

Sample teaching unit 7.4, lesson 1, starting points

Lesson

1

Using a spreadsheet

ICT Framework objectives

DEVELOPING IDEAS AND MAKING THINGS HAPPEN

Models and modelling

- Use software to investigate and amend a simple model by:
 - formatting and labelling data appropriately;
 - entering rules and formulae.

Key vocabulary

From Year 6: cell, column, cut, data, drag, formula, graph, label, model, paste

From Year 7: address, cell reference, value, variable

From Year 8: absolute cell reference, relative cell reference

Preparation and planning

- Find out about the achievement of the pupils in your class in mathematics, including the extent to which they can create formulae, their use of spreadsheets in mathematics and their familiarity with graphs and charts of different types.
- Ensure that you are familiar with the spreadsheet software and the pupil and teacher resources you will be using.
- Check that all the equipment is working.
- Ensure that:
 - teacher resources 7.4T1d Table square.xls, 7.4T1e Teachers' football league.xls, and 7.4T1c Presentation.ppt are available electronically;
 - pupil resources 7.4P1f Football league table.xls, 7.4P1a Zoo activity.doc and 7.4T1b Zoo activity.xls are available electronically in the shared area.
- If necessary, prepare guidance for the pupils to support the software being used, either as a handout or available on the school's intranet.
- Create a key vocabulary wall display for the unit which will be added to each week as lessons progress.
- Display the objectives for the lesson, phrased so that all pupils will understand them.

Resources

- Large computer screen display
- Calculators (one per pair)
- Sufficient computers for pupils to work in pairs or in small groups
- Spreadsheet software
- Shared network area, or alternative way to pass spreadsheet data to pupils
- Whiteboard or flipchart
- Resource files:
 - 7.4P1a Zoo activity.doc
 - 7.4T1b Zoo activity.xls
 - 7.4T1c Presentation.ppt
 - 7.4T1d Table square.xls
 - 7.4T1e Teachers' football league.xls
 - 7.4P1f Football league table.xls
 - 7.4T1g Football league table workings.xls

Lesson outline

60 minutes

1	Starter: Problem-solving using a table and paper-based resource	Problem-solving Whole class Paired work	10 minutes
2	Using a formula in a spreadsheet	Demonstrating software Whole class	10 minutes
3	Creating a times-table square	Using software Paired work	10 minutes
4	Setting up a simple spreadsheet	Demonstration Whole class	10 minutes
5	Using formulae to enter information into a spreadsheet	Using software Paired work	15 minutes
6	Plenary: Advantages and disadvantages of using a spreadsheet	Discussion Whole class	5 minutes
	Homework	Individual work	

Activities

10 minutes

1 Starter: Problem-solving using a table and paper-based resource

Questioning: Find out which pupils have used a spreadsheet before, e.g. to model perimeter and area of different sized shapes. Use Year 6 work from QCA Unit 6B to prompt discussion.

Use traffic light skills checklist: Check pupils' awareness of and confidence with skills/techniques.

Observation: Check numeracy skills, problem-solving skills, ability to read tables.

Questioning: Check understanding of the terms *cost*, *profit*, *loss*, *underspend*.

Explain that pupils are going to learn how to use spreadsheets effectively. Discuss the lesson objectives with the class.

Ask pupils to work in pairs. Distribute resource sheet **7.4P1a Zoo activity.doc**. Check the vocabulary with the pupils. Explain any unfamiliar words, such as 'underspend'. Ask pupils to do the first example on the resource sheet, working out the cost of feeding all of the animals.

Zoo activity
First example

Animal	Cost per week to feed each animal	Number of animals	Total cost per week for animals
Lion	£25	10	
Tiger	£30	8	
Zebra	£5	9	
Elephant	£20	9	
Snake	£5	8	
Penguin	£5	12	
Sea lion	£20	3	
Alligator	£5	4	
Eagle	£1	5	

Encourage pupils to calculate products such as $£25 \times 10$ and $£20 \times 3$ mentally. They may need calculators when they total the columns.

After 3 to 4 minutes, refer pupils to the second example. Say that there will be twelve more lions and four more penguins. Ask 'How does this affect the totals?'

Discuss the changes they will need to make, and which figures they will need to alter, then let them recalculate and find the new total. Ask what might happen to the number next to the word 'Underspend'.

After 6 to 7 minutes, display **7.4T1b Zoo activity.xls**. Make the appropriate alterations to the relevant cells and highlight how the values in other cells change automatically. Draw attention to the use of * for multiplication.

Animal	Cost per week to feed each animal	Number of animals	Total cost per week for animals
Lion	£25	10	£250
Tiger	£30	8	£240
Zebra	£5	9	£45
Elephant	£20	9	£180
Snake	£5	8	£40
Penguin	£5	12	
Sea lion	£20	3	
Alligator	£5	4	
Eagle	£1	5	
Total Allowed			
Underspend			

Questioning: Check understanding of spreadsheet; use of spreadsheet for modelling.

Ask pupils to identify what is represented by the values in individual cells, if they can, and to say what happens to the numbers in the cells. Draw out responses such as:

- the total cost for penguins has changed;
- the cost for lions has changed;
- the values in E3 and E8 have increased;
- the total, E12 has increased;
- the underspend, E14 has decreased;
- there is less money left.

Questioning: Check justification of choice of software, reasons for its use for modelling.

Ask pupils to identify the benefits of using a spreadsheet for the task on the resource sheet. Draw out responses such as:

- the ease of making changes;
- the spreadsheet does the calculations;
- you can quickly see if you have any money left.

10 minutes

2 Using a formula in a spreadsheet

Show **7.4T1c Presentation.ppt** on the large screen display. Point out and identify each of the main parts of a spreadsheet. Open a blank spreadsheet page and use 'alt-tab' to switch between the presentation and the spreadsheet so that you can demonstrate features. Highlight one cell of the spreadsheet and ask, 'What is this?' Explain that each cell has an address or cell reference and ask pupils to give the address of the highlighted cell. Highlight a row and then a column and ask pupils to name each of them correctly.

Show pupils that the spreadsheet has many more rows and columns than they can see on the screen. Ask them to suggest how many there are altogether. (A typical spreadsheet has 65 536 rows and 256 columns, making over 16 million cells altogether.) Explain that we normally use a very small part of a much bigger sheet. Illustrate this by pointing out a small poster or picture on a large wall.

Ask pupils what problems might arise if they forget how big the spreadsheet really is. Draw out points such as:

- not selecting the correct area to print;
- printing out unnecessary cells.

Ask pupils to suggest types of information that may be entered in a spreadsheet, for example, numbers, text, labels and formulae. Use the example on the screen to highlight types of data and other information.

Move the cursor to the bottom right of a cell and point out the small black dot in the corner. Explain that this is the fill handle. Enter a number into each of six consecutive cells in two adjacent columns on the spreadsheet (twelve numbers, two columns of six rows).

Demonstrate how to construct a formula to add two numbers across a row, using '=A4+B4'. Ask pupils to describe what happens to the data in the spreadsheet. Make sure they know that the formula is a rule and that this rule is being applied to the numbers being entered, which are called the variables.

Questioning: Check understanding of formulae, rules, variables.

Questioning: Check understanding of use of a formula, copy/paste, edit, cell-referencing.

Now demonstrate how to edit the formula and how to subtract and multiply, using – and *. Stress that * is used for multiplication in this application. Demonstrate the effect on the address elements of a formula when it is copied and pasted, or dragged by means of the fill handle. Discuss what happens to the cell reference as you copy down. The cell is not copied exactly but relative to the row or column you are moving to. This is called relative cell referencing.

10 minutes

3 Creating a times-table square

Use **7.4T1d Table square.xls** to demonstrate the effect on numbers, months and days of the week when the cells are dragged by means of the fill handle. Drag down from 'Wednesday' to get days. Drag down from 'Mar' to get months.

Observation of skills/techniques: Check use of copy/paste, edit, cell-referencing.

Monday	Jan					
Tuesday	Feb	Table Square	T1d			
Wednesday	Mar	X	2	3	4	5
			2	4	6	
			3	6	9	
			4	8	12	
			5	10	15	
			6			

Emphasise the need to select more than one cell when pupils want to produce a sequence of numbers. For example, if they drag from the 6, they will get a row of 6s. The software needs to know at least two numbers to recognise the sequence. Highlight 5 and 6 and, using the fill handle, drag across the row. This produces 7, 8, 9, Make sure that 7.4T1c Presentation.ppt is available on the shared area for pupils to use as support material. Demonstrate how pupils can copy the file 7.4T1d Table square.xls into their work area from the shared area. Tell pupils they are going to create a times-table square. Tell them that the table square should go up to the 12 times table but could go further.

Differentiation

Some pupils may start the times-table square from scratch, while others may use the file 7.4T1d Table square.xls from the shared area. When checking, expect pupils to know by heart tables to 10×10 , although they may not know all multiples of 11 or 12. Tell pupils to use the fill handle to click and drag. Remind them that they must select more than one cell to drag, as this will extend the sequence of numbers and not just copy a single value.

Encourage pupils who manage the task quickly to add colour or shading to the table to make it easier to use. If appropriate, suggest pupils make printouts of the table to help them in mathematics with multiplication by 11 or 12.

Questioning: Check ability to justify choice of formatting in terms of audience and purpose.

10 minutes

4 Setting up a simple spreadsheet

Show pupils **7.4T1e Teachers' football league.xls**. Explain that they will:

- use a spreadsheet to display data about football teams;
- use the spreadsheet to calculate which team has the most points;
- update the table as the teams play more games;
- add their own teams if they wish.

Team name	Won	Lost	Drawn	Played	Poi
Ipswich Town	3	3	5	11	11
Manchester City	5	4	3	12	17
Oldham Athletic	4	4	3	11	13
Crewe	2	8	0	10	6
Plymouth Argyle	2	0	10	12	6
Birmingham City	1	4	5	10	7
Bury	4	4	4	12	16

Questioning: Check understanding of formulae, use of copy and sort techniques.

Ask pupils to suggest how they could use the spreadsheet to calculate the total number of games played and the total number of points gained. Demonstrate how to enter and copy formulae to do this.

If it is appropriate, extend the demonstration by showing pupils how to sort the data. Explain the problems that may occur if the entire table is not highlighted when sorting. Ask pupils to suggest reasons for sorting data of this kind.

15 minutes

5 Using formulae to enter information into a spreadsheet

Observation of skills/techniques:

Check ability to enter formula, save to folder, edit cell references, efficiency.

Questioning: Check understanding of use of formulae and mathematical principles.

Observation of skills/techniques:

Check use of sorting.

Questioning: Check understanding of absolute cell references.

Show pupils how to copy **7.4P1f Football league table.xls** into their workspace. Tell them to create, enter and copy a formula for the number of games played and a formula for the number of points gained. Check that pupils understand that they will need to multiply for the points won and then add the draw points. Check the position of the 'multiply' operator.

Ask pupils to save their spreadsheets into their own work areas as they will need them at the start of the next lesson.

Differentiation

Pupils who manage the task quickly could be asked to sort the table.

Pupils working at higher levels could set up two cells giving the number of points for a win and the number of points for a draw, then incorporate these into their formulae instead of the numbers 1 and 3.

Show pupils how they could use one cell to hold either the win or draw information to use in their formula. What happens when they copy or drag down the formula? What is needed? Show absolute referencing using the \$ sign in front of each cell reference, for example, \$H\$4. This makes it possible to change the points awarded easily and efficiently.

7.4T1g Football league table workings.xls demonstrates this and shows the formula with the answers that pupils will work out in lesson 2.

Pupil's name					
Form/Class					
Team name	Won	Lost	Drawn	Played	Points
West Ham United	8	0	3	11	30
Leeds United	6	1	4	11	22
Liverpool	5	2	5	12	20
Newcastle United	5	3	2	10	17
Manchester United	3	5	6	14	15
Arsenal	2	6	5	13	13
Everton	2	7	4	13	10
Norwich City	1	6	6	13	7
Southampton	0	9	3	12	3

5 minutes

6 Plenary: Advantages and disadvantages of using a spreadsheet

Ask pupils to compare the method of using a spreadsheet for recording football results with using a pen, paper, ruler and, perhaps, calculator to do the same thing.

Draw out advantages such as:

- speed, and the ease of correcting mistakes;
- the possibility of making multiple copies.

Ask them what was difficult about the task. Draw out disadvantages such as:

- the coordination needed to use the mouse;
- the need to work out what the formula should be rather than just adding or multiplying numbers together;
- the possibility of highlighting the wrong cells.

Observation of discussion and questioning:

Check ability to evaluate and justify choice of ICT.

Homework

Ask the pupils to think how they would use a spreadsheet in real life. Ask them to apply the ideas suggested in the plenary and to identify two advantages and two disadvantages for their real-life examples.

Homework: Check ability to evaluate and justify choice of ICT for modelling.