Computing Data - Theme Park Spreadsheets 1-4

No.	Learning Intention Steps to Success Success Criteria	Resources	Starter	Main Teaching	Independent Activities	Plenary
1	**LI:** To create a spreadsheet 1. Open up the theme park model spreadsheet 2. Spend up to £500,000 designing a theme park <u>Good:</u> I can add: roller coasters, rides and paths. I can write down the number of items bought and loan left in the bank. <u>Great:</u> I can add cafes, shops, ice cream stands and paths. I can try out different designs and notice how the loan left in bank changes. <u>Super:</u> I can add toilets and scenery. I can fill up as much space as possible without running out of money.	*Google Sheets* Spreadsheet file: *Theme Park Design Model* Sheet for recording notes on about theme park finances	Remind the children about their earlier work with spreadsheets and discuss mathematical investigations they have carried out using them. Tell them they are going to spend the next few weeks creating spreadsheets to explore mathematical problems based around the design of a theme park to find out whose makes the most profit. *How is profit calculated?* Explain how it is the running costs subtracted from money spent by visitors.	Introduce the first task of the investigation to the children – how they must choose how to spend the £500,000 they have by buying: rides, attractions and facilities for their park. Show them the spreadsheet model. *What is a computer model?* (something that lets you explore possibilities by mimicking a real-life scenario). Explain how it allows them to choose which type of item they wish to put in each grid square of the theme park. Point out the 'Prices' tab which describes: how many of each item have been bought, what the total cost is so far (each category of attraction is a different price) and how much money is left available to spend.	Ask the children to design a theme park using the spreadsheet model. Encourage them to include a mixture of items so that their theme park appeals to everyone (i.e. not just roller coaster lovers), as well as to join everything up with paths. Also point out how they can change their designs by replacing attractions with different items to explore what the effect of buying different attractions has on their budget of £500,000. Doing this will demonstrate an ability to evaluate their decisions. At the end, ask them to record the number of each item bought and the amount of money left in the bank on the note taking sheet.	*What do you think of your theme park? How have you made sure it caters for all types of visitors?* *How is this an example of a spreadsheet model?* (It is a simplified representation of a real-life scenario, enabling you to easily make changes and instantly see the effect that this has on your spending money.) *How much money have you got left in the bank that you haven't spent yet?*

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2	**LI:** Can I create a spreadsheet? 1. Can I create a spreadsheet table? 2. Enter formulae to do calculations <u>Good:</u> I can enter formulae into a spreadsheet using replication. <u>Great:</u> I can change the format of cells appropriately. <u>Super:</u> I can draw a graph to represent spreadsheet data.	*Microsoft Excel* Example spreadsheet table layout for children to copy Sheet for recording notes on about theme park finances Running costs sheet Click here for Sheets	*What is a spreadsheet made up of?* *What does a formula do in a spreadsheet?* Remind the children how a spreadsheet is made up of: rows, columns and cells, and how you can enter formulae (starting with an equals sign) to perform calculations in them. *Can you remember why entering an =SUM() formula is better than doing lots of adds?*	Teach the children some new spreadsheet skills, including how to: ● click on a cell/range of cells to easily add its reference to a formula (to save having to work it out manually); ● use 'Fill Down'/'Fill Series' to quickly replicate a formula across a range of cells; ● change the format of a cell so the spreadsheet interprets the value within it as currency; ● change the column widths so that you can see all the digits in a number. *How can you check a formula result is reliable?* (e.g. make an estimate of what the answer should be and then compare with what the spreadsheet calculates). Also, demonstrate to the children how to construct a chart in a spreadsheet by selecting the source value cells and then completing the chart creation wizard in 'Explore' (e.g. to select the type of graph to draw and what title(s) need to be displayed on it).	Ask the children to create spreadsheets to calculate: the money spent by visitors to their theme park (income), the running costs and profit made over two weeks. *How can you make your spreadsheet look nicer?* Encourage them how to change: cell formats (text, number and currency), cell alignment (left/center-align for text, right-align for numbers), cell borders/fill styles and the appearance of text. Prompt them to choose a sensible, consistent design. Remind them how to : At the end, ask them to record the number of each item bought and the amount of money left in the bank on the note taking sheet.	*Why did you change the format of the cells in your spreadsheet?* *Why did you use 'Fill Down' when entering your formulae?* *How did you check your spreadsheet formulae results were reliable? How did you make any corrections?* *How did you construct your chart? Why is this the most suitable type of graph? What does it show you?* *Why are graphs useful for presenting tables of numbers?* Describe how patterns in a series of numbers can be identified more easily when the numbers are shown visually. *How did you improve the appearance of your spreadsheet/graph?*

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3	**LI:** Can I create a spreadsheet to demonstrate profit and loss? <u>Good:</u> I can enter formulae into a spreadsheet using replication. <u>Great:</u> I can change the format of cells appropriately. <u>Super:</u> I can draw a graph to represent spreadsheet data.	*Microsoft Excel* Example spreadsheet table layout for children to copy Sheet for recording notes on about theme park finances	Using my pre-prepared template file, I again ask the children to work across each column to enter the required formulae/numbers: The first column simply lists the different places in the park where visitors can spend money. The second column requires the children to input how many opportunities each visitor has to spend their money at each type of place. The entrance fee will only be paid once, so the children need to put the number 1 in cell B4. For: cafes, shops and ice cream stands these values can be easily copied from the note-taking sheets each child has. The third column details the amount of money a visitor will spend at each place. Whilst the amounts for the: cafe, shop and ice cream stand are already there, the children need to input their park entry fee by themselves. To work out their entry fee to charge visitors, I ask them to consider how many attractions they actually have for people to ride on in their theme park. Ask the children to change the format of these cell values to currency here so that formulae dependent on them (i.e. in the next column) will automatically apply it to their results to save the children the hassle later.	The fourth column displays the total amount of money spent by a visitor at each place - children need to enter a formula into the top cell (D4) to multiply the money spent on the entry fee by the number of opportunities to spend it, before then using fill down to quickly replicate it down for the other facilities in the park. The final cell (D8) requires the children to find the total of all the money spent at each place in their park to determine how much each visitor spends - whilst they can do this using a long addition, I try to encourage them to use an =SUM() formula. This answer needs to be written down on the note-taking sheet for future reference. Once the spreadsheet table has been completed, similar to the last lesson, I then ask the children to create a pie chart using the wizard to illustrate how the money spent by each visitor is divided up (shared) between the different places it is spent. The children should put a sensible title at the top, display the money spent values next to each segment and also allow them to change the colour of both the text labels and the sectors for effect. Also ask them to consider what the pie chart shows (Which place do visitors spend the most/least money at?) and how it compares to examining a table of data (Which is easier to see how the money spent by visitors is divided up and why - a pie chart or a table?). Finally, finish by letting the children spend a short time improving the appearance of their table by changing: font colours, cell fill colours, border styles as well as using: bold, italic and underline. Oviously highlight to them the benefits of choosing contrasting colours and making titles/header rows stand out. Discourage from changing the font style/size (except for the title) in spreadsheets as it not only often makes the data much harder to comprehend, but also often means that cell widths/column heights have to be adjusted to show all

				the cell contents - a job which is much easier said than done! As this activity is basically just a tweaked version of the previous lesson, it enables the children to recap/practice many of the key skills it taught (e.g. changing cell formats, replicating formulae etc.) whilst also allowing them to develop some independence in their spreadsheet work.

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			created saves lots of messing around finding and opening up old spreadsheet files. **In the sixth column**, children need to enter a formula that calculates the theme park's profit (income from visitors - running costs) which can then be filled down into the cells underneath to find out how this changes during the month. A discussion about why any negative numbers that appear here is sometimes needed - this means that the park has made a **loss** on that day. Finally, in the bottom cell, the children need to enter an =SUM formula that finds the total of each day's profit/loss to determine whether the park has made a profit or loss at the end of one month of business.	This is the most suitable graph because it can clearly show changes over time of discrete data (the daily profit is an end-of-day figure that would be wrongly shown as being a continuously changing figure if shown as a line graph). When creating a bar chart in Sheets, whilst it is fairly straightforward to make following the 'Explore' function could they try out the 'insert' chart and use the 'chart editor' wizard?	

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			Whilst the amounts for the: cafe, shop and ice cream stand are already there, the children need to input their park entry fee by themselves. To work out their entry fee to charge visitors, I ask them to consider how many attractions they actually have for people to ride on in their theme park. Ask the children to change the format of these cell values to currency here so that formulae dependent on them (i.e. in the next column) will automatically apply it to their results to save the children the hassle later.	The children should put a sensible title at the top, display the money spent values next to each segment and also allow them to change the colour of both the text labels and the sectors for effect. Also ask them to consider what the pie chart shows (Which place do visitors spend the most/least money at?) and how it compares to examining a table of data (Which is easier to see how the money spent by visitors is divided up and why - a pie chart or a table?). Finally, finish by letting the children spend a short time improving the appearance of their table by changing: font colours, cell fill colours, border styles as well as using: bold, italic and underline. Obviously highlight to them the benefits of choosing contrasting colours and making titles/header rows stand out. Discourage from changing the font style/size (except for the title) in spreadsheets as it not only often makes the data much harder to comprehend, but also often means that cell widths/column heights have to be adjusted to show all the cell contents - a job which is much easier said than done! As this activity is basically just a tweaked version of the previous lesson, it enables the children to recap/practice many of the key skills it taught (e.g. changing cell formats, replicating formulae etc.) whilst also allowing them to develop some independence in their spreadsheet work.

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5	**LI:** Can I create a spreadsheet? 1. Can I create a spreadsheet table? 2. Enter formulae to do calculations	*Microsoft Excel* Example spreadsheet table layout for children to copy	Working along each column: **in the first column**, the children have to use fill series to create a number series going from one to six to label the six months of the year their park is open for; in the second column,		Having done this, I then ask the children to create a bar chart, following the chart wizard, to show how the end-of-month profit increased over the six month period. Try to let them do this fairly independently (just giving them some guidance	

	Good: I can enter formulae into a spreadsheet using replication. Great: I can change the format of cells appropriately. Super: I can draw a graph to represent spreadsheet data.	Sheet for recording notes on about theme park finances Running Yearly/ 6 monthly profit sheet	Percentage increase in profit on the previous month: this is 10% for each month, with the first month needing no increase as their are obviously no prior values; **in cell C4**, the children need to enter their park's profit for month one, copied from their note-taking sheet (and changed to currency format); **in cell C5**, the children need to enter a formula which increases this profit by 10% - =C4*1.1; **the formula in C5** then needs to be replicated using fill down into the rows for months three to six; **in cell C10,** the children need to input an =SUM formula to add up all the profit earned in each month; **in cell C11,** the children need to put in how much money they still have left in the bank which they didn't spend in lesson one when building their park, copied from their note-taking sheet (and changed to currency format); **in cell C12**, the children then finally need to enter a formula that adds together the money in the bank with the profit their park's made over six months to determine what its overall profit is.	about the need to use suitable titles) as they will hopefully now be quite familiar with the options it gives them and what buttons they have to click on. Next, let them spend a short time (between five and 10 minutes) improving the appearance of their graph and spreadsheet to make it look more attractive and easy to read. Try to encourage them to choose complementary colours for the text/cell fill colours and discourage them from changing the font style (as it's too much of a time-wasting activity in my opinion - spreadsheets work best using just a standard font like Arial). By this point, the children have spent five lessons working out how much profit their virtual theme park has made. Don't announce whose park has made the most straightaway - collect in everyone's note-taking sheets on Classroom / Forms and analyse the numbers on them carefully myself to check that they are (or at least appear to be) sensible before letting them know whose profit value is the largest and post to Google Forms for year 5.	