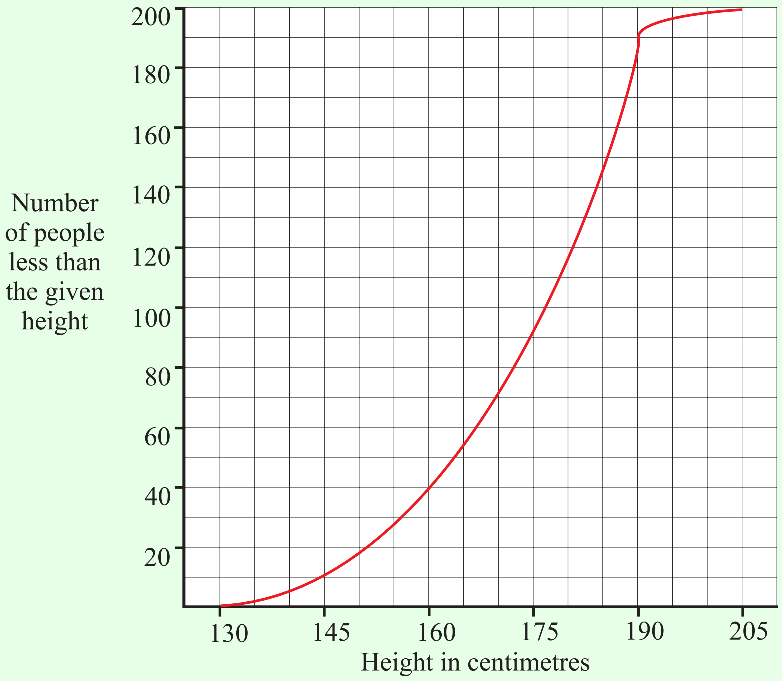
STATISTICS (Q 7, PAPER 2)

2003

7 (a) The heights of 200 people are recorded to the nearest centimetre. The results are represented by the ogive below.



(i) Copy the cumulative frequency table below and use the ogive to complete it.

Height	<130	<145	<160	<175	<190	<205
Number of people	0					

(ii) Hence, copy and complete the following grouped frequency table:

Height	130 – 144	145 – 159	160 – 174	175 – 189	190 – 204
Number of people					

(iii) Using your grouped frequency table, and taking mid-interval values, find an estimate of the mean height.

(iv) Use the ogive to estimate the number of people who are taller than the mean.

(b) (i) The mean of the following five numbers is 10. Find the standard deviation of the numbers.

7, 9, 10, 11, 13.

(ii) The mean of the following five numbers is also 10. Find the standard deviation of these numbers.

5, 7, 9, 13, 16.

(iii) What does comparing the two standard deviations tell you about the two sets of numbers?

SOLUTION

7 (a) (i)

Height	<130	<145	<160	<175	<190	<205
Number of people	0	10	40	90	190	200

7 (a) (ii)

Height	130 – 144	145 – 159	160 – 174	175 – 189	190 – 204
Number of people	10	30	50	100	10

7 (a) (iii)

Draw up a frequency table using the mid-interval values. To get a mid-interval value add the two numbers together and divide by 2.

Ex. Class interval: 130 – 144

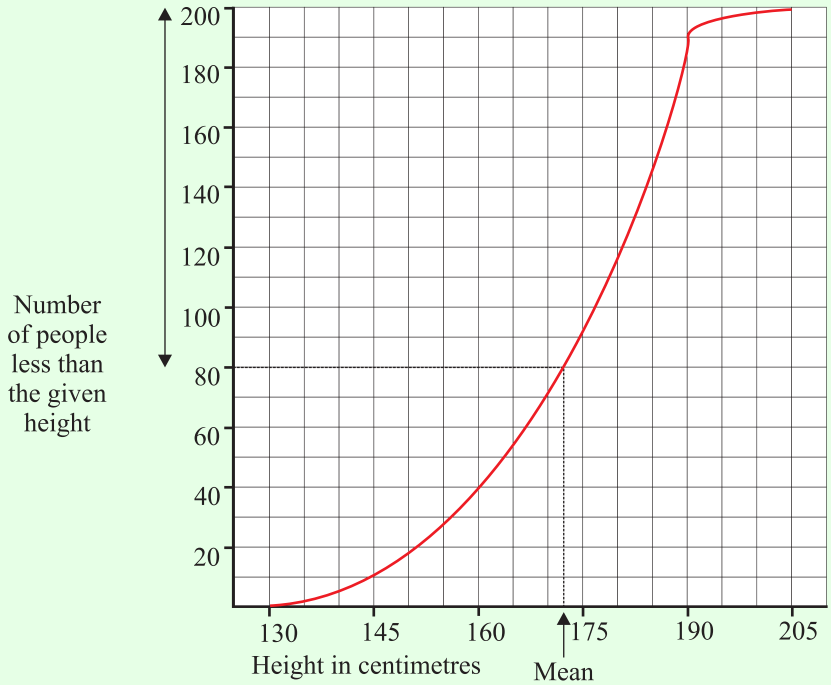
Mid-interval value: $\frac{130+144}{2}=137$

$$\bar{x}=\frac{f_1x_1+f_2x_2+\ldots\ldots+f_Nx_N}{f_1+f_2+\ldots\ldots\ldots+f_N}=\frac{\sum fx}{\sum f}$$ **2**

x	f	fx
137	10	1370
152	30	4560
167	50	8350
182	100	18200
197	10	1970
	200	34450

Mean height: $\bar{x}=\frac{\sum fx}{\sum f}=\frac{34450}{200}=172.25$

7 (a) (iv)



As you can see from the ogive, the number of people who are taller than the mean height = 200 – 80 = 120.

7 (b) (i)

Steps
1. Find the mean.
2. Draw up a table of x, d and d^2.
3. Apply the standard deviation formula.

1. This is done for you.

$\bar{x} = 10$

2. The deviation, d, is given by the formula:
$d = (x - \bar{x}) = (\text{Number} - \text{Mean})$.
To work out d, get the difference between each number, x, and the mean, $\bar{x}$.

x	d	d^2
7	–3	9
9	–1	1
10	0	0
11	1	1
13	3	9
		20

3. $\sigma = \sqrt{\dfrac{20}{5}} = \sqrt{4} = 2$

$\sigma = \sqrt{\dfrac{\text{Sum of (Deviations)}^2}{\text{Number of numbers}}} = \sqrt{\dfrac{\sum d^2}{N}}$ 4

7 (b) (ii)

1. This is done for you.

$\bar{x} = 10$

2. The deviation, d, is given by the formula:
$d = (x - \bar{x}) = (\text{Number} - \text{Mean})$.
To work out d, get the difference between each number, x, and the mean, $\bar{x}$.

x	d	d^2
5	–5	25
7	–3	9
9	–1	1
13	3	9
16	6	36
		80

3. $\sigma = \sqrt{\dfrac{80}{5}} = \sqrt{16} = 4$

$\sigma = \sqrt{\dfrac{\text{Sum of (Deviations)}^2}{\text{Number of numbers}}} = \sqrt{\dfrac{\sum d^2}{N}}$ 4

7 (b) (iii)

The standard deviation, σ, is a measure of the spread of the values about the mean.

There is a greater spread of numbers about the mean with the second set of numbers.