

# **ICT**

## **Study Module 5**

# Working with numbers and charts

Published by Pearson Education, Edinburgh Gate, Harlow CM20 2JE

© Pearson Education 2010




All rights reserved. This material may be used only within the Functional Skills Development Programme Centre that has retrieved it, in which case it may be desk printed and/or photocopied for use by learners within that institution; otherwise no part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanic, photocopying, recording or otherwise without either the prior written permission of the Publishers or a licence permitting restricted copying in the United Kingdom issued by the Copyright Licensing Agency Ltd, Saffron House, 6–10 Kirby Street, London EC1N 8TS, UK.

First published 2008. This revised edition published 2010.

Typeset by Oxford Designers & Illustrators, Oxford

# 5 Working with numbers and charts

By the end of this module, you should be able to:

-  use formula to process numerical data
-  format data
-  produce charts and graphs

## Introduction

In Module 4, you saw how spreadsheets can be used for storing and organising records. But they can do much more than that. They can be used for solving problems, for predicting what might happen in the future, for simulating a real-life situation and for financial modelling.

It's formulas that make spreadsheets so useful. In this module, you will learn how to use formulas to process and manipulate numeric data stored in a spreadsheet, and how to create meaningful charts.

### Skill Standards covered

At Level 1, you can...	At Level 2, you can...
<b>2</b> Interact with and use ICT systems to meet requirements of a straightforward task in a familiar context	<b>2</b> Select, interact with and use ICT systems safely and securely for a complex task in non-routine and unfamiliar contexts
2.1 Select and use software applications to meet needs and solve straightforward problems	2.1 Select and use software applications to meet needs and solve complex problems
<b>7</b> Enter, develop and refine information using appropriate software to meet the requirements of straightforward tasks	<b>6</b> Enter, develop and refine information using appropriate software to meet requirements of a complex task
7.1 Apply editing, formatting and layout techniques to meet needs, including text, tables, graphics, records, numbers, charts, graphs or other digital content	6.1 Apply a range of editing, formatting and layout techniques to meet needs, including text, tables, graphics, records, numerical data, charts, graphs or other digital content
<b>8</b> Use appropriate software to meet requirements of straightforward data-handling task	<b>7</b> Use appropriate software to meet the requirements of a complex data-handling task
8.1 Process numerical data	7.1 Process and analyse numerical data
8.2 Display numerical data in a graphical format	7.2 Display numerical data in appropriate graphical format

## A


## Working with numbers

You can use formulas to perform calculations on numerical values stored in a table. Have a look at this part of the Loyalty Scheme table (digital asset SB5.1.1).

A formula is used to calculate the cash value of the points members have collected.

I	J
Points	Cash Value
249	£31.13
250	£31.25
499	£62.38

### Skill Builder 5.1

 Open digital asset SB5.1.1. What happens if you add or take away points from a customer?

A **formula** begins with the = sign and is followed by a calculation, e.g. =5+5, or a cell reference, e.g.=D3, or a combination of both, e.g. =D3+E3.

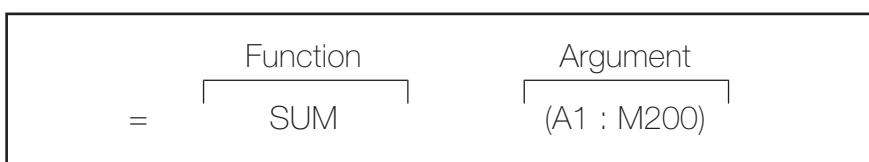
When you press Enter, the outcome of the formula is displayed in the cell.

I	J
Points	Cash Value
249	=I2*Points = money!\$D\$5
250	=I3*Points = money!\$D\$5
499	=I4*Points = money!\$D\$5



## Functions

A function is a preset formula. Like formulas, functions begin with the equals sign (=), followed by the function's name and its arguments. (Arguments are cell references that supply the data for a function.) The function name tells the spreadsheet what calculation to perform. The arguments are contained inside round brackets.



There are a number of built-in functions that you can use in formulas to make it easy to perform common calculations on data.

The *SUM* function adds up a column or row of numbers. For example, if there is a set of 10 numbers in column C, row 5 to row 14, the formula =SUM(C5:C14) in cell C15 will display the result of adding them together.

Function	Process
=SUM(B1:B4)	Adds together the contents of cell range B1 to B4
=AVERAGE(B1:B4)	Calculates the average of the contents of the cell range B1 to B4
=COUNT(A1:C5)	Calculates how many cells in the range A1 to C5 contain numbers or dates.
=MAX (A1:C5)	Finds the largest number in the range A1:C5
=MIN (A1:C5)	Finds the smallest number in the range A1:C5

The formula builder helps you construct a formula step by step.

## Which software application should I use?

If your task involves number crunching, spreadsheet software is the best tool for the job. You can use formulas to process numerical data and produce charts and graphs to display information in an 'easy to see at a glance' format.

## Formatting cells


You can alter the way numbers are displayed. Have a look at this table.

	A	B
1	Format	Display
2	General	45.27
3	Rounded	45.3
4	Currency	£45.27
5	Percent	45%
6	Date	04 May 2010

The Display cells contain the same value (45.27) but they are formatted in different ways:

- Cell B2 has no special format (General), the value shows as entered.
- Cell B3 displays 45.3. The cell format has been set to show one decimal place, so the number is rounded up to 45.3. The data type of information in this cell is number.
- Cell B4 displays £45.27. The format has been set to currency with two decimal places. The data type in this cell is currency.
- Cell B5 displays 45%. The cell format has been set to percentage with no decimal places. The data type of the information in this cell is percentage.
- Cell B6 displays 04 May 2010. The cell format has been set to date, using one of the built-in date formats that show the month as a word. The data type in this cell is date. The value has not been entered as a number but as 04/05/2010 so that it can be shown as a date.

## Skill Builder 5.2

-  Open digital asset SB5.2.1. The table contains information about promotional material for a trade fair.
- Adjust the column widths so that all the headings are visible.
- In cell D2, enter the formula  $=B2*C2$  to calculate the total cost of the 12 page leaflet.
- Copy the formula in D2 to cells D3 to D8 (move the mouse pointer onto the bottom-right handle of cell D2, hold down the left mouse button and drag down to cell D8).
- Click in cell C2 and drag into cell D8 to select the range C2:D8. Format the data in this range as currency with two decimal places.

## Step 1

	A	B	C	D	E
1	Promotional material	er needed	Cost per item	Total cost	
2	12 page leaflet	5000	0.22	£ 1,100.00	
3	A1 poster	450	0.8	£ 360.00	
4	Flyer	7500	0.12	£ 900.00	
5	Pen	1000	0.17	£ 170.00	
6	USB stick	250	1	£ 250.00	
7	Mug	500	0.75	£ 375.00	
8	Post-its	500	0.1	£ 50.00	
9					

## Step 2

	A	B	C	D	E	F	G	H	I	J	K	L
1	Promotional material	er needed	Cost per item	Total cost								
2	12 page leaflet	5000	0.22									
3	A1 poster	450	0.8									
4	Flyer	7500	0.12									
5	Pen	1000	0.17									
6	USB stick	250	1									
7	Mug	500	0.75									
8	Post-its	500	0.1									
9												
10	Average cost per item											
11	Order cost											
12	Delivery charge											
13	Order plus Delivery											
14												
15												
16												
17												
18												
19												
20												

**Format Cells**

Number Alignment Font Border Fill Protection

Category:

General Number Currency Accounting Date Time Percentage Fraction Scientific Text Special Custom

Sample: £0.22

Decimal places: 2

Symbol: £

Negative numbers:

-£1,234.10  
£1,234.10  
-£1,234.10  
-£1,234.10

## Step 3

	A	B	C	D	E
1	Promotional material	er needed	Cost per item	Total cost	
2	12 page leaflet	5000	£0.22	£ 1,100.00	
3	A1 poster	450	£0.80	£ 360.00	
4	Flyer	7500	£0.12	£ 900.00	
5	Pen	1000	£0.17	£ 170.00	
6	USB stick	250	£1.00	£ 250.00	
7	Mug	500	£0.75	£ 375.00	
8	Post-its	500	£0.10	£ 50.00	
9					

- Enter the formula  $=SUM(C2:C8)$  in cell D11 to calculate the cost of the order.
- Enter the formula  $=AVERAGE(C2:C8)$  in cell C10 to calculate the average cost of the promotional items.
- Enter a formula in cell D12 to give the total including delivery.
- Add your name and the date to the footer.
- Save the file.

## IF Function


The *IF* function tests to see whether a certain condition is true or false and responds accordingly.

IF(condition, true, false)

- condition: what you want to test for
- true: what you want to happen if the condition is met
- false: what you want to happen if the condition is not met

Function	Process
=IF(A1>12,"Martin wins", "Anja has won")	If the number in cell A1 is bigger than 12 it displays the message "Martin wins", otherwise the message "Anja has won" is displayed.


### Skill Builder 5.3

-  Re-open digital asset SB5.2.1. The method of charging for delivery has changed. If the value of the order is more than £2000, then delivery is free. Otherwise delivery costs £18.
- Enter a formula in cell D12 using the *IF* function:  
=IF(D11>2000,0,18)
- See what happens if you reduce the number of flyers needed to 3000. What affect does it have on the cost of delivery?

## Absolute cell referencing

When you copy and paste a cell with a reference in it – beware! Check if the formula contains a reference that must always point to the same cell. This is called an absolute cell reference and is indicated by the \$ sign.

### Skill Builder 5.4

-  Open digital asset SB5.4.1.
- You need to change this spreadsheet so that you can quickly show different times tables with just a few key presses.
- Click on cell E5, press the equals sign. Click on cell D3 and press Enter. Cell E5 should display =D3.
- Click on cell D3 and enter another number. Press Enter.
- A new number is shown in cell E5; all other numbers remain the same.


- Click on cell E5 again and copy the formula down to E16. What has gone wrong? Use the keyboard shortcut to show the formulas. As you dragged down the formula, the important reference to cell D3 was lost!
- Click on cell E5 and add the dollar signs ( $=\$D\$3$ ), then copy down to cell E16. Cells E5 to E16 now all refer to cell D3. This means the table will work as expected.
- Use the keyboard shortcut to switch back to see the results.
- Enter other numbers into cell D3. What happens if you enter a number bigger than 1000? What do you need to do to show all the numbers?



## Conditional formatting

Conditional formatting is a feature you can use to highlight values automatically. The colour can be made to change according to the current values.

### Skill Builder 5.5

 Digital asset SB5.1.1 contains information about members of a customer loyalty scheme. There are three grades of membership: bronze for those with 250–499 points; silver for those with 500–749 points and gold for those who have earned 750 points or more.

- Re-open digital asset SB5.1.1.
- Sort the records by 'Card number' in ascending order.
- Apply conditional formatting to cell I2 to show membership grades. Click on cell I2, then on 'Format', 'Conditional Formatting'. The dialogue box prompts you to define the first condition.
- Start with bronze. Complete the fields so that they read: 'Cell Value is between 250 and 499'. Next click on 'Format' and, under 'Patterns', choose a suitable colour to shade the cell. Click 'OK'.
- Click on 'add'. For silver, the fields should read: 'Cell Value is between 500 and 749'. Click on 'Format' and, under 'Patterns', choose another suitable colour. Click 'OK'.
- Click on 'add' again. For gold, the fields should read: 'Cell Value is greater than or equal to 750'.
- The current value in cell I2 is 249 - just below the threshold for bronze membership. Enter 250 into the cell. The cell should now be appropriately shaded.
- Check that the second and third conditions are also working correctly by entering numbers in the silver and gold range. When you have finished, re-enter 249 into cell I2.
- If cell I2 passed all your tests, copy the conditional formatting to the other Points cells. An easy way is to use the *Format Painter*: highlight cell I2 and click on the *Format Painter* icon. Click on cell I3, hold down the left mouse key and drag down to cell I101.
- Check: the number of points for the first six records were chosen deliberately - they are the border values of your conditional formatting and should show one neutral, two bronze, two silver and one gold.



## Testing a spreadsheet

Just because you get results from a spreadsheet, it does not mean they are correct. Some mistakes generate an error message but others are harder to spot. Use a calculator to check that all the calculations are correct. If you get a different answer from the one on the spreadsheet, check the formulas.




It is essential that your spreadsheets give you and others correct information. You may make decisions based on what a spreadsheet tells you.

## Layout matters

If you know that you need to print your spreadsheet, make sure your layout fits well onto standard sheets of paper (normally A4, portrait or landscape). Identify your work by entering your name in the footer (especially useful if others on a network are working on the same task as you).

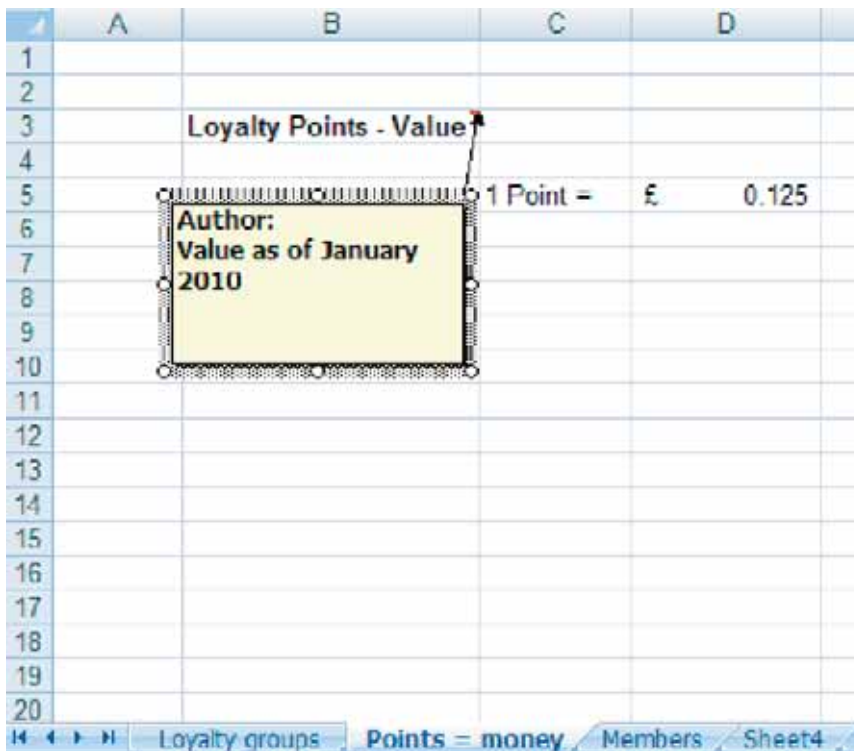
### Skill Builder 5.6

-  Re-open digital asset SB5.2.1.
- Add a suitable title.
- Switch on gridlines and show row and column headings.
- Find out how to switch on 'formula view'. Print out the spreadsheet in landscape, showing the formulas.
- Print out the spreadsheet in portrait, showing the data.
- Save the file.
- What else can you do to make the information clear and easy to read?

## Comments

Comments are useful – they do not interfere with calculations but give additional information. The comment attached to cell B3 reminds readers when the current cash value was set. Click on 'Insert' on the toolbar, then 'Comment'.





## Tabs

A spreadsheet 'Workbook' can consist of several 'sheets'. These are shown as 'Tabs' at the bottom of the spreadsheet window.

The screenshot above shows a version of digital asset SB5.1.1 with three Tabs, each re-named to indicate what is in the sheets.

Sheets can be linked. In the case below, the value in Cell D5 in sheet 'Points = money' is used in sheet 'Members' to calculate the cash value of their points. Note that the name of the linked sheet is used in front of the cell reference.

If you change the value in D5 in 'Points = Money', the link makes the spreadsheet recalculate all cash values in the 'Members' sheet and displays the new amounts.

fx =I2*'Points = money'!\$D\$5			
	I	J	K
	Points	Cash Value	JoinedDate
	249	=I2*'Points = money'!\$D\$5	39492
	250	=I3*'Points = money'!\$D\$5	40159
	499	=I4*'Points = money'!\$D\$5	39688
	500	=I5*'Points = money'!\$D\$5	39466

# B Using charts to display numerical information

Often a chart or graph is the best way of getting a message across. They can show at a glance how things change over a period of time (trends) or compare sets of data.

## Which type of chart should you use?

Pie charts, column/bar charts and line graphs are the most common types of chart. The type of chart you choose will depend on the purpose – what information you want to present, who it is for and how it will be presented.

### Bar charts

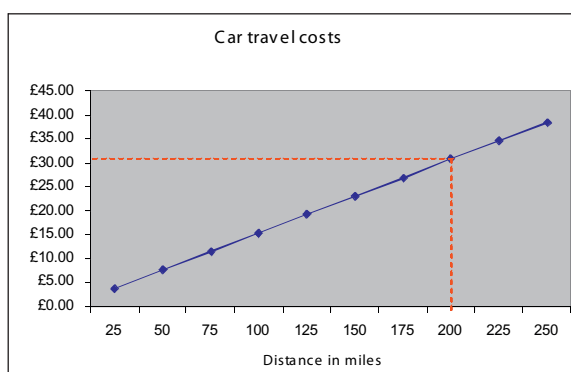
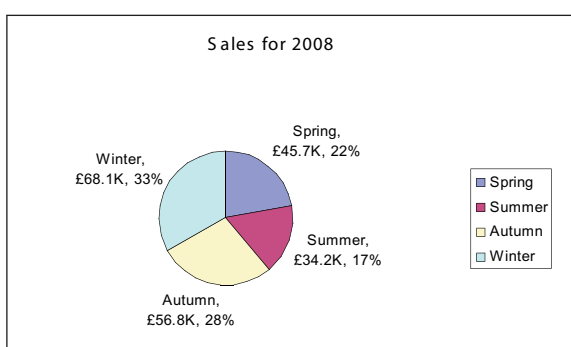
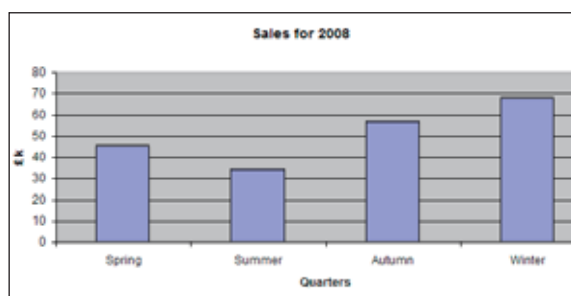
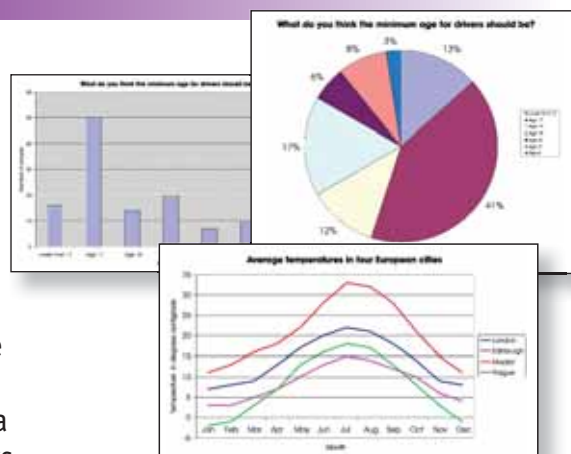
Column and bar charts are useful if you want to compare different values, such as sales each month or different answers to a survey question. The graph on the right is a bar chart showing income from sales for the four quarters of the year. The sales value for a quarter can be found by 'reading' the height of the bar off the y-axis (Sales). The line shows that sales in the autumn quarter were about £57,000.

### Pie charts

Pie charts are good for showing proportions or percentages, but they do not work well if there are too many items. Below the bar chart is the same information shown now in a pie chart. A pie chart is used when you want to show each data value as a percentage of the total. This chart shows that the autumn quarter sales were £56,800 and that the quarter's sales are 28% of the total.

### Line graphs

Line graphs are used to show values that are always changing. For example, you could use a line graph to show the temperature over a year. There is a graph of petrol costs for car journeys of different distances below the pie chart. This is known as a 'straight line graph'. The two red lines that have been added show that a journey of 200 miles costs about £31. Approximately how much would a journey of 120 miles cost?





## Creating a chart

When creating a chart, you need to ask yourself the following questions:

- Is the type of chart suitable?
- Is the scale sensible?
- Is it easy to read the values from the chart?
- Are the headings and labels clear? Do they give enough information to the reader?
- Are the colours clear?

### Meaningful title

The title is the most important item. It should clearly say what the chart shows or what questions the chart answers.

### Sensible axis labels

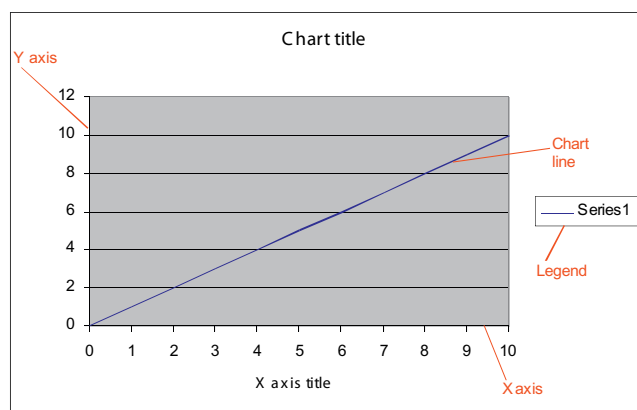
Make sure you label what each axis shows. Labels help the audience to understand the chart.

### Gridlines and values

You should be able to read off the exact values of each part of the chart. You can insert gridlines and values to make this easier.

### Legend and data labels

Your chart will include the row and column headings from your spreadsheet. These may be too long to use as horizontal data labels. Sometimes you can change the angle. Alternatively, you can use a legend.




### Skill Builder 5.7

Here are the results of a survey of 335 people who were asked about their favourite type of film.

- Plot this information as a vertical bar chart and set the titles as follows:
  - Chart title – 'Favourite film categories'
  - X-axis title – 'Film category'
  - Y-axis title – 'Percentage'
- Make sure the x-axis labels are all shown. You may need to set them at an angle.
- Do not show a chart legend.
- Plot the same data as a pie chart.
- Make sure a chart legend is shown that clearly identifies each 'slice' of the pie.
- Show the percentage value with zero decimal places against each slice.
- Explain why this data is not suitable for plotting as a line graph.

Favourite type of film	Number of responses
Comedy	92
Action	63
Romance	48
Drama	50
Horror	37
Foreign	27
Sci-fi	29

**Skill Builder 5.8**

-  Open digital asset SB5.8.1.
- Create a suitable chart to display the highest and lowest temperatures for each month.
- Create a suitable chart to display the average daily maximum temperature and the lowest temperature for each month.

# C Wrapping up

**Skill Check – make sure you know how to:**

- ✓ enter formulas
- ✓ use the SUM and AVERAGE functions
- ✓ use an IF function (L2)
- ✓ use 'search' and 'replace' (L2)
- ✓ use absolute cell references (L2)
- ✓ use conditional formatting (L2)
- ✓ display and print a spreadsheet showing the data
- ✓ display and print a spreadsheet showing the formulas
- ✓ set the print area (L2)
- ✓ insert your name and other information in a footer
- ✓ adjust column width and row heights
- ✓ use colours, borders and shading
- ✓ insert comments (L2)
- ✓ select data in adjacent columns
- ✓ select data in non-adjacent columns (L2)
- ✓ choose a suitable chart or graph to display the data
- ✓ add a suitable title and axis labels
- ✓ add and remove a legend
- ✓ save a chart

**Test Tips**

- In Task 2 of the test, you are likely to be required to enter, sort and search records, process numerical data and produce a chart or graph.
- Make sure you give yourself enough time for this task.
- You will be asked to produce printouts in data view and formula view. Make sure you know how to show formulas. You may have to adjust column widths to ensure that all the information is visible in formula view.
- Have a look at the mark schemes for Task 2 of the sample tests. What marks are awarded for the chart? Why is a mark awarded in the Level 1 test for the removal of the legend?