purple mash

Computing
Scheme of Work

2 + 2 =

Unit 4.3 – Spreadsheets

Year Group: 4
Number of Lessons: 5

From 2simple

Contents

Introduction

2Calculate is a simple to use spreadsheet (and more!) for beginners and beyond.

A user guide can be found at 2Calculate User Guide.

The following guide contains a Scheme of Work for teaching the use of spreadsheets as part of the Computing curriculum.

The lessons show a progression of knowledge and skills from lesson to lesson and year to year. Children who have not used 2Calculate before will benefit by using the crash course. Teachers who are not familiar with the tools in 2Calculate might find reviewing the lessons for younger children helpful to build up their own knowledge.

Differentiation

The use of spreadsheets has a strong link to mathematics. Some children might have difficulty with the mathematical concepts in some lessons and might need guidance with this aspect. For example, in lessons where spreadsheets are being used to add up prices; children who are not familiar with converting pence (45p) to pounds (£0.45) might need this aspect explained in more details; in lessons dealing with percentages and fractions some children might need extra support for the mathematical concepts.

Where appropriate, guidance has been given on how to simplify tasks within lessons or challenge those who are ready for more stretching tasks. The lesson plans are progressive so if a child has not completed plans from a previous year, there might be tools that they are unfamiliar with and will need extra guidance.

If children have not used and logged onto Purple Mash before then they will need to spend some time before starting these lessons, learning how to do this. Young children can be supported by having their printed logon cards (produced using Create and Manage Users) to hand.

Note: To force links within this document to open in a new tab, right-click on the link then select 'Open link in new tab'.

Year 4- Medium-Term Plan

Lesson	Aims	Success Criteria
1	Using the formula wizard in the advanced mode to add formulae and explore formatting cells	• Children can use the number formatting tools within 2Calculate to appropriately format numbers. • Children can add a formula to a cell to automatically make a calculation in that cell.
2	Timer and spin button	• Children can use the timer, random number and spin button tools. • Children can combine tools to make fun ways to explore number.
3	Line graphs	• Children can use a series of data in a spreadsheet to create a line graph. • Children can use a line graph to find out when the temperature in the playground will reach 20°C.
4	Using a spreadsheet for budgeting	• Children can make practical use of a spreadsheet to help them plan actions. • Children can use the currency formatting in 2Calculate.
5	Exploring Place Value with a spreadsheet	Children can allocate values to images and use these to explore place value. • Children can use a spreadsheet made in 2Calculate to check their understanding of a mathematical concept.

Lesson 1 – Formula Wizard and Formatting cells

Aim

To explore how the numbers entered into cells can be set to either currency, decimal or fraction.

To explore the use of the display of decimal places.

To find out how to add formulae to a cell.

Success criteria

Children can use the number formatting tools within 2Calculate to appropriately format numbers.

Children can add a formula to a cell to automatically make a calculation in that cell.

Resources

All resources can be found on the main page for this unit. From this page they can be set as 2dos if required by clicking on the icons. Open the links below in a new tab (by right-clicking on them) so that you can preview them without navigating away from the lesson plans.

Sample file Y4 L1 – Spelling Competition; set this as a 2do for your class.

Activities

1. Remind children how to switch to the advanced mode of 2Calculate by clicking on the mode switch button at the top of the screen:

2. Open the sample spreadsheet; spelling scores. Explain that class 3P had a spelling competition and these are the scores. The test was out of 140.

3. Discuss with children what percentage means? What is the most that you can get as a percentage and what is the least? What percentage would mean that you got half correct?

4. 2Calculate can format cells in different ways to make performing calculations easier. One of these ways is as a percentage. Show the children how to select all the cells which will eventually contain percentages.


5. Next click on the Format Cell toolbox and select the % format:

6. We will be discussing decimal places later in the lesson, so do not set these for now.

7. Explain that 2Calculate also has a 'formula wizard' which you can use to help calculate the

    required result. Click on cell D4 then click on the formula wizard button [icon] this will open the
    Formula Wizard screen in simple mode.
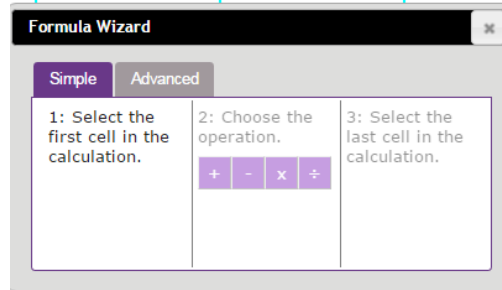
8. Click on cell B4 (Thomas' score) then choose ÷ as the operator (on the wizard screen), then click
    on cell C4 followed by 'Ok'. Now we can see that Thomas got 40%.
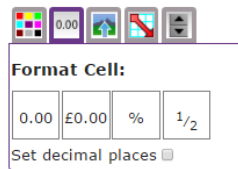
9. Depending upon the children's maths ability, you might want to discuss the calculation of
    percentages here for further understanding.

10. Repeat this process for Olivia. You will see that the percentage is reported as 96.43%. This is
    because 2Calculate has calculated to 2 decimal places automatically.

11. Calculate the result for Olivia into cells E5 and F5 as well.

	A	B	C	D	E	F	G
1			3P	Spelling	Scores		
2	Name	score	out of	%			fraction
3				0 d.p.	1 d.p.	2 d.p	
4	Thomas	56	140	40%			
5	Olivia	135	140	96.43%	96.43%	96.43%	
6	Jack	140	140				

12. The general level of children's maths ability will determine in how much depth you discuss what
    decimal places mean and whether this number is nearer to 96% or 97%? If this is felt to be too
    complicated, then just fill in the 0 d.p. column and explain that this will show the nearest whole
    percentage.

13. Now click in cell D5 which should be set to show the answer to 0 decimal places. In the format cell toolbox (right-hand side), tick the 'Set decimal places' tickbox and type '0' then press the 'enter' key on the keyboard.
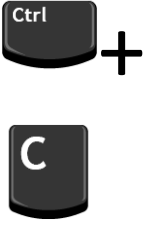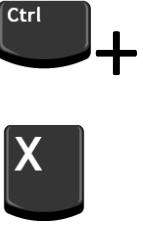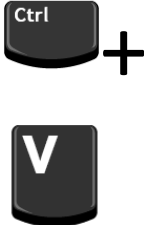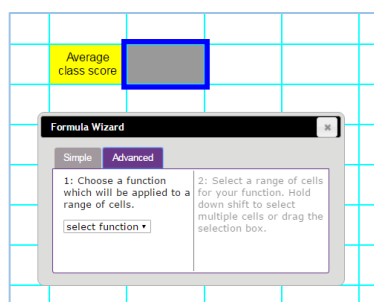
Format Cell:

| 0.00 | £0.00 | % | $^1/_2$ |

Set decimal places ☑

0
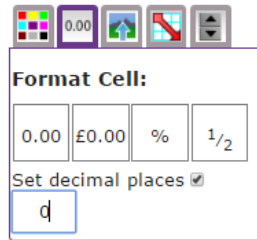
14. Repeat this for cell E5 setting decimal places to 2.

15. Before sending the children to their own computers to try for themselves, explain that it is easier to set the format for lots of cells at once by selecting all the relevant cells e.g. the 0 d.p. column and set the number of decimal places. Then repeat for 1 d.p. and 2 d.p.

16. It is also possible to copy and paste a formula down the column e.g. use the formula wizard to work out the formula for cell D4, then copy D4 and paste to all the other cells in the D column (but not to the other columns as this will not work).

17. Copying and pasting reminder:

18. Copying	19. Cutting	20. Pasting
21. **Ctrl** + **C**	22. **Ctrl** + **X**	23. **Ctrl** + **V**

24. Now give children time to complete this on their own copies of the spreadsheet.

25. When children have finished, discuss who got the top score and the bottom score? How can we work out the average score? The Formula wizard in 2Calculate can work this out for us as well.

26. Into cell I5 enter the text 'average class score' then click on cell J5. Format this cell as a % to the desired number of decimal places. Now click on the formula wizard button and choose the Advanced tab.

Formula Wizard

| Simple | Advanced |

1: Choose a function which will be applied to a range of cells.

select function ▼

2: Select a range of cells for your function. Hold down shift to select multiple cells or drag the selection box.

27. Select the function 'Average', then select the cells with the results (could be any of the d.p. columns). Then click 'OK' and you should see the average percentage was 76.15%.
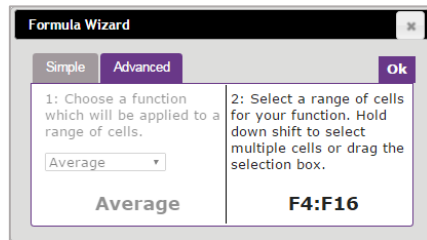
28. Children should try this on their own spreadsheets, they could also explore what minimum and maximum functions do.

Lesson 2 – Using the timer and spin buttons

Aim

To explore how tools can be combined to use 2Calculate to make number games.

To explore the use of the timer, random number and spin button tools.

Success criteria

Children can use the timer, random number and spin button tools.

Children can combine tools to make fun ways to explore number.

Resources

All resources can be found on the main page for this unit. From this page they can be set as 2dos if required by clicking on the icons. Open the links below in a new tab (by right-clicking on them) so that you can preview them without navigating away from the lesson plans.

Completed example spreadsheet Y4 L2 Number Fun.

NB Part of the lesson plan takes children through the process of creating their own copy of this spreadsheet, if this is too difficult for some children, set the completed sheet as a 2do. Then they can open the example sheet and adapt it as is suggested in the lesson activity from step 8.

All tools can be found in the Controls Toolbox on the right-hand side of the screen, rightmost tab

Activities

1. Show the children the example spreadsheet and have a play with it.

2. Click the random number tools in turn (column A) to change the first number in the calculations.

3. Click the spin tool (cell N3) to select the times table.

4. Change the numbers in column E as desired by altering the times table or the random numbers. Or change the total in column K (column E could be set to zero to make it a bit easier).

5. The idea is to fill in the correct number in column I in the fastest time possible.

6. Click the timer (cell N1) to start the timer, complete the calculations (the 'is equal to' tool will turn green if the answer is correct).

7. Then move on to explaining the tools:

8. The timer tool in cell N1 will start from the number in the cell to the right of it (O1), so enter 0 in this cell to start timing from 0, the timer counts up each second. To start the timer, click on it and it will turn green, to stop it and it will stop counting and turn red.

9. The numbers in column A use the random number tool, each time they are clicked, they will change to a number between 0 and 9.

10. In cell N3 is the spin tool, this changes the number in the cell next to it (O3) by 1 each time it is clicked up or down.

11. The cells in column C are linked to cell O3. Click on cell C1 and look in the formula bar to see how this is done.

12. The equals signs in column J are 'is equal to' tools, they turn red or green depending upon whether the calculation does equal the number after them:

13. Children can make their own number fun spreadsheets or use the completed example and adapt it to their own needs. Here are some suggestions:

14. To simplify it to a test of number bonds to 20 (or another amount)

15. To make the random number tool create 2 digit numbers. Then use these in calculations to make 100 (or another) total.

16. To do this you will need to use a formula and place value knowledge to put the two 1 digit numbers together to make a 2 digit number in the next cell like this

0	7	7	+		=?	100
4	1	41	+		=?	100
3	9	39	+		=?	100

C1 | fx | =(A1*10)+B1

	A	B	C			
4	X	5	=?		⏱	0
1	X	5	=?			
0	X	5	=?		Times Table	5

17. To simplify it to just a times tables test

Lesson 3 – Line Graphs

Aim

To use the line graphing tool in 2Calculate with appropriate data.

To interpret a line graph to estimate values between data readings.

Success criteria

Children can use a series of data in a spreadsheet to create a line graph.

Children can use a line graph to find out when the temperature in the playground will reach 20°C.

Resources

All resources can be found on the main page for this unit. From this page they can be set as 2dos if required by clicking on the icons. Open the links below in a new tab (by right-clicking on them) so that you can preview them without navigating away from the lesson plans.

Line Graph example data photo; the lesson uses example data; you could collect similar real data in advance of the lesson to make the activity more relevant to the children.

Activities

1. Create a blank worksheet by clicking on the new page icon at the top left of the screen.

2. You will probably have to resize the spreadsheet using the [image] buttons in order to fit in the data. These buttons can be pressed at any time if you are running out of space and then the data can be copied and pasted into different cells if necessary.

3. Class 4J collected data on the daytime temperature in the school playground. They recorded the temperature each hour during the day.

4. Here is their record of the data (this photo is linked to above for displaying on a whiteboard):

5. Ask the class to put the data into a spreadsheet and then review what children have done. The expected outcome is like this:

Time	Temperature
9:00	15
10:00	18
11:00	19
12:00	22
13:00	25
14:00	23
15:00	22

6. Now we are going to create a line graph to help us figure out what time the playground reached 20°C.

7. Click on the Charts button in the top menu bar [chart icon]. This button will try to find all the relevant data in your spreadsheet and create a chart using it.

8. If the tool does not find all your data, you can drag the dotted lines (that will appear) to select the data that you want to include in your chart.

9. The default chart is a bar chart. Use the buttons within the chart pop-up screen to change to a line graph.

10. The final button in the chart pop-up screen allows you to give your chart a title, and rename the x and y axes.
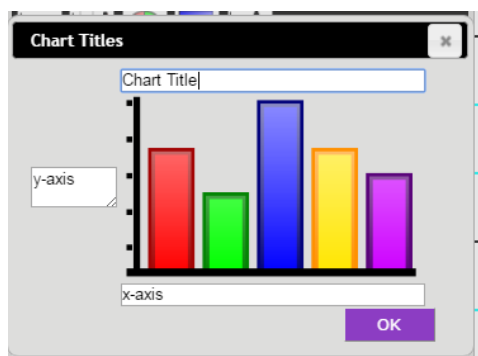
11. Children should make their own graphs.

12. Can they work out at which time the playground was 20°C? What other questions can the line graph answer. Why is it better than a bar chart for this type of data?

13. Can they think of other data that could be collected and put into a line graph? Some of the information in the examples below could be researched on the Internet and plotted in a line graph such as average temperatures through the year in different countries.

14. Some examples;

15. Age and height of a person or average height for a group of people and their age;

16. Months of the year and average temperature;

17. Car valuations over years since new

18. Sales of TVs/mobile phones/radios over the decades.

Lesson 4 – Using a spreadsheet for budgeting

Aim

- To use the currency formatting tool in 2Calculate
- To use 2Calculate to create a model of a real-life situation.

Success criteria

- Children can make practical use of a spreadsheet to help them plan actions.
- Children can use the currency formatting in 2Calculate.

Resources

All resources can be found on the main page for this unit. From this page they can be set as 2dos if required by clicking on the icons. Open the links below in a new tab (by right-clicking on them) so that you can preview them without navigating away from the lesson plans.

Party items price list file.

Example budget sheets; budget sheet no formulae and budget sheet with formulae there are 2 versions of this sheet. The simpler version (budget spreadsheet no formulae) does not use formulas. The more advanced version (budget spreadsheet with formulae) uses formulae. If children are familiar with the formula wizard from previous lessons they can use the formula version but some children might find the simpler version enhances their understanding of the process.

Activities

1. Explain that the children are going to use a spreadsheet to plan their birthday party and decide which entertainments and food they can afford within their party budget.

2. Show the children the price list on the whiteboard, they will have to decide which items to include in their party, how many people they can afford to invite and what to feed them. Note

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Food	Cost per person		Drinks	Cost each		Entertainment	Cost each		venue	Cost each		decorations	Cost each
2	pizza	£2.50		milkshake	£1.25		DJ	£150.00		home	£0.00		party poppers	£0.10
3	sandwich	£1.00		fizzy can	£0.50		fireworks display	£75.00		local hall	£40.00		plates	£0.02
4	hotdog	£1.15		big bottle fizzy	£0.40		sports activities	£100.00		bowling to include activity	£150.00		themed plates	£0.10
5	vegetables	£0.30		bottled water	£0.10		magican	£100.00		swimming to include activity	£170.00		cups	£0.01
6	burger	£2.00		fruit juice	£0.60		animal man	£150.00		astroturf pitches to include activity	£150.00		themed cups	£0.05
7	chips	£0.50		tap water	£0.00		DIY games	£25.00		soft play	£170.00		tablecloths	£1.00
8	nuggets	£2.00		squash	£0.15		movie	£5.00					helium balloons	£4.00
9	pasta	£1.50		ice crush	£1.50		pinata	£20.00		Going home gifts	Cost each		banners	£2.00
10	basic crisops	£0.10								toy	£0.50			
11	deluxe crisps	£0.15		Invitations	Cost each					helium balloon	£1.00			
12	popcorn	£0.12		DIY	£0.20					hat	£0.10			
13	fruit salad	£0.30		printed	£1.00					book	£1.00			
14	cup cake	£0.20								chocolate	£0.20			
15	deluxe cake	£0.40								sweets	£0.20			
16	ice cream	£0.30												

that the cells with prices in are all formatted as currency using the Format cell toolbox; children should do this on their spreadsheets too.

3. Show them the example budget sheet (see resources section for information about which example budget sheet to use). Highlight the places where there are calculations, e.g. to work out the totals and grand total.

Item	Price		Quantity		Total
pizza	£2.50	x	30	=	£75.00
chips	£0.50	x	30	=	£15.00
ice cream	£0.30	x	30	=	£9.00
DJ	£150.00	x	1	=	£150.00
milkshakes	£1.25	x	30	=	£37.50
Invites DIY	£0.20	x	30	=	£6.00
fireworks	£75.00	x	1	=	£75.00
pinata	£20.00	x	1	=	£20.00
soft play	£170.00	x	1	=	£170.00
Budget	£300.00				£557.50

Simpler spreadsheet

Item	Price	Quantity	Total
pizza	£2.50	30	£75.00
chips	£0.50	30	£15.00
ice cream	£0.30	30	£9.00
DJ	£150.00	1	£150.00
milkshakes	£1.25	30	£37.50
Invites DIY	£0.20	30	£6.00
fireworks	£75.00	1	£75.00
pinata	£20.00	1	£20.00
soft play	£170.00	1	£170.00
			£557.50
Budget	£300.00		

Advanced spreadsheet

4. They should use the calculations functions to work out the costs because otherwise it will be very hard to change things if the prices change or there are more children to invite or the budget is reduced.

5. Children should make their own budget spreadsheets. At first there is no spending limit and they can invite as many people as they want (no naming names!).

6. Can they work out a total cost for their chosen party?

7. Once they have had a chance to do this give the children some restrictions:

8. Certain venues have maximum number limits so they might have to change venue or invite less people; can they change their spreadsheet to reflect their choices?

9. There is a maximum budget for the party of £300 can they plan a party that doesn't cost too much?

10. There is currently a special sale on pizza; now half price! Can they work out the new cost quickly?

11. The entertainer has added 20% to their bill to cover damage, what things need to be excluded now so that the party is still in budget?

12. If children have done work in 2Email, they could email you their budgets as an attachment along with a letter about how they have chosen their desired party.

Lesson 5 – Exploring Place Value with a spreadsheet

Aim

- To use the functions of allocating value to images in 2Calculate to make a resource to teach place value.

Success criteria

- Children can allocate values to images and use these to explore place value.
- Children can use a spreadsheet made in 2Calculate to check their understanding of a mathematical concept.

Resources

All resources can be found on the main page for this unit. From this page they can be set as 2dos if required by clicking on the icons. Open the links below in a new tab (by right-clicking on them) so that you can preview them without navigating away from the lesson plans.

- Clipart of thousands, hundreds, tens and unit blocks in a location that children can access such as a shared drive on the computer system on the main page for this unit
- Example file Y4 L5 Place Value; this is the finished game.
- This activity can be made easier by just doing hundreds, tens and units or tens and units. You could challenge more able pupils to include tens of thousands. There are finished examples of these in the Maths Place Value category of Purple Mash.

Activities

1. Open the example file on the whiteboard and switch to advanced view. Demonstrate the features, children will need to use these to create their own copy.
2. Click each of the digits of the 'Number to make' number. These are made using the random number tool and will change to a different random number between 0 and 9 each time.
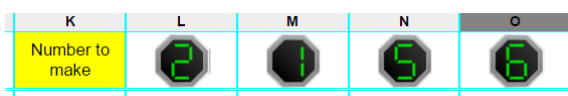

3. The random number tool is in the controls toolbox

4. Look at cell I14, show that this also automatically updates when the random numbers are changed.

5. Look at the area with the ___. If you click on the image toolbox and then click on one of the images, you can see that they each have a value assigned to them:
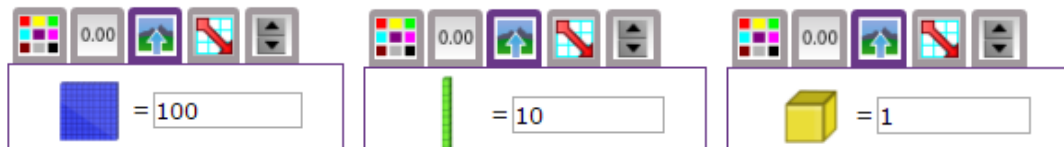
6. Also try dragging one of the images, you will see that it can be dragged around the spreadsheet.

7. Next look at the totalling tools in row 13 and the sum below it. The totalling tools can be found in the total toolbox.
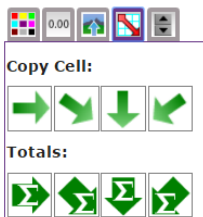
What do children think that this does?
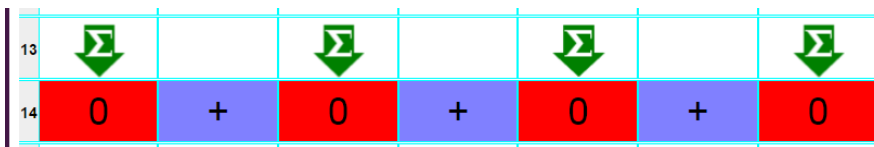
8. In cell H14 there is an 'is equals to' tool. Can children remember what this does?

9. Now demonstrate how to use the spreadsheet.

If the number in cell O1 is zero, change it (just for the purposes of this demonstration).

Ask children to suggest how many thousands they need to drag into the thousands column (Th) and drag the relevant number. Repeat this for the hundreds and tens. Notice that the 'is equals to' remains red as the number does not yet equal the total. Can children work out a running total as you go in their heads?

10. Add the correct number of units and watch the equal sign turn green. Investigate what happens if you then remove a thousand, hundred, ten or unit.

11. Leave the example displayed on the whiteboard for children to copy.

12. They will need extra guidance on the following processes

**How to insert an image from a file**

Open the 'image' toolbox and click the button, this opens the drawing screen. Click on the clipart button then click on the button at the bottom of this screen . Show children where you have saved the image files. It might be easier for them to copy and paste these files into their own folders before starting depending upon your school network.

How to give an image a value

Click on the image toolbox and then the image. Type the corresponding value into the space in the image toolbox.

How to make an image draggable

Click on the image, then click on the 'move' tool in the objects toolbox

**How to copy the images quickly to adjacent cells**

Complete the above processes for one thousand, hundred, ten and unit image. Now select the images and a blue line will appear around them. If you move your mouse to the bottom blue line, the mouse pointer will change to an arrow, drag this arrow downwards to create copies of the cells.
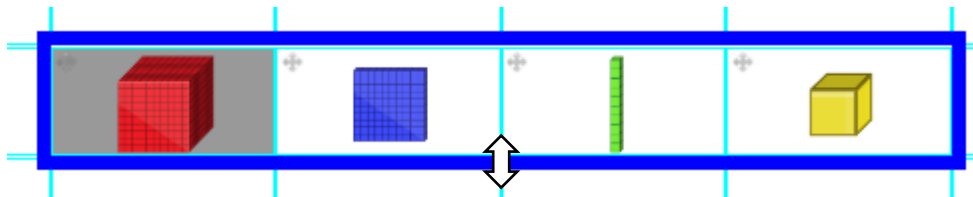
This can be quite useful when images go missing too, it saves recreating them and it copies the value and draggable properties too.

How to make the 'Number to make' display in cellI14

This is done using a formula. Click on the cell and type the formula into the formula bar at the top of the screen then press the enter key. The '&' symbol puts each digit together from the random number tools in cells L1, M1, N1 and O1 to make a 4 digit number. An '+' symbol would add the 4 numbers together.
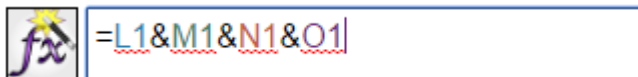
13. Once children have made their place value machines, they can 'play' with them. They could use them to answer place value questions in class. For example, a series of calculations where they have to make a number and then add or subtract a given number and work out the result.

Assessment Guidance

The unit overview for year 4 contains details of national curricula mapped to the Purple Mash Units. The following information is an exemplar of what a child at an expected level would be able to demonstrate when completing this unit with additional exemplars to demonstrate how this would vary for a child with emerging or exceeding achievements.

Assessment Guidance	
Emerging	With support throughout, children will use 2Calculate and a limited data set to design a simple graph to solve a mathematical problem (Unit 4.3 Lesson 3. Point 7). Children will present their data and information using 2Calculate (Unit 4.3 Lesson 5. Point 5).
Expected	Children will use 2Calculate to design a graph to solve a mathematical problem (Unit 4.3 Lesson 3. Point 7). Children will present, format and analyse their data and information in a variety of ways and use their spreadsheets to solve and check mathematical problems and concepts (Unit 4.3 Lesson 5. Point 5). Most children can use the number formatting tools within 2Calculate to appropriately format numbers (Unit 4.3. Lesson 1 Point 4). Children can add a formula to a cell to automatically make a calculation in that cell using the 'formula wizard' (Unit 4.3. Lesson 1 Point 6). They will be fluent in copying and pasting contents between cell(s) (Unit 4.3. Lesson 1 Point 17). Children can use spreadsheets to collate data and extract information from it to answer questions e.g. children can create line graphs and can use it to identify when something will happen using 2Calculate (Unit 4.3 Lesson 3).
Exceeding	Children demonstrating greater depth will explore more complex functioning of the 2Calculate tools to create their own spreadsheets to explore number and interpret their own data. They will intuitively grasp the concept of using a spreadsheet to model a real-life situation and calculate solutions. Children demonstrating greater depth will use 2Calculate to design a range of different graphs which present data in a variety of ways and select the most appropriate one to independently to solve mathematical problems (Unit 4.3 Lesson 5. Point 5).