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3 The speeds of 120 cars on a stretch of motorway were measured and the following results were obtained.

data hasn't been rounded this time.

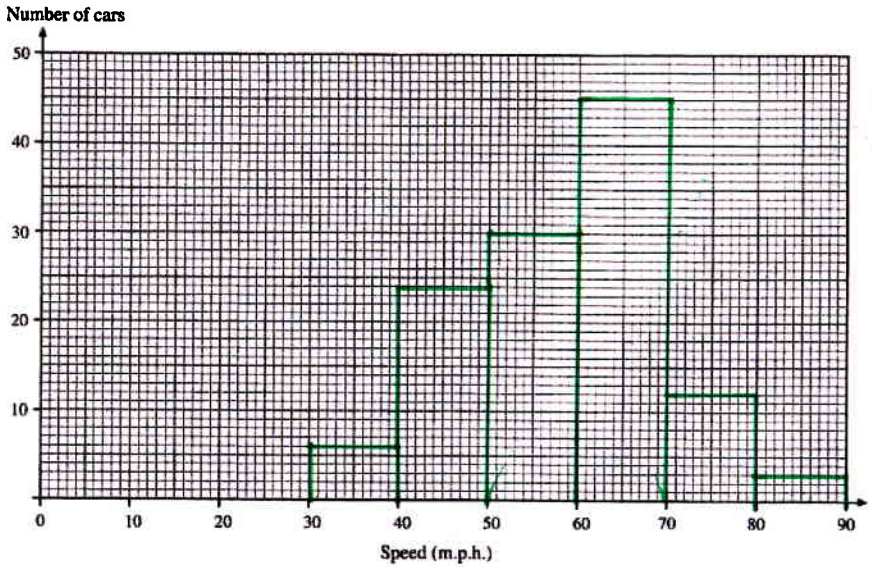
Speed, s (m.p.h.)	Number of cars
$30 \leqslant s < 40$	6
$40 \leqslant s < 50$	24
$50 \leqslant s < 60$	30
$60 \leqslant s < 70$	45
$70 \leqslant s < 80$	12
$80 \leqslant s < 90$	3

(a) Write down the modal class.

$60 \leq s < 70$

[1]

(b) On the graph paper below, draw a grouped frequency diagram for the data. [2]



often linked to grouped frequency / frequency polygon questions.

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(c) Find an estimate for the mean speed of the cars.

$$\frac{(35\times 6)+(45\times 24)+(55\times 30)+(65\times 45)+(75\times 12)+(85\times 3)}{120}$$

$$= \frac{210+1080+1650+2925+900+255}{120}$$

$$= \frac{7020}{120}$$

$$= 58.5 \text{ mph}$$

[4]

* Check: does this look sensible?

yes its pretty central in the data. *

Turn over.

Arrgh – rounded again!

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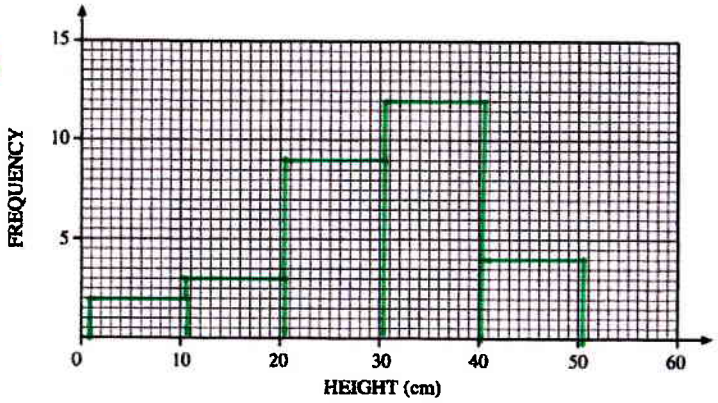
4 A nurseryman measures the heights of some shrubs correct to the nearest centimetre. This table shows his results.

Height (cm)	1 to 10	11 to 20	21 to 30	31 to 40	41 to 50
Frequency	2	3	9	12	4

watch the scale here

(a) On the grid below, draw a grouped frequency diagram to show these results.



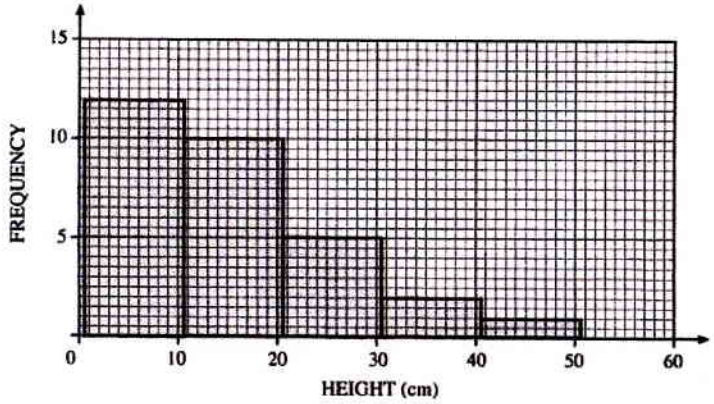
[2]

(b) One shrub is selected at random. What is the probability that its height, correct to the nearest cm, is between 11 cm and 20 cm?

3/30

[2]

This grouped frequency diagram shows the distribution of the heights of a different sample of shrubs.



Make sure that you use one of the average measures in your answer

(c) Which sample of shrubs, the first or the second, was taller on average? You must give a reason for your answer.

The first which has a modal height of 31-40 cm compared with the 2nd modal height of 1-10 cm

[2]

WARM UP 1

John is an insurance salesman and his wife Denise works in the main office of the company. In one week, John was paid £85 plus 8% commission on his insurance sales of £3700. For the same week, Denise was paid £8.42 an hour for a 35 hour week plus 5 hours at time and a half.
Calculate the difference in their earnings for the week.

John $85 + (0.08 \times 3700) = £381$

Denise $(8.42 \times 35) + (5 \times 1.5 \times 8.42) = £357.85$

Difference = £23.15

[6]

WARM UP 2

Solve the following equation.

$7x + 8 = 5(x + 3)$

$7x + 8 = 5x + 15$

$7x - 5x = 15 - 8$

$2x = 7$

$x = \frac{7}{2}$

[3]

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Turn over.

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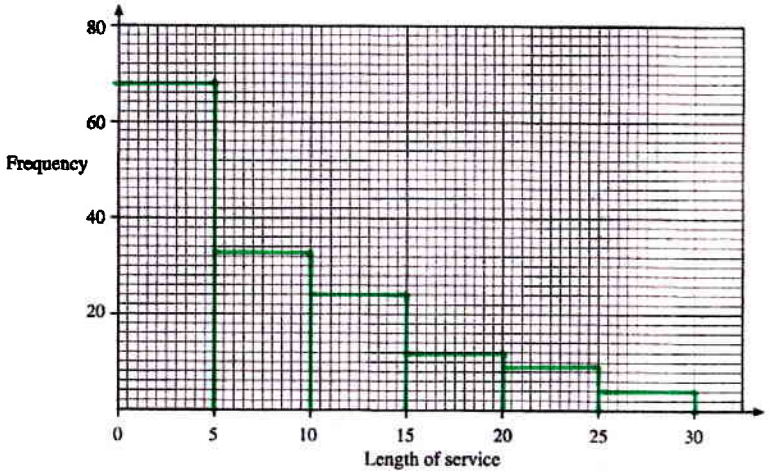
(5) A college employs 150 staff. The time that a member of staff has worked at the college is called their length of service. The table below shows a grouped frequency distribution of the length of service of the staff.

Time isn't rounded here.

Length of service	Frequency
Up to and including 5 years.	68
Over 5 years, up to and including 10 years.	33
Over 10 years, up to and including 15 years.	24
Over 15 years, up to and including 20 years.	12
Over 20 years, up to and including 25 years.	9
Over 25 years, up to and including 30 years.	4

(a) On the graph paper below, draw a grouped frequency diagram for this distribution.



[2]

(b) Write down the modal class.

up to + including 5 years.

[1]

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(c) The following grouped frequency diagram shows the distribution of the lengths of service of the 150 staff in another college.

The staff of which college, the first or the second, has on average, the longer lengths of service? You must give a reason for your answer.

The second which has a modal service length of 10-15 years compared to that of the first.

[2]

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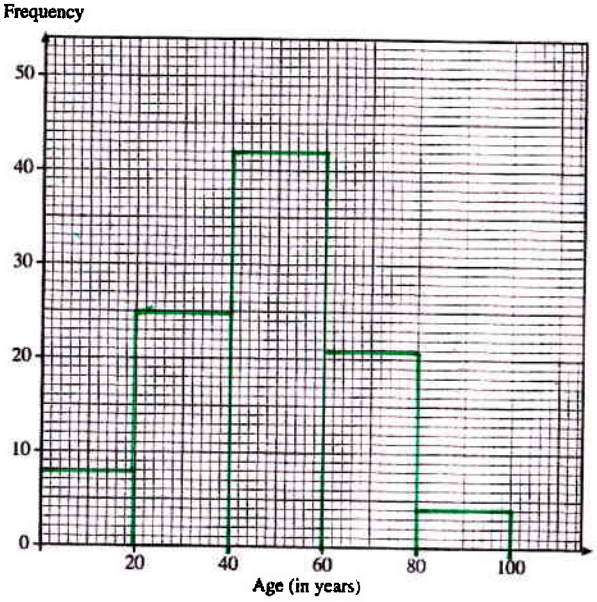
6. (a) The table shows a grouped frequency distribution of the ages of 100 people at a concert.

Again, no rounding for age.

Age x (in years)	Frequency
$0 < x \leqslant 20$	8
$20 < x \leqslant 40$	25
$40 < x \leqslant 60$	42
$60 < x \leqslant 80$	21
$80 < x \leqslant 100$	4

(i) On the graph paper below, draw a grouped frequency diagram for the data.



[2]

(ii) Write down the modal group.

$40 < x \leq 60$

[1]

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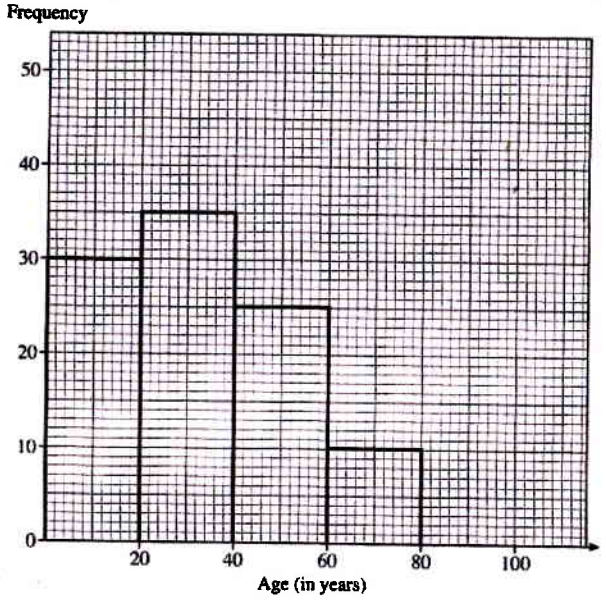
(b) Below is a grouped frequency diagram for a different 100 people at some other concert.



Which concert, the first or the second, had the younger audience? You must explain your reasoning by making reference to the two frequency diagrams.

The second concert had the younger audience because 65/100 people were 40 or younger compared to only 33/100 in the first audience.

[2]

Grouped Frequency Diagrams & Frequency Polygons PPQ's

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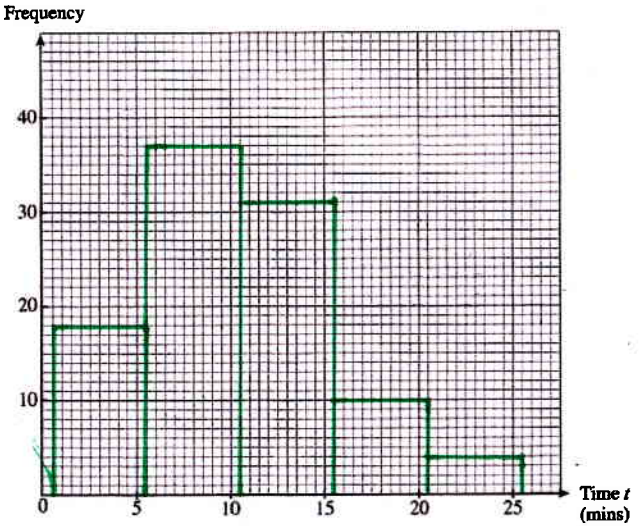
1 The times of telephone calls to a certain company were [redacted] and the results are summarised in the following table.

Measured to the nearest minute, so be careful....
1st group goes from 0.5 to 5.5
2nd group " " 5.5 to 10.5
etc.

Time t (in minutes)	Frequency
1 - 5	18
6 - 10	37
11 - 15	31
16 - 20	10
21 - 25	4

(a) On the graph paper below, draw a grouped frequency diagram for the data. [2]



(b) Write down the modal group.

MOST FREQUENT - TALLEST BAR ⇒ 6-10 mins

[1]

(A184/2)

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2 One afternoon, a shopkeeper kept a record of the amount of money spent by each customer in his shop. The table below shows his results.

rounded again

Amount spent (to the nearest £)	1 to 10	11 to 20	21 to 30	31 to 40	41 to 50
Frequency	9	5	3	7	1

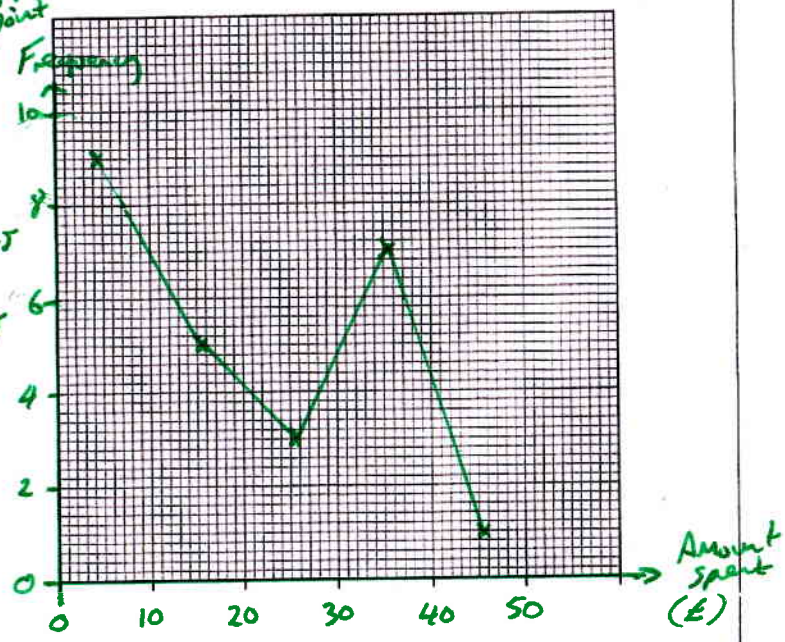
On the graph paper below, draw a ~~frequency polygon~~ to show this data. [3]

plot Frequency polygons as points at midpoint of each group....

1st group midpt = $\frac{(1+10)}{2} = 5.5$

2nd group M.P. = $\frac{(11+20)}{2} = 15.5$

etc



This question is made more difficult by expecting the student to decide on an appropriate scale.... try to make the graph fill the space available.

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WARM UP 3

Find an expression, in terms of n, for the nth term of **each** of the following sequences.

(a) 1^2, 2^2, 3^2, 4^2, ...

n^2

[1]

(b) 2^2, 3^2, 4^2, 5^2, ...

$(n+1)^2$

[1]

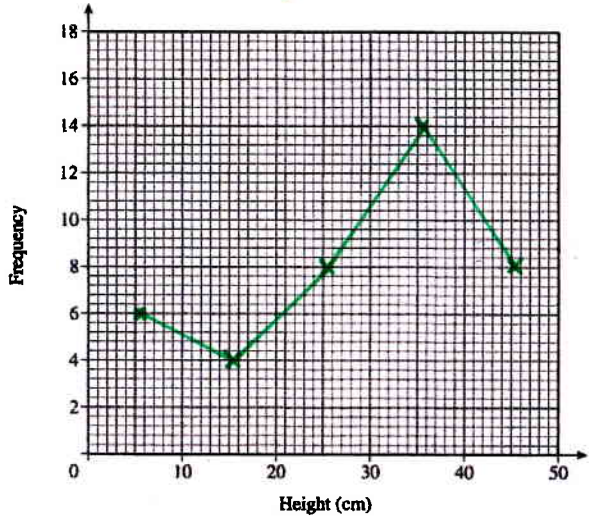
7 The table below shows the distribution of the heights, **correct to the nearest centimetre**, of 40 plants.

5.5 15.5 25.5 rounded. 35.5 45.5

Height (cm)	1 to 10	11 to 20	21 to 30	31 to 40	41 to 50
Frequency	6	4	8	14	8

(a) On the grid below, draw a frequency polygon to show the distribution of these heights.

midpoints



[2]

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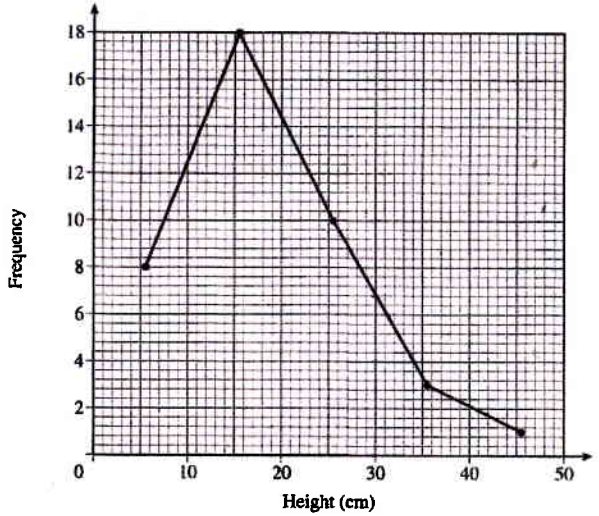
(b) The frequency polygon below shows the distribution of the heights of a different sample of 40 plants.



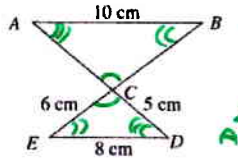
Which of the samples, the first or the second, has the greater mean height? Give a reason for your answer.

The first because the modal is 31-40 compared with 11-20.

[2]

WARM UP 4

The diagram below shows two **similar** triangles ABC and DEC.
The lines AB and DE are parallel. AB is 10 cm, DE is 8 cm, DC is 5 cm and EC is 6 cm.



match up corresponding sides:

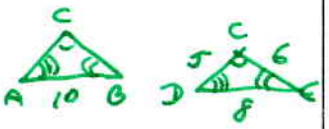


Diagram not drawn to scale.

Calculate the length of the side BC.

$\frac{BC}{CE} = \frac{AB}{DE}$

$\frac{BC}{6} = \frac{10}{8}$

[3]

$BC = \frac{10}{8} \times 6 = \frac{60}{8} = \frac{30}{4} = \frac{15}{2} = 7.5$ cm

Turn over.