STATISTICS (Q 7, PAPER 2)

2010

7   (a)   The following table gives the distribution of donations, in euro, made by 20 people to an appeal fund:

Amount of donation, €	5 – 15	15 – 25	25 – 35	35 – 65
Number of people	2	4	8	6

[Note: 5 – 15 means 5 or over but less than 15 etc.]

(i)   Draw a histogram to represent the data.

(ii) Taking mid-interval values, calculate the mean amount donated.

(iii) Taking mid-interval values, calculate the standard deviation, correct to one decimal place.

(b)   The cumulative frequency table below refers to the scores, in an aptitude test, of 400 candidates who applied for places on a particular course:

Score	≤ 20	≤ 40	≤ 60	≤ 80	≤ 100
Cumulative frequency	40	150	300	380	400

(i)   Draw the cumulative frequency curve.

(ii) Use your curve to estimate the median score.

(iii) Candidates who scored above 65 in the test were called for interview. Use your curve to estimate the number of candidates who were called for interview.
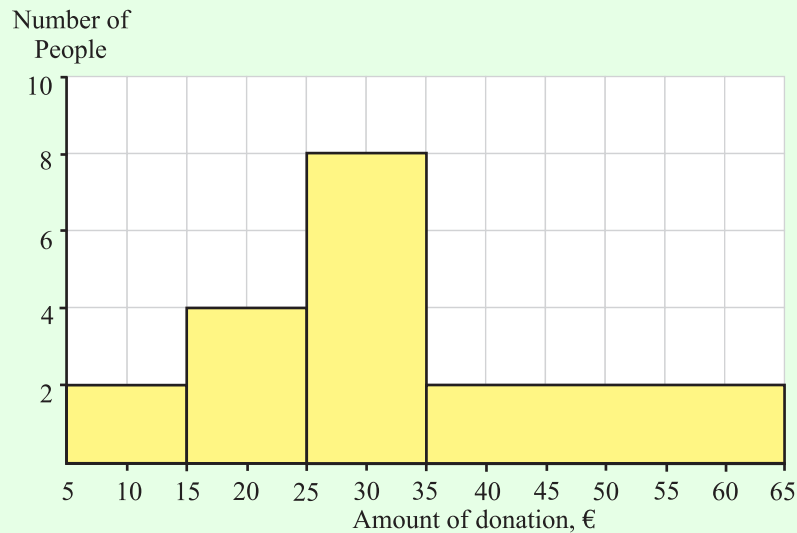
SOLUTION

7 (a) (i)

Area (No. of students) = Base × Height = Frequency

Look at the donations. Pick out the smallest interval (5–15) and make this base one unit. Therefore the interval 35–65 has a base of 3 units. Divide the base into the area (frequency) to get the height of a box.

Amount of donation, €	5 – 15	15 – 25	25 – 35	35 – 65
Number of people	2	4	8	6
Base	1	1	1	3
Height	2	4	8	2

Number of People

Amount of donation, €

7 (a) (ii)

Amount of donation, €	5 – 15	15 – 25	25 – 35	35 – 65
Mid-interval values	10	20	30	50
Number of people	2	4	8	6

x	f	fx
10	2	20
20	4	80
30	8	240
50	6	300
	20	640

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

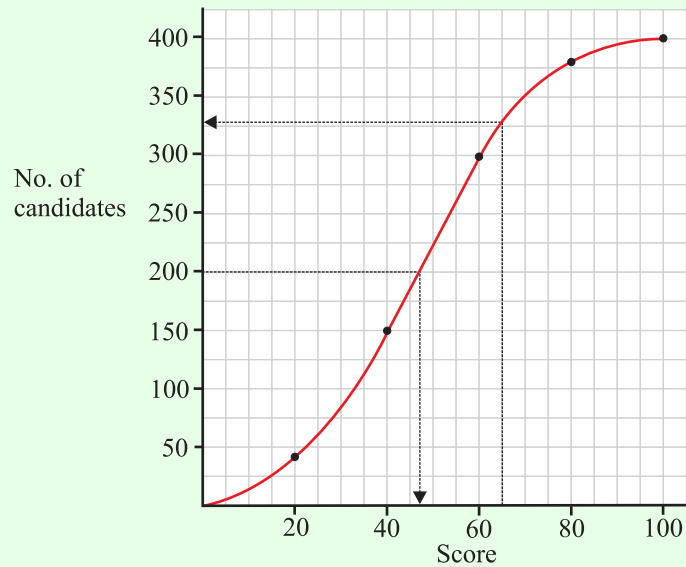$$\bar{x} = \frac{\sum fx}{\sum f} = \frac{640}{20} = 32$$

7 (a) (iii)

x	f	fx	d	d^2	fd^2
10	2	20	-22	484	968
20	4	80	-12	144	576
30	8	240	-2	4	32
50	6	300	18	324	1944
	20	640			3520

$$\sigma = \sqrt{\frac{\sum fd^2}{\sum f}}$$

$$\sigma = \sqrt{\frac{\sum fd^2}{\sum f}} = \sqrt{\frac{3520}{20}} = 13.3$$

7 (b) (i)

Score	≤ 20	≤ 40	≤ 60	≤ 80	≤ 100
Cumulative frequency	40	150	300	380	400

7 (b) (ii)

The total number of candidates that sat the exam was 400.
Half of this number is 200. The median score as seen on the graph is 47 marks.

7 (b) (iii)

The number of candidates scoring above 65 marks was 400 – 326 = 74.