2.3 Grouped Data: Frequency Histograms

Histograms and Frequency Distributions

Healthy Crunch Cereal is about to take over sponsorship of the TV program "Space Voyage." The advertising manager has requested a report on the age distributionof the viewers so the spot ads can be tailored to appeal to the age groups with the most viewers. The viewer age report contains the graph in Figure 2-13 that was made from a random sample of viewers.

GUIDED EXERCISE 6

Review the graph of the viewer age distribution for the program "Space Voyage" (Figure 2-13) before answering the following questions.

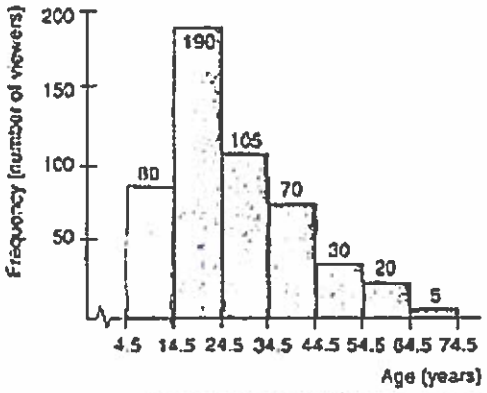
(a) What does the height of each bar represent? How many viewers are represented in this graph? ⇨ 80+190+105+70+30+20+5=500

(b) What does the width of a bar represent? ⇨ age category

(c) What ages are included in the group with the most viewers? Is this graph detailed enough to tell you exactly how many viewers are 21 years old? ⇨ 14.5 - 24.5, no.

(d) What age would best represent all the ages in each category? Why? ⇨ averages: 9.5, 19.5, 29.5, 39.5, 49.5, 59.5, 69.5

FIGURE 2-13 Viewer Age for "Space Voyage"



IB Math Studies

2.3 Grouped Data: Frequency Histograms

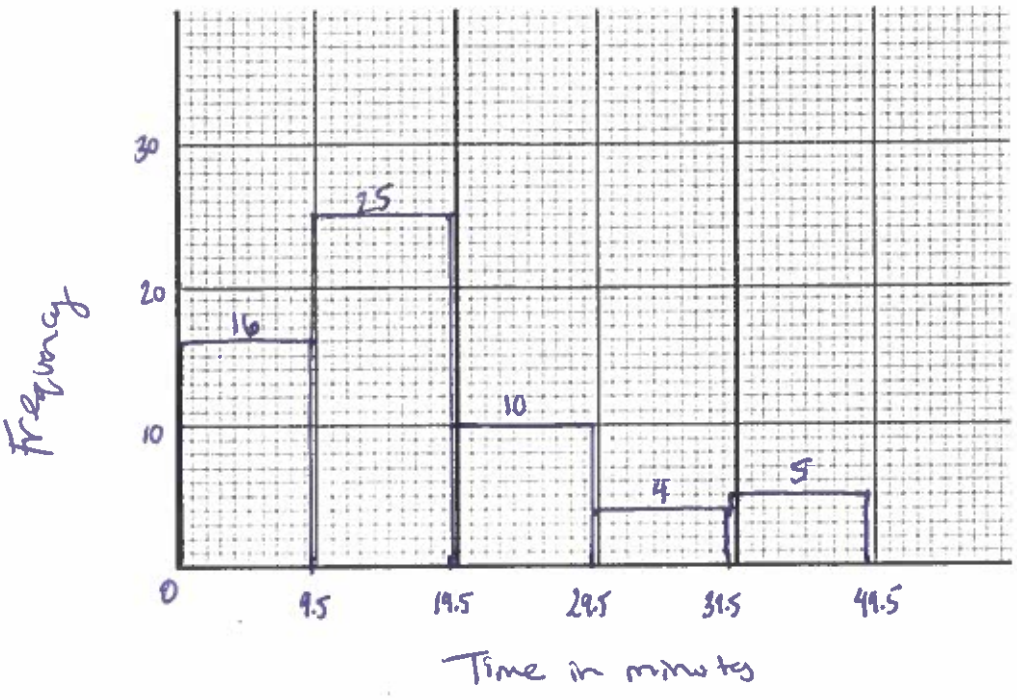
To create a histogram:

- Classes must be distinct, with no overlap. Tally data into classes.
- Determine the class boundaries: halfway point between classes
- Compute the class mark for each class. This is the midpoint of the class boundaries, and the representative value for the class.
- Draw the histogram: label with class boundaries AND the class mark.

One-Way Commute Times, in Minutes

15	27	10	3	16	20	17	40	4	3
7	25	8	21	19	15	3	17	14	8
12	43	3	8	4	16	11	18	23	12
6	2	14	13	7	15	46	12	8	18
34	13	41	28	36	17	24	27	29	9
14	26	18	24	37	31	8	16	12	16

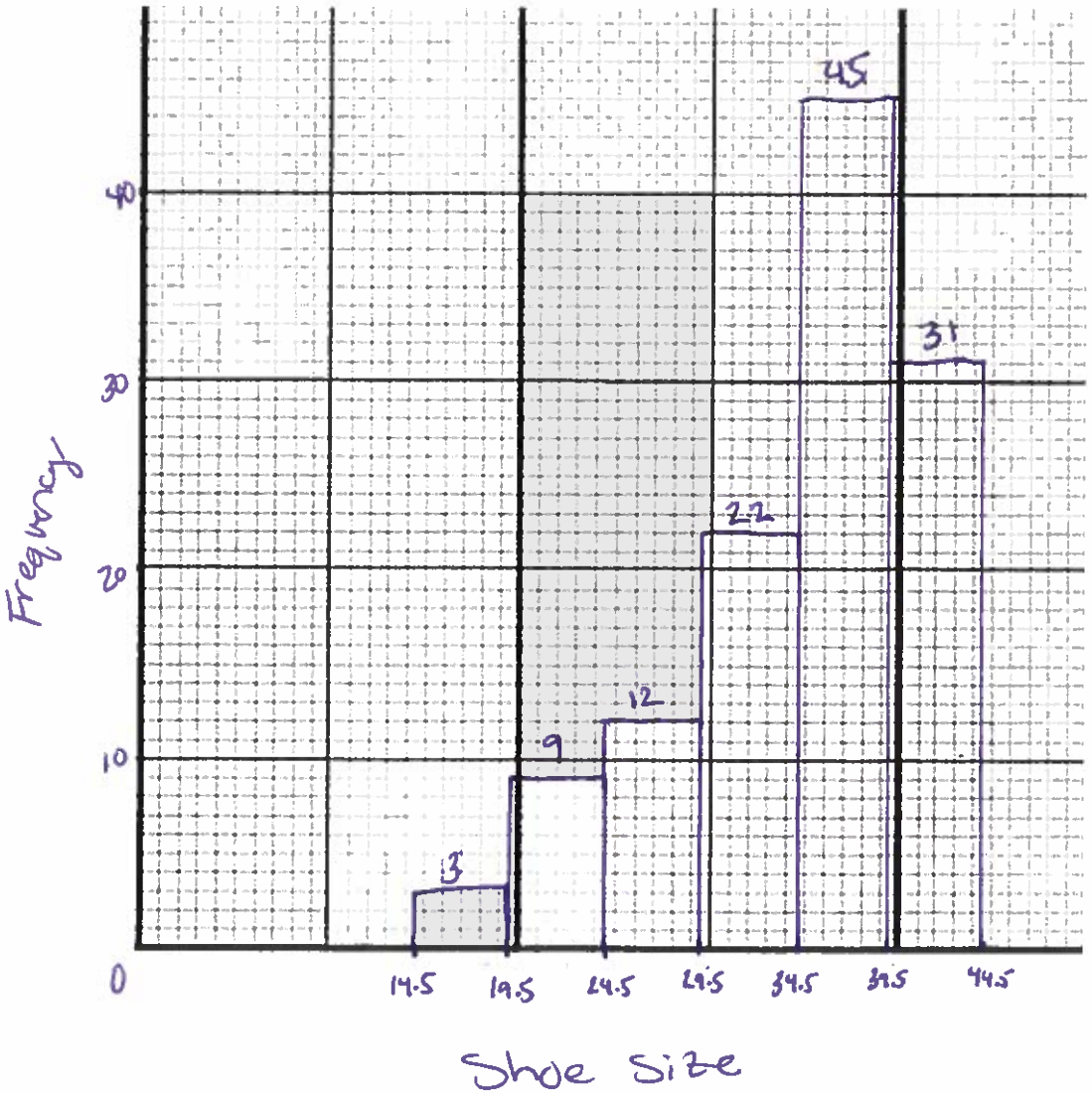
Time	Frequency	Lower Class Boundaries	Upper Class Boundaries	Class marks
$0 \le t < 10$	𝍸 𝍸 𝍸 | (16)	0	9.5	4.5
$10 \le t < 20$	𝍸 𝍸 𝍸 (25)	9.5	19.5	14.5
$20 \le t < 30$	𝍸 𝍸 (10)	19.5	29.5	24.5
$30 \le t < 40$	||| (4)	29.5	39.5	34.5
$40 \le t < 50$	𝍸 (5)	39.5	49.5	44.5



IB Math Studies

2.3 Grouped Data: Frequency Histograms

Shoe Size	Frequency	Lower Class Boundaries	Upper Class Boundaries	Class marks
15 - 19	3	14.5	19.5	17
20 - 24	9	19.5	24.5	22
25 – 29	12	24.5	29.5	27
30 – 34	22	29.5	34.5	32
35 – 39	45	34.5	39.5	37
40 - 44	31	39.5	44.5	42



IB Math Studies

2.3 Grouped Data: Frequency Tables and Histograms

IB Practice (2003)

Fifty students at Layton High School recorded how much money each student in their class spent on video rentals this month (to the nearest dollar). The results are shown in the frequency table below:

Class interval in $	Boundaries in $	Frequency
1 – 10	0.50 – 10.50	10
11 – 20	10.50 – 20.50	20
21 – 30	20.50 – 30.50	10
31 – 40	30.50 – 40.50	0
41 – 50	40.50 – 50.50	4
51 – 60	50.50 – 60.50	2
61 – 70	60.50 – 70.50	4

(a) On graph paper using a scale of 2 cm to represent each interval ($ 10.00) on the horizontal axis and 1 cm to represent 5 people on the vertical axis, draw and clearly label a frequency histogram which displays the above information. *[5 marks]*

(b) Answer the following questions:

(i) Which class is the modal class? $11-20

(ii) In which class is the median? $11-20 (25 + 26th student) *[2 marks]*

(c) Assuming these students spend the same amount on videos each month, find the probability that next month a student will spend an amount in the class interval:

(i) From $ 21 to $ 30 inclusive on video rentals. $\frac{10}{50} = \frac{1}{5}$

(ii) $ 30 or less on video rentals. $\frac{40}{50} = \frac{4}{5}$

(iii) From $ 41 to $ 60 on video rentals, given that they spent more than $ 20 on video rentals. $\frac{6}{20} = \frac{3}{10}$

(iv) Not more than $ 60 on video rentals, given that they spent over $ 10 on video rentals. $\frac{36}{40} = \frac{9}{10}$ *[6 marks]*