

# 8 Data Handling

## 8.1 Tables and Timetables

1. In a factory there are 79 male and 74 female managers.

Managers can be either junior or senior. There are 28 male senior managers.

There is a total of 93 junior managers.

- (a) Construct a two-way table to show the number of male and female managers in junior and senior management.
- (b) Comment on the proportion of women in junior and senior management.

	<i>Male</i>	<i>Female</i>
<i>Junior management</i>		
<i>Senior management</i>		

(LON)

2. The timetable summarises part of the Intercity East Coast line trains from King's Cross to Edinburgh.

London, King's Cross	0800	0830	0900	–	1000
Peterborough	–	0915	–	–	1045
Doncaster	0930	1015	–	1130	1145
York	1005	1055	1100	1205	1220
Darlington	1035	1125	1130	1235	1250
Durham	1050	1145	–	1300	1315
Newcastle	1105	1205	1200	1315	1330
Berwick	–	1250	–	–	1415
Edinburgh	1235	1340	1330	–	1505

- (a) What is the shortest journey time from Newcastle to Edinburgh?
- (b) If you arrive at London King's Cross at 0745, what is the earliest time that you can reach Berwick?
- (c) If you just miss the 1015 train from Doncaster to Edinburgh, what is your new arrival time in Edinburgh?
- (d) What is the shortest travel time from London to Edinburgh?

3. The table shows the distances, in miles, between major cities in Scotland.

	Aberdeen							
		Dumfries						
	210							
	67	140						
			Dundee					
	125	75	57					
				Edinburgh				
	147	73	78	46				
					Glasgow			
	106	239	124	158	173			
						Inverness		
	86	119	21	42	61	114		
							Perth	
	116	89	51	38	31	140	30	
								Stirling

- (a) What is the distance between
- Aberdeen and Stirling,
  - Aberdeen and Glasgow
  - Edinburgh and Perth,
  - Dumfries and Glasgow?
- (b) You are planning a cycling tour of Scotland, starting and finishing in Dumfries, and visiting, in order,  
*Dumfries – Edinburgh – Stirling – Perth – Inverness – Glasgow – Dumfries.*  
 What is the total distance that you will travel?

4. Here is some information about Year 11 students in a school.

<i>No.</i>	<i>Name</i>	<i>Date of birth</i>	<i>Form</i>	<i>Village</i>	<i>Stays school lunch</i>
1	Bright. M	12/2/77	11W	Swinton	Yes
2	Patel. D	24/4/77	11L	Bolton	Yes
3	Learson. M	5/11/76	11L	Bolton	No
4	Thompson. A	30/09/76	11W	Bolton	Yes
5	Williams. C	15/7/77	11P	Bolton	No
6	Yip. D	21/10/76	11R	Goldthorpe	No
7					

- (a) Gillian Reed, in form 11L, stays for school lunches. She lives in Bolton and was born on 17 January 1977. Add this information to the list.
- (b) What is the name of the oldest student on the list?
- (c) Which students live in the village of Bolton *and* do not stay for school lunch?

(NEAB)

5. Four hockey teams play each other in a competition.

The results are

<i>ROUND 1</i>	Ramblers	3	Wanderers	2
	Rovers	0	Nomads	0
<i>ROUND 2</i>	Wanderers	2	Rovers	2
	Nomads	0	Ramblers	1
<i>ROUND 3</i>	Wanderers	3	Nomads	1
	Ramblers	0	Rovers	2

Using the above table of results, suggest a reason why

- (a) Ramblers could say they are the best team,
- (b) Wanderers could say they are the best team,
- (c) Rovers could say they are the best team.

(MEG)

6. The London Police fitted cameras on traffic lights.

The table shows the number of accidents that occurred before and after the cameras were fitted.

<i>Type of accident</i>	<i>Number of accidents before cameras</i>	<i>Number of accidents after cameras</i>
Minor	685	532
Serious	914	707
Very serious	146	103

- (a) Calculate the total number of accidents which happened *before* the cameras were fitted.

Write this answer to the nearest hundred.

- (b) Without using a calculator, estimate the number of accidents that occurred *after* the cameras had been fitted.

Show how you made your estimate.

- (c) A spokesman for the police said:

*"The total number of accidents has been reduced by almost 25%."*

Use the information in the table above to decide if you agree with this statement.

Show all your working.

Give a clear reason for your decision.

(LON)

7. The following table gives the distances, in km, between major cities and towns in Finland to which the national airline, *Finnair*, operates flights.

	Ke	R	O	T	V	Ku	J
Helsinki (H)	1050	1200	900	300	700	600	650
Joensuu (J)	750	850	600	900	700	200	
Kuopio (Ku)	600	700	500	700	600		
Vaasa (V)	600	750	550	500			
Turku (T)	1200	1300	1050				
Oulu (O)	200	300					
Rovaniemi (R)	150						
Kemi (Ke)							

Use the table to answer the following questions.

- (a) Which is the place furthest away from Helsinki?
- (b) Which is the place closest to Oulu?
- (c) If you fly from Oulu to Helsinki, via Rovaniemi and Kemi, how much further do you travel than flying direct from Oulu to Helsinki?
- (d) A plane makes the following journey:

*Helsinki to Oulu*

*Oulu to Kemi*

*Kemi to Helsinki*

*Helsinki to Rovaniemi*

*Rovaniemi to Kuopio*

*Kuopio to Helsinki*

What is the total distance flown by this plane?

8. 80 students each play in one of three mixed sports teams.  
The two-way table shows some information about these students.







	Football	Cricket	Hockey	Total
Female		6		36
Male	23			44
Total	36	19		80

Complete a copy of the two-way table.

(Edexcel)

## 8.2 Pictograms and Bar Charts






1. The table below shows the profits after taxation of a company from 1986 to 1991.
- (a) What was the profit (i) in 1989?  
(ii) in 1991?
- (b) in which year was the profit smallest? By how much had the profit fallen that year from the previous year?

1986	
1987	
1988	
1989	
1990	
1991	



represents 1 million dollars

2. The pictogram shows the number of TV sets manufactured by a factory between 1988 and 1991.

1988		 represents 2000 sets
1989		
1990		
1991		

- (a) How many TV sets were manufactured in 1988?  
 (b) How many TV sets were manufactured in 1990?  
 (c) In which year was the most number of TV sets manufactured?
3. The table below shows the results of a survey on the number of families who visited various countries from March to December last year.

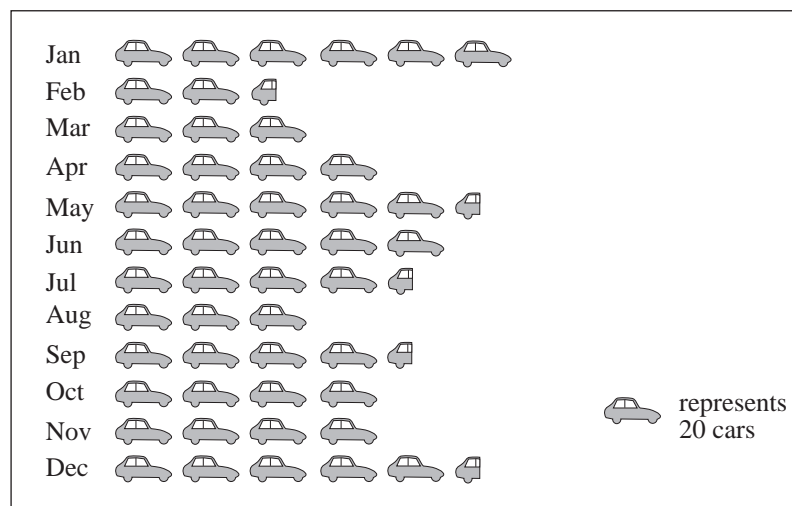
<i>Country</i>	<i>Portugal</i>	<i>Spain</i>	<i>France</i>	<i>Holland</i>
<i>No. of families</i>	40	135	90	65

- (a) What was the total number of families involved in the survey?  
 (b) What fraction of the total number of families visited Spain?  
 (c) Draw a pictogram to represent the given data, using one picture to represent 10 families.
4. The grades obtained by 40 pupils in a Mathematics examination are shown in the table.

<i>Grade</i>	<i>Fail</i>	<i>Pass</i>	<i>Credit</i>	<i>Distinction</i>
<i>No. of pupils</i>	4	18	12	6

Draw a pictogram for this information.

5. This is a pictogram for the number of cars sold each month by a motor company.



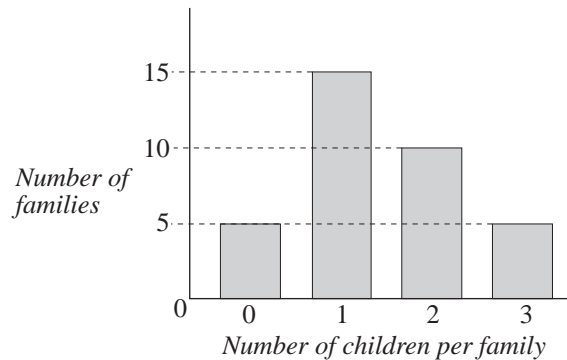
- (a) In which month were the sales the highest?  
 (b) In which month were the sales the lowest?  
 (c) How many cars were sold in August?  
 (d) How many cars were sold in December?

6. The table shows the number of pupils in a certain school sitting various subjects.

<i>Subject</i>	<i>Mathematics</i>	<i>Physics</i>	<i>Chemistry</i>	<i>Literature</i>	<i>History</i>
<i>No. of pupils</i>	88	63	42	30	20

Show this information on a bar chart.

7. The bar chart shows the results of a survey of the number of children per family.

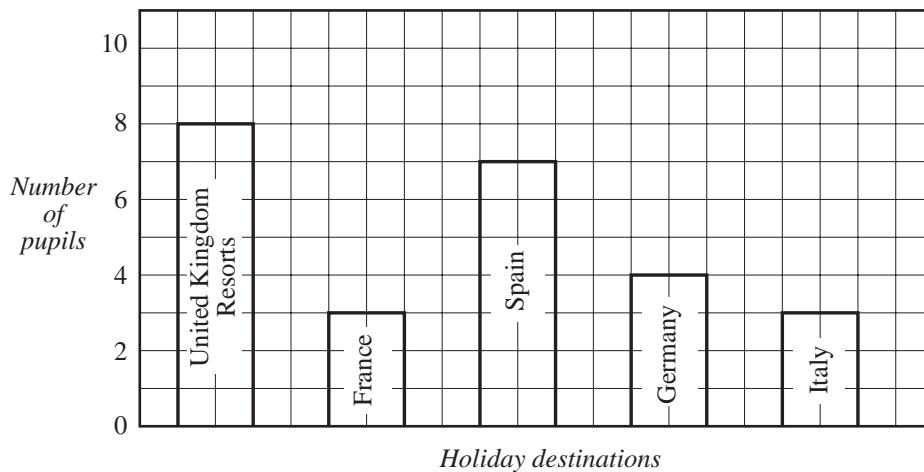


- (a) How many families have just 2 children?  
 (b) How many families were surveyed?  
 (c) How many children are there altogether?
8. In a particular year, 720 families booked holidays to the Far East through a local travel agent.

<i>Country</i>	<i>Japan</i>	<i>Hong Kong</i>	<i>Thailand</i>	<i>Phillipines</i>	<i>Taiwan</i>
<i>Number of families</i>	200	190	110	100	120

Represent this information on a horizontal bar chart.

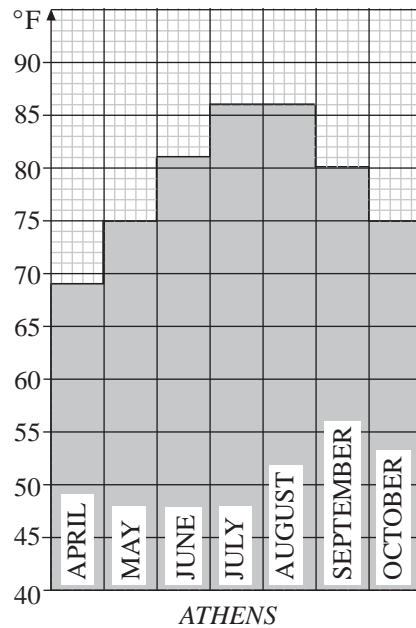
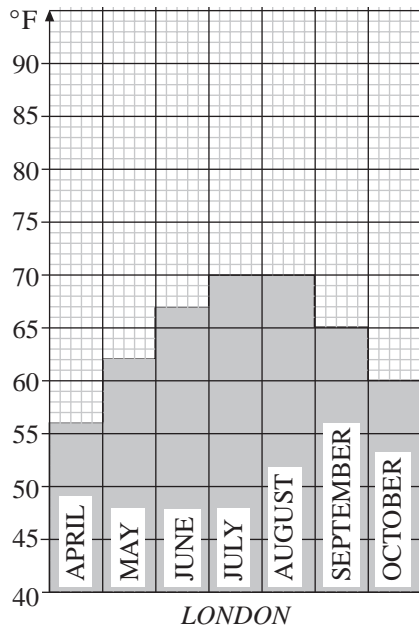
9. The bar chart shows the holiday destinations of the pupils in a class.



- (a) How many pupils went on a holiday to Spain?
- (b) How many pupils were in the class?
- (c) A pupil is chosen at random from the class. What is the probability that this pupil went to Germany?

(SEG)

10. The usual mid-day temperatures, in °F, are shown for London and Athens.



- (a) What is the usual mid-day temperature in London in June?
- (b) Find the difference in the temperatures in London and Athens in June.
- (c) Which place has the lowest difference in temperature for the months shown?  
Justify your answer.

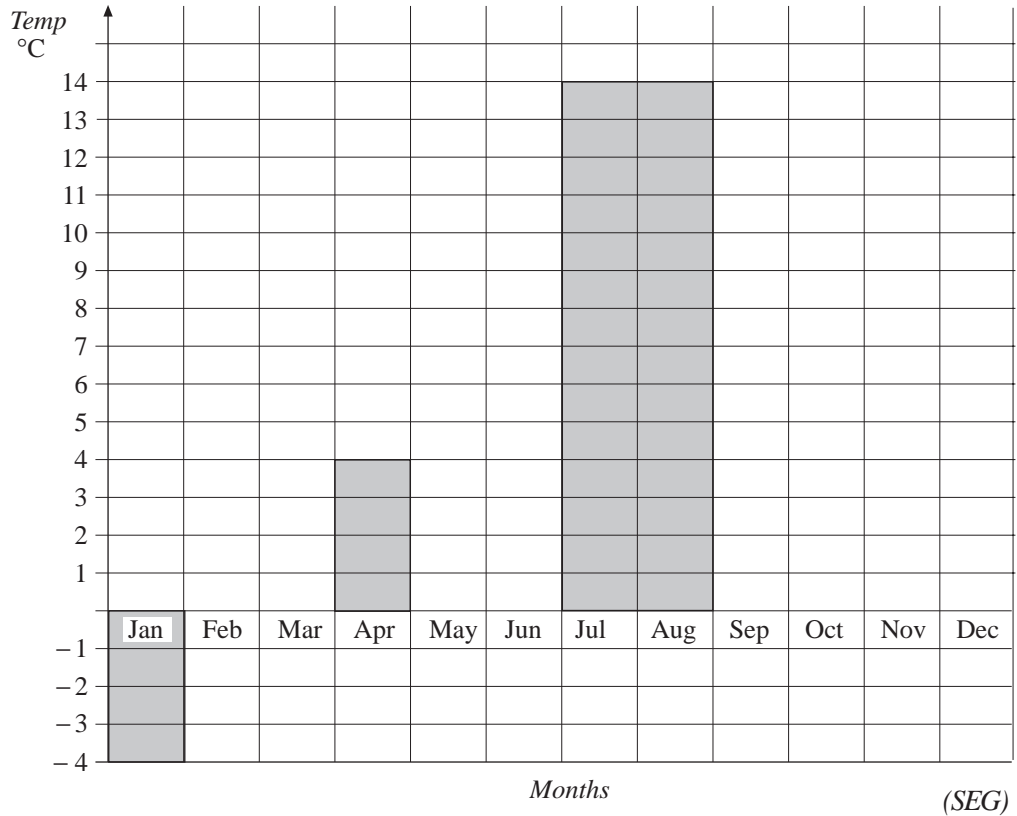
(NEAB)

11. The average monthly temperature in Prague for 1990 is shown in the table.

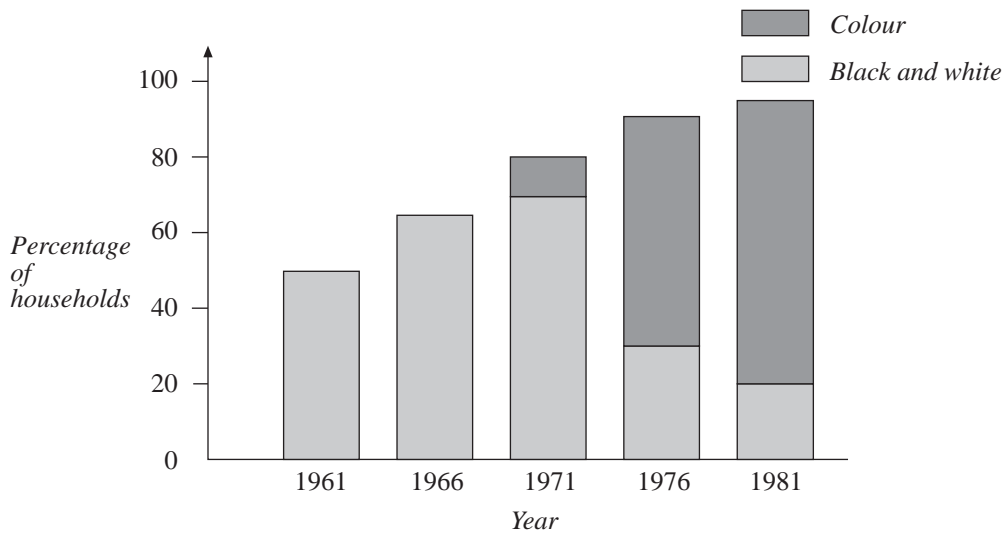
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temp °C	-4	-2	1	4	9	13	14	14	11	7	2	-2

- (a) Copy and complete the following bar chart to show this information.
- (b) Which month has the lowest average monthly temperature?
- (c) What is the range of these temperatures?





12. You are writing an article about television viewing in Newtown since 1981.

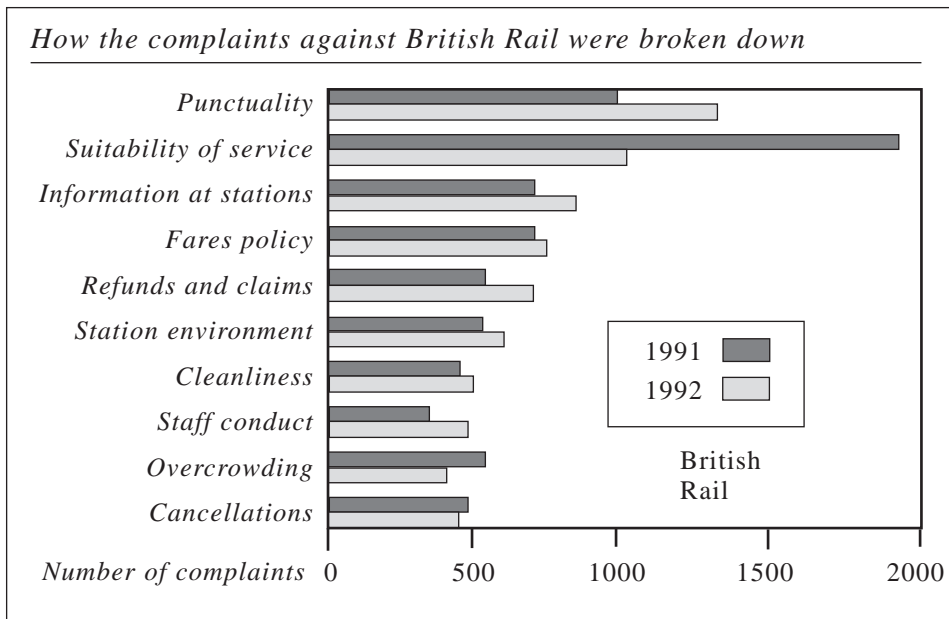


You have obtained the diagram above.

- (a) What percentage of households had a television licence in 1966?
- (b) What percentage of households had a licence for colour television in 1976?
- (c) Comment on how the percentage of licences for colour television compared with the percentage of licences for black and white television over the years 1961 – 1981.
- (d) This year, 97% of the households have a television licence. If one household is chosen at random, what is the probability that they do *not* have a television licence?

(NEAB)

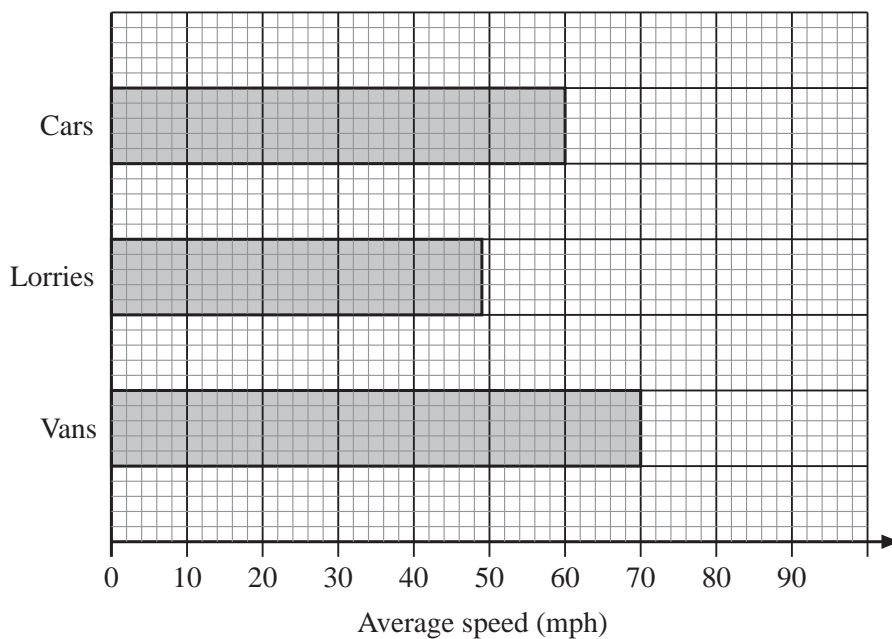
13. The bar chart shows the complaints that people made to British Rail in 1991 and 1992.



- (a) Which complaints were made more often in 1991 than in 1992?
- (b) The total number of complaints made in 1992 was 7000.  
What percentage of these complaints was about 'Cleanliness'?

(NEAB)

14. The bar chart shows the average speeds of cars, lorries and vans on a motorway.



- (a) Write down the average speed of cars.
- (b) Work out the difference between the average speeds of lorries and vans.

- (c) Andrew says that the graph shows that cars always travel faster than lorries on the motorway.

Is he correct? Give a reason for your answer.

(AQA)

15. The heights of twenty Y7 students were measured in metres. The measurements, to the nearest 0.1 metre, are given below.

1.5 1.5 1.8 1.6 1.7 1.5 1.6 1.9 1.7 1.6  
1.9 1.7 1.5 1.6 1.6 1.7 1.5 1.7 1.6 1.9

- (a) Complete a copy of the frequency table below.

<i>Height (m)</i>	<i>Tally</i>	<i>Frequency</i>
1.5		
1.6		
1.7		
1.8		
1.9		

- (b) Use a copy of the grid below to draw a bar chart for the information in the frequency table.

Make sure that you label your diagram clearly.


- (c) One of these students is chosen at random. What is the probability that this student is 1.7 m tall?

(OCR)

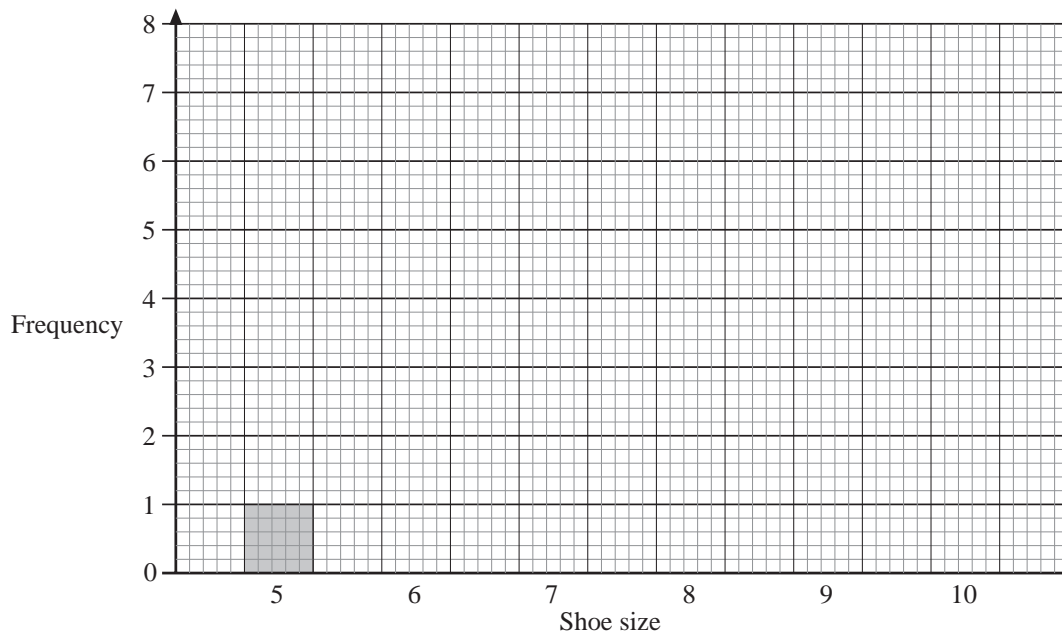
16. The data show the shoe sizes of 20 students.

5 7 6 7 10 8 6 7 9 10  
 10 8 6 6 7 8 7 9 7 6

(a) Complete a copy of the frequency table below.

<i>Shoe size</i>	<i>Tally</i>	<i>Frequency</i>
5		1
6		
7		
8		
9		
10		

(b) Complete a copy of the bar chart to show this information.



(c) Write down the mode of the shoe sizes.

(AQA)

## 8.3 Pie Charts

1. A survey of workers in a city firm asked how they travelled to work. The results are given in the table.

<i>Mode of travel</i>	<i>Number of people</i>
Bus	12
Train	14
Car	9
Train and Bus	5
Train and Walk	16
Bicycle	4

Represent this data as a pie chart.

2. John and Ahmad counted cars of various colours in a car park. The table below shows what they found out.

<i>Colour</i>	Red	Blue	Yellow	Green	White	Grey
<i>Number of cars</i>	15	12	10	8	15	30

Represent the data as a pie chart.

3. A pie chart is used to represent the sales of 3 products, A, B and C. The angles of the sectors representing A, B and C are  $90^\circ$ ,  $120^\circ$  and  $150^\circ$  respectively. Given that the total sales is 480 kg, calculate the amount, in kilograms, of each product sold.
4. Each week a class of pupils has lessons in 7 subjects. The number of lessons in each subject is: English 6, Mathematics 6, Literature 4, Geography 3, History 3, Second Language 6 and PE 2. Draw a pie chart to show this information.
5. The nursing staff of a hospital are made up of 10 sisters, 20 staff nurses, 110 nurses and 40 trainee nurses. Represent this information on a pie chart by first calculating the angle of each of the 4 sectors.
6. The diagram shows how a council tackles the problem of what to do with domestic waste.

- (a) Write down the fraction of waste which is recycled.

- (b)  $\frac{2}{5}$  of the total waste is burnt.

Calculate the angle of the sector which represents the waste burnt.

- (c) Calculate the percentage of the total waste which is used for landfill.

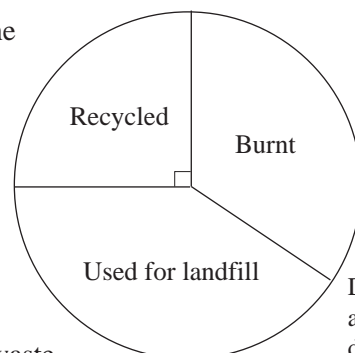


Diagram not accurately drawn.

(NEAB)

7. 300 young people were asked what they did after completing Year 11 at school. The pie chart shows the results of the survey.

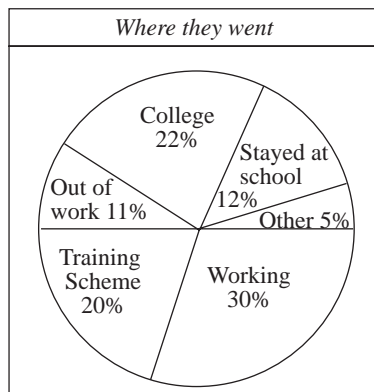


Diagram not accurately drawn

- (a) How many of the young people were working?

Gwen made an accurate drawing of the pie chart.

She first drew the sector representing the young people out of work.

- (b) Calculate the size of the angle of this sector.  
Give your answer to the nearest degree.
- (c) Change to a decimal the percentage going to college.
- (d) What fraction of the young people stayed at school?  
Give your answer in its simplest form.

(LON)

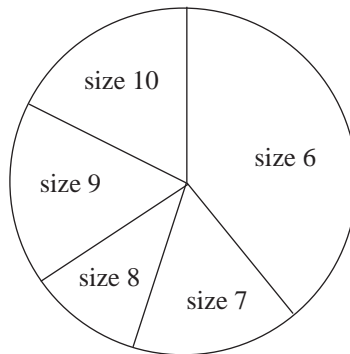
8. A shop sells a certain type of boot in five sizes.

- (a) During February the sales and prices were as follows:

<i>Size</i>	6	7	8	9	10
<i>Price (£)</i>	25.99	25.99	26.99	26.99	27.99
<i>Number sold</i>	23	32	26	23	30

Calculate the exact amount of money received from the sale of all these boots.

- (b) The numbers sold during March are illustrated in the pie chart

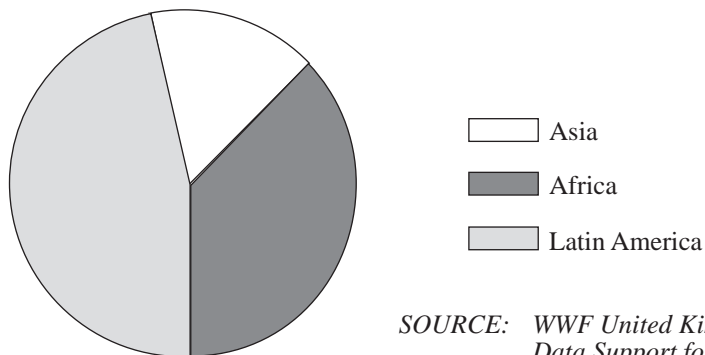


- (i) Measure the angle for size 9.
  - (ii) The total number of pairs of boots sold during March was 150. Calculate the number of size 9 pairs which were sold.
  - (iii) What was the median boot size for March?
- (c) The pattern of sales changed from February to March. Write down one way in which the pattern changed.

(SEG)

9. (a) A geography book contains the pie chart shown below.

*Comparison of distribution of tropical forests by area*



SOURCE: WWF United Kingdom  
Data Support for  
Education Service

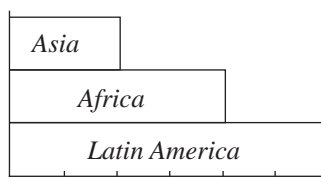
This pie chart shows that about one third of the tropical forests lie in Africa.

Copy and complete each of the following statements.

- (a) (i) About . . . . . of the tropical forests lie in Latin America.
- (ii) The area of tropical forest in Latin America is about . . . . . times the area of tropical forest in Asia.

- (b) Another geography book contains the diagram shown below.

*Comparison of distribution of tropical forests by area*



- (i) Does the information in this bar chart agree exactly with the information in the pie chart?  
Give a reason for your answer.
- (ii) Using the bar chart, find the percentage of the total area of tropical forest which lies in Latin America.

(MEG)

10. Pali asked 180 boys what was their favourite sport. Here are his results.

<i>Sport</i>	Soccer	Rugby	Cricket	Basketball	Other
<i>Number of boys</i>	74	25	18	37	26

- (a) Draw a pie chart to show these results.

Pali also asked 90 girls about their favourite sport.

In a pie chart showing the results, the angle for Tennis was  $84^\circ$ .

- (b) How many of these girls said that Tennis was their favourite sport?

(OCR)

11. The table shows the races that 60 primary school pupils entered on their Sports Day. They each entered one race.

<i>Race entered</i>	<i>Number of pupils</i>
Egg and spoon	18
3-legged	20
Sack	12
Obstacle	10

- (a) Draw and label a pie chart to represent the information in the table.
- (b) Work out the percentage of pupils who entered the egg and spoon race.
- (c) The pupils in the obstacle race took these times in seconds.

23 36 18 29 44 39 36 54 43 41

Draw an ordered stem and leaf diagram to show this information.

(AQA)



## 8.4 Line Graphs

1. The table shows the hourly temperature readings of a patient.

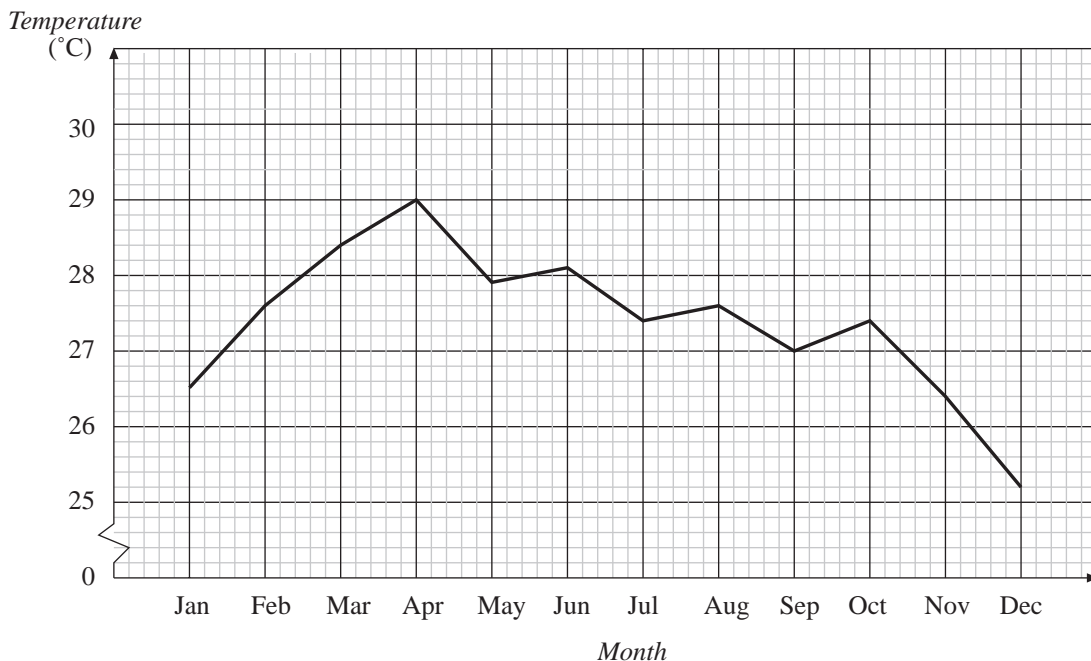
<i>Time</i>	8 pm	9 pm	10 pm	11 pm	12 am	1 am	2 am	3 am	4 am	5 am
<i>Temperature (°C)</i>	40.0	38.5	39.5	37.4	38.0	36.9	37.2	37.0	37.2	37.0

Draw a line graph to represent this information.

2. The table below shows the number of spectators who attended a tennis tournament.

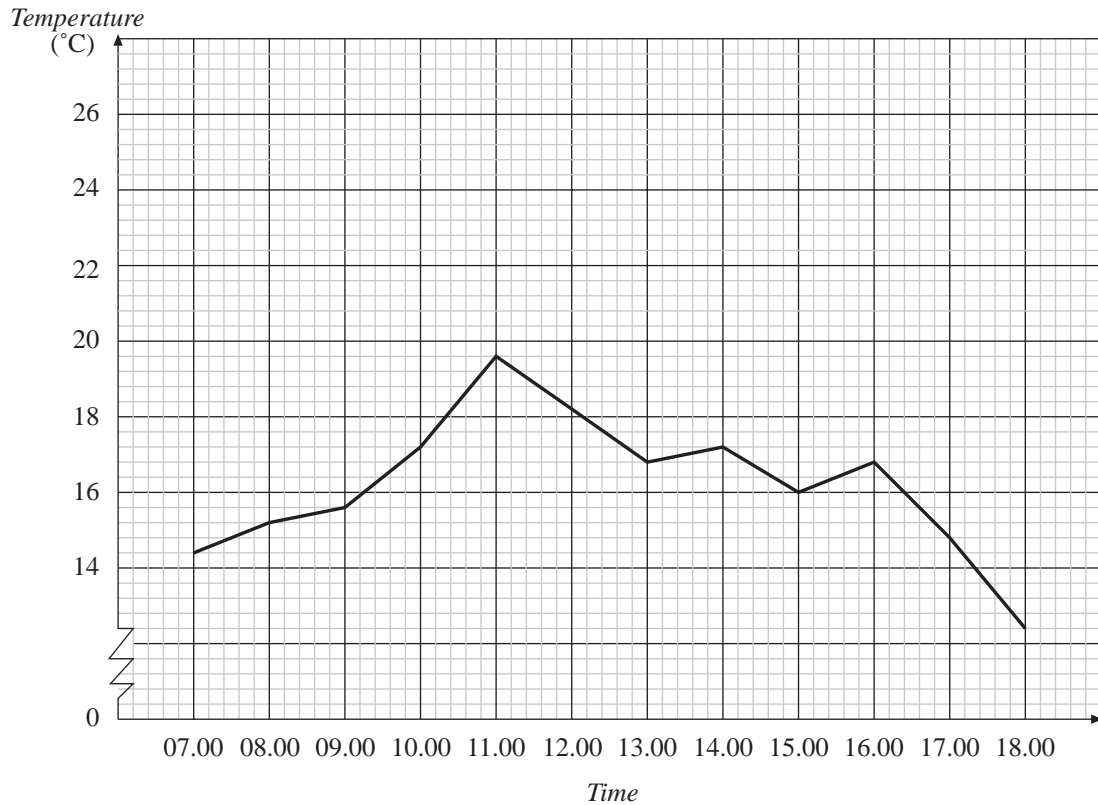
<i>Date</i>	22	23	24	25	26	27	28
<i>Temperature (°C)</i>	31	29	30	31	33	36	38

- (a) Draw a line graph for this information.  
 (b) What was the total number of spectators?
3. The line graph below shows the average monthly temperatures recorded in Chicago Meteorological Station in Singapore in a certain year.



- (a) What was the highest average monthly temperature during the year?  
 (b) Which was the coolest month on the year?  
 (c) In which month was the average temperature 28.4 °C?  
 (d) In which months were the average temperatures below 27 °C?  
 (e) What was the difference in the average monthly temperature for the months of April and December?

4. The following graph shows the hourly temperatures between 7 am and 4 pm on a certain day in the summer.
- What was the temperature at 09.00?
  - What was the temperature at 14.00?
  - Between 07.00 and 13.00, was the temperature rising or falling?
  - What happened to the temperature after 1 pm?

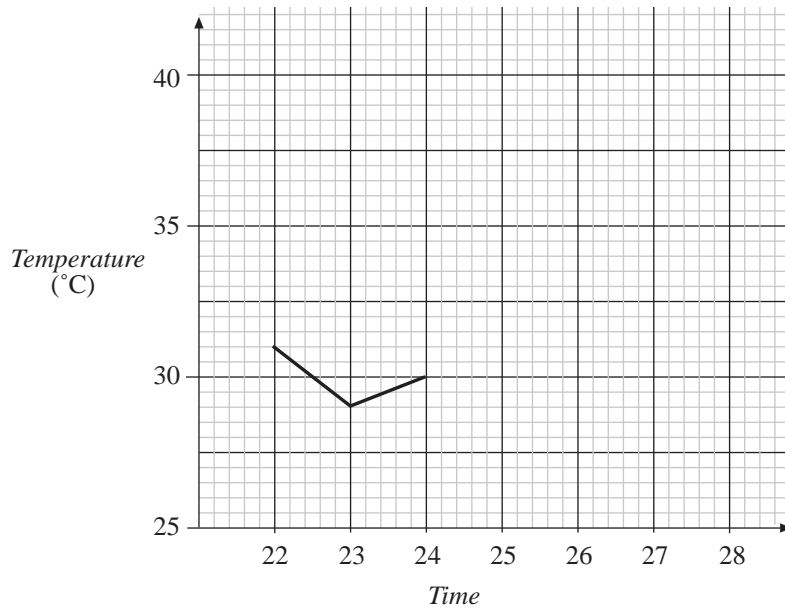


5. In August, Claire went to Spain. She recorded the midday temperature each day.

<i>Day</i>	1st	2nd	3rd	4th	5th	6th
<i>No. of spectators</i>	500	450	300	330	310	510

Claire used her data to draw a temperature graph.

- Copy and complete her graph.



- (b) Calculate the average midday temperature.  
Give your answer to the *nearest degree*.
- (c) What is the range of these midday temperatures?

(SEG)

6. The weekly sales of Chanel No.5 in a shop are shown below.

Day	Sun	Mon	Tue	Wed	Thur	Fri	Sat
No. sales	0	4	3	3	7	9	2

Draw a line graph to illustrate this data.

7. The number of trains arriving late at London, Paddington Station each day during one week is shown in the table below.

Day	Sun	Mon	Tue	Wed	Thur	Fri	Sat
No. late	4	7	3	1	12	3	0

Illustrate this data by using a line graph.

The following results were recorded during another week.

Day	Sun	Mon	Tue	Wed	Thur	Fri	Sat
No. late	6	2	0	0	5	7	9

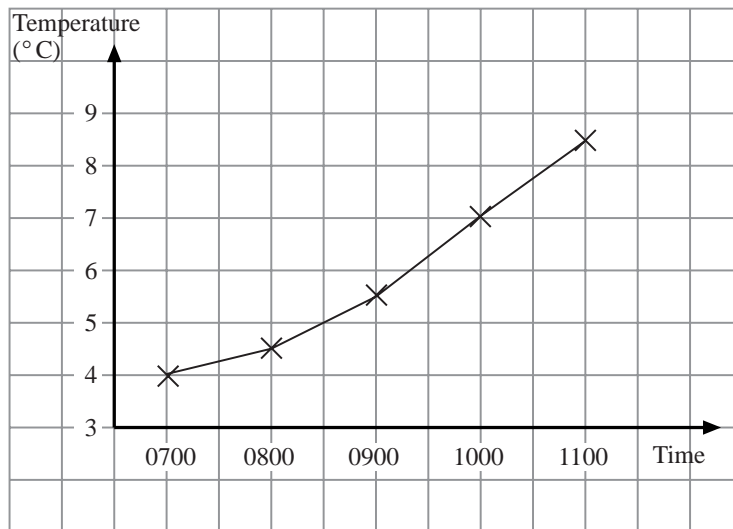
Illustrate this data with a line graph, using the same axes. What are the main characteristics of the two sets of data?

8. The table shows the temperature at midday on each day of a week during winter.

Day	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Temperature ( $^{\circ}\text{C}$ )	6	8	6	7	8	8	7

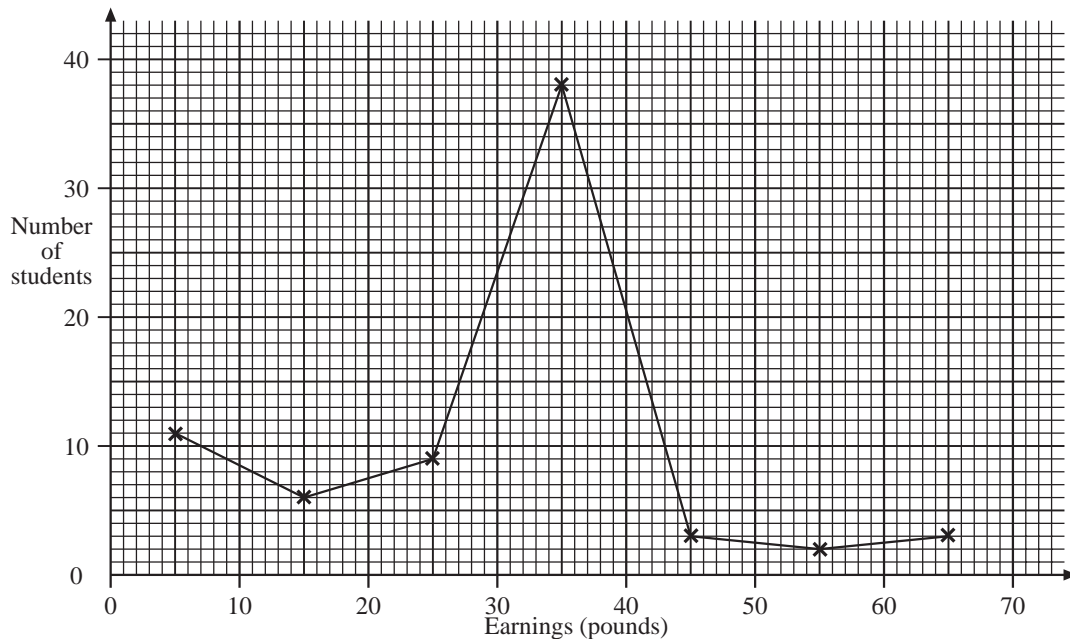
- (a) Work out the median temperature.

The graph shows the temperature from 0700 to 1100 during one day.



- (b) What was the temperature at 1000?  
 (c) What was the temperature at 0800? *(Edexcel)*
9. A survey was carried out to see how much the sixth formers in a school earn each week from part-time employment.

The frequency polygon shows the distribution of earnings for Year 12 students.



The table below shows the distribution of earnings of the Year 13 students.

<i>Earnings (£x)</i>	<i>Number of Year 13 students</i>
$0 < x \leq 10$	15
$10 < x \leq 20$	27
$20 < x \leq 30$	14
$30 < x \leq 40$	4
$40 < x \leq 50$	1

- (a) Draw, on a copy of the grid above, the frequency polygon for the earnings of the Year 13 students.
- (b) Make two different comparisons between the earnings of the Year 12 and the Year 13 students.

(OCR)

## 8.5 Questionnaires and Surveys

1. Criticise the following questions for bias.
  - (a) "Animal Hospital was a super TV programme, wasn't it?"
  - (b) "Shouldn't the Queen pay income tax?"
  - (c) "Do you think that butter tastes much better than margarine?"
  - (d) "Shouldn't the Government spend more on education than on defence?"
2. Provide suitable multiple responses for these questions.
  - (a) "Do you like watching Eastenders?"
  - (b) "How often do you play football?"
  - (c) "Do you enjoy listening to music?"
  - (d) "What sort of holiday do you like?"
3. Angela and Sanjay organise a school trip.  
They can go to Chester Zoo, Alton Towers or Blackpool.  
Angela and Sanjay ask each pupil where they would like to go.  
Here is one page of their notebook.



<i>Chester Zoo</i>	<i>Blackpool</i>
<i>Alton Towers</i>	<i>Blackpool</i>
<i>Alton Towers</i>	<i>Chester Zoo</i>
<i>Chester Zoo</i>	<i>Chester Zoo</i>
<i>Blackpool</i>	<i>Chester Zoo</i>
<i>Chester Zoo</i>	<i>Blackpool</i>
<i>Alton Towers</i>	<i>Alton Towers</i>
<i>Chester Zoo</i>	<i>Alton Towers</i>
<i>Chester Zoo</i>	<i>Alton Towers</i>

- (a) Think about the way you have recorded answers when you have done a survey.

Show how you would improve Angela and Sanjay's method.

- (b) The trip is arranged for Chester Zoo.

246 pupils and 22 teachers are going on the trip.

Angela and Sanjay are hiring buses. Each bus holds 63 people.

How many buses will they need?

*(NEAB)*

4. A teacher wants to find out how his 32 pupils travelled to school today.

- (a) Design a suitable observation sheet to get this information.

- (b) Fill in your observation sheet as if you had carried out this survey.

(You should invent suitable replies for all 32 pupils and collect the information together.)

5. A school is considering whether to abolish all or part of its school uniform, but wants to find out the views of all pupils. Design a suitable questionnaire for this purpose.

6. Your school is conducting a survey of its staff to find out how the school day should be divided up between teaching periods, breaks and lunch. Design a suitable questionnaire for this.

7. Design a survey to find out what sort of films your school friends most enjoy.

8. Design a survey to find out what type of holidays pupils in your class most enjoy.

9. Tony wants to collect information about the amount of homework the students in his class get.

Design a suitable question he could use.

You should include response boxes.

*(Edexcel)*

10. Dan and Doris are doing a survey on the type of music people buy.

(a) This is one question from Dan's survey.

Classical music is just for snobbish people. Don't you agree? Tick (✓) a box.  Strongly agree <input type="checkbox"/> Agree <input type="checkbox"/> Don't know <input type="checkbox"/>		
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Give two criticisms of Dan's question.

(b) This is a question from Doris's survey.

Do you buy CDs? <input type="checkbox"/> Yes <input type="checkbox"/> No			
If yes, how many CDs do you buy on average each month?			
<input type="checkbox"/> 2 or less	<input type="checkbox"/> 3 or 4	<input type="checkbox"/> 5 or 6	<input type="checkbox"/> More than 6

Give two reasons why this is a good question.

(AQA)

## 8.6 Frequency Graphs

1. A company claims that it produces matches in boxes of 50 sticks. Forty boxes were selected from a large number of boxes manufactured by the company and their contents counted, giving the following results.

53	50	48	52	52	50	49	51	50	52
49	49	50	51	48	51	50	52	52	49
50	50	51	52	49	53	50	52	49	52
51	49	50	53	52	50	49	50	48	50

(a) Construct a frequency distribution table for the results.

(b) Draw a bar chart to represent the data.

(c) What percentage of the boxes contain exactly 50 matches?

2. The lengths,  $x$ , in mm, of 50 hummingbirds were measured and the results are given below.

45	49	45	45	49	52	46	49	41	46
50	48	42	48	52	45	48	49	48	47
54	46	49	49	48	49	48	43	52	43
51	54	51	50	41	52	42	43	45	44
47	48	48	43	47	48	46	43	54	49

Copy and complete the following table.

<i>Length (<math>x</math> mm)</i>	$40 < x \leq 42$	$42 < x \leq 44$	$44 < x \leq 46$	$46 < x \leq 48$	$48 < x \leq 50$	$50 < x \leq 52$	$52 < x \leq 54$
<i>Frequency</i>							

- (a) Draw a histogram for the above frequency distribution.
- (b) Using a separate diagram, draw a frequency polygon to represent the results.
- (c) Find:
- the fraction of birds whose length is greater than 48 mm,
  - the percentage of birds whose length is at most 44 mm.

3. The lengths,  $x$  in cm, of 40 pencils were measured and the results are given below.

8.5 10.8 9.8 13.0 13.1 11.3 8.4 12.5 9.0 8.8  
 9.0 11.0 9.2 8.7 15.0 8.5 10.1 11.7 9.4 11.2  
 9.7 12.0 14.0 10.5 16.7 9.4 10.9 10.5 9.9 10.1  
 10.3 12.4 17.0 10.7 12.8 10.0 16.0 10.3 10.0 9.5

- (a) Copy and complete the following table.

<i>Length of pencil (<math>x</math> cm)</i>	$8 < x \leq 9$	$9 < x \leq 10$	$10 < x \leq 11$	$11 < x \leq 13$	$13 < x \leq 17$
<i>Number of pencils</i>					
<i>Frequency density</i>					

- (b) Draw a histogram which represents the information given above.
- (c) Find
- the percentage of pencils whose length is greater than 10 cm and less than or equal to 13 cm,
  - the proportion of pencils whose length is at most 11 cm.

4. The following are measurements of the breaking strength ( $x$  g) of a sample of 50 threads.

721 574 562 568 596 490 460 542 470 690  
 743 696 650 538 678 389 580 544 654 438  
 670 584 304 692 493 578 566 584 588 462  
 582 472 708 596 593 620 528 500 493 506  
 472 518 426 480 404 424 748 674 487 668

- (a) Construct a frequency table using class intervals of  $300 < x \leq 350$ ,  $350 < x \leq 400$ ,  $\dots$ ,  $750 < x \leq 800$ .
- (b) Draw a histogram for the above frequency distribution
- (c) Using a separate diagram, draw a frequency polygon to illustrate the above data.



5. The following statistics were obtained for the ages ( $x$  years) of 35 diabetics.

48	61	54	64	10	41	38
23	45	60	57	48	47	53
43	83	79	56	82	76	41
75	79	68	21	55	77	68
38	65	59	7	61	70	47

- (a) Construct a grouped frequency table for these ages using classes of equal width, beginning with the class  $0 < x \leq 10$ .
- (b) Draw a histogram to illustrate this information.
6. The recommended daily intake of iron is 18 milligrams for adult females below the age of 51. The amounts of iron intake during a 24-hour period for a sample of 45 women are given below.

15.0	18.1	16.0	12.6	15.3	9.4	14.6	11.9	17.0
6.3	14.4	16.6	19.5	12.5	16.8	14.6	20.7	18.3
18.6	12.5	10.9	19.8	14.5	13.1	16.3	18.1	11.6
16.6	12.1	14.7	18.2	12.8	11.5	10.7	12.7	18.3
15.6	16.4	17.3	16.3	15.0	11.0	12.5	12.4	11.5

- (a) Construct a grouped frequency table for the above information using classes of equal width, beginning with the class  $6 \leq x < 8$ .
- (b) Draw a histogram to display the above results.
7. The marks scored by a group of 50 pupils in an examination are given below.

52	22	24	30	64	47	23	27	47	17
39	21	30	42	35	44	36	19	32	58
22	45	66	38	44	36	29	37	33	33
44	53	57	28	11	40	49	56	5	48
13	25	40	33	63	23	40	51	59	33

- (a) Construct a frequency table using class intervals of 0-9, 10-19, 20-29 and so on.
- (b) Draw a bar chart to represent this information.
- (c) Using a separate diagram, draw a frequency polygon to illustrate this data.
8. The daily wages of 50 workers, in pounds per day to the nearest pound, are given below. Construct a frequency table with class intervals

10-14, 15-19, 20-24 and so on.

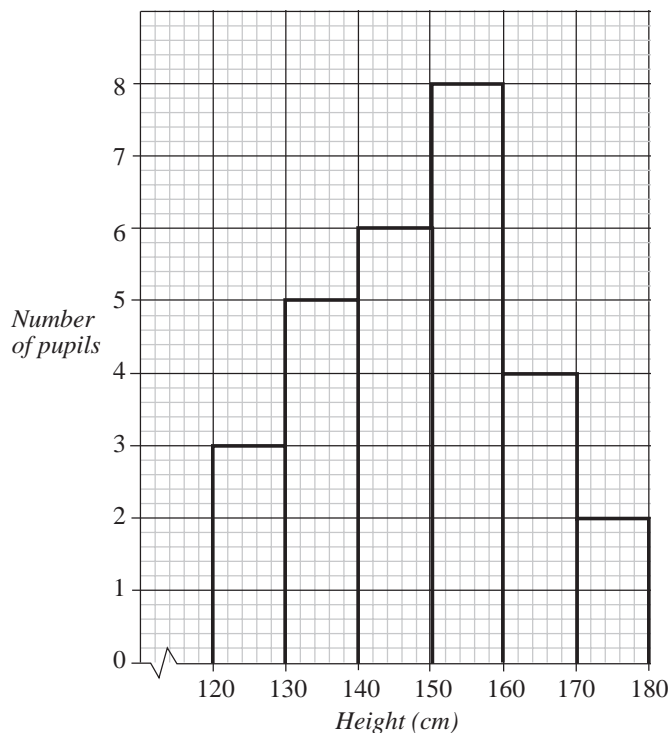
Draw a histogram to represent the data.

12	21	13	17	29	33	26	47	10	17
36	31	32	27	25	16	36	29	22	24
21	25	45	18	37	42	35	28	20	44
34	32	22	36	34	20	15	26	17	21
25	30	27	32	26	28	30	38	19	26

9. The waiting times, to the nearest minute, for 60 patients at a certain clinic are as follows.

25	12	53	8	26	5	19	73	67	18
87	42	6	21	14	19	12	15	13	36
36	16	72	36	13	37	11	51	39	32
30	47	6	22	68	25	98	23	45	22
7	9	26	35	27	48	58	56	29	20
32	62	80	41	58	17	54	15	14	74

- (a) Construct a frequency table using class intervals  
0-9, 10-19, 20-29 and so on.
- (b) Draw a histogram for the frequency distribution.
- (c) Using a separate diagram, draw a frequency polygon to illustrate the data.
10. The histogram shows the heights of pupils in a class.



- (a) How many pupils are in the class?
- (b) How many are taller than 150 cm? What percentage is this?

## 8.7 Histograms with Unequal Class Intervals

1. The frequency table below shows the time (in seconds) taken by 100 athletes to run a distance of 400 metres.

<i>Time (<math>x</math> seconds)</i>	$50 \leq x < 56$	$56 \leq x < 59$	$59 \leq x < 62$	$62 \leq x < 65$	$65 \leq x < 70$
<i>Frequency</i>	21	18	30	15	16

Draw a histogram to display this data.

2. The table below gives the number of shoots produced by 60 plants in a botanical research establishment.

<i>Number of shoots (<math>x</math>)</i>	$0 \leq x < 20$	$20 \leq x < 25$	$25 \leq x < 30$	$30 \leq x < 40$	$40 \leq x < 55$
<i>Frequency</i>	10	17	15	9	9

Draw a histogram to illustrate these results.

3. The amount of money collected by each of 308 students involved in a charity walk was recorded below.

<i>Amount collected</i>	$10 < x \leq 20$	$20 < x \leq 50$	$50 < x \leq 100$	$100 < x \leq 150$	$150 < x \leq 250$
<i>Number of students</i>	10	17	15	9	9

Draw a histogram to represent these data.

4. The following table shows the weekly earnings of 100 employees of Baywind Pte. Ltd.

<i>Weekly earnings (£)</i>	<i>Number of workers</i>
80 – 85	2
85 – 90	3
90 – 100	8
100 – 110	20
110 – 130	32
130 – 180	15
180 – 250	12
250 – 350	5
350 – 500	2
500 – 750	1

Draw a histogram representing this information.

5. On a particular day, the length of stay of each car at a car park, measured to the nearest minute, was recorded.

<i>Length of stay (min)</i>	<i>Number of cars</i>
5 – 24	60
25 – 59	70
60 – 79	86
80 – 104	150
105 – 114	55
115 – 149	105
150 – 199	45
200 – 299	30

- (a) Find the total number of cars parked in the car park that day,  
 (b) Draw a histogram representing the information.
6. The following list shows the maximum daily temperature, in °F, throughout the month of April.

56.1 49.4 63.7 56.7 55.3 53.5 52.4 57.6 59.8 52.1  
 45.8 55.1 42.6 61.0 61.9 60.2 57.1 48.9 63.2 68.4  
 55.5 65.2 47.3 59.1 53.6 52.3 46.9 51.3 56.7 64.3

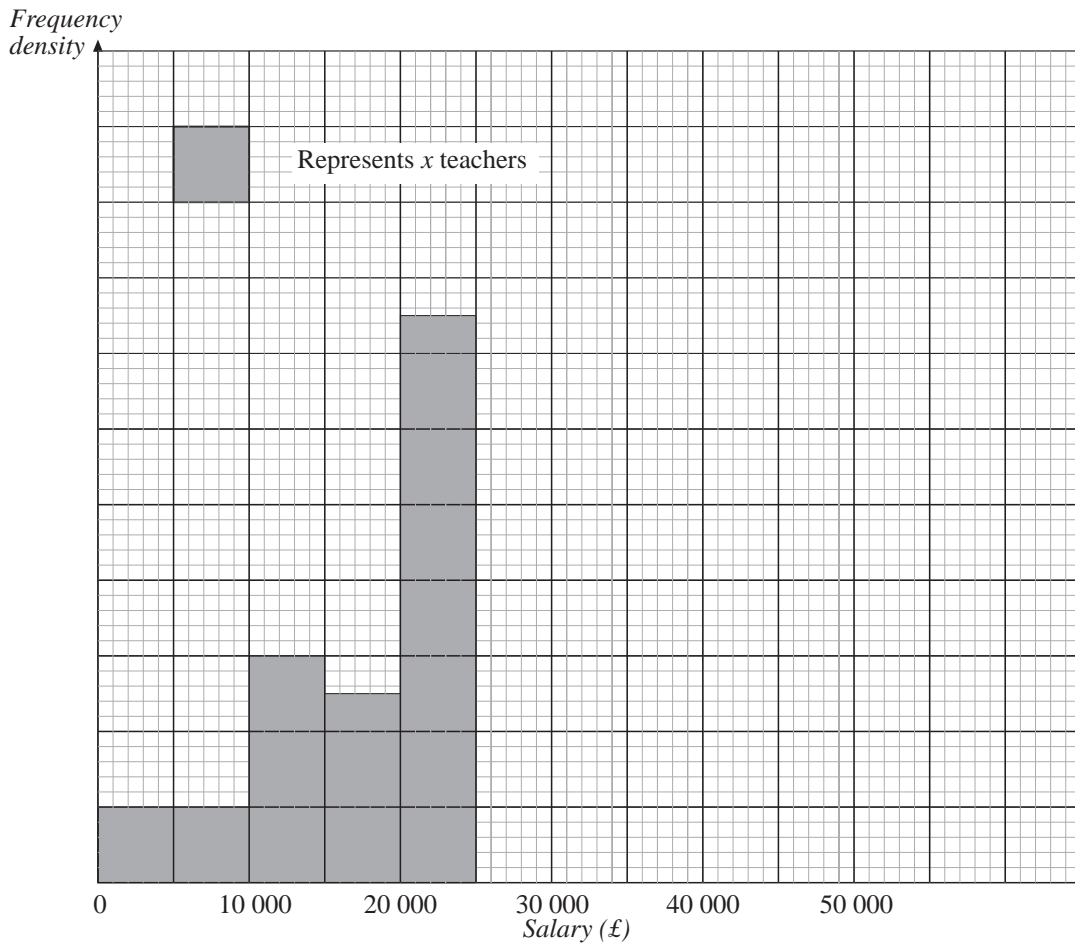
- (a) Copy and complete the grouped frequency table below.

<i>Temperature, T</i>		<i>Frequency</i>
$40 < T \leq 50$		
$50 < T \leq 54$		
$54 < T \leq 58$		
$58 < T \leq 62$		
$62 < T \leq 70$		


- (b) Draw a histogram to represent your distribution in part (a).

(MEG)

7. The unfinished histogram and table show information about the salaries, in pounds, of the teachers at Mathstown High School.



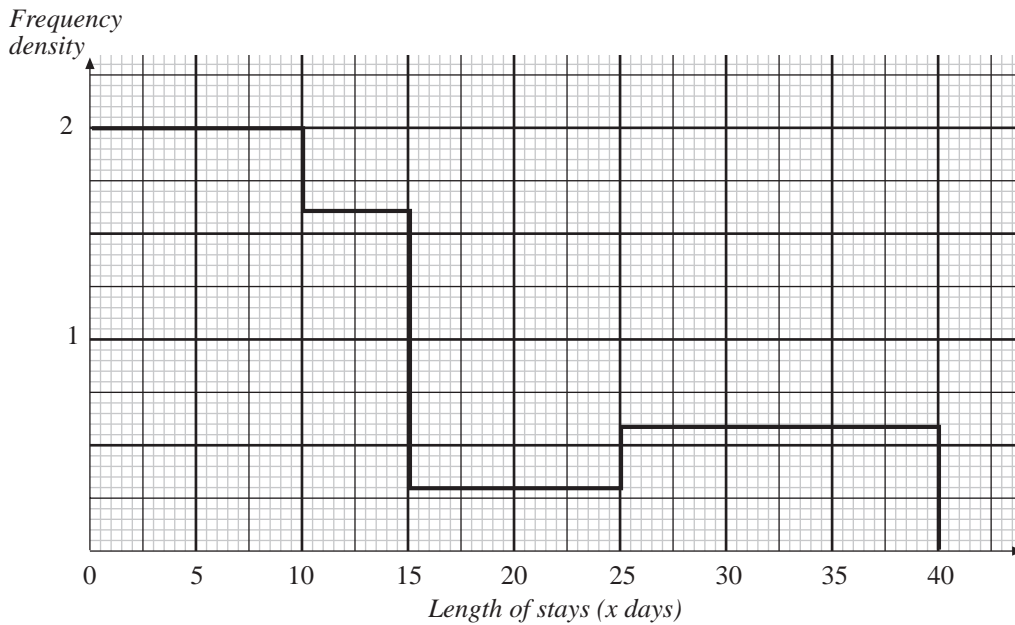
<i>Salary (<math>s</math>) in pounds</i>	<i>Frequency</i>
$0 \leq s < 10\,000$	4
$10\,000 \leq s < 15\,000$	6
$15\,000 \leq s < 20\,000$	5
$20\,000 \leq s < 25\,000$	...
$25\,000 \leq s < 30\,000$	8
$30\,000 \leq s < 50\,000$	4

 1 cm<sup>2</sup> represents  $x$  teachers

- (a) Calculate the value of  $x$ .
- (b) Use the information in the histogram to complete the table.
- (c) Use the information in the table to complete the histogram.

(LON)

8. The histogram illustrates the lengths of stay in Australia of a group of Singaporean tourists this year.



- (a) Copy and complete the following table.

<i>Length of stay (x days)</i>	$0 < x \leq 5$	$5 < x \leq 10$	$10 < x \leq 15$	$15 < x \leq 25$	$25 < x \leq 40$
<i>Number of tourists</i>	10	10			

- (b) Find the number of Singaporean tourists in the group.  
 (c) Calculate the fraction of tourists who stayed in Australia longer than 15 days.
9. The histogram displays the energy consumptions for a representative sample of households in a city in 1993.

- (a) Copy and complete the following table.

<i>Energy consumption (x millions of BTU)</i>	$40 \leq x < 70$	$70 \leq x < 80$	$80 \leq x < 90$	$90 \leq x < 110$	$110 \leq x < 160$
<i>Number of households</i>					

- (b) Find the number of households in the group.  
 (c) Calculate the percentage of households whose energy consumption is at least 80 millions of BTU, giving your answer correct to the nearest whole number.

