C if U can

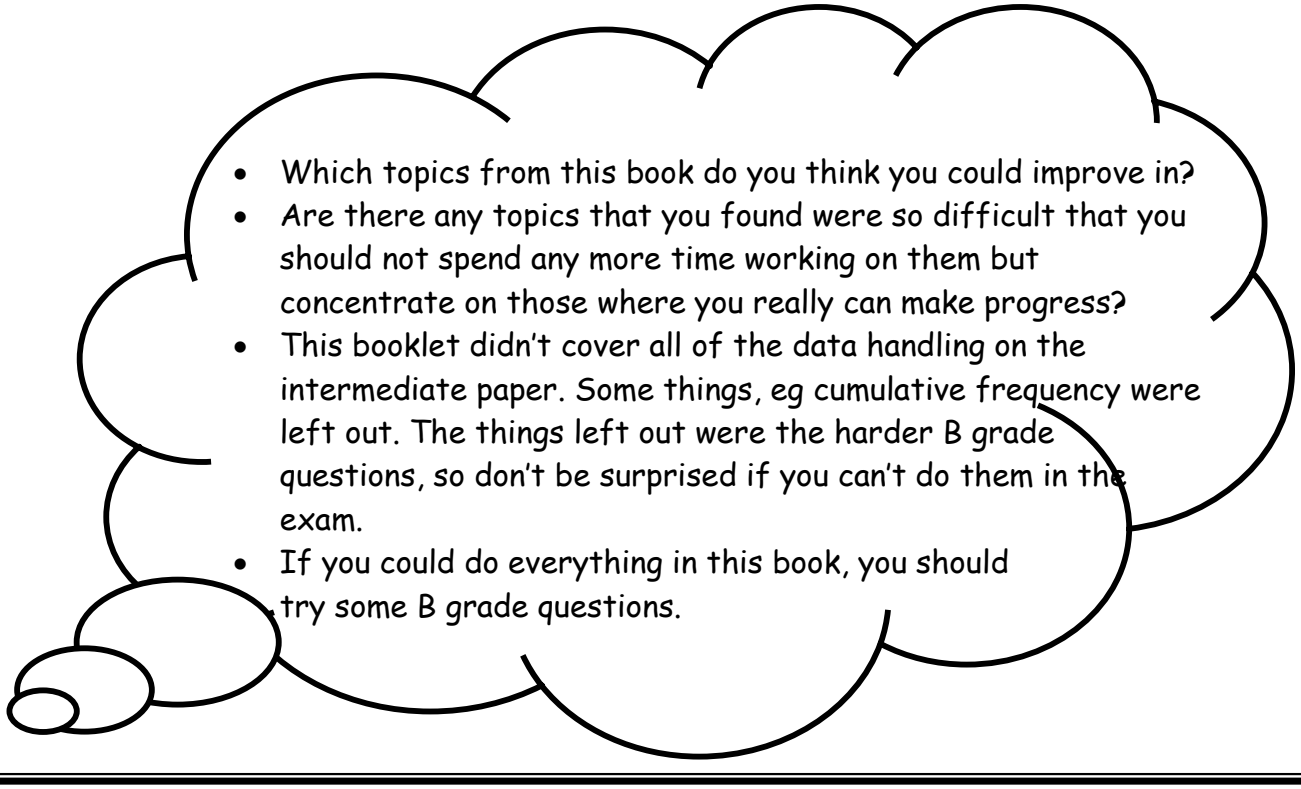
Handling data

Birmingham City Council
Learning and Culture

Name .....

How will this booklet help you to move from a D to a C grade?

- The topic of data handling is split into five units –displaying data 1, displaying data 2, averages, probability and mixed problems
- For each unit, you start by thinking about which types of question you are confident with, which types you're not sure about and which types cause you a real problem and assess yourself using the grid
- You then try some questions similar to those you have seen before – usually D grade questions so you can see whether your self assessment is accurate
- You then have some questions to try which are harder – these are C grade questions. There are hints to help you if you don't know where to start
- There are also some C grade questions with even bigger hints available from your teacher if you need them and there are also some C grade questions with no help (also available from your teacher) for when you feel brave enough!



- Which topics from this book do you think you could improve in?
- Are there any topics that you found were so difficult that you should not spend any more time working on them but concentrate on those where you really can make progress?
- This booklet didn't cover all of the data handling on the intermediate paper. Some things, eg cumulative frequency were left out. The things left out were the harder B grade questions, so don't be surprised if you can't do them in the exam.
- If you could do everything in this book, you should try some B grade questions.

Sometimes harder questions use more than one topic

Now C if U can do these……

A survey was carried out to find how much time was needed by a group of pupils to complete homework set on a particular Monday evening.
The results are shown in the table below.

Time, t hours, spent on homework	Number of pupils
0	3
$0 < t \leq 1$	14
$1 < t \leq 2$	17
$2 < t \leq 3$	5
$3 < t \leq 4$	1

Calculate an estimate for the mean time spent on homework by the pupils in the group.

CLUE:-
Your answer could be in hours and minutes or as a decimal fraction

The table shows the number of computer games sold in a supermarket each month from January to June

Jan	Feb	Mar	Apr	May	Jun
147	161	238	135	167	250

Work out the three month moving averages for this information.

CLUE:-
How many calculations will you need to do?

Charles found out the length of reign of each of 41 kings.
He used the information to complete the frequency table

Length of reign (L years)	Number of kings		
$0 < L \leq 10$	14		
$10 < L \leq 20$	13		
$20 < L \leq 30$	8		
$30 < L \leq 40$	4		
$40 < L \leq 50$	2		

a. write down the class interval that contains the median

b. calculate an estimate for the mean length of reign

CLUE:-
Do you know why the mean length of reign will be an estimate?

John records the time, in minutes, between aircraft passing over his house.
The table shows the results

Time, t minutes	Frequency
$0 < t \leq 4$	2
$4 < t \leq 8$	1
$8 < t \leq 12$	3
$12 < t \leq 16$	10
$16 < t \leq 20$	15

Calculate the class interval in which the median lies

Using John's table in the box on the left, he claims that this results show that the mean time is 10 minutes.

Is John correct?
Explain briefly your answer.

You have seen simple questions like these before

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Some students took a mental arithmetic test.
Information about their marks is shown in the frequency table

Mark	Frequency
4	2
5	1
6	2
7	4
8	7
9	10
10	3

a. How many students took the test?
b. Write down the modal mark

Use the information in the box on the left to answer these questions

24 students had a higher mark than Caroline

a. Work out Caroline's mark

b. Find the median mark

c. Work out the range of the marks

The mean weight of the 14 girls in a class is 54·2 kg

a. Calculate the total weight of the girls in the class

The mean weight of the 11 boys in the class is 59·2 kg

b. Calculate the mean weight of the 25 pupils in the class

Assess how well you think you understand this topic before you start. Are you confident, close or clueless?

C if U can Probability

	Confident	Close	Clueless
Calculate probabilities			
List possible outcomes			
Solve word problems involving probability			
Understand what is meant by bias			
Complete tree diagrams to show outcomes for two successive events			

At the end of the section, think about your self assessment. Were you right?

You should recognise this type of question

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The probability of it raining is 0·3. What is the probability of it not raining?	A train can be early, on time, or late. The probability of it being late is 0·63. The probability of it being early is 0·1. What is the probability of it being on time?	A fair coin is tossed and a fair dice is thrown. One possible outcome is Heads, 4 List all the possible outcomes

*Assess how well you think you understand this topic before you start. Are you **confident, close** or **clueless?***

C if U can Averages

	Confident	Close	Clueless
Calculate mode, median, mean and range for simple data			
Calculate mean and modal class from a discrete or grouped frequency table			
From a grouped frequency table, find the class interval that contains the median			
Write brief clear explanations			
Calculate a moving average			

At the end of the section, think about your self assessment. Were you right?

Hamid wants to find out what people in Melworth think about the sports facilities in the town.
Hamid plans to stand outside the Melworth sports centre one Monday morning.
He plans to ask people going into the sports centre to complete a questionnaire.
Carol tells Hamid that his survey will be biased.

a. Give one reason why the survey will be biased

b. Describe one change Hamid could make to the way in which he is going to carry out his survey so that it will be less biased

CLUE:-
You don't have to write a lot but be clear.

Kerry has a bag of beads.
2 of the beads are red
4 of the beads are blue
the other 9 beads are green
Kerry is going to take a bead at random from the bag.
What is the probability that she will take a blue bead?

The table shows information about the number of fillings students in a class had last year.

Number of fillings	Number of students
0	10
1	5
2	4
3	2
More than 3	1

The headteacher is to choose a student at random from the class.
What is the probability that she will choose a student who had

a. exactly 1 filling
b. 2 or more fillings

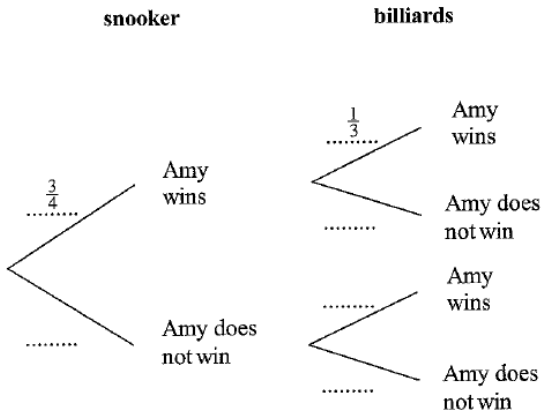
Trickier ones!

Now C if U can do these……

Amy is going to play one game of snooker and one game of billiards.
The probability that she will win the game of snooker is $\frac{3}{4}$
The probability that she will win the game of billiards is $\frac{1}{3}$

Complete the probability tree diagram

Complete the probability tree diagram.



CLUE :-
Remember what probabilities add up to

Angela asked 20 people in which country they spent their last holiday.
Here are their answers.

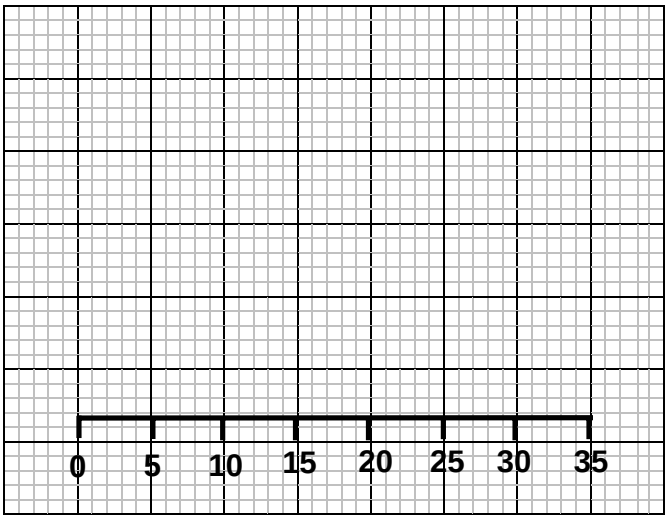
France	Spain	Italy	England
Spain	England	France	Spain
Italy	France	England	Spain
Spain	Italy	Spain	France
England	Spain	France	Italy

Design and complete a suitable data collection sheet that Angela could have used to show this information

CLUE :-
Design something simple

More complicated questions

Now C if U can do these……



Time (seconds)

The times, in seconds, taken by 11 teachers to solve a puzzle are listed in order.

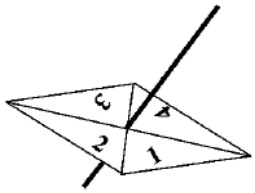
4 12 13 17 18 20 22 24 25 30 34

Draw a box plot for this data

CLUE:-

The times are already in order, so that will help

Here is a 4-sided spinner



The sides of the spinner are labelled 1, 2, 3 and 4
The spinner is biased.
The probability that the spinner will land on each of the numbers 2 and 3 is given in the table.
The probability that the spinner will land on 1 is equal to the probability that it will land on 4

Number	1	2	3	4
Probability	x	0.3	0.2	x

a. Work out the value of x

Sarah is going to spin the spinner 200 times

b. Work out an estimate for the number of times it will land on 2

CLUE:-

For part a, remember what the probabilities add up to and for part b, scale up your answer according to the sample size

A lorry contains 232 boxes of crisps. Each box has either plain crisps or cheese and onion flavour crisps. The probability that a box selected at random holds plain crisps is $\frac{1}{3}$ of the probability that the box holds cheese and onion crisps

a. Calculate the number of boxes of plain crisps

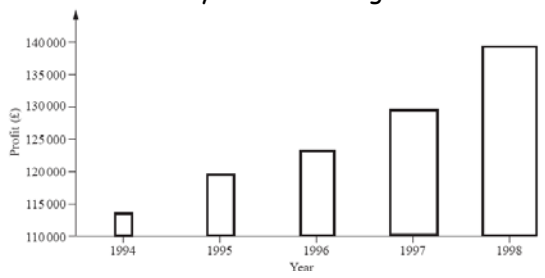
Each box holds 48 packets of crisps. One in every 8 packets of plain crisps has a prize in it. One in every 16 packets of cheese and onion crisps has a prize in it. A packet is selected at random from the lorry

b. Calculate the probability that the packet will have a prize in it.

CLUE:-

This is hard!! For part a, what is the ratio of plain to cheese and onion crisps? You need this to answer part b. If you can't do it all, you can still get some marks

For this diagram, give **two reasons** why it may be misleading



Mr Smith owns minibuses and coaches. He is going to sell drinks on his coaches.

He wants to know what type of drinks people like.

Design a suitable questionnaire he could use to find out what type of drink people like.

Simple questions first.

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Complete this stem and leaf diagram for the weights of 10 new born babies
4·1kg, 3·6kg, 4·5kg, 2·9kg, 3·8kg, 3·2kg, 2·8kg, 3·7kg, 2·5kg, 3·6kg,

Weight of babies

2	
3	6
4	1 5

The manager of a school canteen has made some changes and she wants to find out what students think of these changes.
On a questionnaire, she uses the question
'What do you think of the changes in the canteen?'
excellent☐ very good ☐ good ☐

What is wrong with this question?

The stem and leaf table shows the number of students late each day to school last month

1	2 3 3 6 6 8 9
2	0 1 1 5 6 9
3	0 0 2 2 2 4 6 7

a, find the median
b. work out the range

Assess how well you think you understand this topic before you start. Are you confident, close or clueless?

C if U can Mixed problems

	Confident	Close	Clueless
Solve problems involving two way tables			
Solve problems involving stem and leaf diagrams			
Design suitable questions for surveys			
Use scatter graphs and pie charts			
Solve problems involving averages or probability			

At the end of the section, think about your self assessment. Were you right?

Easy questions

C een it B4

Draw a two way table to record whether boys and girls have completed their maths homework. Use this information to complete the table: 10 boys and 8 girls complete their homework there were 15 boys and 14 girls in the class	Here are the weights, in kilograms, of 15 parcels 1·1, 1·7, 2·0, 1·0, 1·1, 0·5, 3·3, 2·0, 1·5, 2·6, 3·5, 2·1, 0·7, 1·2, 0·6 Draw a stem and leaf diagram to show this information	Janie wants to collect information about the amount of sleep the students in her class get. Design a suitable question she could use.

Can you cope with these?

C if U can Displaying data 2

	Confident	Close	Clueless
Understand how to use and create stem and leaf diagrams			
Understand and use box plots			
Create and/or comment on surveys and questionnaires			
Identify and understand what is meant by bias			
Write clear explanations when interpreting data			

At the end of the section, review your self assessment. Were you right?

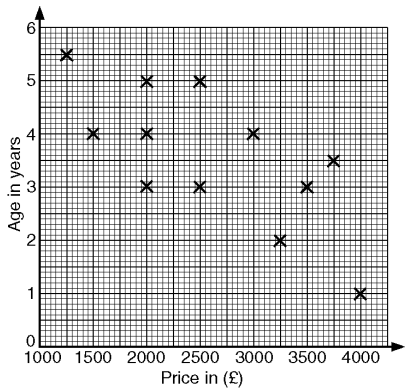
The grouped frequency table shows information about the weights, in kilograms, of 20 students chosen at random from year 11

Weight (w kg)	Frequency
$50 \leq w < 60$	7
$60 \leq w < 70$	8
$70 \leq w < 80$	3
$80 \leq w < 90$	2

There are 300 students in year 11.
Work out an estimate for the number of students in year 11 whose weight is between 50 kg and 60 kg

CLUE:-
Look at the sample size – what is the relationship between that and the total number of students in the year group?

Joe has 12 cars for sale.
The scatter diagram shows the ages and prices of the cars

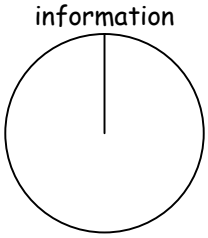


Describe the correlation between the ages of the cars and their prices

40 students went on foreign holidays. Each student went to one of four countries.

Country	***Number of students***	
France	***16***	
Spain	***12***	
Germany	***5***	
Italy	***7***	

The table shows the number of students who visited each country
Draw an accurate pie chart to show this information



Getting harder

Now C if U can do these……

A fair dice is to be thrown.
Write down the probability of the dice landing on

a. a six
b. an even number

A second dice is to be thrown.
The probability that this dice will land on each of the numbers 1 to 6 is given in the table

number	1	2	3	4	5	6
probability	*x*	0.2	0.1	0.3	0. 1	0.2

The dice is to be thrown once

c. calculate the value of x
d. calculate the probability that the dice will land on a number higher than 3

The dice is thrown 1000 times

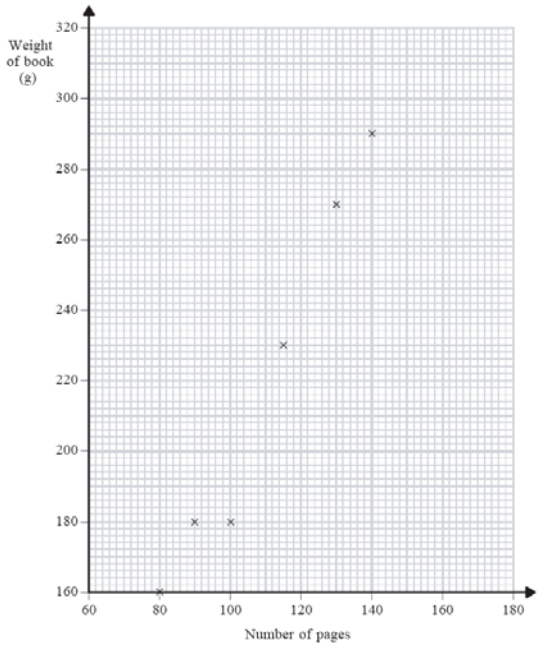
e. Estimate the number of times the dice is likely to land on a six

CLUE:-
If you can't do all of the parts of a question, you can still pick up quite a lot of marks.

The table shows the number of pages and the Weight, in grams, for each of 10 books

Number of pages	80	130	100	140	115	90	160	140	105	150
Weight (g)	160	270	180	290	230	180	320	270	210	300

a. complete the scatter graph to show the information in the table. The first six points have been plotted for you
b. describe the relationship between the number of pages and the weight of a book
c. draw a line of best fit on the scatter diagram
d. use your line of best fit to estimate
   (i) the number of pages in a book weighing 280g
   (ii) the weight of a book with 120 pages



CLUE:-
For part b, what kind of correlation might you expect? For part c – do this carefully or your answer for part d will not be accurate enough

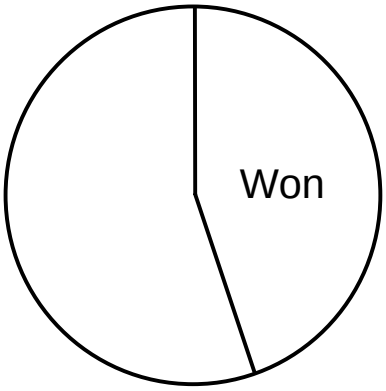
You'll have to think harder for these

Now C if U can do these……

Mathstown Rovers played 40 football matches.
The table shows information about their results

Won	Drawn	Lost
18	9	13

The incomplete pie chart shows some of this information. Complete the pie chart



CLUE:-
Use the numbers in the table to work out the size of the angles

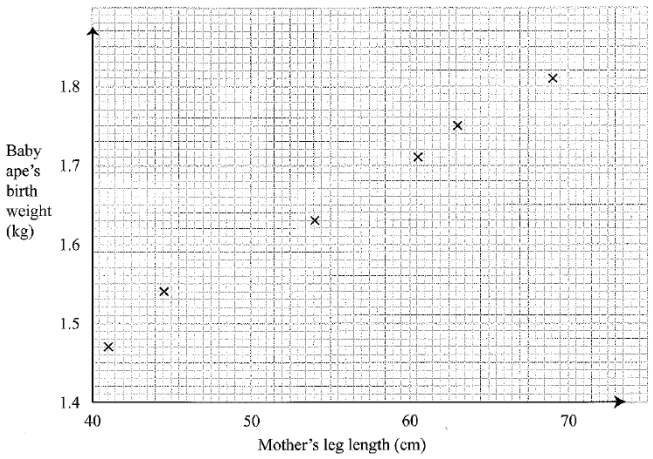
Michelle keeps a record of the number of minutes her train is late each day.
The table shows her results for a period of 50 days.

Number of minutes late (t)	Frequency
$0 \leq t < 10$	24
$10 \leq t < 20$	12
$20 \leq t < 30$	7
$30 \leq t < 40$	2
$40 \leq t < 50$	3
$50 \leq t < 60$	2

Calculate an estimate of the mean number of minutes late

CLUE:-
If the number of minutes late is within a range, what do you take as the value to multiply by the frequency?

The scatter graph shows some information about six new-born baby apes.
For each baby ape, it shows the mother's leg length and the baby ape's birth weight.



CLUE:-
Be as accurate as possible to get maximum marks

The table shows the mother's leg length and the birth weight of two more baby apes

Mother's leg length (cm)	50	65
Baby ape's birth weight (kg)	1.6	1.75

a. on the scatter graph, plot the information from the table
b. describe the correlation between a mother's leg length and her baby ape's birth weight
c. draw a line of best fit on the diagram

A mother's leg length is 55 cm

d. use your line of best fit to estimate the birth weight of her baby ape

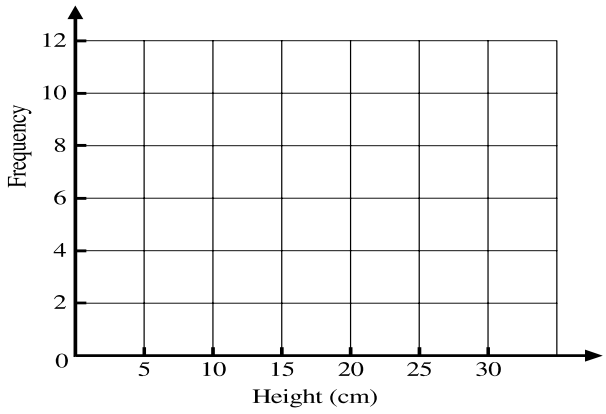
This is a record of the heights, in centimetres of 40 guinea pigs

21	22	11	16	22	13	11	25	9	17
21	24	27	25	12	14	8	12	6	17
23	7	12	26	14	8	12	26	17	19
23	29	21	19	26	26	18	21	13	9

Complete the frequency table

Height (h) cm	Tally	Frequency
$5 \leq h < 10$		
$10 \leq h < 15$		
$15 \leq h < 20$		
$20 \leq h < 25$		
$25 \leq h < 30$		

Use the table in the box on the left to draw a frequency diagram



a. how many guinea pigs were under 15 cm in height?
b. Write down the modal class interval of the heights

These should be fairly simple to answer

C een it B4

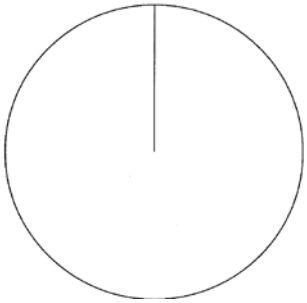
	S	Fr	Gr	Tot
Male	**24**	**41**	**5**	
Female		**32**		
Total	**58**		**26**	

Each student in Y11 studies exactly one modern foreign language – French, German or Spanish.
Complete this two way table

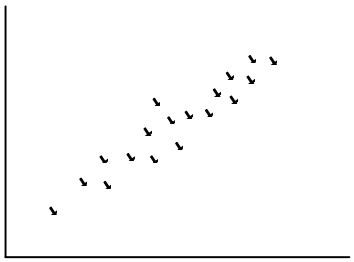
The table gives information about the medals won by Austria in the 2002 Winter Olympic Games

Medal	Frequency	
Gold	3	
Silver	4	
Bronze	11	

Draw an accurate pie chart to show this information



Here is a scatter graph



For this graph, state the type of correlation

*Assess how well you think you understand this topic before you start. Are you **confident, close** or **clueless?***

C if U can Displaying data 1

	Confident	Close	Clueless
Sort, collect and understand data displayed in a tally table or grouped frequency table			
Draw, understand and use two way tables			
Draw bar charts and understand and use data represented this way			
Understand and use data displayed in pie charts and represent data using pie charts			
Use and understand scatter graphs and draw conclusions based on information they show			

At the end of the section, think about your self assessment. Were you right?