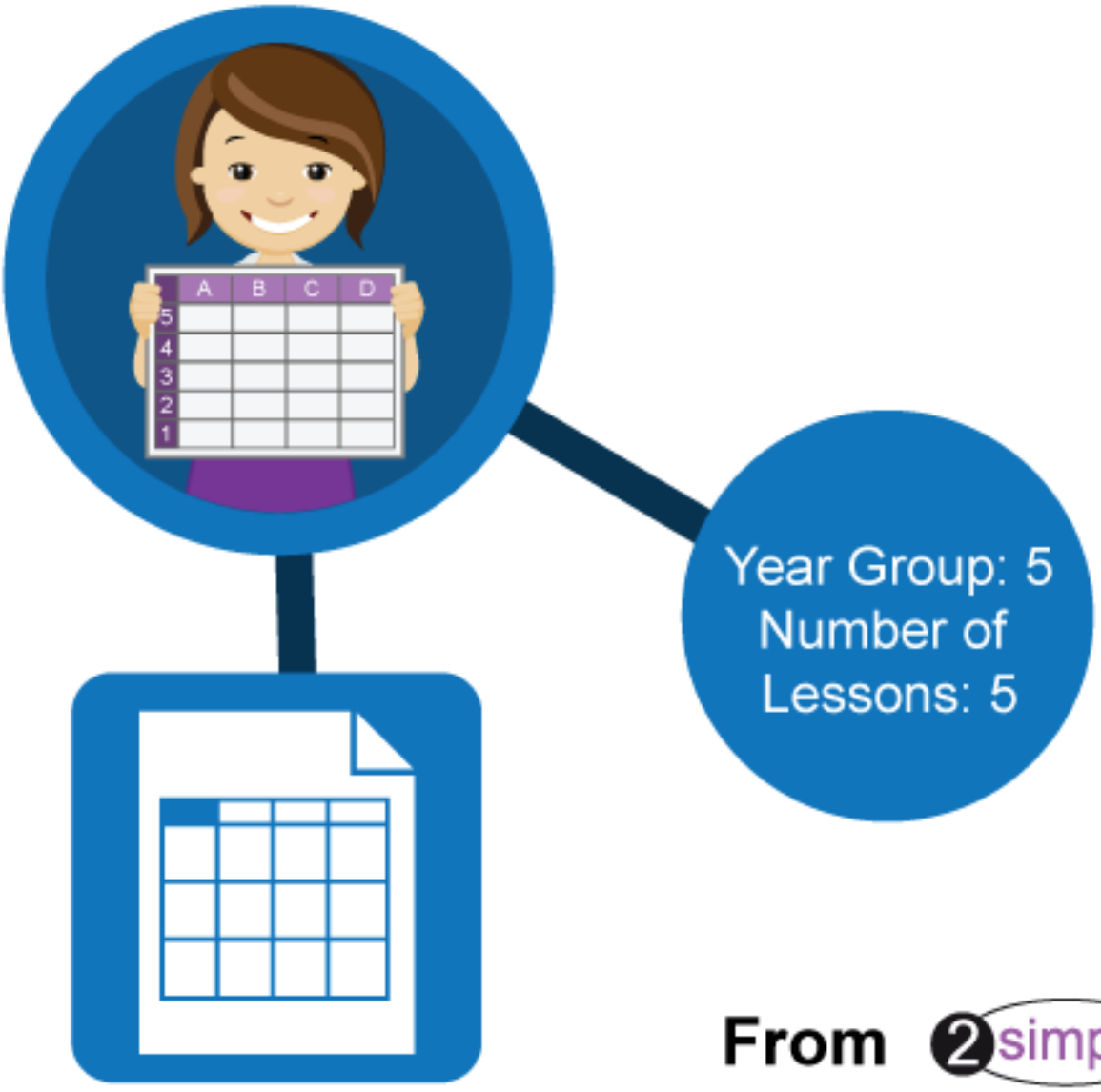
purple mash

Computing

Scheme of Work

Unit 5.3 – Spreadsheets



Year Group: 5
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 lessons show a progression of knowledge and skills from lesson to lesson and year to year. Classes who have not used 2Calculate before will benefit by using the Y5 spreadsheets catch-up unit instead of this unit. 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.

The lessons assume that children are logged onto Purple Mash with their own individual usernames and passwords so their work will be saved in their own folders automatically and can be easily reviewed and assessed by the class teacher.

If you are currently using a single login per class or group and would like to set up individual logins yourself, then please see our guide to doing so at Create and Mange Users. Alternatively, please contact support at support@2simple.com or 0208 203 1781.

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 about area and perimeter of shapes, some children might need more experience of drawing the shapes on the spreadsheet and counting squares before moving onto using formulae to calculate area and perimeter.

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.

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'.

Medium-Term Plan

Lesson	Aims	Success Criteria
1	Conversions of measurements	• Children can create a formula in a spreadsheet to convert m to cm. • Children can apply this to creating a spreadsheet that converts miles to km and vice versa.
2	Novel use of the count tool	• Children can use a spreadsheet to work out which letters appear most often. • Children can use the 'how many' tool.
3	Formulae including the advanced mode	• Children can use a spreadsheet to work out the area and perimeter of rectangles. • Children can use these calculations to solve a real-life problem.
4	Using text variables to perform calculations	• Children can create simple formulae that use different variables. • Children can create a formula that will work out how many days there are in x number of weeks or years.
5	Using a spreadsheet to plan an event	• Children can use a spreadsheet to model a real-life situation and come up with solutions that can be practically applied.

Lesson 1 – Conversions of measurements

Aim

- To use formulae within a spreadsheet to convert measurements of length and distance.

Success criteria

- Children can create a formula in a spreadsheet to convert m to cm.
- Children can apply this to creating a spreadsheet that converts miles to km and vice versa.

Resources

Unless otherwise stated, all resources can be found on the main unit 5.3 page. From here, click on the icon to set a resource as a 2do for your class. Use the links below to preview the resources; right-click on the link and 'open in new tab' so you don't lose this page.

- Conversion example spreadsheet.

Activities

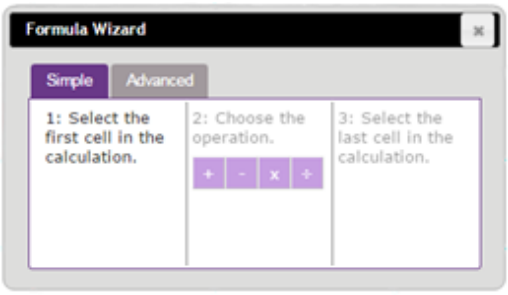
1. Explain that the children are going to use a spreadsheet to convert measures of lengths. Discuss what this means, why would you want to do this in real life?
2. Show children the example spreadsheet layout. What do you need to do to a measurement in metres to convert it to cm? Show the children how to enter this as a calculation on the sheet.

m				cm
1	x	100	=	100
7	x	100	=	700
567	x	100	=	56700

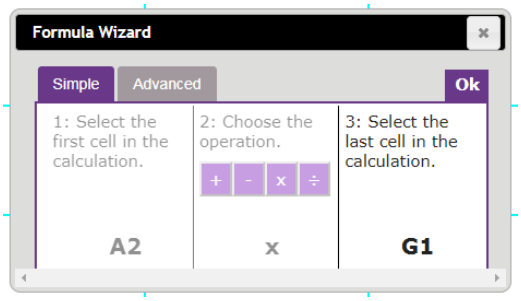
3. Ask children to use the same format to convert from cm to m on their own sheets.
4. Once they have done this, remind them of the advanced view in 2Calculate; they were introduced to this last year. Remind children how to switch to the advanced mode of 2Calculate by clicking on the mode switch button at the top of the screen: 
5. Open a new blank spreadsheet choosing the advanced format spreadsheet.
6. Create a spreadsheet with the headers as follows:

A	B	C	D	E	F	G
m	cm		cm	m		100

7. Click on cell **B2.** Explain how we want the number in this cell to equal the number in cell A2 x 100.
8. Click on the formula wizard button  this will open the Formula Wizard screen in simple mode.



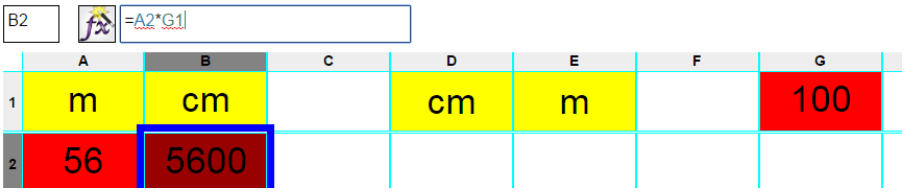
9. Click on cell A2 then choose x as the operator then click on cell G1 (this contains the number 100).



10. Click OK and then try entering a number in cell A2, the calculation of the conversion to cm should occur automatically.

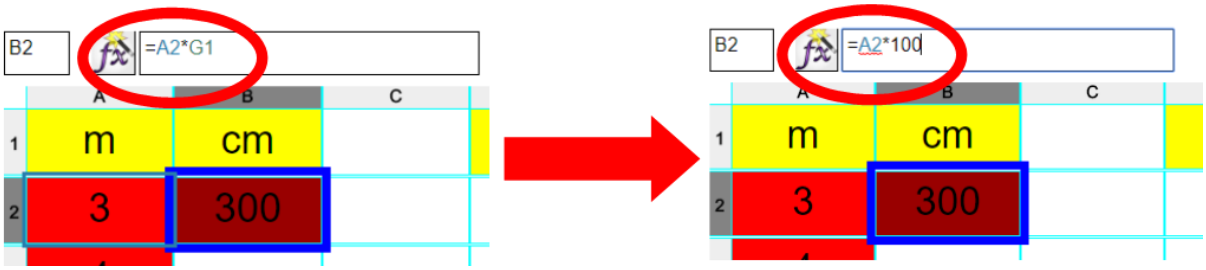
11. Ask children to create a similar formula for the other cells in column B on their own spreadsheets and test it out by entering different values in column A.

12. Now look at the formula bar for one of the formulae e.g. click on cell B2 and look at the formula bar:



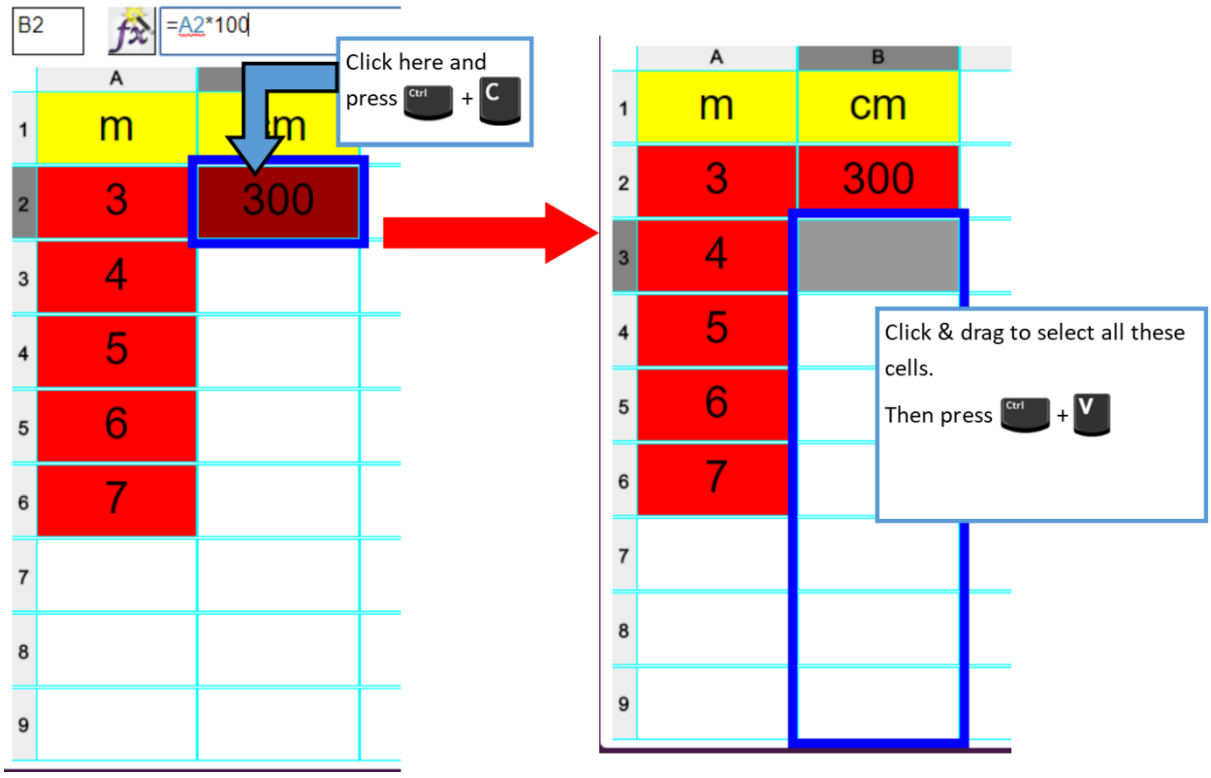
13. To enter formulae, you can type directly into this bar. Now, the formula says that this cell (B2) = whatever is in cell A2 x whatever is in cell G1.

14. Click in the formula bar and change the text 'G1' to the number '100'.



15. Press enter and the resulting number of cm (in cell B2) should not change. The advantage of 'hardcoding' the number 100 in the formula bar is that now the formula can be copied and pasted instead of having to enter it into each cell individually.

16. Copy cell B2 (click on cell B2 then press Ctrl + C. Now select the rest of column B and then paste Ctrl + V. This should copy the formula and automatically update it to each row. The rows where column A is empty should initially display zeros. Test this out by entering numbers into the cells in column A.



17. See if children can use this method to create a formula that takes the contents on the cells in column D and divides by 100 to convert from cm to m.

    NB They will need to use the '/' key for a divide sign.

18. Now see whether the children can apply this knowledge to convert from km to miles and vice versa?

19. Display the following information to assist children and discuss how they would write formulas to convert between the 2?

1.6	Km	~	1	mile
0.63	Miles	~	1	kilometre

Lesson 2 – Novel use of the count tool for literacy

Aim

- To use the count tool to answer hypotheses about common letters in use.

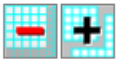
Success criteria

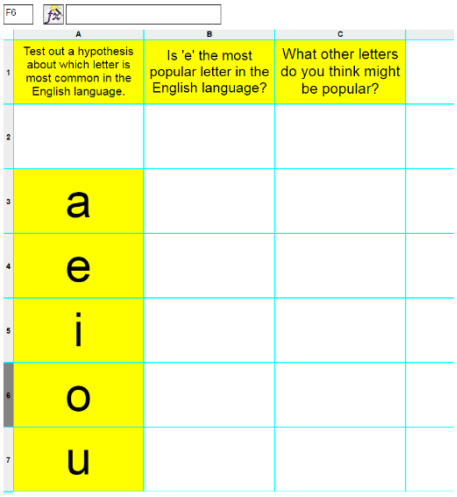
- Children can use a spreadsheet to work out which letters appear most often.
- Children can use the 'how many' tool.

Resources

- 2Calculate tool

Activities

1. Explain that we are going to see how spreadsheets can also be used for literacy and for carrying out investigations.
2. Open a new spreadsheet in advanced mode.
3. Remind the children how to make their spreadsheet bigger by clicking on the + in the button on the bottom right of the screen to add more cells. 
4. In this lesson we will be testing out a hypothesis about which letters are most commonly used in the English language. We will start off by asking whether 'e' is the most popular vowel.
5. Create a spreadsheet like the following picture:

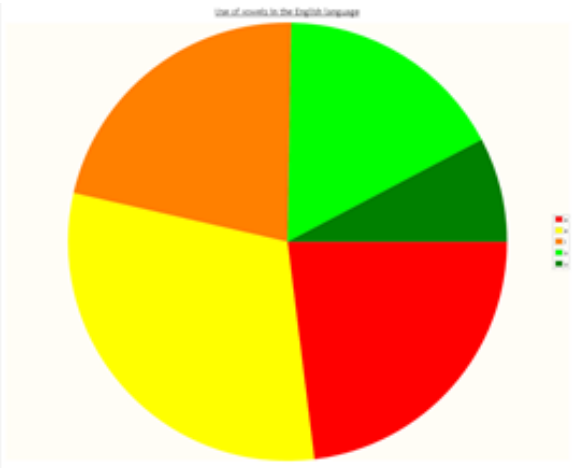


	A	B	C
1	Test out a hypothesis about which letter is most common in the English language.	Is 'e' the most popular letter in the English language?	What other letters do you think might be popular?
2			
3	a		
4	e		
5	i		
6	o		
7	u		

6. The vowels on the left-hand side are the variables that we are going to get the spread sheet to count. Click on the cells next to the letter 'a' and add a 'how many' tool from the controls toolbox on the right-hand side.

7. This tool will count all of the letter ‘a’s on the spreadsheet except for the cell to its immediate left.
8. Ask children to create a similar spreadsheet and add the ‘how many’ tool for each vowel. Which is the most common vowel so far?

9. Add some common consonants e.g. m, t, s, c, p and see how the count updates.
10. Add some more sentences for the tools to count. These can be typed into cells or copied and pasted e.g. from a website such as an online encyclopaedia.
11. Can children answer questions about the most popular letters? Can they use the spreadsheet to answer hypotheses e.g. Certain genres will use a greater variety of letters than others?
12. Can children present their results in a graph?



13. The count tool can also count words as well as individual letters. Can children suggest words to count? They could enter a variety of connectives for example and see which is the most commonly used in a variety of texts.

Formulae including the advanced mode

Aim

- To use a spreadsheet to model a real-life problem
- To use formulae to calculate area and perimeter of shapes.

Success criteria

- Children can use a spreadsheet to work out the area and perimeter of rectangles.
- Children can use these calculations to solve a real-life problem.

Resources

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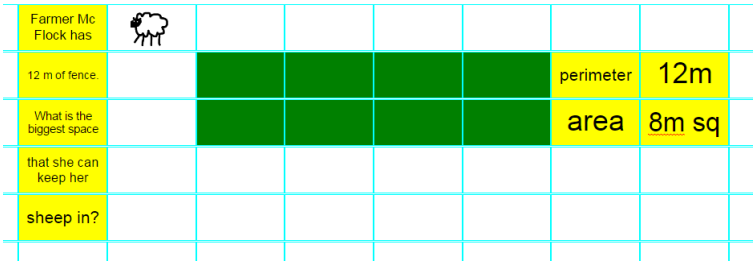
- Cuboids example

Activities

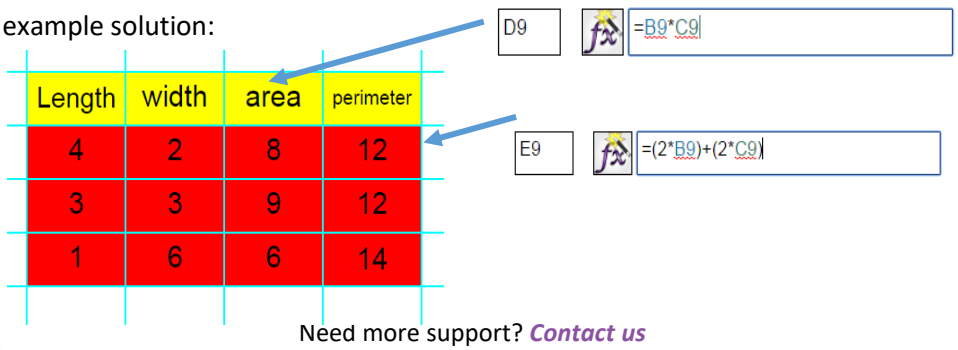
1. Modelling in Computing means creating or using a model or simulation of a real life situation, on a computer. For example, we could start by creating a page in 2Calculate which added up how much money we made by selling 3 pizzas for 25p and 2 apples for 10p each in the school tuck shop . We could then use 2Calculate to explore what would happen if we changed parts of the model—by putting up the prices for example. Changing certain values within the page and seeing what happens is what is meant by modelling.

2. Today we are starting by solving a problem for farmer McFlock. She keeps sheep and each sheep needs at least 1m² of space in the field. Create a spreadsheet to draw fields in like the following example. NB this is not to scale; each cell height or width represents 1m:



3. Can children recreate this model and work out the maximum number of sheep that can be kept with 12m of fence? What if farmer Mc Flock obtains more fencing? Can they think of a way that the spreadsheet could calculate the best answer?

4. Here is an example solution:



5. The area column uses a formula made using the formula wizard.
6. The perimeter column uses a formula that was typed into the formula bar. Can children explain in words what this formula says and how it calculates the perimeter?
7. Children should recreate this on their own spread sheets and try to answer the questions of the maximum number of sheep with different lengths of fencing. Or turn the problem around and specify a minimum area for them to calculate the minimum required metres of fencing required.
8. For children who are ready you can extend this to calculating volumes of cuboids using a spreadsheet. Can they adapt their field solution to model this situation and work out the volume of the cuboids pictured in the examples file?

Lesson 4 – Using text variables to perform calculations

Aim

- To Learn to create formulae that use text variables. Calculate how many days in x amount of years.

Success criteria

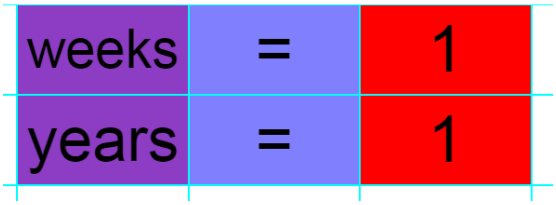
- Children can create simple formulae that use different variables.
- Children can create a formula that will work out how many days there are in x number of weeks or years.

Resources

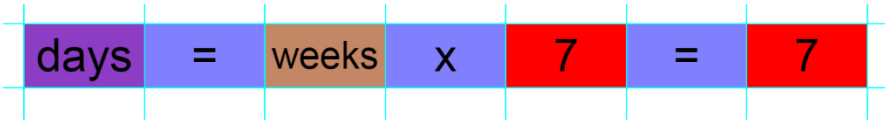
- A calendar; ideal calendars are wall calendars with a whole month to view or the one that appears when you click the clock in the bottom right hand corner of a PC. It can be any calendar that children could use to count the number of weeks since their last birthday.
- If children want to work out the number of hours and minutes since they were born, then they need to find out their exact time of birth in advance of the lesson.

Activities

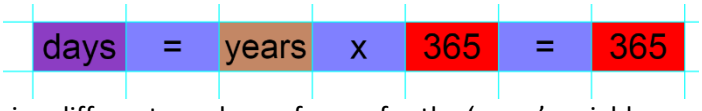
1. We will start this lesson by creating two formulae. The first will convert weeks into days and the second will convert years (non-leap years) into days.
2. We are going to create 2 variables called 'weeks' and 'years'.
3. A variable is used in programming to keep track of things that can change while a program is running. In this case the variables will be tracking numbers of weeks and years.
4. To create a variable in 2Calculate you type the name of the variable and then an equal's sign in the cell next to it. Create the variables on a blank sheet:



5. Next create a formula to calculate the number of days, enter this below the variables:



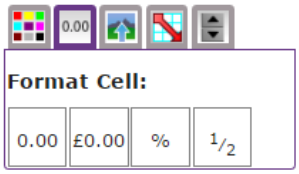
6. Try changing the value of the variable 'weeks' and the days should update.
7. Now enter a formula for days = years x 365 below the week's calculation.



8. Try entering different numbers of years for the 'years' variables and seeing how the number of days change.

9. You can enter decimals in the years as well e.g. try 1.25. You can display the number of days in different formats such as a fraction:

10. Click on the cell with the number of days, if you entered 1.25 for the 'years' variable then it will currently say 456.25. Click on the format toolbox and select fraction and 465¼ will be displayed.

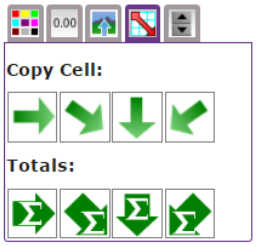


11. Now we are going to use this spread sheet to calculate children's age in days, hours and minutes. Firstly, children need to work out how many whole weeks and how many extra days it has been since their last birthday. They might need guidance on the easiest way to count whole weeks on the calendar. Then complete the spreadsheet like the example below:

12. Here is an example of a finished calculation

	years	=	9				
	weeks	=	23				
	extra days	=	4				
	days	=	years	x	365	=	3285
	days	=	weeks	x	7	=	161
					extra days	=	4
							Σ
					Total days	=	3450

NB The totalling tool can be found in the toolbox

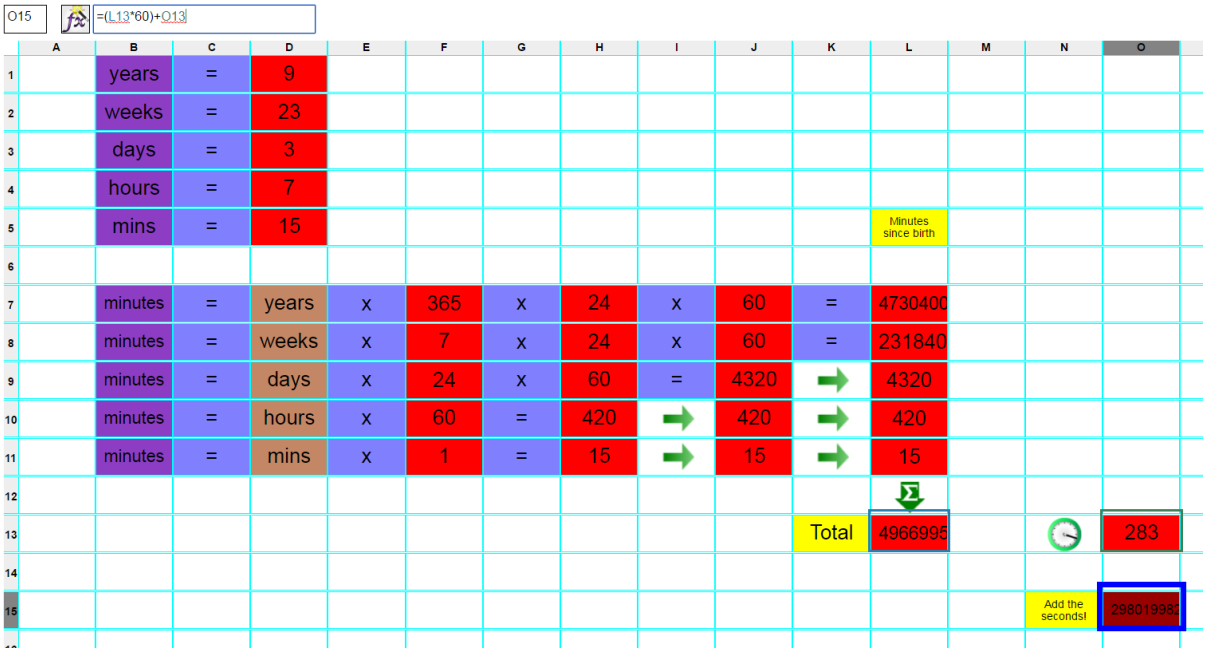


13. To calculate the numbers of hours and then minutes since they were born, children will need to replace the extra days variable with whole days (days), extra whole hours (hours) and extra minutes (mins)

14. They will also have to convert the data for years and weeks into hours and/or minutes. Below is an example of a finished calculation:

15. The arrow  (in the totalling toolbox) can be used to copy a cell's contents to the next cell to the right so all the minutes end up in one column for totalling.

16. For an extra challenge, this example also includes a timer control (from the control toolbox) this counts up one number each second once it is started by clicking on it. The cell beneath it uses a formula typed into the formula bar that multiplies the number of minutes total by 60 and then adds on the seconds from the timer so you can see the seconds of your life ticking away! Some children might enjoy trying to get this as accurate as possible.


O15
=(L13*60)+O13
years = 9
weeks = 23
days = 3
hours = 7
mins = 15
Minutes since birth
minutes = years x 365 x 24 x 60 = 4730400
minutes = weeks x 7 x 24 x 60 = 231840
minutes = days x 24 x 60 = 4320 4320
minutes = hours x 60 = 420 420 420
minutes = mins x 1 = 15 15 15
Total 4966995
283
Add the seconds!
298019982

Using a spreadsheet to plan an event

Aim

- To use a spreadsheet to help plan a school cake sale.

Success criteria

- Children can use a spreadsheet to model a real-life situation and come up with solutions that can be practically applied.

Resources

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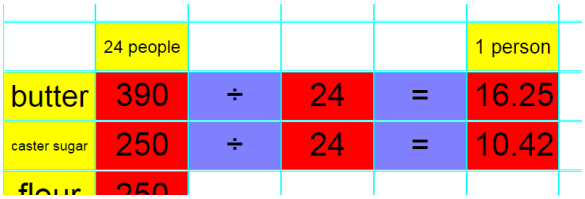
- example recipe for cupcakes . You could add variety by using additional recipes for children to work in small groups to plan e.g. some children could work with an egg or milk free recipe to cater for those with allergies, some could plan chocolate cupcakes or different decorations such as fruit. They could even design their cupcakes beforehand and research their own recipes to make the lesson more relevant to real life and combine with design and technology learning objectives.
- Lesson 5, example 1 uses example prices but you might want to show children how to look up real prices for their local supermarket.

Activities

1. Today we are going to use a spreadsheet to plan our next cake sale.
2. The tasks for today are
   - Using a recipe to plan what ingredients to buy so there are enough cakes for everyone.
   - Using the spreadsheet to plan how much we should sell the cakes for to maximise the profit made.
3. Show the children the recipe, this makes 24 cupcakes; enough for 24 children.
   - We want everyone in the school to be able to buy a cupcake and some parents and some staff.
   - We don't want too many cupcakes because they will go stale and get wasted.
   - Not all children will buy a cupcake and not all parents or staff.
   - Decide as a class, a sensible number of cupcakes to make for your school and use this figure in place of the example figure used.
4. Children should start by making a spreadsheet of the things that they will need to buy. It should look like the following example:
5. The salt and food colouring are separated from the other ingredients as only a very small quantity is used, and we can assume that one packet will be sufficient. The muffin cases will also need to be calculated individually as they come in packs with a certain number in each pack.

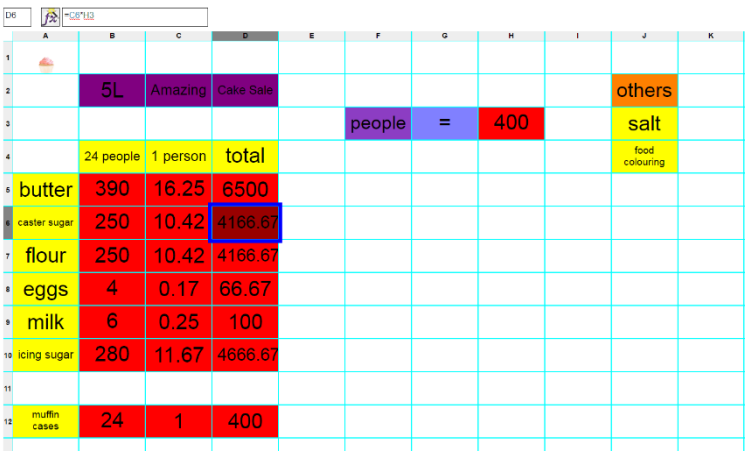
6. Now add in the amounts needed for 24 people (just enter numbers not measures g or tblsp) and use a formula to work out how much would be needed for 1 person. There are 2 alternative methods below depending upon the ability of your class to understand formulae typed into the formula bar.



NB In reality, a person wouldn't do this step when making a recipe for lots of people, they would just work out how many sets of the original recipies needed making e.g. if you were catering for 230 people you would multiply the recipie ingredients by 10 to make the correct quantity. However from a teaching point of view, this step provides more practice and requires thinking skills.

7. Now calculate the quantity of ingriedients needed for the desired number of people. The example uses 400.

8. Set a variable called 'people' equal to the desired number and then use a formula to calculate the amount of each ingredient required. This means that you can update the people cell and the recipe will automatically recalculate. The screen shot below shows the formula for the selected cell in the formula bar.



9. Now we know the quantities required, we need to find out how much it will cost to buy them. Look up the prices or use the example prices below.
10. When looking up prices remind children to use sensible quantities e.g. it might be better value to buy big packs of ingredients; some websites will list prices per 100g for items so children can compare.
11. The level of realism you wish to introduce will come down to the children's ability and time available. In the example below, best value for caster sugar would be to buy 2 2kg bags and a 500g bag but this idea might be too complex for many children.
12. The spreadsheet can be expanded to store this information somewhere on the sheet. Prices can be formatted as currency for clear display.
13. Now either expand the current spreadsheet or open a new one and copy and paste the prices in.

	A	B	C	D	E	F	G	H	I	J	K
1						people	=	400			
2		5L	Amazing	Cake Sale							
3						Costs					
4		24 people	1 person	total		butter 250g	£0.95		milk 1.1l	£0.75	
5	butter	390	16.25	6500		butter 500g	£1.80		milk 2.3l	£0.99	
6	caster sugar	250	10.42	4166.67		caster sugar 2kg	£2.45		icing sugar 1kg	£1.55	
7	flour	250	10.42	4166.67		caster sugar 1kg	£1.48		icing sugar 500g	£0.78	
8	eggs	4	0.17	66.67		caster sugar 500g	£0.99		cup cake cases 75	£0.75	
9	milk	6	0.25	100		flour 1.5kg	£0.80		salt	£0.80	
10	icing sugar	280	11.67	4666.67		flour 500g	£0.50		food colouring per bottle	£1.00	
11	muffin cases	24	1	400		eggs 12	£1.75				
12	salt					eggs 6	£0.89		1 tablespoon	=	15ml
13	food colouring										

	A	B
1	Ingredient	Price
2	butter 250g	£0.95
3	butter 500g	£1.80
4	caster sugar 2kg	£2.45
5	caster sugar 1kg	£1.48
6	caster sugar 500g	£0.99
7	flour 1.5kg	£0.80
8	flour 500g	£0.50
9	eggs 12	£1.75
10	eggs 6	£0.89
11	milk 1.1l	£0.75
12	milk 2.3l	£0.99
13	icing sugar 1kg	£1.55
14	icing sugar 500g	£0.78
15	cup cake cases 75	£0.75
16	salt	£0.80
17	food colouring per bottle	£1.00

NB Children can open Purple Mash in another Internet explorer tab and navigate to 2Calculate so they can have both spreadsheets open at once.

14. They should then decide how many of each thing to buy and use formulae to calculate the cost for each item and then the total cost.
15. Remind them that they can use the spreadsheet to do calculations for them to work out how much to get of the different ingredients e.g. 1 tablespoon of milk equals 15ml, they will need to do a calculation to work out how many ml they need? They will need to calculate how many packs of cupcake cases to get.

16. Now the cost per cupcake can be calculated by dividing the total cost by the number of cupcakes. See if children can make a sensible calculation for what to charge per cupcake. They might like to consider the cost of electricity and time spent making them as well. How does the cost compare to commercially bought cupcakes? Have a look online.

	A	B	C	D	E	F	G	H	I
1	Ingredient	Price	Quantity required	cost					
2	butter 250g	£0.95	1	£0.95					
3	butter 500g	£1.80	12	£21.60		Total cost for 400 cupcakes	£57.38		
4	caster sugar 2kg	£2.45	2	£4.90		cost each	£0.14		
5	caster sugar 1kg	£1.48	0	£0.00					
6	caster sugar 500g	£0.99	1	£0.99					
7	flour 1.5kg	£0.80	3	£2.40		lowest to	charge for a	cupcake is	£0.20
8	flour 500g	£0.50	0	£0.00					
9	eggs 12	£1.75	6	£10.50					
10	eggs 6	£0.89	0	£0.00					
11	milk 1.1l	£0.75	0	£0.00					
12	milk 2.3l	£0.99	1	£0.99					
13	icing sugar 1kg	£1.55	5	£7.75					
14	icing sugar 500g	£0.78	0	£0.00					
15	cup cake cases 75	£0.75	6	£4.50					
16	salt	£0.80	1	£0.80					
17	food colouring per bottle	£1.00	2	£2.00					
18			Total cost	£57.38					

17. You could also pose some questions that might change the costs. Supposing you get the ingredients much cheaper from a commercial supplier and butter is now half the price that it was, how does this affect the cost per cupcake? What about using fancier cup cake cases? Or adding different decorations?

Assessment Guidance

The unit overview for year 5 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 can create a simple formula with limited success using 2Calculate that converts metres into centimetres (Unit 5.3 Lesson 1. Point 2). Children understand what a variable is and can program a variable that converts weeks into years (Unit 5.3 Lesson 4). Furthermore, they can represent their data as a simple graph (Lesson 2. Point 10).
Expected	Children can create a formula using 2Calculate that converts metres into centimetres (Unit 5.3 Lesson 1. Point 2). Children can program different variables to convert data from one format and present it in an alternative way (Unit 5.3 Lesson 4). Furthermore, they can convert their data into a graphical format (Lesson 2. Point 10). Throughout this unit, children will be tasked with creating spreadsheets which are contextualised and evaluating them. Most children can use suitable layouts and content (and explain this) which achieve a specific goal, such as creating a spreadsheet to work out the area and perimeter of rectangles (Unit 5.3. Lesson 3). Their layouts and contents will be fit for purpose for their intended audience, such as applying graphs to represent data (Unit 5.3. Lesson 2 Point 10). Children will use, manipulate and create spreadsheets within this unit. Their improving skill of using text variables to perform calculations, advanced mode and count tools will lead to the creation of their own purposeful spreadsheet. Children will invite feedback through sharing their spreadsheets, focusing on the functionality, layout, clear purpose and whether it achieve it. Most children can use 2Calculate to produce functional spreadsheets with clear purpose and their spreadsheets are set up so that interrogation of data is easily achieved. They demonstrate they can use formulae such as converting between measures and incorporating text variables to perform calculations. Automatic graph creation from data sets is easily achieved by the children, including appropriate labelling and graph type for data type (Unit 5.3).
Exceeding	Children demonstrating greater depth can use their understanding of converting metres into centimetres and apply this to other mathematical conversions (Unit 5.3 Lesson 1. Point 2 and Point 16). Furthermore, they choose the most appropriate way to convert and represent their data and can give their reasons behind this choice (Lesson 2. Point 10).