EDEXCEL FUNCTIONAL SKILLS PILOT

TEACHER'S NOTES

Maths Level 2

Chapter 6

Working with data and averages

Maths Level 2

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Chapter 6: Working with data and averages

Use these free pilot resources to help build your learners' skill base
We are delighted to continue to make available our free pilot learner resources and teacher notes, to help teach the skills learners need to pass Edexcel FS Mathematics, Level 2.

But use the accredited exam material and other resources to prepare them for the real assessment
We developed these materials for the pilot assessment and standards and have now matched them to the final specification in the table below. They'll be a useful interim measure to get you started but the assessment guidance should no longer be used and you should make sure you use the accredited assessments to prepare your learners for the actual assessment.

New resources available for further support
We're also making available new learner and teacher resources that are completely matched to the final specification and assessment – and also providing access to banks of the actual live papers as these become available. We recommend that you switch to using these as they become available.

Coverage of accredited specification and standards
The table below shows the match of the accredited specification to the unit of pilot resources. This table supersedes the pilot table within the teacher notes.

Coverage and Range	Exemplification	Learner Unit
Collect and represent discrete and continuous data, using ICT where appropriate	• Collecting data • Tally charts • Frequency tables • Pie charts • Bar charts • Line graphs • Grouped frequency tables • Scatter graphs	**I1** Types of data **I2** Extracting and interpreting information from tables **I3** Extracting and interpreting information from bar charts **I4** Extracting and interpreting information from charts and graphs **I5** Collecting data **I6** Representing data in bar charts, pie charts, line graphs and scatter graphs **I7** Using spreadsheets to draw statistical diagrams Grouped frequency tables are covered in our new publishing (see below)
		I8 Remember what you have learned
Use and interpret statistical measures, tables and diagrams, for discrete and continuous data, using ICT where appropriate	• Mean, median, mode and range for discrete data • Modal class for grouped data	**J1** Mean **J2** Median and mode **J3** Using average and the range
	• Positive and negative correlation and line of best fit	**I6** Representing data in bar charts, pie charts, line graphs and scatter graphs
Use statistical methods to investigate situations	• Comparison of two groups using measures of average and range	**J3** Using averages and the range
	• Use line of best fit	**I6** Representing data in bar charts, pie charts, line graphs and scatter graphs
	• Compare proportions in a pie chart	**I4** Extracting and interpreting information from charts and graphs
		I6 Representing data in bar charts, pie charts, line graphs and scatter graphs
		J4 Remember what you have learned

Where to find the final specification, assessment and resource material
Visit our website **www.edexcel.com/fs** then:
- **for the specification and assessments:** under **Subjects**, click on **Mathematics (Levels 1–2)**
- **for information about resources:** under **Support**, click on **Published resources**.

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6 Working with data and averages

(pages 84–108 in the learner materials)

Performance	Coverage and Range	Unit Objectives
Learners can:	**Learners can:**	
■ understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations ■ identify the situation or problem and the mathematical methods needed to tackle it ■ select and apply a range of mathematics to find solutions ■ use appropriate checking procedures and evaluate their effectiveness at each stage ■ interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations ■ draw conclusions and provide mathematical justifications	■ collect and represent discrete and continuous data, using ICT where appropriate ■ use and interpret statistical measures, tables and diagrams for discrete and continuous data, using ICT where appropriate	**I1** Types of data **I2** Extracting and interpreting information from tables **I3** Extracting and interpreting information from bar charts **I4** Extracting and interpreting information from charts and graphs **I5** Collecting data **I6** Representing data in bar charts, pie charts, line graphs and scatter graphs **I7** Using spreadsheets to draw statistical diagrams
		I8 Remember what you have learned
	■ use statistical methods to investigate situations	**J1** Mean **J2** Median and mode **J3** Using averages and the range
		J4 Remember what you have learned

Approach to learning

These sections cover the skills necessary for learners to be able to work efficiently with data, averages and the range. Each unit focuses on the delivery of one particular aspect of collecting, representing, using and interpreting statistical measures and using statistical methods to investigate situations. The table identifies the coverage and range from the functional skills standards: mathematics level 2 which are covered in this section.

I Working with data

I1 *Types of data*

The main idea is to introduce the terminology for different types of data. Discuss the connection between the words qualitative and quality for non-numerical data and quantitative and quantity for numerical data. Encourage the learners to think of continuous as being something 'unbroken' and link to data such as height and weight; for example, you cannot jump from 60 kg to 61 kg but have to go through all the weights in-between, 60.1, 60.11 etc. Whereas discrete data has breaks, for example, the number of people in a room has to be an integer, it must jump from 2 to 3, you cannot have 2.5 people.

Activities

1. Make cards showing different types of data as in Try the skill, such as shoe sizes, temperature of a room, types of drink etc. Ask the students to work in pairs and classify each as qualitative or quantitative and if quantitative whether it is discrete and continuous. Ask them to think of some examples of their own.

2. Draw a line graph to illustrate the following data for the heights of 25 fourteen to nineteen year-old students.

Height to the nearest cm	Frequency
1.46 – 1.55	3
1.56 – 1.65	9
1.66 – 1.75	7
1.76 – 1.85	4
1.86 – 1.95	2

Tackle this as a whole group activity. Discuss the fact that height is continuous data and establish the limits for each interval. 1.455 – 1.555, etc. Frequency should always be on the vertical axis and graph should be stepped with horizontal lines.

Misconceptions

Learners have difficulty distinguishing between discrete and continuous data. Linking quantitative data with the associated graph emphasises the 'broken' nature of discrete data.

I2 *Extracting and interpreting information from tables*

The main idea is to look at the different ways data can be recorded in table form and identify how to extract the required information from tables. Encourage students to read the questions carefully to identify what information is required and to pay attention to the column headings and notes at the end of tables. Remind them that sometimes this means adding values together. Discuss where tables are used in everyday life, for example holiday brochures and mail order catalogues.

Activities

Use holiday brochures, menus, timetables, price lists including special offers and mail order catalogues to get students to practise extracting information. For example, they could be asked to work out the costs for a family of four going on holiday for two weeks on a particular date.

Misconceptions

The problems with this type of question usually arise when a student does not read the question carefully. For example, in question 1b on page 85, students may not realise that they need the cost for two people and may not multiply by 2. Students must be encouraged to identify the key points in a question.

I3 *Extracting and interpreting information from bar charts*

The main idea is to emphasise the importance of reading the scale correctly. Encourage the learners to always work out the value of 1 small square on the vertical axis to enable them to read off the scale correctly. Remind them to use a ruler to enable them to read the values on the vertical axis. Encourage them to read the question carefully to ensure they work with the values required in the question. Emphasise the importance of using the key to identify the correct set of data values when working with dual or component bar charts. Discuss why it is sometimes useful to use a vertical scale which does not start at 0 and why this can be misleading.

Activities

Make a set of cards with frequency tables and a set of cards with the corresponding bar charts. Ask the learners to work in pairs to match the frequency table with the correct bar chart.

Draw a set of bar charts for a set of data. Have one that is correct and others that are incorrect because the axis labels are incorrect, the points are incorrectly plotted, the title is incorrect etc. Ask students to match the correct bar chart with the data.

Draw a set of charts where the data have been represented in a misleading way, for example as in question 1 on page 86. Discuss why they are misleading. Emphasise that it is not necessarily incorrect if the vertical axis does not start at 0.

Misconceptions

Many of the misconceptions for extracting and interpreting information from bar charts arise from misunderstanding the scale used on the vertical axis. This can be addressed when the learners are drawing their own bar charts in section I6, by discussing the different possible scales that can be used depending on the data that is to be represented. It is also very common for learners to make mistakes as they do not read the questions carefully. Encourage the learners to read through the question at least twice, to ensure they work with the correct set of data values.

I4 *Extracting and interpreting information from pie charts, line graphs and scatter graphs*

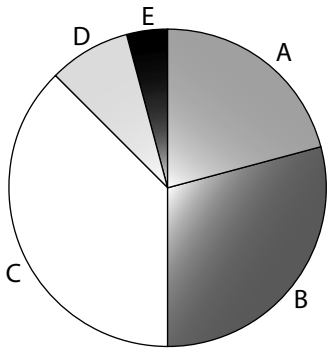
The main idea for pie charts is to emphasise that they are used to display proportion and that it is sometimes not possible to extract numerical values unless sufficient information is given. For example, ask the learners to consider the following pie charts which show student achievement in maths GCSE in 2006 and 2007:

	No. of students	
Grade	**2006**	**2007**
A	25	20
B	35	45
C	45	65
D	10	20
E	5	15
Total	**120**	**165**

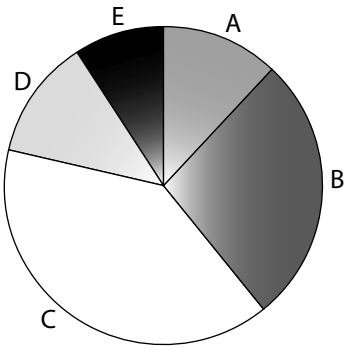
Percentage of grade B 2006 = $\frac{35}{120} \times 100 = 29.2\%$

Percentage of grade B 2007 = $\frac{45}{165} \times 100 = 27.3\%$

Student achievement 2006



Student achievement 2007



The angle representing grade B in 2006 is bigger than the angle representing grade B in 2007. This means that there is a higher **proportion** of grade B grades in 2006 not a higher number of students. The table shows that there were actually 35 students who achieved a grade B in 2006 and 45 in 2007.

The main idea when extracting information from line graphs and scatter graphs is to ensure the scale is read correctly. Remind them that line graphs are used for continuous data. At level 2, often more than one line graph is drawn on the same axes and the learner is asked to make comparisons. Remind them that it is important to read the question carefully and make sure they answer the question that is asked.

When dealing with scatter graphs, the learner will be often be asked whether there is any correlation between the two sets of data. Remind them to watch out for false correlation, i.e. the cases where it looks as if the plotted points form a pattern, but there is actually no causal connection between the two sets of data. Inform them that the word 'causal' is derived from the word cause and means 'being the cause of something'. Discuss the fact that a city's ice cream sales can be shown to be highest when the rate of drownings in the city's swimming pools is highest as another example of non-causal correlation. It would be wrong to conclude that high ice-cream sales cause drowning, this could be due to a heat wave which would mean more people buy ice-cream and go swimming.

Activities

Use the example on student achievement, above, as a focus for class discussion.

Draw a set of pie charts on cards. Draw the corresponding data on a separate set of cards and ask students to match them up.

Encourage the learners to bring in their own examples of line graphs which are used in the media for class discussion.

Ask the learners to identify sets of data which they think should have positive or negative correlation.

Misconceptions

Many of the misconceptions in extracting and interpreting information from pie charts arise from misunderstanding the concept of proportion. For example, in the question on student achievement above, the learners will think that because there is a bigger angle representing grade B in 2006 than there is in 2007, this means that there is a larger number of students in 2006. This can be addressed when the learners are drawing their own pie charts in section I6, by discussing the different proportions and how they relate to the angles. Encourage them to remember the following connections between fractions, decimals and percentages and the angle in a pie chart.

Fraction	Decimal	Percentage	Angle
1	1	1	360^o
$\frac{1}{2}$	0.5	50%	180^o
$\frac{1}{3}$	$0.\dot{3}$	$33.\dot{3}\%$	120^o
$\frac{1}{4}$	0.25	25%	90^o

Many of the misconceptions for extracting and interpreting information from line graphs and scatter graphs arise from misunderstanding the scale used on the vertical axis. This can be addressed when the learners are drawing their own line graphs and scatter graphs in section I6, by discussing the different possible scales that can be used depending on the data that is to be represented. It is also very common for learners to make mistakes as they do not read the questions carefully. Encourage the learners to read through the question at least twice, to ensure they answer the question that is asked.

I5 *Collecting data*

The main idea is to introduce the idea of primary and secondary data and the different ways they can be collected. Learners should be familiar with tally charts and data collection sheets as well as how questionnaires can be used to collect data. They should also understand the difference between

collecting data by observation and by experiment. Discuss the structure of questions for questionnaires, emphasising the need to make sure all categories are covered in the response boxes and make sure the questions are not biased. Also discuss the importance of choosing an appropriate sample that is not biased towards any particular group of people.

Activities

Learners can carry out their own survey, for example using a data collection sheet to record how people travel to college or work. They should discuss how to take an appropriate sample to be representative of the people at college or work.

Learners can write questions for a questionnaire to investigate how often people at college or work use the internet. This could be developed into a more sophisticated activity when use of the internet is categorised for work and leisure and distinguishing between week-days and week-ends. Again the choice of sample should be discussed.

Design some questions which have faults and ask the learners to identify what is wrong with the question and design their own better versions. Use errors such as those identified in the misconceptions below as well as using subjective options such as 'a lot' 'not much' etc.

Misconceptions

The main difficulty with collecting data is in identifying an appropriate sample and designing suitable questions for questionnaires. For example, in question 3a on page 89, the learners may not identify that only asking customers who visit the supermarket on Monday morning to take part in the survey will not take into account the opinions of the people who work from 9 to 5 etc. When designing response boxes for questions, learners will often have overlap when defining intervals e.g. 1 to 5, 5 to 10 etc; they may also leave gaps e.g. £1 to £5, £6 to £10 etc; they may also not cover all possibilities e.g. starting at 10 to 20 means less than 10 is not covered and ending with 90 to 100 means greater than 100 is not included. Learners will often not include a category of 'other' for example in a survey to find out people's favourite nationality of food, they would need to include 'other' for those who choose one of the more unusual nationalities. Using the activities outlined above will help eliminate these difficulties.

I6 *Representing data in bar charts, charts, line graphs and scatter graphs*

The main idea is for learners to identify the most appropriate way to display data. Discuss the different types of data; qualitative and quantitative and the sub-categories of discrete and continuous. Remind the learners that line graphs are only suitable for representing continuous data. Emphasise the importance of choosing a scale which is easy to use for bar charts, line graphs and scatter graphs, e.g. 1 small square as 1, 2, 5, 10, 20, 50, 100, 200, 500, 1 000 etc. For dual and component bar charts discuss the use of an appropriate key to distinguish between the sets of data. Distinguish between component bar charts that use raw figures and those that use percentages and so all have the same height of 100%.

When drawing pie charts to represent data, remind the learners of the need to first express the values for each category as a fraction of the whole and then multiply by 360^{o} to find the number of degrees to represent each sector. Emphasise the fact that they should always check the total number of degrees is 360^{o}.

When plotting points on line graphs it is sometimes necessary to round the given values to enable them to be plotted on the scale. Discuss the fact that using real data doesn't always give whole values.

Reinforce the fact that when plotting points on scatter graphs, each point plotted represents a pair of data values. For example, in question 5 on page 000 for the scatter graph representing the number of mobile phones and computers owned from 1996 to 2005, each point represents a year interval and so the year does not appear on the scatter graph. Drawing a line of best fit on a scatter graph requires practice. The line of best fit should represent the **slope** of the band of points that are plotted and there is no hard and fast rule about the number of points on each side of the line, just that the line should pass through the middle of them. Once drawn, the line of best fit can be used to make predictions. Emphasise that in assessments the learner should draw lines on the scatter graph using the line of best fit to identify the predicted value and demonstrate their understanding of its use. This will also ensure they arrive at a good estimate for their prediction. Remind them of the need to use a ruler and a sharp pencil so that their answers are as accurate as possible.

Activities

Give the learners a conversion such as 1 inch = 2.54 centimetres and ask them to use this to enable them to draw a conversion graph from inches to centimetres, using the points (0, 0), (10, 25.4), (20, 50.8). Note that only two points are needed to fix a line but 3 points will confirm it. Discuss suitable scales and the range of values to use on the axes. Discuss how to convert values which are outside the rage of values on the graph. Ask them if all conversion graphs will pass through (0, 0)? Do they know of any counter-examples? (One example, is converting from degrees Celsius to degrees Fahrenheit.) Remind them

that straight line graphs which pass through the origin indicate the variables are in proportion. Ask the learners to draw their own conversion graph.

Ask the learners to investigate the connection between height and weight by collecting data from their peers and plotting on a scatter graph. Is there a correlation? If there is a correlation draw in a line of best fit. Use the line of best fit to make predictions. Are there any limitations for using the line of best fit? This activity will allow for discussion on the scales used on the axes and how this can affect the appearance of the plotted points. It should also highlight the fact that the line of best fit can only be used to make predictions where the points are plotted, the 'region of reliability'.

Misconceptions

Many of the misconceptions are covered under I4. When drawing bar charts, learners may not remember that bars should be the same width and they will not allow for gaps between the bars. Reproducing bar charts using spreadsheets will reinforce this as standard representation. When drawing pie charts they will sometimes confuse the method of finding the angle for each sector. Emphasising the fact that pie charts represent proportion should help them remember this method. Learners may not plot points correctly in line graphs and scatter graphs because they have not chosen an appropriate scale. Explain the difficulties involved with choosing a scale such as 1cm to 3 units and emphasise that they need to choose as large a scale as possible so that they are able to work with the graph and find required values more easily.

I7 *Using spreadsheets to draw statistical diagrams*

The main idea is to enable learners to have access to ICT facilities to produce statistical diagrams as this can help them with their understanding. It is much quicker to produce a chart or graph using ICT and so more time can be spent on understanding and interpreting. It is very important that statistical diagrams produced by the learners look mathematical and so the process of converting a graph from a standard one produced by Excel to one adapted to look as if it has been produced on graph paper is important. Excel has been chosen to demonstrate this because most learners use Microsoft Office. The instructions in the learner materials relate to a scatter graph, but they can easily be adapted to other statistical diagrams which are required for level 2.

Activities

Use Excel to display all the data produced in the activities in I6 above. Compare the scales used when drawing by hand to those used by Excel. Compare any differences in the answers to these activities.

Misconceptions

Learners can become very adept in producing statistical diagrams using ICT with practice. The main difficulties arise with the learners being able to identify the most appropriate statistical diagram to use to represent the data. This is addressed under I4 and I6.

J Working with mean and range

J1 *Working with the mean*

The main idea is to ensure that students are able to calculate the mean correctly by adding all the items together and dividing by the number of items. Remind them that even when zero is one of the items it still needs to be included in the number of items. Encourage students to become familiar with frequency distributions so that they understand which values need to be multiplied together to calculate the sum of the values. Emphasise that they should always divide by the sum of the frequencies, not the sum of the possible values. Remind the students that the mean does not have to be one of the given values. Discuss how to apply the methods they learned for simplifying fractions to working out the mean value, by using common factors for cancelling. Encourage the students to check their answer makes sense by verifying it lies between the values of the given data items.

Activities

Investigations:

1. The mean of a set of numbers is 42. The sum of the numbers is 336. How many numbers are there?

2. The mean of a set of 12 numbers is 84. What is the total of the numbers?

3. The mean of six numbers is 25. Five of the numbers are 21, 28, 22, 25 and 26. What is the sixth number?

4. The table shows the number of goals scored by 40 teams in a football league.

Goals	0	1	2	3	4	5
No. of teams	8	12	6	7	4	3

a What is the total number of goals scored?

b What is the mean number of goals scored? Comment on your answer. Does it make sense?

c What fraction of the teams scored fewer than 2 goals?

Misconceptions

Students are often confused when zero is one of the values when they are finding the mean, and they may not include it in the number of values. See example 2 on page 101. Emphasise that all items must be included even if the value does not contribute to the total. A common mistake in calculating the mean of a frequency distribution is to divide by the sum of the possible values instead of the sum of the frequencies. For example, in question 6 on page 87, students may write 125/(0 + 1 + 2 + 3 + 4) instead of multiplying the values and then dividing by 125. Try to overcome this misunderstanding by illustrating how the table would be written out in full, in this case, 0, 0, 0, …, 0, 1, 1, 1, …, 1, etc. Emphasise that the table is a convenient way of displaying the full data set.

J2 *Working with the median and mode*

The median

The main idea is to introduce a different type of average and the method for determining its value. Emphasise that it is important first to put the numbers in order. Encourage students to add one to the number of numbers and divide by 2 to find the position of the median. Remind students that when there is an even number of numbers there will be two numbers in the middle and they need to find the mean of the middle two numbers. Discuss how to find the position of the median of a frequency distribution by using a cumulative approach. Emphasise again how the table would look if it were written out in full. Remind the students that the median does not have to be one of the given values. Encourage them to check their answer makes sense by verifying that it lies between the values of the given data items. Advise them to check the distribution of the data to see that the position also makes sense.

Activities

Use the table as an aid to illustrate the method for calculating the median value for a frequency distribution.

Number of children	Number of couples
0	3
1	22
2	12
3	10
4	2
5	1
Total	50

What would the data look like, written out in full?

What is the position of the median value?

Write the cumulative totals on the table.

What is the median number of children? Comment on your answer. Does it make sense?

What is the mean number of children? Comment on your answer. Does it make sense?

Misconceptions

The main difficulty students have with finding the median occurs in questions on frequency distributions. For example, in question 5 on page 106, a large number of students will write 5 as the median, as it is the median of the possible number of peas 3, 4, 5, 6 and 7. Try to overcome this error by carrying out activities of the type above, which clearly outline the data content.

The mode

The main idea is to introduce the mode as an average which represents the most common or most popular item of data. Remind students that the mode is the only type of average that can be used for qualitative data and it is the only average that has to be one of the data items. Emphasise that the modal value is not the value of the frequency, but the data item with the highest frequency. Encourage the students to check their answer makes sense by verifying it is one of the given data items.

Activities

Work out the modal value of the frequency distributions above for goals and numbers of children. Compare and discuss the values for the mean, median and mode in each case. Do they make sense?

Misconceptions

The most common error in finding the mode or modal value is to write the highest frequency as the answer, instead of the data item. For example, in question 5 on page 106, students will give the answer 40 for the mode, instead of 6 for the most common number of peas. Emphasise that the frequency identifies the data item with the highest value and that the mode must be one of the data set, so in this case the answer must be 3, 4, 5, 6 or 7.

J3 *Working with averages and the range*

The main idea is that different types of average are useful in different situations. Encourage students to look at different data sets and try to decide for themselves which would be the best average to use. Remind them that the range is a measure of the

spread of the data and is an actual value, not a range of values: they need to subtract the lowest value from the highest value. Emphasise that knowing the range alone is not enough to inform them of the data values, it merely informs them how spread out the data values are. Discuss how different types of average may be useful in different situations and how the range is also used as a measure of consistency.

Activities

Investigations:

1. The following set of data has a range of 12: 12, 11, 17, *x*, 9, 16, 12, 11, 15, 19, 11, 9, 18, 11 find the two possible values of *x*.
2. For a set of five numbers the mode is 1, the median is 2, the mean is 3, the range is 6. Write down the five numbers.
3. The range in the number of mobiles sold by a company per week for one month was 250. The range in the number of mobiles sold by another company over same period was 50. Discuss.

Card activity:

Write a series of scenarios similar to those in question 3 on page 91 and ask the students to match the best average to each set of data. (There could be more than one.)

Misconceptions

Students sometimes have difficulty identifying the best average to use in different situations. For example, in question 3 on page 106, they may be unsure as to why the mode is the best average for part a. Many of the decisions are down to logic. Discuss the table on page 105, which outlines the advantages and disadvantages and gives examples. Also, try activities of the type described above. A common error when finding the range of a set of values is to use the last and the first in the list rather than the highest and lowest. Emphasise that the values must be put in order. The problems identifying the range usually occur in questions involving frequency distributions. For example, in question 5 on page 106, students may find the range of the frequencies instead of the range in the number of peas and give 34 as the answer instead of 4. Emphasise that the range must be determined from the data items themselves and not the frequencies.

Apply the skills

The learners need to develop their Process Skills, which are:

Representing	Analysing	Interpreting
Making sense of situations and representing them	Processing and using the mathematics	Interpreting and communicating the results of the analysis

At level 2 the learners must decide on the methods used and identify the information they need for themselves. A suitable activity to practice their skills in data handling would be to investigate relationships between heart rate and lifestyles. The practice task below involves collecting data on students' heart rates and exercise levels and organising and representing this data to make valid conclusions.

An investigation into the effects of exercise and healthy eating on heart rate

Sample tasks

Ask the learners to:

- Count the number of their heart beats over 15 seconds when they are relaxed.
- Use this information to work out their heart beat per minute.
- Work out the percentage of learners that are above an adult's normal heart beat rate range. (60 – 80 bpm)
- Work out the mean, median, mode and range of heart beats per minute for the sample.
- Do at least 10 minutes of exercise, running up and down stairs or jogging etc then count the number of their heart beats over 15 seconds and work out their heart beat rate per minute.
- Use Excel to plot a scatter graph using the heart beat per minute when relaxed and the heart beat per minute after exercise. Is there a correlation?
- If there is a correlation, use Excel to draw in a line of best fit and use it to work out a normal range of values for the number of heart beats per minute after exercise for an adult.
- Design a question, identifying gender, with categories to ask learners the average number of hours they spend on exercise per week.
- Use the question to collect data on the number of hours spent on exercise per week.
- Display the information on the number of hours spent on exercise per week on a pie chart, (not linked to gender).
- Display the information on a dual and a comparative bar chart, identifying the difference between the genders.
- Organise individual student information on gender, amount of exercise, and heart rate before and after exercise into a table.
- Use the charts and the mean calculations to draw any conclusions on the effects of exercise and on heart rate.

Note

High heart beat rate does not mean high blood pressure

Answers

I1 Types of data – *page 84*

1. quantitative and continuous
2. qualitative
3. quantitative and continuous
4. quantitative and continuous
5. qualitative
6. quantitative and continuous
7. quantitative and discrete
8. quantitative and continuous

I2 Extracting and interpreting information from tables – *page 85*

1a £400 **1b** £840
2a 28 **2b** 43 **2c** 9 **2d** 83

I3 Extracting and interpreting information from bar charts – *page 86*

1. a Because the scale on the vertical axis does not start at zero
b 4p
2. a £500 **b** Other

I4 Extracting and interpreting information from charts and graphs – *page 87*

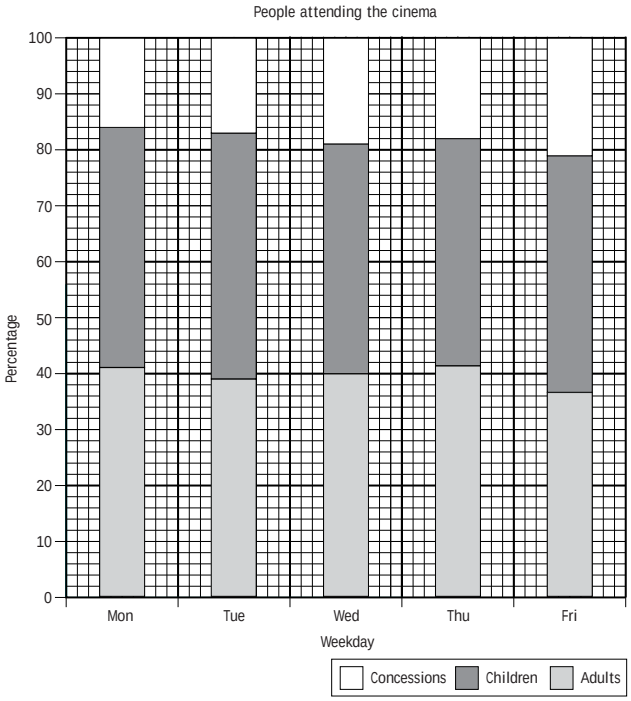
1. a £288 **b** $\frac{1}{12}$
2. A line graph
3. a January, March, April, June **b** February

I5 Collecting data – *page 89*

1. Data collection sheet; primary data
2. Question identifying number of people eating the meal and covering all price ranges with no overlap
3a For example, will not survey people who are in 9 to 5 jobs
3b Sample different times of day and include weed-ends as well as week-days, taking account a range of ages

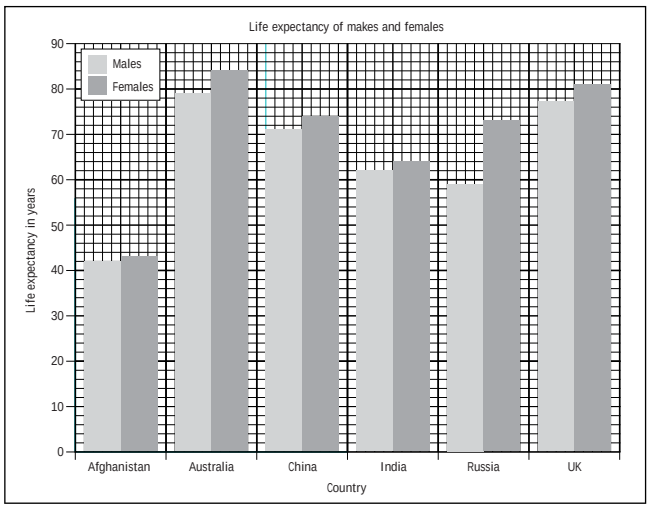
I6 Representing data in bar charts, pie charts, line graphs and scatter graphs – *page 90*

1a



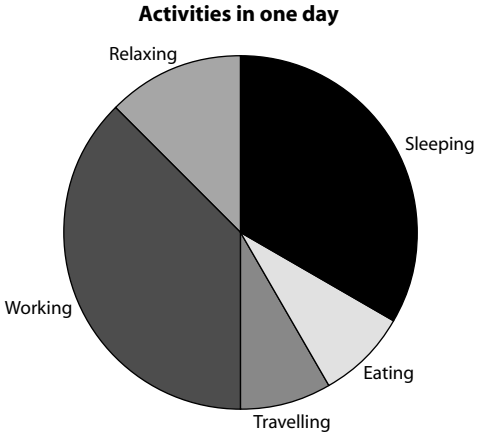
1b Australia **1c** Afghanistan **1d** Russia – 13.7 years

2

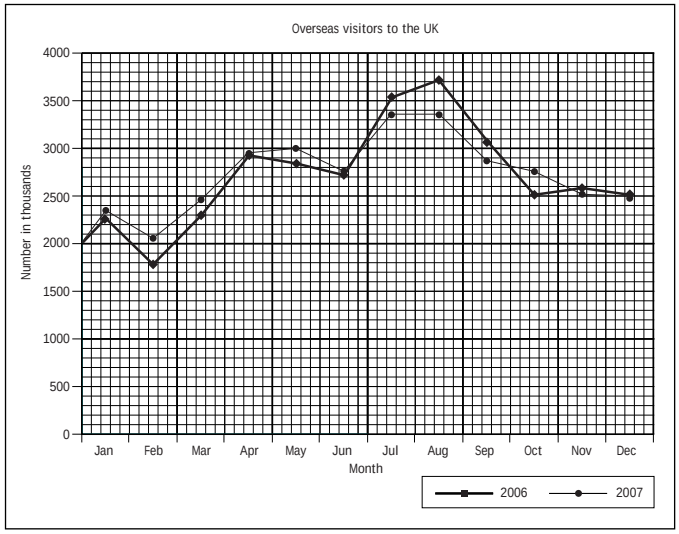


3

Activity	Number of hours	Number of degrees
sleeping	8	$\frac{8}{24} \times 360 = 120°$
eating	2	$\frac{2}{24} \times 360 = 30°$
travelling	2	$\frac{2}{24} \times 360 = 30°$
working	9	$\frac{9}{24} \times 360 = 135°$
relaxing	3	$\frac{3}{24} \times 360 = 45°$
TOTAL	**24**	**360°**

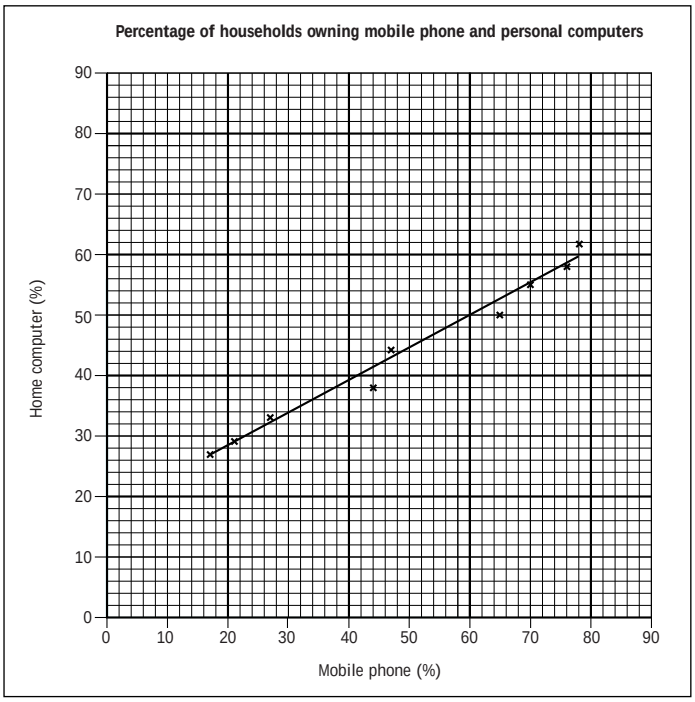


4a



4b August – 350 thousand **4c** December – 30 thousand

5a



5b(i) approx 60% **5b(ii)** approx 5%

I7 Using spreadsheets to draw statistical diagrams – *page 97*

Excel versions of graphs are shown above

I8 Remember what you have learned – *page 99*

1. A **2.** B **3.** C **4.** C **5.** B **6.** C

J1 Mean – *page 101*

1. 155cm **2.** 17 minutes **3.** £0.60 **4.** 66%
5. 17.94 years **6.** 1 pet

J2 Median and mode – *page 103*

1. a 46 **b** 45
2. a 107.4p **b** 107.9p
3. a 3 **b** 3
4. a **i** 2 **ii** 1 **b** **i** 2 **ii** 1
c Men receive more parking tickets for illegal parking in the city centre than women do.

J3 Using averages and the range – *page 105*

1. a 12 **b** 12
c 10
2. a Silver **b** 13
3. a Mode **b** Median
c Mean
4. B
5. a 5.59 **b** 6
c 6 **d** 4

J4 Remember what you have learned – *page 107*

1. A **2.** C **3.** A **4.** D
5. B **6.** B **7.** A **8.** B