

L2 Unit 6: Spreadsheets – design and use (2010)

Learning outcomes

By completing this unit candidates will develop a thorough knowledge and understanding of how to create and use spreadsheets.

Candidates will be able to:

- design a spreadsheet to meet the needs of an organisation
- create the spreadsheet according to the design and format it to make it user friendly
- sort data and use simple filters
- carry out modelling activities using a spreadsheet
- analyse data using appropriate graphs/charts
- create macros to automate procedures in a spreadsheet.

It is anticipated that a candidate will require **40** guided learning hours to complete this unit.

Assessment objectives	Knowledge, understanding and skills
1 Develop a spreadsheet to meet the needs of an organisation	<p>Considering:</p> <ul style="list-style-type: none"> • user requirements (purpose and audience) <p>Spreadsheet features:</p> <ul style="list-style-type: none"> • formulas eg: arithmetic operators: +, -, *, / and brackets • functions eg: <ul style="list-style-type: none"> ○ arithmetic and statistical functions such as SUM, AVERAGE, MAX, MIN, MEDIAN, MODE, COUNT, COUNTIF ○ mathematical/trigonometric functions, eg SIN, COS, TAN, LOG, POWER, RND ○ rounding functions, such as INTEGER, ROUNDUP and ROUNDDOWN, TRUNC ○ logical functions, such as IF, AND, OR and NOT, including nested IF statements ○ lookup functions, such as VLOOKUP, HLOOKUP, MATCH ○ reference functions, such as ROW, COLUMN ○ text functions, such as LEFT, MID, RIGHT, LEN, VALUE, TEXT, CONCATENATE, FIND ○ date and time functions, such as TODAY, NOW, YEAR, MONTH, DAY • relative and absolute cell referencing • multiple worksheets in a workbook, linked sheets

Assessment objectives	Knowledge, understanding and skills
2 Format a spreadsheet to make it user friendly	Formatting eg: <ul style="list-style-type: none"> • text and background colour and cell borders to distinguish between different types of cell (eg cells to input data, cells which automatically calculate) • adjust row/column width/height • hide and show columns/rows • merge cells • change the direction of text in a cell • set text to wrap in a cell • conditional formatting • comments • worksheet protection, including protection at individual cell level, so that data cells can be changed by a user but formulas are protected • validation with useful feedback to users
3 Sort data and use simple filters	Sort/filter the data, eg: <ul style="list-style-type: none"> • sort data on one and more than one column • filter data one and more than one column • customise a filter eg <ul style="list-style-type: none"> ○ greater/less than on numeric fields ○ begins with, contains or ends with on text fields
4 Carry out modelling activities using a spreadsheet	Change variables to experiment with different outcomes, eg: <ul style="list-style-type: none"> • predict outcomes • experiment with different data sets by changing variables
5 Analyse data using appropriate graphs/charts	Present data from the spreadsheet in a graphical form, eg: <ul style="list-style-type: none"> • different types of graph eg line graph, bar chart and pie chart • create comparative chart(s)/graph(s) with more than one dataset • create appropriate types of graph/chart for different types of data (understanding the difference between continuous and discrete data)
6 Create macros to automate procedures in a spreadsheet	Use macros to automate tasks in the spreadsheet, eg: <ul style="list-style-type: none"> • create macros to automate task(s), eg save and print, reset a form, move to a different sheet • access and print out the macro code • show an understanding of the functions of specific items of macro code • create keyboard shortcuts and buttons to run the macro(s)
7 Test the spreadsheet solution	Areas to be tested, eg: <ul style="list-style-type: none"> • formulas • validation • conditional formatting • charts/graphs • macros <p style="text-align: right;">continued on next page</p>

Assessment objectives	Knowledge, understanding and skills
	<ul style="list-style-type: none"> • user friendliness • worksheet protection • outcomes meeting user needs <p>Test data to include</p> <ul style="list-style-type: none"> • normal data • abnormal data • extreme data <p>Respond to any issues by making necessary changes.</p>

Assessment

This unit is centre assessed and externally moderated.

In order to achieve this unit, candidates must produce a portfolio of evidence showing that they have met all of the assessment objectives.

Portfolios of work must be produced independently. They will need to be made available, together with witness statements and any other supporting documentation, to the OCR Visiting Moderator when required.

Centres must confirm to OCR that the evidence produced by candidates is authentic. An OCR Centre Authentication Form is provided in the Centre Handbook and includes a declaration for assessors to sign. It is a requirement of the QCA Common Criteria for all Qualifications that proof of authentication is received.

Guidance on assessment and evidence requirements

The precise functions will depend on the software used, but a sufficiently advanced spreadsheet package that offers all eight categories of function should be used.

Candidates may provide portfolio evidence for this unit using a range of suitable and appropriate techniques. These will include written or typed descriptions and screenshots and printouts of spreadsheets created, showing both data and formulas. There is no requirement for candidates to describe in detail how they create their spreadsheets.

Candidates will need considerable practice using the different spreadsheet features, perhaps by following structured tasks set by the centre.

The spreadsheets created for this unit must be more complex than the simple one used in Unit 1. The work carried out and evidenced in this unit will extend significantly from that which was carried out in Unit 1.

In order to produce a portfolio for assessment, candidates need to be provided with, or negotiate, a brief that requires a spreadsheet solution. This brief must be sufficiently complex to allow candidates to meet the requirements for all the Assessment Objectives.

As candidates must develop their own individual solutions to meet the requirements of the brief it is expected that there will be significant differences in the solutions provided by different candidates. Centres must not direct candidates by providing design ideas.

For Assessment Objective 1, candidates need to consider the user requirements and develop a spreadsheet to meet these needs. Although pencil and paper designs are not required, it would be expected that they will spend some time considering the overall design of their solution, eg how the solution will be split into different worksheets and the basic layout of each sheet, before they begin to create it. The complexity of the solution provides the differentiation for this Assessment Objective. Centre assessors must refer to the list of possible functions in the Knowledge, Understanding and Skills when assessing the range of different functions used, although this list is not exhaustive - candidates may be credited with the use of other functions instead of those listed. To achieve Distinction level, absolute cell referencing must be used appropriately.

Evidence for the formulas used might be provided by formula printouts, screenshots and/or the electronic file. Where printouts are relied upon it is important that entire formulas are shown.

The formatting features required by Assessment Objective 2 may be demonstrated in a single sheet or across a number of different sheets in one workbook. Most formatting can be seen clearly from a printout of the sheet(s) or from the electronic file, so there is no need for the candidate to add written explanation or screenshots of methods used. However, some features, eg conditional formatting and validation, are not always easy to find in an electronic file, so some indication from the candidate of where these are used is advisable if electronic evidence is used.

Hiding/showing rows/columns should ideally be functional. Candidates might, perhaps, hide a column containing a list for validation purposes.

At Pass and Merit level the different skills required can be credited as long as they have been used once. However, for a Distinction it is necessary for candidates to consider where features such as comments, validation and cell protection are needed, and they must apply these where necessary to make the final solution easy for a beginner to use, allowing the user to edit data cells as necessary to meet their needs, without being able to alter formulas or other features that would affect the functionality of the sheet.

Only simple sorting and filtering is required for Assessment Objective 3. When setting customised filters it is not necessary to use all the different comparisons. For example, a filter using 'less than' is sufficient demonstration of a custom filter on a numeric field. A filter using 'begins with' is sufficient demonstration for a text field. Other comparisons such as 'less than or equal to' or 'not equal to' or 'does not begin with' are acceptable options. Tasks given to candidates should be functional, eg 'produce a list of all orders taken in 2007' rather than 'do a filter for order date $\geq 01/01/2006$ AND order date $\leq 31/12/2006$. It is not acceptable for assignments to tell the candidates what criteria to use in their sorts and filters. Multiple criteria sorts and searches should be functional. For example, sorting a stock list on a unique item code and then on item name would not be appropriate.

Assessment Objective 4 requires candidates to use their spreadsheet as a model, to experiment with data and find solutions to problems. For example, in a budget spreadsheet they may experiment with different expenditure to meet a particular budget. Evidence is most likely to come

from 'before' and 'after' screenshots/printouts showing that some variables have been changed. Short explanation(s) of this is required.

There is no requirement for candidates to 'guess' the results before they use their spreadsheet – they need to use their spreadsheet solutions to predict the effect of changing elements. For example 'what would happen to overall profit if the price of x was increased by £y but sales reduced by z?'

Candidates must carry out at least two different modelling activities, changing different variables each time. At Pass level candidates must identify the effect of the change. At the higher levels, candidates must describe the problem; explain what they did to solve it as well as identifying the solution found.

Decision making is essentially goal-seeking. The automatic goal seek facility can be used, or candidates can find solutions by trial and error. For example, 'What amounts would I need to sell in order to make a profit of at least £x?'

Assessment Objective 5 requires candidates to analyse data using tables, graphs and/or charts. Whilst it is expected that some conclusions will be drawn by candidates it is not necessary for a report of results to be written up. Since the appropriateness of the charts is assessed, centres must not direct candidates to the type of chart to use for particular purposes.

Evidence for the macros produced for Assessment Objective 6 should comprise a printout of the macro code. Where a button is used to run the macro an annotated screenshot might be used, or candidates could indicate where on an electronic file this might be found. For higher grades candidates need to describe what the macro does and how it can be run. They also need to annotate the macro code to show the purpose of at least three different lines of code, eg 'this line prints the sheet'. This annotation must be of functional code. This does not include the name of the macro, the 'End macro' line, any comments or keyboard short cuts.

For Assessment Objective 7 the spreadsheet solution should be tested, covering a range of different areas as listed in the KUS. For all grades candidates must test formulas using normal data, to ensure the spreadsheet will produce accurate results meeting the main needs of the user. For higher levels, testing should include more areas (as stated in the KUS) of the spreadsheet solution, using some abnormal data (outside acceptable limits) and, at Distinction level, extreme data (on the boundary of acceptable limits).

It is possible that candidates might attempt a solution that is more complex than is required. In such cases a Pass can be awarded so long as the primary function required by the user is accurately met. For example, user requirements might focus on the need to create an invoice for purchasers. If the totals on that invoice are incorrect then a Pass cannot be awarded. However, if the candidate has also attempted to create, for example, a summary sheet of sales, which is peripheral or additional to the main user requirements, a Pass can be awarded even if there are errors on this sheet, so long as the main invoice is accurate. At Merit level, all implemented formulas must produce accurate results, although some features, eg conditional formatting, worksheet protection, validation, may not all be implemented or working. At Distinction level testing should be sufficiently thorough to ensure all user requirements are met.

If any errors are found then corrections/improvements will be necessary. These are not specifically mentioned in the grading grid to avoid penalising candidates who find no errors at the testing stage. However, the extent to which the *final* spreadsheet solution provides an accurate solution to user needs is a key differentiator. Therefore it is important that where corrections/improvements are made there is clear evidence of these, which might be provided by screenshots, printouts of the amended spreadsheet file or by providing an electronic copy of the final spreadsheet file.

Mapping to national occupational standards

The mapping in the table below provides an indication of where evidence might be available for assessment against some of the knowledge and understanding contained in the national occupational standards (NOS). It does not claim to guarantee that evidence will meet the NOS.

Occupational standards	Unit number	Title
IT Users (e-skills UK)	SS2	Spreadsheet software Level 2
Print Administration (Pro Skills)	O56NPA523	Spreadsheet software
Print Administration	PGPA3.306IT	Design and produce spreadsheets (ITNTO)
IT Users 2009 (e-skills UK)	SS:B	Spreadsheet software
IT Users 2009 (e-skills UK)	ISF:FS:B	IT software fundamentals
IT Users 2009 (e-skills UK)	IPU: B	Improving productivity using IT
IT Practitioners and Professionals (e-skills UK)	ICTTEST	Testing ICT systems Level 2

Signposting to functional skills

- ✓ The unit contains opportunities for developing Functional Skills.

Functional Skills Standards					
English		Mathematics		ICT	
Speaking and Listening		Representing	✓	Use ICT systems	✓
Reading	✓	Analysing	✓	Find and select information	✓
Writing	✓	Interpreting	✓	Develop, present and communicate information	✓

Resources

This section provides suggestions of suitable resources. The list is neither prescriptive nor exhaustive, and candidates should be encouraged to gather information from a variety of sources.

Some suggested resources are intended for Tutor use. The resources in this section were current at the time of production.

Books and electronic resources

Kelsall, Manson, Patel & Cushing	<i>OCR Level 2 Nationals in ICT: Units 6 & 7</i> Payne-Gallway. ISBN: 978-905292-12-7
Bowman & Jones	<i>OCR National Level 2 in ICT Student Book with Dynamic Learning CD-ROM</i> Hodder Arnold. ISBN: 9780340942017, ISBN-10: 0340942010
North West Learning Grid	<i>GNVQ ICT Unit 7 Numerical Modelling</i> ISBN: 1 84224 048 x
Thomas Telford Online	<i>OCR Nationals in ICT</i> Thomas Telford Online

Websites

[URL:http://office.microsoft.com/en-gb/officeupdate/default.aspx](http://office.microsoft.com/en-gb/officeupdate/default.aspx)

Microsoft Office On-line - Provides up-to-date guidance on how to use Microsoft Office.

<http://www.improveyourexcel.com/>

Excel reference site

Equipment

A computer system with a spreadsheet package that meet the requirements listed in the Knowledge, Understanding and Skills must be used.

Grading

Assessment Objective	Pass	Merit	Distinction
<p>AO1</p> <p>Develop a spreadsheet to meet the needs of an organisation</p>	<p>Candidates will state user requirements.</p> <p>They will create a functional spreadsheet that mostly meets the requirements of the user.</p> <p>The spreadsheet will include formulas using at least two of +, -, * and /.</p> <p>Functions from at least two different categories will be used.</p> <p>Relative or absolute cell referencing will be used.</p> <p>The spreadsheet may contain only one sheet.</p>	<p>Candidates will state user requirements.</p> <p>They will create a functional spreadsheet that meets the requirements of the user.</p> <p>The spreadsheet will include formulas using all of +, -, * and /.</p> <p>Functions from at least three different categories will be used. This will include the use of one IF statement.</p> <p>Relative or absolute cell referencing will be used.</p> <p>Most choices will be appropriate.</p> <p>The spreadsheet will contain more than one sheet, linked by formulas.</p>	<p>Candidates will state user requirements.</p> <p>They will create a functional spreadsheet that meets the requirements of the user.</p> <p>The spreadsheet will include formulas using all of +, -, * , / and brackets.</p> <p>Functions from at least four different categories will be used. This will include the use of one IF statement.</p> <p>Relative and absolute cell referencing will be used.</p> <p>All choices will be appropriate.</p> <p>The spreadsheet will contain more than sheet, linked by formulas.</p>
<p>AO2</p> <p>Format a spreadsheet to make it user friendly</p>	<p>Candidates will use text and background colour and cell borders although these may not show the different types of cell in the most helpful way.</p> <p>They will adjust row height or column width and will merge cells.</p> <p>They will set the direction of text in a cell.</p> <p>They will add at least one example of help for the user, such as an instruction on the sheet, a cell comment, an input message or validation, although this may not be of a high quality.</p>	<p>Candidates will use text and background colour and cell borders to distinguish between different types of cell (eg cells to input data, cells which automatically calculate).</p> <p>They will adjust row height or column width, hide and show rows or columns and will merge cells.</p> <p>They will set the direction of text in a cell and will set some text to wrap in a cell.</p> <p>They will add help for a new user. This help will include at least one cell comment and appropriate validation in at least one row/column.</p> <p>They will use conditional formatting.</p>	<p>Candidates will appropriately use text and background colour and cell borders to distinguish between different types of cell (eg cells to input data, cells which automatically calculate).</p> <p>They will adjust row height or column width, hide and show rows or columns and will merge cells.</p> <p>They will set the direction of text in a cell and will set some text to wrap in a cell.</p> <p>They will add sufficient help to enable a beginner to use the spreadsheet with ease. This help will include suitable cell comments and validation with useful feedback to users.</p>

(Continued)

Assessment Objective	Pass	Merit	Distinction
			<p>They will set cells for input from a drop-down list.</p> <p>They will use conditional formatting to make the output clearer.</p> <p>They will use worksheet protection to prevent a user changing/deleting formulas whilst allowing data to be added/edited as needed by a user.</p>
<p>AO3 Sort data and use simple filters</p>	<p>Candidates will sort data using one field. They will filter data using one field.</p> <p>They will state the purpose of their sort and filter.</p>	<p>Candidates will sort data using at least two fields. They will filter data using at least two fields.</p> <p>They will state the purpose of their sort and filter.</p>	<p>Candidates will sort data using at least two fields. They will filter data using at least two fields. They will customise at least one filter.</p> <p>They will state the purpose of their sort and filter(s).</p>
<p>AO4 Carry out modelling activities using a spreadsheet</p>	<p>Candidates will change different variables in their spreadsheet to make at least two predictions or decisions.</p> <p>They will state the results obtained.</p>	<p>Candidates will change different variables in their spreadsheet to make at least two predictions or decisions.</p> <p>They will write about their investigations and the results they find.</p>	<p>Candidates will change different variables in their spreadsheet and make suitable predictions and decisions.</p> <p>They will write about their investigations and the results they find.</p>
<p>AO5 Analyse data using appropriate graphs/charts</p>	<p>Candidates will create at least two different types of graph/chart.</p> <p>Graphs should be given appropriate titles and the data will be labelled.</p>	<p>Candidates will create at least one example of each type of graph from line graph, bar chart and pie chart. At least one of these should compare values from different data sets.</p> <p>Graphs should be given titles and appropriate axis labels.</p>	<p>Candidates will create at least one good example of each type of graph from line graph, bar chart and pie chart. At least one of these should compare values from different data sets.</p> <p>Graphs should be given titles and axes will be appropriately scaled and labelled.</p> <p>The final graphs will be clear, show the data clearly and helpfully and be appropriate for the type of data plotted.</p>

Assessment Objective	Pass	Merit	Distinction
<p>AO6</p> <p>Create macros to automate procedures in a spreadsheet</p>	<p>Candidates will record a simple macro to automate a sequence of at least two tasks.</p> <p>They will enable this macro to be run by either keyboard shortcut or a button on the sheet or on the toolbar.</p> <p>They will access the macro code and print it out.</p>	<p>Candidates will record a macro to automate a sequence of at least two tasks.</p> <p>They will enable this macro to be run by both a keyboard shortcut and a button on the sheet or on the toolbar.</p> <p>They will access the macro code and print it out.</p> <p>They will describe what the macro does and how it can be run.</p>	<p>Candidates will record a macro to automate a sequence of more than two tasks.</p> <p>They will enable this macro to be run by both a keyboard shortcut and a button on the sheet or on the toolbar.</p> <p>They will access the macro code and print it out.</p> <p>They will describe what the macro does and how it can be run. They will annotate the macro code to show the function of at least three different lines of code.</p>
<p>AO7</p> <p>Test the spreadsheet solution</p>	<p>Candidates will test their spreadsheet solution, ensuring that it provides accurate results that meet the main user needs.</p>	<p>Candidates will test their spreadsheet solution, ensuring that all formulas provide accurate results and that the spreadsheet meets the main user needs.</p> <p>The tests will cover most of the main areas of their spreadsheet (as shown in the KUS) and will be appropriate.</p> <p>Normal and abnormal data will be used in testing.</p>	<p>Candidates will test their spreadsheet solution, ensuring that it provides accurate results and meets user needs.</p> <p>The tests will cover all main areas of their spreadsheet (as shown in the KUS) and will all be appropriate.</p> <p>Normal, abnormal and extreme data will be used in testing.</p>