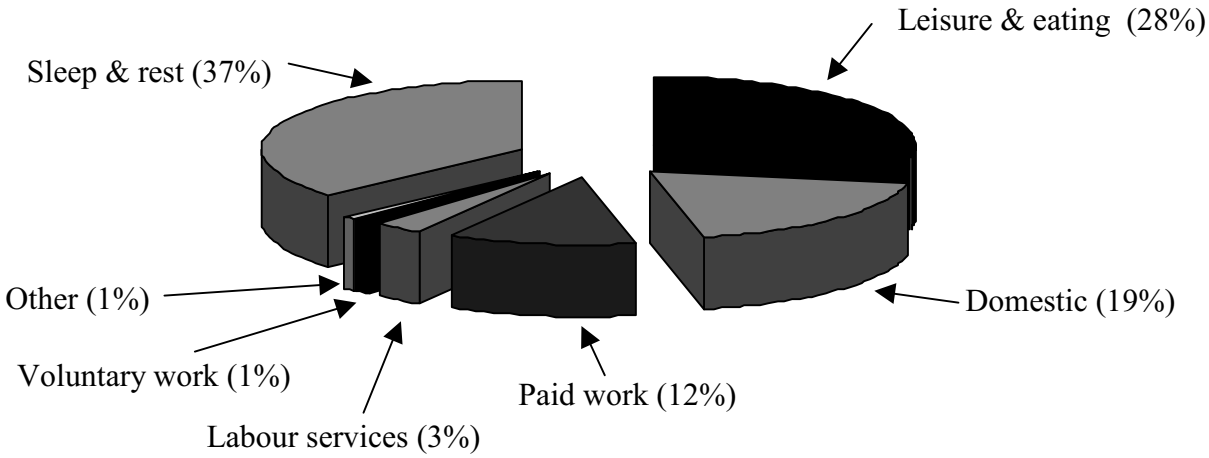
SAT REVISION; Shape & Space

ALL LEVELS.

1) The pie chart shows how much time **each day**, on average, we spend doing different things.

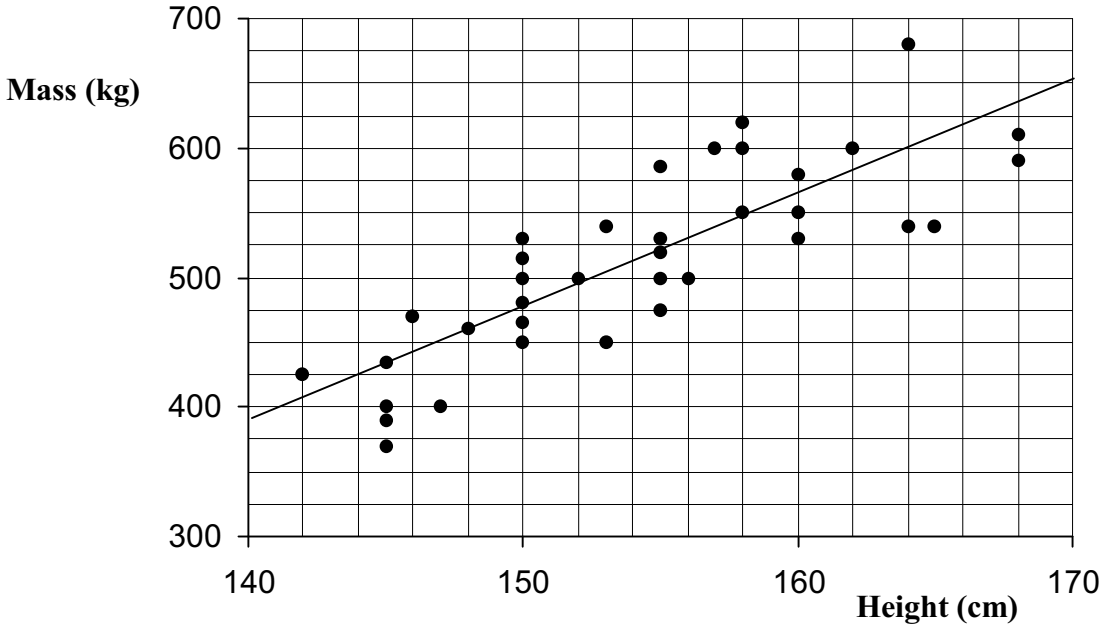


a) The sum of the percentages is not 100%.
Does this mean that there must be a mistake in the pie chart? Explain your answer.

b) Calculate how much time in one day (24 hours) we spend on average on **paid work**.
Show your working and give your answers in hours and minutes.

c) Most days of paid work are at least 7 hours long. Give one reason why the average amount is **less** than this.

2) The scatter diagram shows the heights and masses of some horses. The scatter diagram also shows a line of best fit.



a) What does the scatter diagram show about the **relationship** between the height and mass of horses?

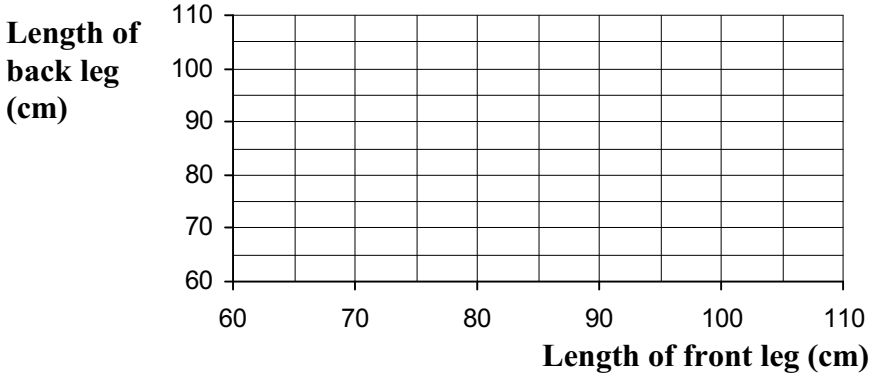
b) The **height** of a horse is **163 cm**. Use the line of best fit to estimate the mass of the horse.

c) A different horse has a **mass of 625 kg.** Use the line of best fit to estimate the height of the horse.

d) A teacher asks his class to investigate the statement:

"The length of the **back leg** of a horse is **always less than** the length of the **front leg** of a horse."

What might a scatter graph look like if the statement is correct?
Copy and complete the diagram below to show your answer.



3) These pie charts show some information about the ages of people in Greece and in Ireland.
There are about 10 million people in Greece, and about 3·5 million people in Ireland.

a) Roughly what **percentage** of people in **Greece** are aged **40–59** ?

b) There are about **10 million** people in Greece. Use your percentage from part a) to work out roughly **how many** people in Greece are aged **40–59**.

c) Dewi claims that the charts show that there are more people **under 15** in **Ireland** than in **Greece**. Explain why the charts do **not** show this.

d) There are about 60 million people in the UK. The table shows roughly what percentage of people in the UK are of different ages.

under 15	15 – 39	40 – 59	over 59
20%	35%	25%	20%

Draw a pie chart to show this information.

4) A newspaper boy keeps a record of the amount of tips he receives for his morning round at Christmas. He puts them into a grouped frequency table.

Calculate an estimate of the mean amount he receives in tips.

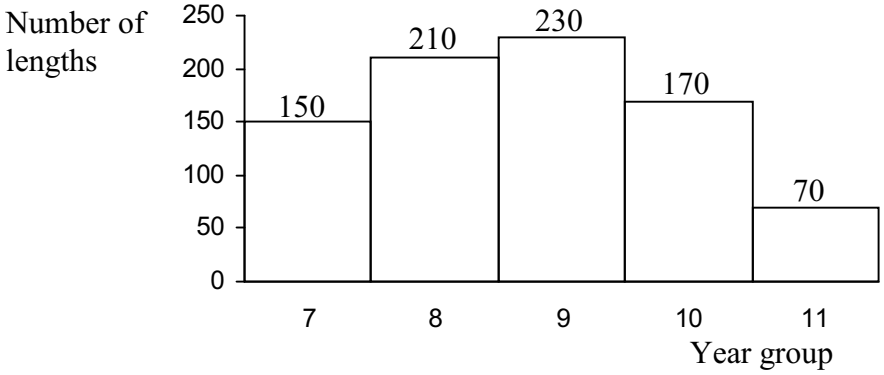
Amount	Mid-Point (x)	Number of rounds (f)	fx
1p to £1·00	0·50	6	
£1·01 to £2·00	1·50	9	
£2·01 to £3·00	2·50	12	
£3·01 to £4·00	3·50	3	
£4·01 to £5·00	4·50	3	

5) A school has 5 year groups. 80 pupils from the school took part in a sponsored swim.

Lara and Jack drew these graphs.

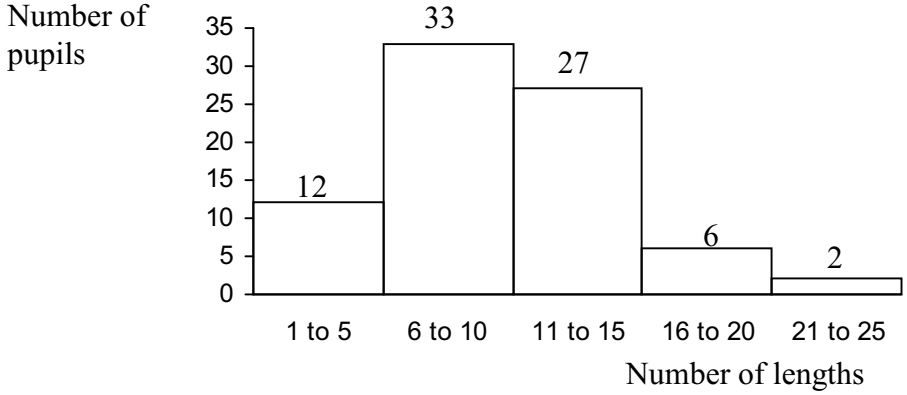
Lara's graph:

Number of lengths swum by each Year group



Jack's graph:

Number of pupils who swam different numbers of lengths



a) Look at **Lara's** graph.
Did **year 10** have **fewer** pupils taking part in the swim than **year 7**?

Answer "YES", "NO" or "CANNOT TELL".

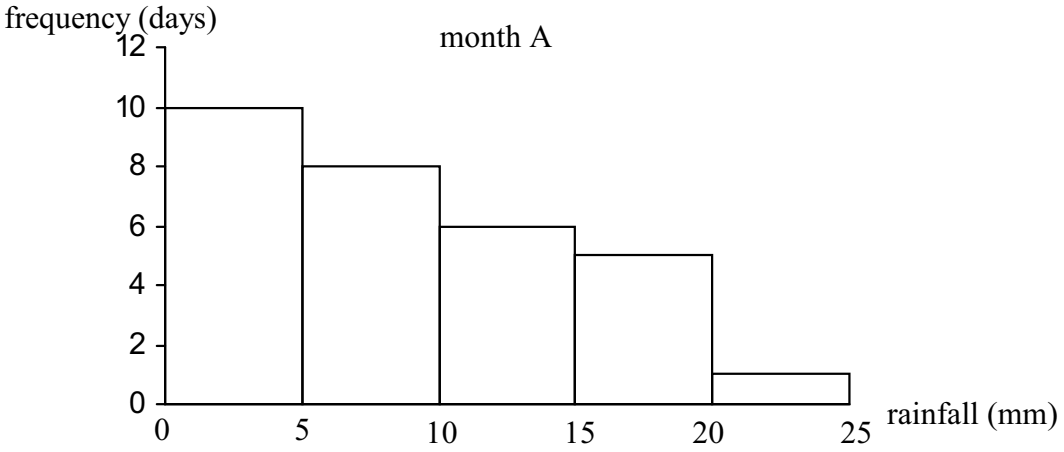
Explain your answer.

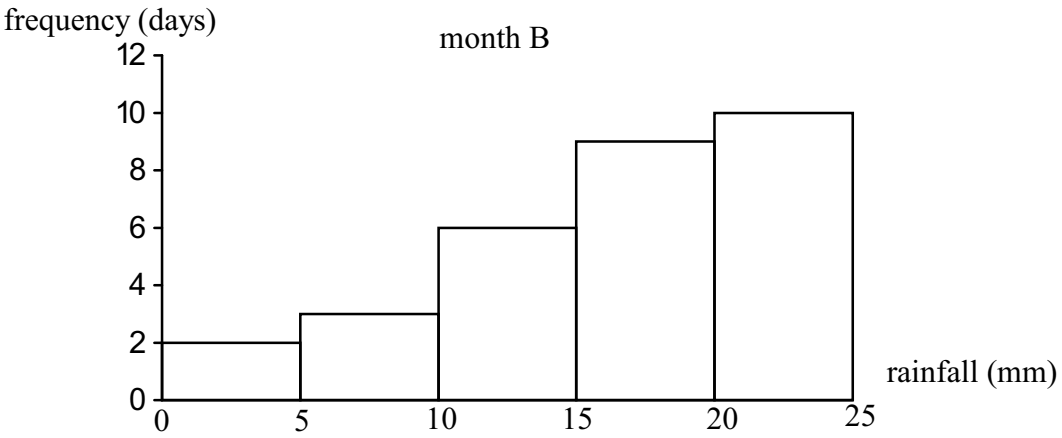
b) Use **Lara's graph** to work out the mean number of lengths swum by each of the 80 pupils. Show your working.

c) Use **Jack's graph** to work out the mean number of lengths swum by each of the 80 pupils. Show your working.

d) Explain why the means calculated from Lara's graph and Jack's graph are different.

6) The two frequency diagrams below show the amount of rain that fell in two different months.





a) Kath said: "*There were 30 days in month A*."

Explain how you know she was **right**.

b) Carl asked 5 friends: "*How much rain fell during month A?*"

They said: Jon: "*5 mm*", Dipta: "*25 mm*", Ian: "*30 mm*"
Nerys: "*75 mm*", Sharon: "*250 mm*".

Only **one** friend could have been right. You can tell who it is **without** trying to work out the **total** rainfall.
Which **one** of Carl's friends could have been right? **Explain how you know.**

c) Sudi said: "*The diagram for month B shows that it rained more at the end of the month.*"

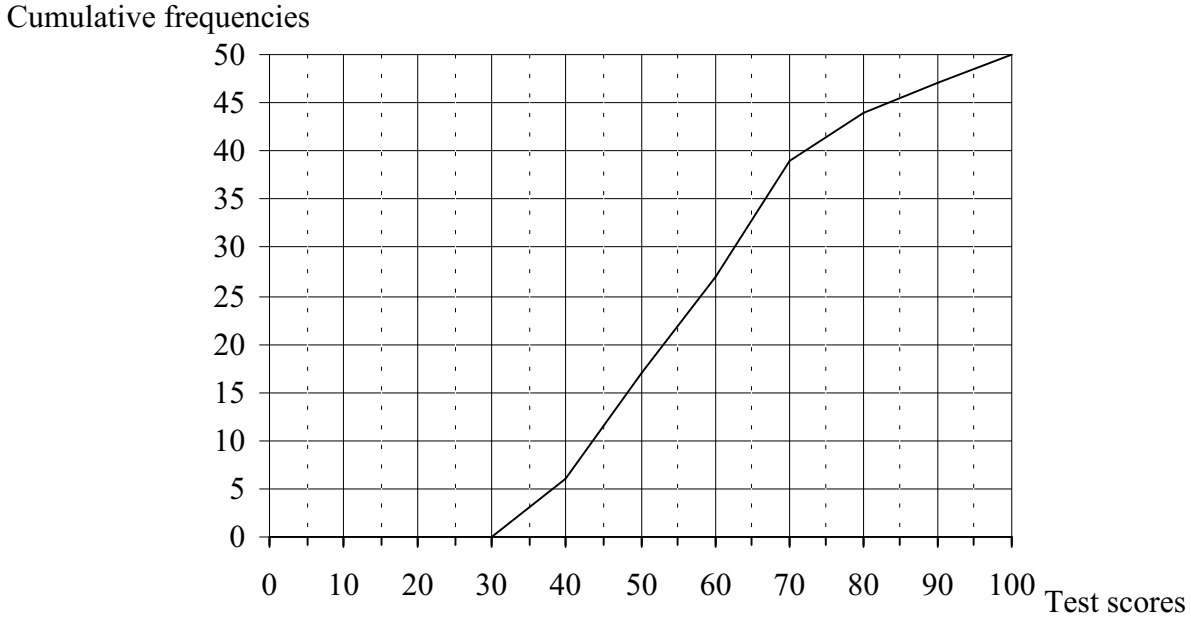
Sudi is wrong. Explain why the diagram does **not** show this.

LEVELS 6–8 ONLY.

1) The following table shows the scores obtained by a group of students in a Mathematics test.

Score	Frequency
30-40	6
40-50	11
50-60	10
60-70	12
70-80	5
80-90	3
90-100	3

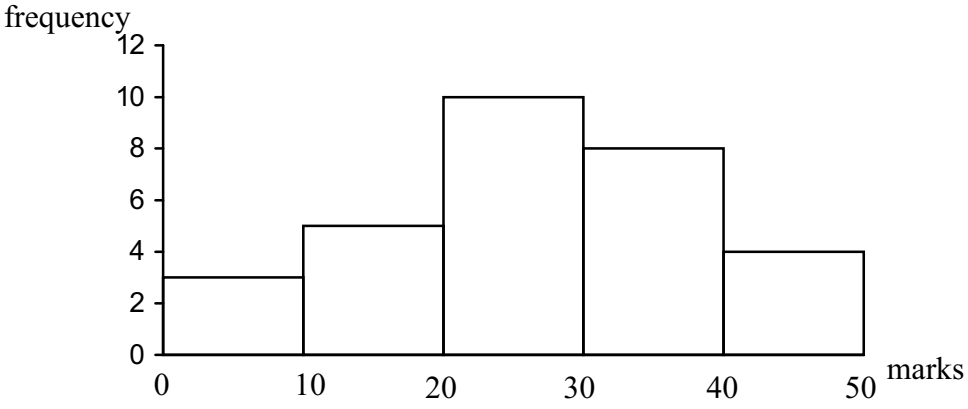
The following diagram shows the cumulative frequency graph of the test scores.



Use the cumulative frequency graph to estimate:

a) the number of students scoring **less than** 55 marks,
b) the number of students scoring **more than** 75 marks,
c) the **median** test mark,
d) the **interquartile range** of the test marks.
e) The pass mark if 40% of the students passed.

2) a) **Thirty** pupils took a maths test. The frequency graph shows the pupils' results.



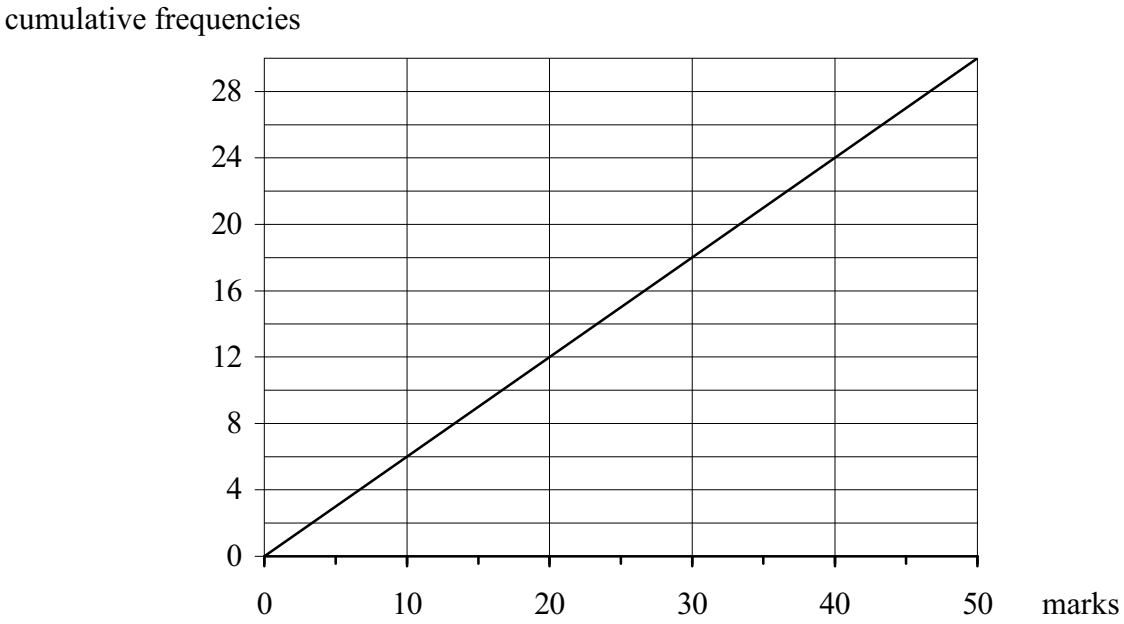
Copy and complete the table showing the **cumulative frequencies**.

Mark	Cumulative frequency
< 10	3
< 20	8
< 30	
< 40	
< 50	

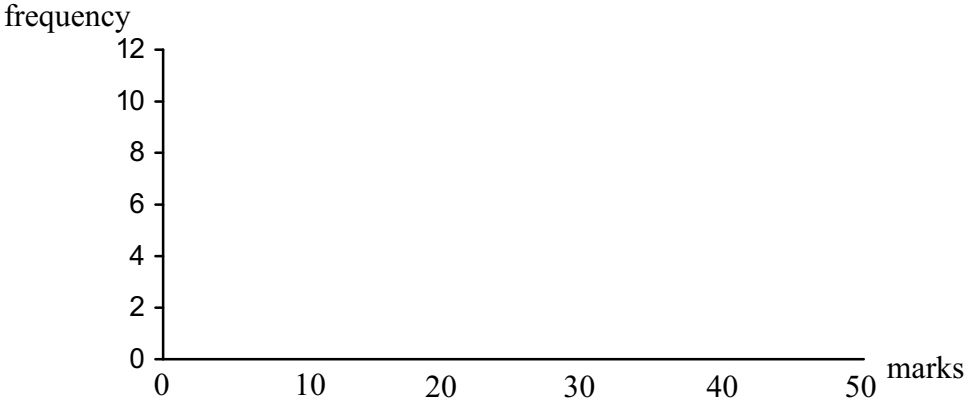
b) **On graph paper**, draw the cumulative frequency graph of the pupils' results.

c) Use your graph to estimate i) the **median** test mark,
ii) the **interquartile range** of the test marks.

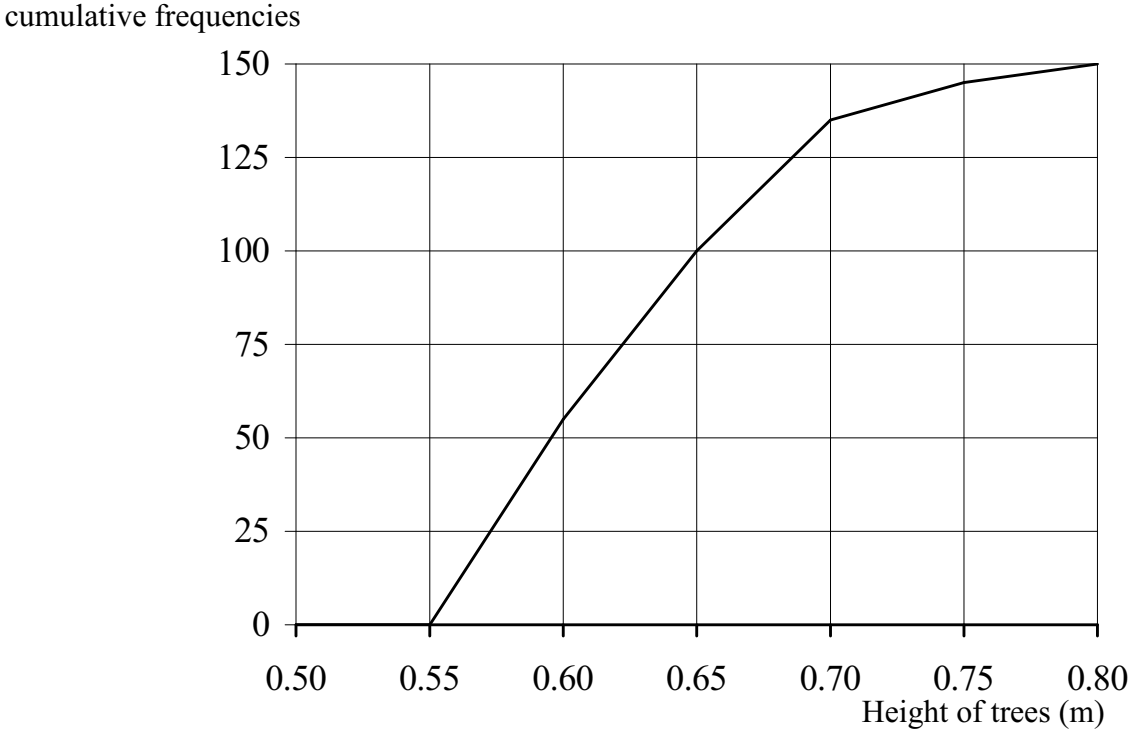
d) The 30 pupils also took a science test. The cumulative frequency graph below shows their results.



Copy and complete the **frequency graph** below to show their science results.

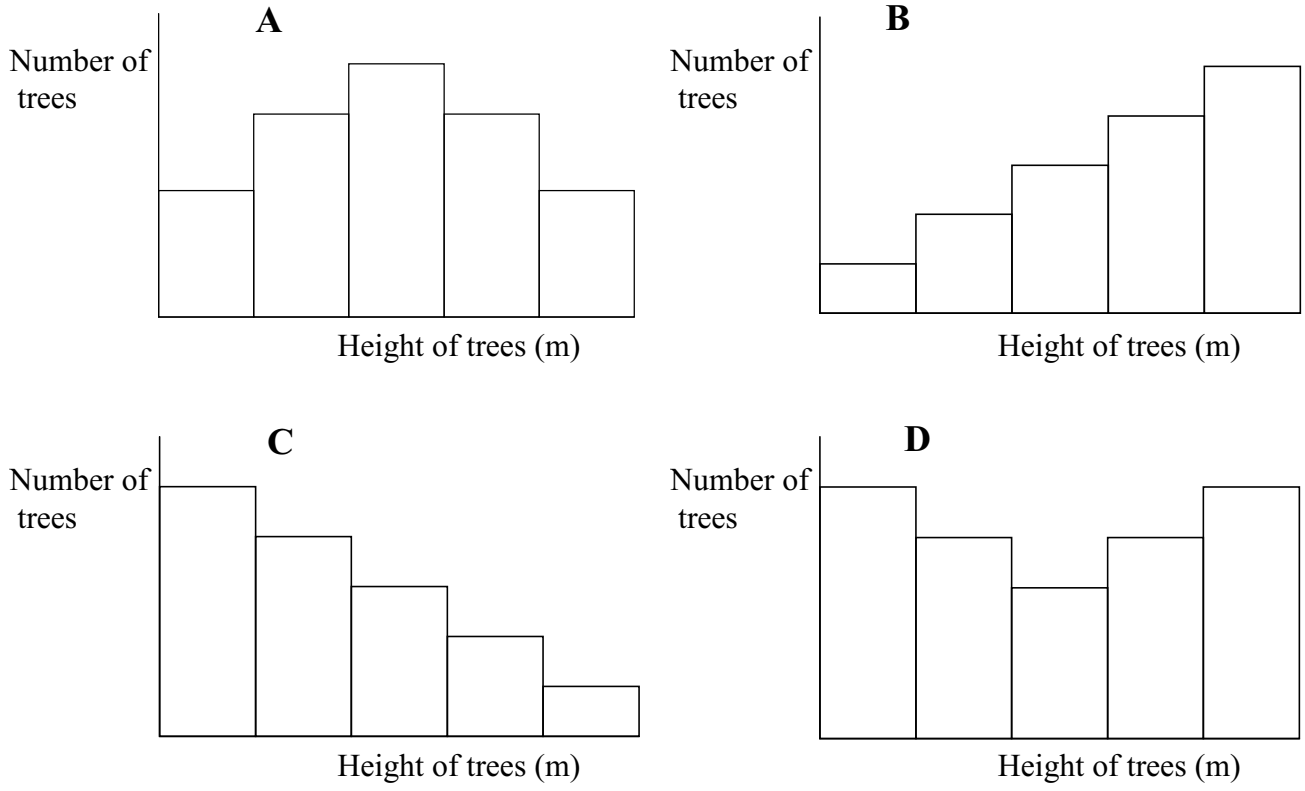


3) The cumulative frequency graph shows the height of 150 Norway fir trees.

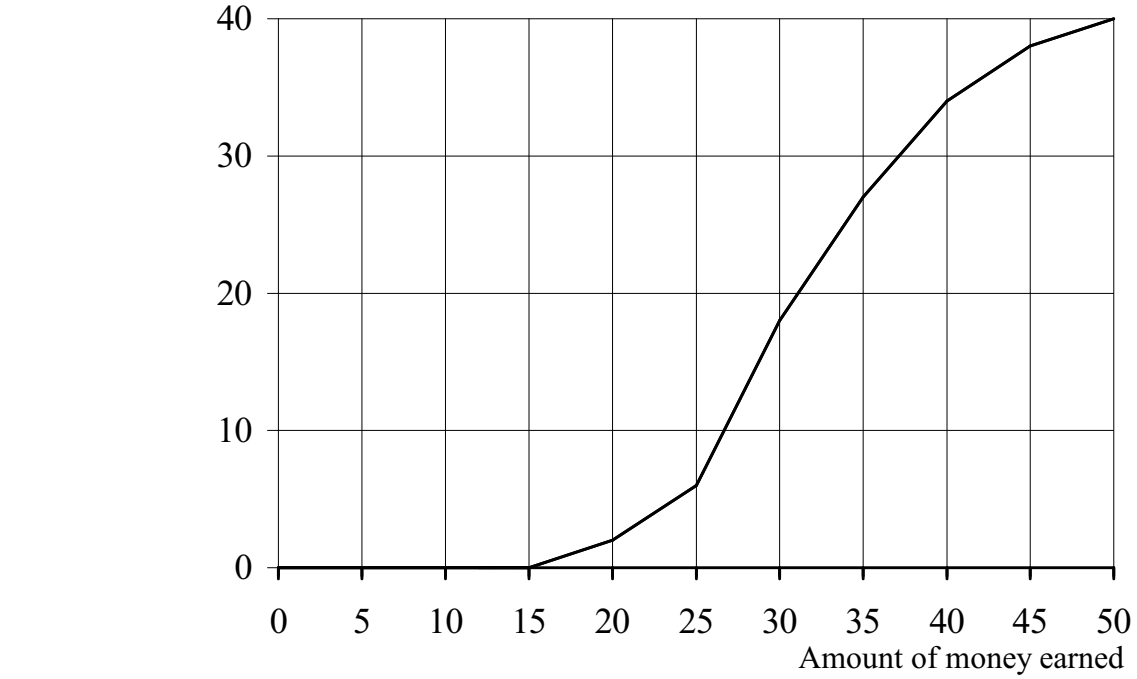


a) Use the graph to estimate the **median** height and the **interquartile range** of the Norway firs.

b) One of the following sketches shows the distribution of heights of the Norway firs. Decide which one it is and answer A, B, C or D as appropriate.



4) 40 students worked on a farm one weekend. The cumulative frequency graph shows the distribution of the amount of money they earned. No one earned less than £15.



a) Read the graph to estimate the **median** amount of money earned.

b) Estimate the **percentage** of students who earned **less than £40**.

c) Use the graph to estimate the **interquartile range** of the amount of money earned.

d) 30 of the students work on the farm another weekend later in the year.
The tables below show the distribution of the amount of money earned by the students.

Money earned (£)	No. of students
≥ 25 and < 30	1
≥ 30 and < 35	2
≥ 35 and < 40	3
≥ 40 and < 45	4
≥ 45 and < 50	10
≥ 50 and < 55	7
≥ 55 and < 60	3

Money earned (£)	No. of students
< 25	0
< 30	1
< 35	3
< 40	6
< 45	10
< 50	20
< 55	27
< 60	30

On graph paper, draw the cumulative frequency graph of the money earned.

e) State which of the following statements are true?

A: Three of the students earned less than £35 each.
B: The median amount earned is between £40 and £45.
C: Most of the 30 students earned more than £50 each.

ANSWERS.

ALL LEVELS.

1) a) No. The percentages could have been rounded to the nearest whole number.
   b) {Convert the 24 hours into minutes etc.) 2 hours 53 minutes (to the nearest minute).
   c) We are not always working during working hours, e.g. lunch times etc.
2) a) There is a good degree of **positive correlation** between the heights and masses.
   b) Approximately 590 kg.
   c) Approximately 167 cm.
   d) Any line plotted below the points (60, 60), (70, 70), (80, 80), (90, 90), (100, 100), (110, 110) etc.
3) a) About 25%.
   b) About 2·5 million.
   c) The charts show that in Ireland there is a greater percentage of the population than in Greece who are under 15. **They say nothing about actual numbers etc.**
   d) Angles 72^o, 126^o, 90^o, 72^o.
4) £2.14p.
5) a) CANNOT TELL. Since Lara's graph gives us the number of lengths swam and NOT the number of pupils taking part etc.
   b) 10.375.
   c) 10.0625.
   d) The mean calculated from Lara's graph is EXACT. The mean calculated from Jack's graph is approximate since we cannot tell the exact numbers of lengths swam etc.
6) a) The number of days in the month is simply the sum of the frequencies; 10 + 8 + 6 + 5 + 1 = 30.
   b) Sharon. The other estimates are too small.
   c) The diagram only shows *the number of days* etc. and consequently does not indicate which day is which etc.

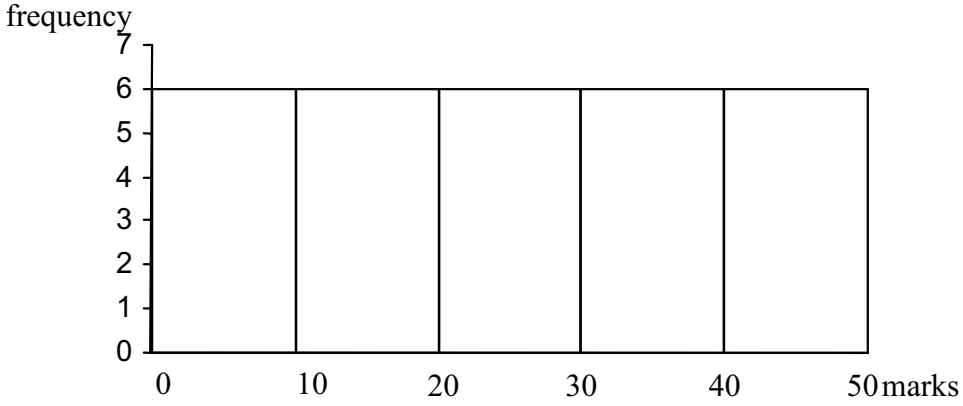
LEVELS 6–8 ONLY.

1) a) 22 students.
   b) 8 students.
   c) 58 marks.
   d) Approximately 22.
   e) Approximately 63 marks.

2) a)

Mark	Cumulative frequency
< 10	3
< 20	8
< 30	18
< 40	26
< 50	30

   c) i) Approximately 27, ii) approximately 18.
   d)



3) a) Median is approximately 0.64 m, interquartile range is approximately 0.09 m.
b) C.

4) a) Approximately £31.50p.
b) Approximately 85%.
c) Approximately £10.
e) A.