



Unit 8.3 Models and presenting numeric data

About this Unit:

In this unit, pupils will use spreadsheet software to develop models. They will be introduced to techniques to enable them to create more complex models and to interrogate and analyse them. They will be shown how to generate random numbers to provide test data and to simulate events. They will then consider the purposes for which simulations and animations are used.

The examples used in this unit include a school fete, tossing a coin and mobile telephone tariffs. Teachers can achieve the same learning objectives with a range of other topics.

The lessons are designed for pupils working at Levels 5 and 6 with an extension activity for pupils working at higher levels. The extension activity is suggested in lesson 4 but it could take the form of a project which pupils develop as the unit progresses. If used, it should be treated flexibly and at appropriate stages in the unit to match the needs of the pupils.

Where this Unit fits in:

This unit builds on skills developed during Key Stage 2 and Years 7 and 8 in the application of spreadsheets, presentation software, databases, desktop publishing, e-mail and imaging software.

Expectations

At the end of this unit

most pupils will: understand and be able to describe the rules that govern the operation of models, identify variables in a spreadsheet, use charts to help interpret data, develop ICT-based models and test predictions by changing variables and rules.

some pupils will not have made so much progress and will: understand that rules govern the behaviour of models; test the behaviour of simple spreadsheet models; solve problems

some pupils will have progressed further and will: refine and extend a spreadsheet model, varying the rules, based on the results of test runs.



Vocabulary and Resources

Vocabulary: cell, chart, column, copy, drag, label, model, paste, row, sort, absolute cell reference, relative cell reference, variable, assumption, goal seek, random number generator, simulation

Resources:

- Large computer screen display
- Sufficient computers for pupils to work in pairs or small groups
- Spreadsheet software
- Shared network area, or alternative way to pass spreadsheet data to pupils
- Whiteboard or flipchart



Learning Objectives <i>Pupils should learn...</i>	Possible Activities	Learning Outcomes <i>Pupils can...</i>	Consider
Activity 1			
<ul style="list-style-type: none"> to remind pupils about the components of a spreadsheet using and interrogating a model 	<ul style="list-style-type: none"> Use PowerPoint to remind pupils about the components of a spreadsheet. Using a prepared spreadsheet, pupils will be asked to identify the kind of data entered in various cells. Introduction of 'What if...?' questions. Demonstration of how changing a variable will cause other values in the model to be recalculated. Introduction of the Goal Seek function. Review the model in order to establish its benefits. 	<ul style="list-style-type: none"> Revision of modelling Interrogating a model Using goal seek Reviewing the model 	<ul style="list-style-type: none"> For homework ask pupils to collect information on the costs of running a mobile phone. Pupils will be required to collect information on the costs of running two types of mobile phone and to identify the similarities and differences between the two packages.
Activity 2			
<ul style="list-style-type: none"> To draw and explain conclusions Review and modify ICT models to improve their accuracy and extend their scope 	<ul style="list-style-type: none"> Ask pupils to refer to their homework and, working in pairs, compare their findings and prepare responses to share with the group. Use the Mobyphone demonstration model to show how a model can be constructed. Pupils use the phone worksheet document to explore how the model makes it easier to analyse the various tariffs and why it is better to use GoalSeek rather than trial and error. Pupils will learn the difference between input and output values and how models can be used to calculate either. 	<ul style="list-style-type: none"> Identify variables Compare tariffs Structure a model Develop, explore and analyse a model Input and output values in a model Evaluate a model 	<ul style="list-style-type: none"> For homework ask pupils to complete question 11 from 8.3P2c Phone worksheet doc.



Learning Objectives <i>Pupils should learn...</i>	Possible Activities	Learning Outcomes <i>Pupils can...</i>	Consider
Activity 3			
<ul style="list-style-type: none"> Develop ICT based models and test predictions by changing variables and rules. Explore and interpret collected data in order to draw conclusions. 	<ul style="list-style-type: none"> Pupils will be asked to examine a set of graphs comparing monthly tariffs for mobile phones. The graphical representation will be compared to the table used in the previous lesson and pupils will be asked to compare them as methods of analysing data. Before developing their own models. The school fete formulae.xls spreadsheet will used demonstrate absolute cell referencing. Using the 8.3p3c Mobyphone 2 extended model.xls pupils reflect upon the model structure. Using the 8.3P3d worksheet 2.doc Pupils will complete tasks on the worksheet. Pupils will then reflect upon what they have learned in the lesson. 	<ul style="list-style-type: none"> Using charts Cell referencing Extending the model Reviewing the model Evaluating the use of charts and graphs 	<ul style="list-style-type: none"> For homework pupils will list other variables that they would might take into account when buying their own mobile phone and selecting a service supplier.
Activity 4			
<ul style="list-style-type: none"> Develop ICT - based models and test predictions by changing variables and rules. Review and modify ICT models to improve their accuracy and extend their scope. 	<ul style="list-style-type: none"> Pupils will be required to experiment by tossing coins and recording their results. Using the 8.3T4a Coin.xls and pressing the <F9> Key to recalculate results in the chart pupils will be asked to reflect upon outcomes. Explain to pupils that RANDBETWEEN is a function in MS Excel that produces a random number. Pupils will be told that they are going to use random numbers to test their models of mobile phone tariffs. Using the 8.3P4b Mobyphone 2.xls pupils will reflect upon how they can use random numbers to make their model more effective. Pupils will experiment and use chats to make their analysis of the data easier. A tally chart will be used to keep track of their results. An online model http://www.buy.co.uk/kellkoo/r5/mobiles.asp will be investigated by pupils. They will be asked to compare the online model with their own. An extension activity is included with this activity. Selected pupils will be required to extend their model by incorporating additional values. 	<ul style="list-style-type: none"> Tossing a coin Testing a model with a random number generator Exploring an online model Reviewing the phone model 	<ul style="list-style-type: none"> Ask pupils to write down the word 'simulation', the key word to be used in the next lesson, and then to summarise, in note form, what they understand it means.



Learning Objectives <i>Pupils should learn...</i>	Possible Activities	Learning Outcomes <i>Pupils can...</i>	Consider
Activity 5			
<ul style="list-style-type: none"> • Developing ICT based models and test predictions by changing variables and rules. • Draw and explain conclusions. 	<ul style="list-style-type: none"> • Use the homework activity of the previous lesson to gather examples of pupils examples of simulations • Use one of the downloaded simulations from: <ul style="list-style-type: none"> • http://familygames.com/free/jumble.html • http://familygames.com/free/vendld.html • http://www.geocities.com/helmi79/gravity/jgrav.zip. • To demonstrate the game as a simulation. • Ask pupils to load 8.3P5d Weblinks and programs.doc. Tell them to choose one program from group A and one site from group B. Working in pairs, they should spend 10 minutes on each one and answer the questions on 8.3P5b Investigations 1.doc for simulations and on 8.3P5c Investigations 2.doc for models. • Remind pupils that, in this unit, their objective was to learn about using ICT for models and modelling. Ask them to recap the main ways in which they have done this. They should recall earlier lessons in which they used spreadsheets to model a school fete as well as using spreadsheets to draw conclusions about finding the best value for money when selecting a mobile phone. 	<ul style="list-style-type: none"> • Define simulations and models • Demonstration of the task • Investigate simulations and models • Review of the unit. 	<ul style="list-style-type: none"> • For homework the pupils will be required to write a brief account of the work they have done in this unit to support the worksheets and printouts they have produced.