Chapter 2

Presenting Data

Recap and Outline

- Frequency tables have limitations.
- Graphical methods can provide clearer picture.
- Use of computer packages.

Stem and Leaf Plots

- Simple to produce.
- Easy to interpret.
- Applicable to all data types.

Stem and Leaf Plots

Consider the following data

11	12	8	15	21	25	19	9

Stem	Leaf
0	8 9
1	1 2 5 9
2	1 5

$n = 8, \quad$ stem unit $= 10, \quad$ leaf unit $= 1$.

Recovering the data

$$\text{Observation} = \text{stem label} \times \text{stem unit} + \text{leaf digit} \times \text{leaf unit}$$

Construct a stem and leaf plot for the following data on time (in seconds) it takes to get through to an operator at a call centre:

54	56	50	67	55	38	49	45	39	50
45	51	47	53	29	42	44	61	51	50
30	39	65	54	44	54	72	65	58	62

Stem and Leaf Plots

Data on lengths (in cm) of items on a production line:

2.97	3.81	2.54	2.01	3.49	3.09	1.99	2.64	2.31	2.22

Stem and leaf plot:

$n = 10$

1	9		
2	0	2	3
2	5	6	9
3	0	4	
3	8		

Stem unit = 1 cm, Leaf unit = 0.1 cm.

Bar Charts

- Simple to produce.
- Easy to interpret.
- Applicable to categorical data and ungrouped discrete data.

Bar Charts

1. Decide what goes on each axis, by convention
   - Horizontal (x-axis) the variable being measured.
   - Vertical (y-axis) the frequency.
2. Find the maximum frequency.
3. Decide on an appropriate number scale for this axis.
4. Draw the axes.
5. Draw the bars.
   - All bars the same width.
   - All gaps between bars equal.

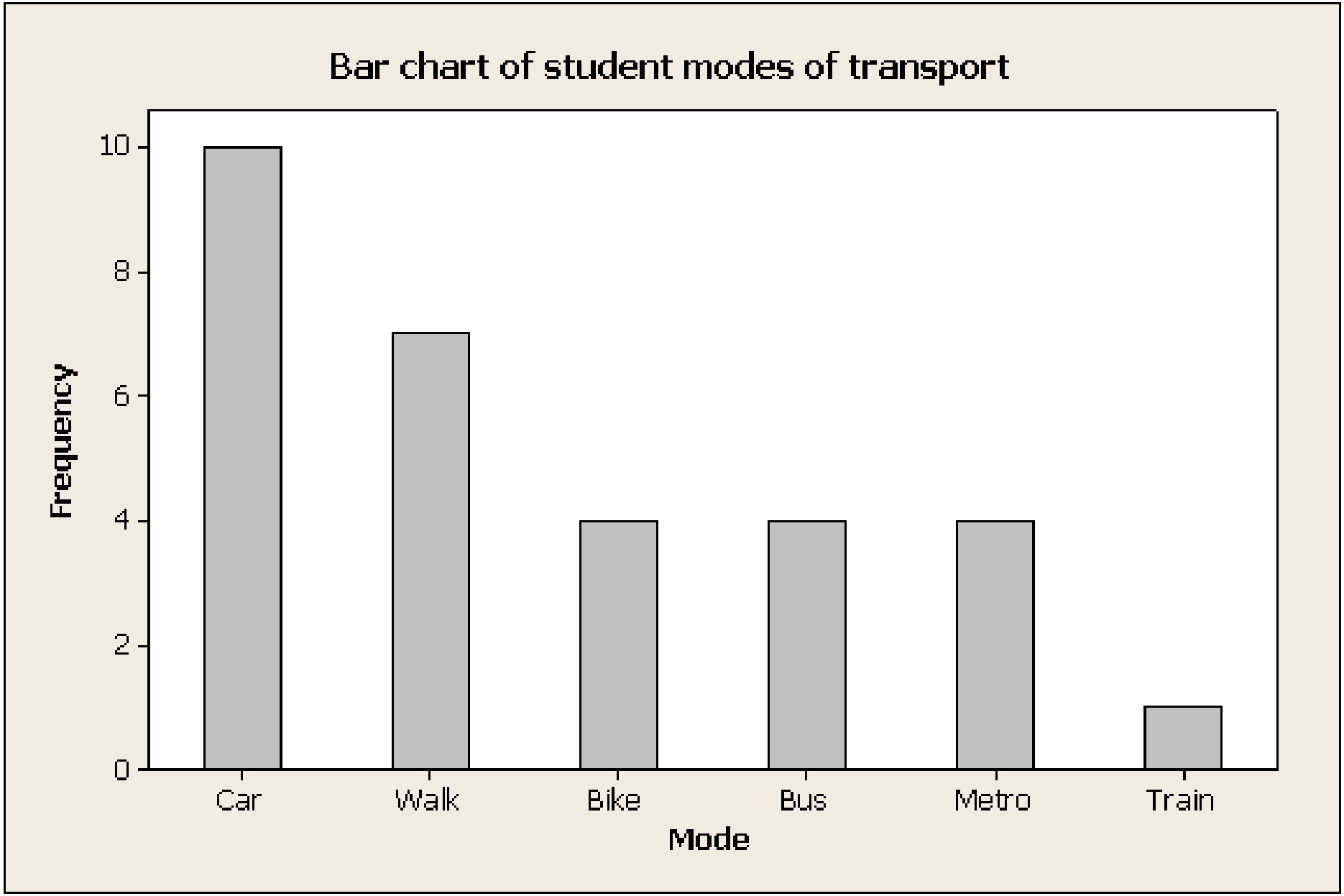
Bar Charts

Recalling our mode of transport example

Student	Mode	Student	Mode	Student	Mode
1	Car	11	Walk	21	Walk
2	Walk	12	Walk	22	Metro
3	Car	13	Metro	23	Car
4	Walk	14	Bus	24	Car
5	Bus	15	Train	25	Car
6	Metro	16	Bike	26	Bus
7	Car	17	Bus	27	Car
8	Bike	18	Bike	28	Walk
9	Walk	19	Bike	29	Car
10	Car	20	Metro	30	Car

Bar Charts

Mode	Frequency
Car	10
Walk	7
Bike	4
Bus	4
Metro	4
Train	1
Total	30


Bar chart of student modes of transport
Frequency
0
2
4
6
8
10
Car
Walk
Bike
Bus
Metro
Train
Mode

Multiple Bar Charts

Daily sales of CDs (in £) by music type for an independent retailer

Day	Chart	Dance	Rest	Total
Monday	12000	10000	2700	24700
Tuesday	11000	8000	3000	22000
Wednesday	9000	6000	2000	17000
Thursday	10000	5000	2500	17500
Friday	12000	11000	3000	26000
Saturday	19000	12000	4000	35000
Sunday	10000	8000	2000	20000
Total	83000	60000	19200	162200

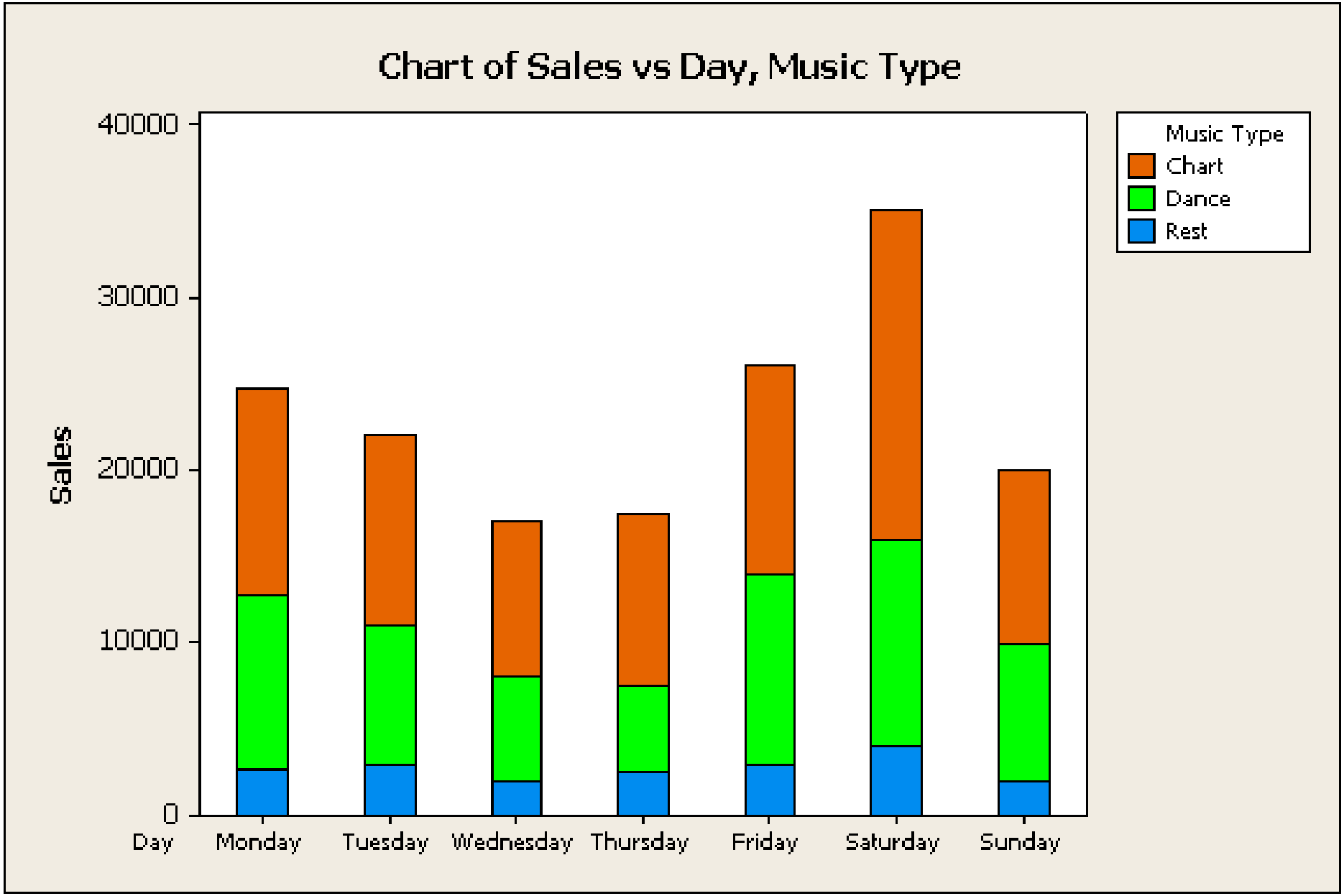


Chart of Sales vs Day, Music Type
Sales
40000
30000
20000
10000
0
Day
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday
Music Type
Chart
Dance
Rest

Histograms

- Simple to produce.
- Easy to interpret.
- Applicable to grouped continuous data.

Histograms

Appear similar to bar charts, but with two critical differences:

- the horizontal (x-axis) is a continuous scale.
- the area of the rectangle is proportional to the frequency.

Generally take equal sized intervals.

Histograms

For equal class interval histograms

1. Produce a grouped frequency table.

2. Find the maximum frequency.

3. Draw the vertical axis from zero to this maximum value.

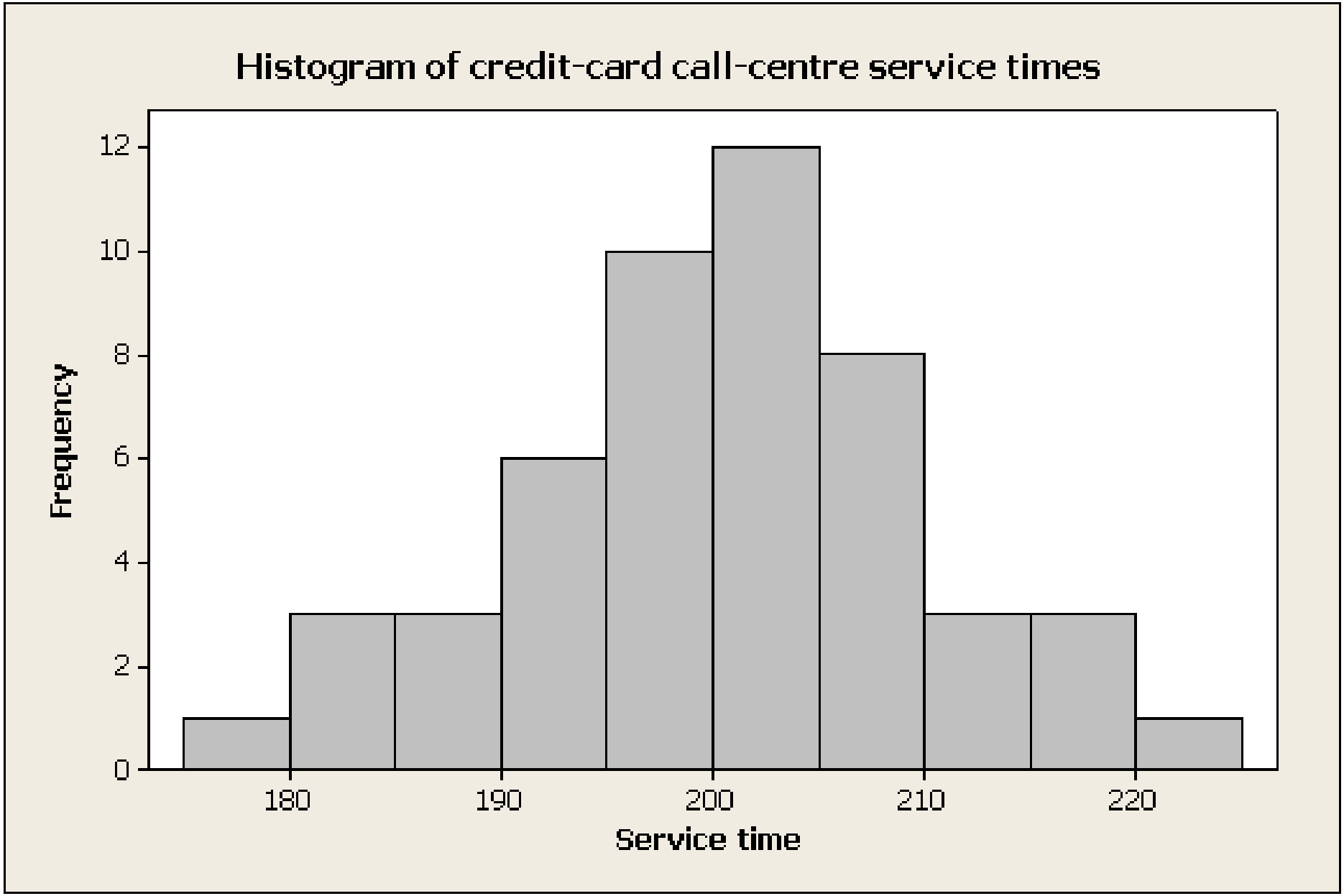
4. Draw the horizontal axis and include the full range of classes.

5. Draw a bar for each class in the frequency table.

Example

Frequency table for the data on service times for a credit card call centre is

Service time	**Frequency**
$175 \leq time < 180$	1
$180 \leq time < 185$	3
$185 \leq time < 190$	3
$190 \leq time < 195$	6
$195 \leq time < 200$	10
$200 \leq time < 205$	12
$205 \leq time < 210$	8
$210 \leq time < 215$	3
$215 \leq time < 220$	3
$220 \leq time < 225$	1
Total	50


Histogram of credit-card call-centre service times
Frequency
0
2
4
6
8
10
12
180
190
200
210
220
Service time