6 Numbers and data: Mobile Medical Services

You will learn

- how to analyse data stored in a data table
- how to use computer data to help with decision making.

In this unit you will use a data table to store information. The work is based on a case study. You will be the manager of a supply depot. A depot is a place where supplies are stored. Your depot will provide vital medical supplies to mobile health clinics. It is your job to ensure that the depot never runs out of supplies. You will use computer data to help with this task. You will highlight emergency shortages. You will make estimates for the year ahead so the service can plan what supplies it will need.

Did you know?

The World Health Organization (WHO) was established by the United Nations in 1948. Its job is to promote good health around the world. The WHO uses technology to collect and analyse data about health needs and how to stay healthy. World Health Day is 7 April every year. The WHO uses this day to communicate key facts about good health.

Learning outcomes: Use technology to analyse data

Unplugged

In this unit you will record the stock in a supply depot. The depot provides supplies to 12 mobile health clinics. Here is an extract from the data table. Rows 8–12 have been left out.

MedCode	Category	Type	Packs in stock	Packs per clinic	Packs needed
MED001	Bandages	plain	307	20	
MED002	Bandages	elastic	133	6	
MED003	Bandages	triangular	200	12	
MED004	Bandages	adhesive	21	1	
MED005	Cotton wool	roll	12	2	
MED006	Tape	adhesive roll	10	3	
MED007	Tape	hypo-allergenic	65	3	
MED013	Scissors	straight	50	3	
MED014	Scissors	curved	15	1	

The table shows the number of packs needed by each clinic. There are 12 clinics.

1. Copy this table onto paper.
2. Work out the total number of packs needed by multiplying the packs per clinic by the number of clinics (12).
3. Compare the number of packs needed with the number in stock. Is there a shortage of any item? Make a note in the table if you are short of any of the items.

You may find that this task takes a while! It is OK if you run out of time before you finish it. Don't worry – in this unit you will use a spreadsheet to make the work much easier and quicker.

Talk about...

What charities and voluntary organisations have you heard of? If you had the chance to work for a charity, which one would you choose? What are your reasons for making this choice? What benefits might you get from doing voluntary work for a charity?

AutoSum
cell reference conditional format
fields highlighting IF formula
key field recalculate records
reorder level shortfall summary data
surplus worksheet

6.1 What medical supplies do you have?

In this lesson

You will learn:

- how to organise data in a structured format to make it more useful
- how to use calculations to make new information.

Spiral back

Last year, you created a data table to store information about products sold by a business. In this lesson, you will apply these skills to a new case study. You will organise information about medical supplies, to help the doctors of a mobile hospital.

Your task

From: Director of Mobile Medical Services

I am appointing you manager of Supply Depot Four. Some basic data has been prepared for you. Get organised as quickly as you can.

Some parts of the world are affected by natural disasters and extreme events such as floods or forest fires. Travel can be difficult in these areas. It can be hard to get sick or injured people to hospital. A mobile medical service can travel to these areas and help people. It can save lives and help people to recover.

Many people work in the medical service. For example: doctors, nurses, and pilots and drivers who transport medical staff to danger zones. But there are other vital jobs. For example, it is important to make sure that doctors have all the supplies they need. Without this in place, the service would fail.

In this unit you will set up a supply data table for a mobile medical service. It will keep track of supplies and make sure they never run out. A good computer system can save lives.

What supplies are needed?

The World Health Organization makes recommendations about the stock needed by emergency clinics.

Examples include:

- bandages
- cotton wool
- tape
- scissors
- bowls
- surgical gloves
- stretcher
- trolley
- kerosene lamp
- stethoscope
- steam steriliser.

How spreadsheet features can help

In this unit you will use a spreadsheet to organise data. You will make a data table. You will use software features to answer questions and help make decisions. Each lesson will introduce new features.

In this lesson you will put the data into a table and use a formula to calculate information.

Organise the data

A spreadsheet has been made for you. It contains information about medical supplies. The spreadsheet is called 'Mobile Medical Services'.

Open the spreadsheet and look at the contents. The spreadsheet has many rows.

The top of the file looks like this:

	A	B	C	D	E	F
1	**Mobile Medical Services - Supply Depot Four**					
2	Number of clinics supported:		12			
3						
4	MedCode	Category	Type	Packs in stock	Packs per clinic	Packs needed
5	MED001	Bandages	plain	307	20	
6	MED002	Bandages	elastic	133	6	
7	MED003	Bandages	triangular	200	12	
8	MED004	Bandages	adhesive	21	1	
9	MED005	Cotton wool	roll	12	2	
10	MED006	Tape	adhesive roll	10	3	
11	MED007	Tape	hypo-allergenic	65	3	

This spreadsheet stores the stock information for Supply Depot Four. The depot has a target to provide supplies for 12 emergency clinics.

Advantages

There are many advantages to organising data as a table. Putting data in a table makes it easier to:

- sort and search the data
- use formatting to pick out important facts
- use formulas to calculate new information.

You will do all of these activities in this unit.

Rows and columns

It is your job to organise the data in the spreadsheet. The first step is to make the data into a table of rows and columns. In Student Book 7 (and in earlier books in this series) you learned about creating and using data tables.

- The columns of a table are called **fields**. Each field stores one piece of data.
- The rows of a table are called **records**. Each record stores all the data about one thing.

One of the fields is a **key field**. The key field stores data that is unique for each item.

What belongs in the table?

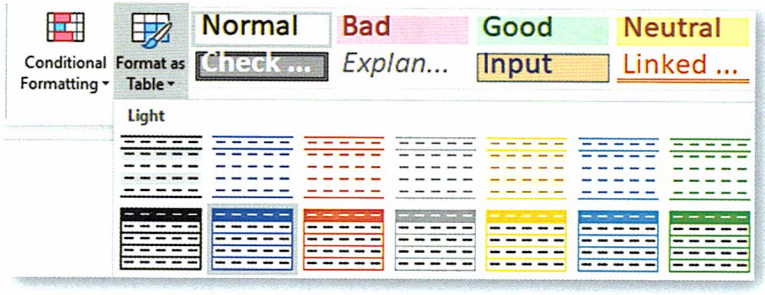
Look at the spreadsheet and see what data belongs in the table.

- Rows 1 and 2 have general facts about the depot. Row 3 is empty. These rows do not belong in the table.
- Rows 4 to 28 belong in the table.
- Columns A to E have data in them. They belong in the table.
- Column F has a heading but no data. You should include this column in the table. You will add data later.

With these facts in mind, select all the cells that belong in the table. You will select all the cells from A4 to F28. Select cells by dragging the mouse across the cells.

Format as a table

When the cells are selected, click on 'Format as Table' at the top of the window. This option is in the 'Styles' section of the 'Home' tab. Choose a colour for the table.



The finished table will look something like this:

	A	B	C	D	E	F
1	**Mobile Medical Services - Supply Depot Four**					
2	Number of clinics supported:		12			
3						
4	MedCode	Category	Type	Packs in stock	Packs per clinic	Packs needed
5	MED001	Bandages	plain	307	20	
6	MED002	Bandages	elastic	133	6	
7	MED003	Bandages	triangular	200	12	
8	MED004	Bandages	adhesive	21	1	
9	MED005	Cotton wool	roll	12	2	
10	MED006	Tape	adhesive roll	10	3	
11	MED007	Tape	hypo-allergenic	65	3	
12	MED008	Safety pins	38mm	20	1	
13	MED009	Safety pins	45mm	16	1	
14	MED010	Safety pins	87mm	20	1	

Activity

Open the Mobile Medical Services spreadsheet.

Convert the data into a table.

Calculate packs needed

Your target is to supply 12 clinics. Column F has the heading 'Packs needed'. You will enter a formula into column F to work out how many packs you need.

First, think about how to work out this value. You did this task by hand in the Unplugged activity in the introduction to this unit.

- Column E shows the number of packs needed by one clinic.
- Your target is 12 clinics.

So you must multiply the number of packs by 12 to get the total number you will need.

Enter the formula

You have put the data into a table. That means you only need to enter the formula once, at the top of a column. The computer will copy it down to all the rows below.

Select cell F5. That is the first cell in the 'Packs needed' column.

- Type = to start the formula.
- Click on the cell to the left (cell E5) which shows the number of packs needed per clinic.
- Type the multiply operator *
- Type the number 12.

The formula looks like this:

Packs per clinic	Packs needed
20	=[@[Packs per clinic]]*12

Press 'Enter' and the computer will fill in the answer for every row of the table.

Packs in stock	Packs per clinic	Packs needed
307	20	240
133	6	72
200	12	144

Activity

Enter a formula in cell F5 to work out the total number of packs needed.

Test

1. How many fields are there in the table you made?
2. What are the names of the fields in the table?
3. Which field is the key field?
4. Give examples to explain why the other fields are not suitable as key fields.

Extra challenge

Through research or your own knowledge, think of three additional items that would be needed in an emergency clinic. Create three new records for the data table. Make sure you put suitable data in columns A to E. You will have to make up these numbers.

If you fill in these values, then the computer will work out the total number of packs needed. It will 'copy' the formula down into these rows.

6.2 Surplus or shortfall?

In this lesson

You will learn:

- how to format data to highlight the most important facts.

Your task

From: Director of Mobile Medical Services

Do you have enough stock to supply your target of 12 clinics? Tell me by the end of today if you have a shortfall. I will send emergency supplies by parachute drop.

In the last lesson, you organised the data for this depot. You made it into a table. Now you will use the data table to answer this urgent request. If you have very low stock of any items, you need to arrange a parachute drop for more supplies.

It is expensive and dangerous to supply items by parachute. You must only request items if they are needed urgently.

How spreadsheet features can help

In this lesson you will use **highlighting** to pick out the answers to the question. Highlighting means using colour or other features to pick out key data in a table. In this example you will pick out items in red.

Highlighting is an example of a **conditional format**. It is a format, such as cell colour, which is based on a logical test. The computer will add highlighting if the test is True. In this example, you will pick out items where stock is too low.

Calculate surplus and shortfall

You need to know if you have enough stock in the depot. You have the information you need to answer this question.

- Column D has the number of packs in stock.
- Column F has the number of packs you need.

To work out if you have enough stock, you must calculate the amount in stock **minus** the amount you need.

If the result is 0 or more, you have as many packs as you need. If the number is negative, you have fewer packs than you need. In that case you must ask for more supplies.

Start a new field

You will add a new field to the data table to store this new data. You will use a calculation.

- If the number is positive, it represents a **surplus**. That means you have more packs than you need.
- If the number is negative, it represents a **shortfall**. That means you need more than you have. You will need more packs.

You can call the new column 'Surplus/Shortfall'. Make a new column heading.

Packs needed	Surplus/Shortfall
240	
72	
144	

The table automatically expands to include the new column. You might need to make the column wider to fit the new text.

Enter a formula

Remember, the formula is the number of packs in stock minus the number of packs needed. You will enter this formula in the first row of the table. The computer will fill in the answer in every other row.

The formula looks like this:

Packs in stock	Packs per clinic	Packs needed	Surplus/Shortfall
307	20	240	=[@[Packs in stock]]-[@[Packs needed]]
133	6	72	
200	12	144	

Use the skills you have learned to make this formula.

1. Type the equals sign.
2. Click on the first value in the 'Packs in stock' column.
3. Type the minus sign.
4. Click on the first value in the 'Packs needed' column.

When you press 'Enter', the computer will calculate the right answer for every item in stock.

Surplus/Shortfall
67
61
56
9
-12
-26
29
8
4
8

Activity

Create a new column to record surplus and shortfall. Enter a formula to calculate the surplus or shortfall.

Highlight the shortfall

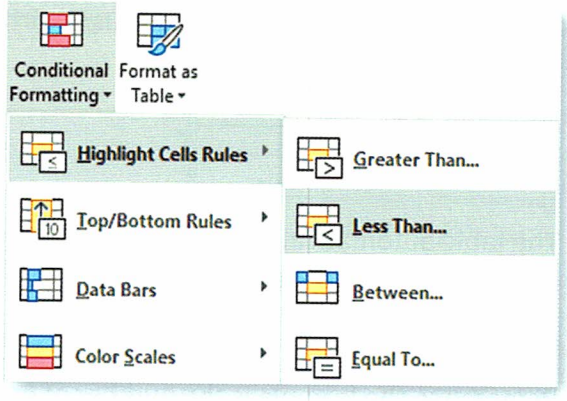
The director has asked you to report if there is a shortfall of any item. Remember, a shortfall means the number you need is bigger than the number in stock. You will have to ask for an emergency drop of these supplies.

If there is a shortfall, you will see a minus number in the new column. Because the table is quite small you can probably look down the list and spot the minus numbers. However, in a large table it is helpful to highlight important facts. Spreadsheets give you tools to do this.

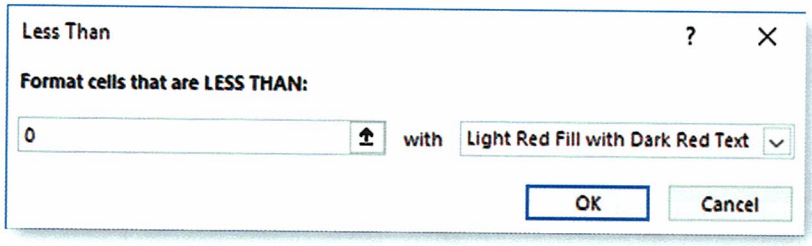
Conditional formatting

First, select the cells in column G. You can click on the G at the top of the spreadsheet to select the whole column.

There is a button in the 'Styles' section that says 'Conditional Formatting'. Click to open a menu. Select 'Highlight Cells Rules'. You will highlight cells with a value 'Less Than…'



A window will appear. You have to enter a number. Enter 0. This will tell the computer to highlight values less than 0.



Click on OK. You will see that negative numbers in column G are highlighted in red. This makes it easy to spot them.

Activity

Use conditional formatting to highlight the items where there is a shortfall.

Extra challenge

Three students have come to work with you as volunteer helpers. You have given them the job of checking all supplies in the depot. They find that some of the items have been damaged by floodwater. Here is the note you receive from the student volunteers.

REPORT TO THE MANAGER OF DEPOT FOUR

Our stock check has discovered:

- There are only 2 undamaged packs of cotton wool.
- There are 3 kerosene lamps – the rest are broken.
- There are no rolls of adhesive tape left in the depot.

Adjust stock levels to match this information.

Prepare a short email to the director. Tell him the names of all items where there is a shortfall, and the size of the shortfall. This will help him to arrange emergency supplies.

Test

Mobile Medical Services also keeps records of the numbers of doctors and nurses working in the different clinics. Here is part of that spreadsheet.

	A	B	C	D
1	Clinic name	Doctors	Nurses	Column D
2	Mobile clinic 4a	2	15	
3	Mobile clinic 4b	3	6	
4	Mobile clinic 4c	0	7	
5	Mobile clinic 4d	4	5	
6	Mobile clinic 4e	3	1	
7	Mobile clinic 4f	0	3	
8	Mobile clinic 4g	5	9	

1 You are asked to calculate the total number of staff in each clinic. Which column would hold this data?

2 What formula would you use?

3 No clinic should have fewer than five members of staff. There is a risk to staff welfare. Explain how you could use cell highlighting to identify clinics with too few staff.

4 Explain how you would identify clinics with no doctors.

6.3 Can you do more?

In this lesson

You will learn:

- how to use a data table to check or test different values.

Your task

From: Director of Mobile Medical Services

Emergency supplies will arrive tonight.

- Cotton wool – 50 packs
- Adhesive tape – 50 packs
- Kerosene lamps – 50

The health crisis is getting worse. We want to set up more clinics. How many extra clinics can you supply from your current stocks?

Your depot has a target to supply 12 mobile clinics. In this message the director has asked if you can manage to support more than 12 clinics. Can you increase your target? In this lesson you will see what is possible. You will test out alternatives.

How spreadsheet features can help

Spreadsheet formulas are used to calculate a result. In Lesson 6.1, you calculated the number of packs you needed. In Lesson 6.2, you calculated any shortfall.

Cell reference

Spreadsheet formulas use **cell references**. That means they take values from other cells in the spreadsheet. For example, when you calculated the number of packs needed, you used the value in the 'Packs per clinic' column. You multiplied it by 12.

Copy down

You made the formula in the top row of the table. The computer automatically copied the formula down to all the rows of the table. It adjusted the formula in each row to use the value from that row of the table.

Recalculate

After you have used a cell reference, you can change the value in the cell. Any formulas that use the value will **recalculate**. Recalculation means the spreadsheet will work out new answers, using the new data. Recalculation lets you try out different values. You can see the effect of each change.

Change values

Emergency supplies have arrived. Your depot now has more items in stock. The message from the director tells you the number of new items.

- Cotton wool: increases to 62 packs.
- Adhesive tape: increases to 60 packs.
- Kerosene lamps: increases to 60 lamps.

Make sure you update your spreadsheet now. Here is the spreadsheet showing the new values.

You can see the effect of recalculation. Values throughout the spreadsheet have changed. The shortfall has disappeared. There are no highlighted cells.

MedCode	Category	Type	Packs in stock	Packs per cl	Packs neede	Surplus/Shortfal
MED001	Bandages	plain	307	20	240	67
MED002	Bandages	elastic	133	6	72	61
MED003	Bandages	triangular	200	12	144	56
MED004	Bandages	adhesive	21	1	12	9
MED005	Cotton wool	roll	62	2	24	38
MED006	Tape	adhesive roll	60	3	36	24
MED007	Tape	hypo-allergenic	65	3	36	29
MED008	Safety pins	38mm	20	1	12	8
MED009	Safety pins	45mm	16	1	12	4
MED010	Safety pins	87mm	20	1	12	8
MED011	Kidney dish		47	3	36	11
MED012	Instrument tray		34	2	24	10
MED013	Scissors	straight	50	3	36	14
MED014	Scissors	curved	15	1	12	3
MED015	Bowls	0.5 litre	36	2	24	12
MED016	Bowls	2 litre	30	2	24	6
MED017	Trolley		16	1	12	4
MED018	Stretcher		20	1	12	8
MED019	Surgical gloves	size 6.5	20	1	12	8
MED020	Surgical gloves	size 7.5	45	3	36	9
MED021	Surgical gloves	size 8.5	20	1	12	8
MED022	Kerosene lamp		60	2	24	36
MED023	Stethoscope		60	3	36	24
MED024	Steam steriliser	15 litre	30	2	24	6

Use a new formula

The number of clinics is set at 12. This value is stored in cell C2. Now you will change the formula that calculates how many packs are needed. You will include a cell reference to cell C2.

Then you can try new values in C2. The computer will recalculate based on the new values.

Use a cell reference

You will change the formula in the 'packs needed' column. At the moment the formula looks like this.

=[@[Packs per clinic]]*12

This takes the number of packs per clinic from column E. It multiplies this value by 12. Now you will change the formula. Instead of multiplying by 12 you will multiply by the value in cell C2.

Click on the formula at the top of the 'Packs needed' column. Delete the number 12 and click on cell C2. Press Enter to complete the formula.

Mobile Medical Services - Supply Depot Four

Number of clinics supported: 12

MedCode	Category	Type	Packs in stock	Packs per clinic	Packs needed	Surplus/Sho
MED001	Bandages	plain	307	20	=[@[Packs per clinic]]*C2	
MED002	Bandages	elastic	133	6	72	

The formula now looks like this

=[@[Packs per clinic]]*C2

Problem!

You will see a problem. All the results in the column have gone wrong!

Packs needed	Surplus/Shortfall
240	67
0	133
#VALUE!	#VALUE!
#VALUE!	#VALUE!
#VALUE!	#VALUE!
#VALUE!	#VALUE!
#VALUE!	#VALUE!
#VALUE!	#VALUE!
#VALUE!	#VALUE!
#VALUE!	#VALUE!

This is because the computer has tried to copy the formula down the table. In every row the cell reference has changed. Click on any cell in the 'Packs needed' column and you will see this error. It changes from C2 to C3, C4, C5, etc. That gives the wrong result.

Fix the error

Sometimes you don't want the computer to change the formula. You want it to stay the same in every row of the table. That's what you need this time.

Luckily there is a way to fix this. You put the dollar symbol $ next to any value you don't want to change. The name for this is an absolute cell reference. An **absolute cell reference** will stay the same in every row of the table.

Go to the top of the 'Packs needed' column. Put a dollar sign in front of the 2.

```
=[@[Packs per clinic]]*C$2
```

You now see the correct results in all rows of the table.

Packs needed	Surplus/Shortfall
240	67
72	61
144	56
12	9
24	38
36	24
36	29
12	8
12	4
12	8
36	11
24	10

Activity

Make changes to the spreadsheet table as shown in this lesson.

- Change the number of items in stock.
- Change the formula for packs needed.

Test and check

Now you can change the value in cell C2. Changing the number will test how many clinics you can supply without a shortfall.

For example, if you increase the number of clinics from 12 to 13 there is no shortfall.

Mobile Medical Services - Supply Depot Four

Number of clinics supported: 13

MedCode	Category	Type	Packs in stock	Packs per clinic	Packs needed	Surplus/Shortfall
MED001	Bandages	plain	307	20	260	47
MED002	Bandages	elastic	133	6	78	55
MED003	Bandages	triangular	200	12	156	44
MED004	Bandages	adhesive	21	1	13	8
MED005	Cotton wool	roll	62	2	26	36
MED006	Tape	adhesive roll	60	3	39	21
MED007	Tape	hypo-allergenic	65	3	39	26
MED008	Safety pins	38mm	20	1	13	7

But if you increase the number of clinics to 20 there is a lot of shortfall.

The answer must lie somewhere between the two.

Packs needed	Surplus/Shortfall
400	-93
120	13
240	-40
20	1
40	22
60	0
60	5
20	0
20	-4
20	0
60	-13
40	-6
60	-10

Activity

Try entering different numbers in cell C2. Find the maximum number of clinics you can supply without any shortfall. When you get the number right, no value in the 'Surplus/Shortfall' column will be smaller than 0.

Extra challenge

Your depot could support 20 clinics – but only if you get more supplies to cover the shortfall. Find out more about this using the spreadsheet to help. Write a message to the director that starts like this.

> **From: Supply Depot Four**
>
> We can support 20 clinics. But we will need the following additional supplies:

Finish the message with details of the supplies you need.

Test

Test questions 1–3 relate to the following formula:

=120*A4

1. If cell A4 held the value 20, what would be the result of this formula?
2. What is the name of a cell reference that does not change when it is copied down a table?
3. Show how you would rewrite this formula so that it does not change when it is copied down the table.
4. Explain how you used recalculation in this lesson to answer the director's question.

6.4 What to order?

In this lesson

You will learn:

- how to analyse data to provide guidance for actions.

Your task

From: Director of Mobile Medical Services

We have opened the road through to you. That means we can begin regular deliveries by supply truck. Each week, send us a list of the items you need.

Now that the road is open, your depot can receive regular supplies. But which items should you ask for? Which are needed most urgently? In this lesson you will learn how to use spreadsheet features to provide guidance for actions. The spreadsheet will help you to select the items that you need from the supply truck.

Spiral back

In this lesson you will use the spreadsheet IF formula. This is similar to 'if… else' structures in programs. The 'if… else' structure is found in most programming languages including Scratch and Python. Your learning in programming units will help you complete this task.

How spreadsheet features can help

In this lesson you will use an **IF formula**. This is a spreadsheet formula. It works like the 'if… else' structure in a program.

An IF formula begins with

=IF()

Three items go inside the brackets (separated by commas):

- a logical test
- the output if the test is True
- the output if the test is False.

Compare to highlight

Using an IF formula is an alternative to using a highlight rule. A highlight rule applies one condition to the whole column. An IF formula lets you set different logical tests for different items in the table.

Reorder level

A stock data table like this often includes a **reorder level**. The reorder level is a minimum level for stock. It is more than zero. If stock gets below the reorder level, that is a sign that you need to order more. In this lesson you will use the IF formula to warn you when stock goes below the reorder level.

Create a new column of the spreadsheet table. Enter the heading 'Reorder level'.

What level?

The reorder level is different for different items. Some items, such as bandages, get used up very quickly. Other items, such as a stretcher, are needed in smaller numbers.

In this spreadsheet you will set the reorder level for each item of stock. To set the reorder level multiply 'Packs per clinic' by 2. If stocks fall below that level you will reorder new stock.

Enter a formula

Enter a formula in the first cell of the reorder column. The formula must multiply 'Packs per clinic' by 2. Use the skills you have learned to complete this formula.

You should see results like this:

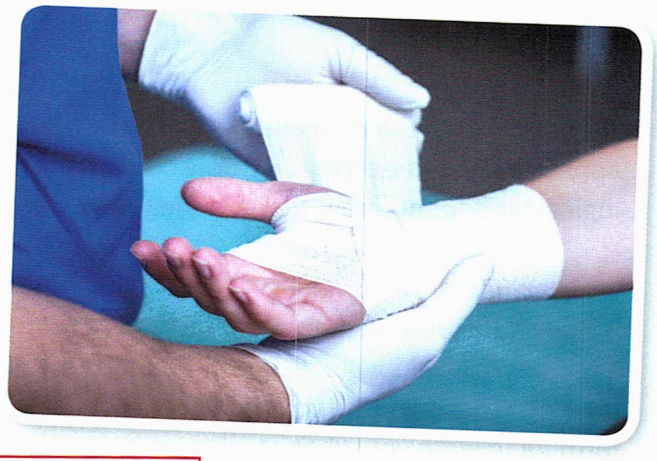
Reorder level
40
12
24
2
4
6
6
2
2
2
6
4

Activity

Add a new column with the heading 'Reorder level'.

Add a formula to calculate the reorder level for every item in the data table.

Reorder message



Create a final column for the stock table. Give it the heading 'Reorder message'.

Now you will enter an IF formula in this column. If the surplus stock is below the reorder level, the column will show the message 'Reorder this item'. Otherwise, it will show the message 'OK'.

Plan

This plan sets out the parts of the IF formula.

Logical test	Surplus < Reorder level
If the test is True	"Reorder this item"
If the test is False	"OK"

Make the formula

Select the first cell in the 'Reorder message' column.

Start the formula

Begin the formula by typing:

=IF(

Logical test

The next thing to enter is the logical test.

- Click on the cell that shows the stock surplus/shortfall.
- Type the 'less than' operator: <.
- Click on the cell that shows the reorder level.

Your formula now looks like this:

=IF([@[Surplus/Shortfall]]<[@[Reorder level]]

If the test is True

Now tell the computer what to show if the test is True.

- Type a comma.
- Enter the message "Reorder this item". Remember to include the quotation marks.

Your formula now looks like this:

=IF([@[Surplus/Shortfall]]<[@[Reorder level]], "Reorder this item"

If the test is False

Complete the formula by typing a comma and a message to show if the test is False, for example, the message "OK". Don't forget the quotation marks and to close the brackets at the end.

Your formula now looks like this:

=IF([@[Surplus/Shortfall]]<[@[Reorder level]], "Reorder this item", "OK")

Press 'Enter' and the formula will copy down to all the cells in the column.

Result

The result of the formula looks like this. The message tells you every item that needs to be reordered.

Reorder message
Reorder this item
OK
Reorder this item
OK
OK
OK
OK
OK
Reorder this item
OK
Reorder this item
OK
Reorder this item

Activity

Create a new column called 'Reorder message'.

Enter an IF formula to show the reorder message for every item with stock below the reorder level.

Extra challenge

Add conditional formatting to the column that shows the reorder message. If the cell has the contents 'Reorder this item' then highlight the cell. For more of a challenge, use green highlighting.

Reorder message
Reorder this item
OK
Reorder this item
OK
OK
OK
OK
OK
Reorder this item
OK
Reorder this item
OK
Reorder this item
Reorder this item

Test

Here is an example of an IF formula.

=IF([@[Stock]]<0, "URGENT REORDER", "Not urgent")

1. The logical test includes a relational operator. What relational operator?
2. What message is shown if the logical test is True?
3. You should order stock before the level reaches zero. Why is that a good thing?
4. The reorder level for bandages is higher than the reorder level for stretchers. Give one reason for this.

6.5 Summary data

In this lesson

You will learn:

- how to calculate summary data from records.

Spiral back

In Student Book 7 you used the AutoSum button. It adds together a group of values. You will use AutoSum again in this unit. If you can't remember what AutoSum is, look back at Student Book 7, Unit 6.

Your task

From: Director of Mobile Medical Services

Congratulations on running the supply depot for four months. How much stock is left? How much have you used?

You have been manager of the supply depot for 4 months. Your work has supported 16 mobile clinics. You have kept careful records. You have recorded how much stock was used each month.

Now you will produce summary data. **Summary data** means a result calculated from a group of figures. Examples would be totals, averages and other statistics. Summary data gives us the big picture rather than the detail.

In this lesson, you use summary data to find out:

- how much stock has been delivered
- how much stock has been used.

In the next lesson, you will use this data to make estimates for the year ahead.

How spreadsheets can help

A spreadsheet can contain more than one worksheet. One worksheet might have detailed records. The other might have summary data.

In this lesson you will use a spreadsheet with two worksheets:

- **Deliveries:** A worksheet that contains detailed records of deliveries each month.
- **Stock count:** A worksheet that gives summary data, such as the 4-month total.

By using cell references, you can take data from the first worksheet and use it in the second worksheet.

Depot summary

Download the spreadsheet called 'Depot summary'.

This spreadsheet has two worksheets. They are called 'Deliveries' and 'Stock count'. Look at the bottom of the spreadsheet. You will see two tabs. The tabs show the names of the two worksheets.

Total deliveries

Select the worksheet called 'Deliveries'. This worksheet shows the amount of each item delivered to the depot in March, April, May and June. The spreadsheet is already formatted as a data table.

Add a new column to the right of the table. Enter the heading '4-month total'. Select the top cell of this column and click on the AutoSum button.

March	April	May	June	4-month total
40	50	50	0	140
10	10	10	0	30
25	0	25	30	80
2	0	2	2	6
5	2	2	2	11
5	0	0	3	8
5	0	0	1	6
2	2	2	2	8
2	2	2	2	8
2	2	2	2	8

Supply Depot Four - N

Number of clinics :

MedCode	Category
MED001	Bandages
MED002	Bandages
MED003	Bandages
MED004	Bandages
MED005	Cotton wool
MED006	Tape
MED007	Tape
MED008	Safety pins
MED009	Safety pins
MED010	Safety pins
MED011	Kidney dish

Deliveries | Stock count

By clicking on the tabs, you can swap between the two worksheets.

The computer adds together the four monthly figures (from March, April, May and June) to give the total deliveries. The computer copies the formula down to all the other rows of the table.

Activity

Load the spreadsheet called 'Depot summary'. Open the worksheet called 'Deliveries'.

Add a column to the worksheet to show the 4-month total. Use AutoSum to calculate this value for every row.

Stock count

The spreadsheet has two worksheets. The second worksheet is called 'Stock count'. Click on the tab to open this worksheet on your screen. It looks like this.

This worksheet shows the amount of stock at the start of the 4-month period ('Starting') and the amount of stock left at the end ('Remaining'). Student volunteers found this data by counting the packs on the shelves.

	A	B	C	D	E
1	**Supply Depot Four - Stock count**				
2	Number of clinics :		(this year)	16	
3					
4	MedCode	Category	Type	Starting	Remaining
5	MED001	Bandages	plain	7	22
6	MED002	Bandages	elastic	43	20
7	MED003	Bandages	triangular	20	10
8	MED004	Bandages	adhesive	6	6
9	MED005	Cotton wool	roll	32	40
10	MED006	Tape	roll	15	23
11	MED007	Tape	hypo-allergenic	20	12
12	MED008	Safety pins	38mm	5	9

Deliveries

Now you will extend the worksheet. You will add a new field that shows how much stock was delivered in the 4-month period.

First, type a heading for the new column. The heading is 'Deliveries'.

Starting	Remaining	Deliveries
7	22	
43	20	
20	10	

Formula

Now you will use a formula to bring the value across from the other worksheet. If you get stuck, go back to the beginning and start again.

1. Select the first cell in the new column you made.
2. Type an equals sign to start the formula.
3. Open the other worksheet by using the tab at the bottom of the page.
4. Click on the cell that shows the 4-month total.

H5 =Table1[@[4-month total]]

	A	B	C	D	E	F	G	H
1	**Supply Depot Four - Monthly delivery data**							
2	Number of clinics :		(this year)	16				
3								
4	MedCode	Category	Type	March	April	May	June	4-month t
5	MED001	Bandages	plain	40	50	50	0	140

Click on the cell that shows the 4-month total.

Look at the formula at the top of the spreadsheet. It looks like this:

=Table1[@[4-month total]]

This tells you that the formula will use the value labelled '4-month total' from 'Table1' (the first worksheet).

Press 'Enter'. The computer will bring the value from 'Table1'. It will bring the values from every row of the table.

Starting	Remaining	Deliveries
7	22	140
43	20	30
20	10	80
6	6	6
32	40	11
15	23	8

Activity

Open the 'Stock count' worksheet. Add a column headed 'Deliveries'. Enter a formula in this column to bring across the 4-month total from the 'Deliveries' worksheet.

Now make a column with the heading 'Stock used'. Enter a formula in the first cell of this column to do the calculation.

- Type an equals sign to start the formula.
- Click on the cells that store the values you need. Use plus and minus operators to enter the formula.

The image shows what the formula should look like. Press 'Enter' and you will see the calculated results.

Starting	Remaining	Deliveries	Stock used
7	22	140	=[@Starting]+[@Deliveries]-[@Remaining]
43	20	30	
20	10	80	

Extra challenge

Add two new columns to the 'Stock count' worksheet.

- Add a column headed 'Monthly average use'. Calculate this value by dividing the 4-month total by 4.
- Add a column headed 'Stock warning'. Use an IF formula to display a warning if the amount remaining in stock is less than the monthly average use.

Test

A medical volunteer has kept records of the number of patients attending a clinic each day for 2 weeks. The numbers are stored in the cells of a spreadsheet. Answer these questions about the spreadsheet the volunteer made.

1. Summary data means a result calculated from a group of figures. Give an example of an item of summary data you could calculate from the patient numbers.
2. What spreadsheet feature would you use to add up the total number of people attending the clinic in the 2-week period?
3. Explain how you would calculate the average daily attendance at the clinic.
4. The maximum capacity of the clinic is 500 people. But some days more than 500 people attend. Describe how you could use spreadsheet features to highlight this problem.

6.6 Plan for the future

In this lesson

You will learn:

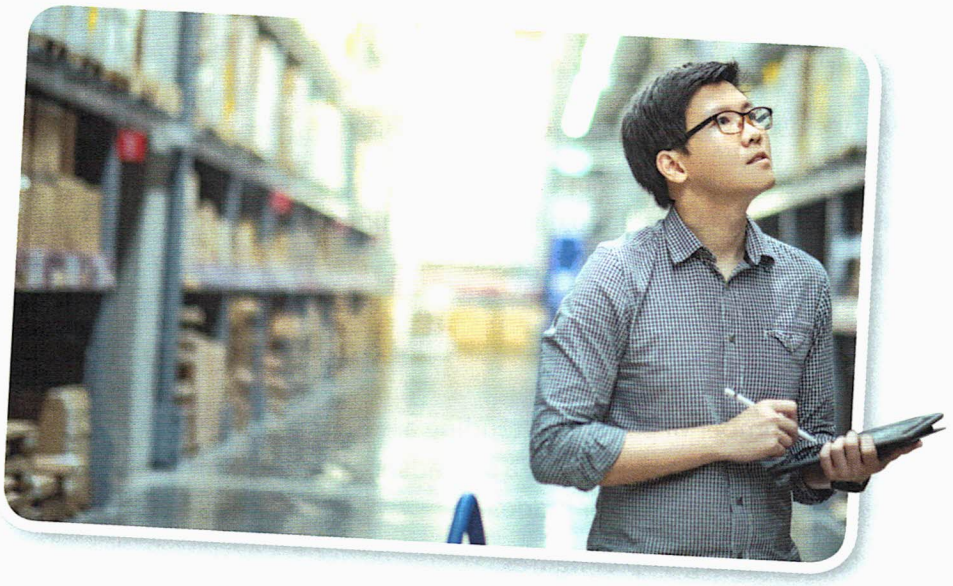
- how to estimate future trends from current data.

Your task

From: Director of Mobile Medical Services

Good news – we have guaranteed funding for next year. Please use your records to estimate your future stock needs.

Your depot supports 16 clinics. In the last lesson you calculated how much of each item was used during a 4-month period. Now you will use that data to estimate the total amount of stock you will need for next year. Mobile Medical Services can use your estimates to plan for the future.



How spreadsheets can help

You can use summary data to estimate future trends. For example, if you know that a tree grew 5 feet last year, you might estimate that it will grow another 5 feet this year. But remember that estimates are not necessarily accurate. Trends that we see in the past might not continue into the future.

To make estimates as accurate as possible:

- base the estimates on reliable data
- take all the important factors into account
- use accurate calculations.

Keeping good records helps you to plan for the future.

Future estimates

Open the spreadsheet file called 'Depot summary'. Select the worksheet called Stock count. The column called 'Stock used' shows how much of each item was used in four months. Four months is a third of a year. So if trends continue then you will use three times this amount of stock in one year.

You have carried out a lot of calculations in this unit. Try to complete this task by working independently. Multiply the stock used by three to give the yearly estimate. Your completed work may look like this. If you have completed the 'Extra challenge' tasks, your spreadsheet may have more columns.

Stock used	Yearly estimate
125	375
53	159
90	270
6	18
3	9
0	0
14	42
4	12
8	24
7	21
11	33
1	3

Extend the data table to show the yearly estimate for each item.

Projected usage

You have just calculated a yearly estimate. This is based on the results from last year. There were 16 clinics. The number of clinics is shown in cell D2.

	A	B	C	D
1	Supply Depot Four - Stock Count			
2	Number of clinics:		(this year)	16

But what if the number of clinics increases to 20? Then the estimates will change too. In the rest of this lesson you will use the spreadsheet to explore this 'What if' question.

What if the number of clinics increases to 20? How much stock will I need?

To answer this 'What if' question, you will:

- find the amount of stock used by one clinic in a year
- multiply by 20 to give the total stock you will need.

Stock used by one clinic

Add a new column to the worksheet. Give it the heading 'One clinic'.

You can calculate the stock used by one clinic with this formula:

- yearly estimate
- divided by the number of clinics (cell D2).

Remember to put a $ sign into D2, so that it looks like this: D$2. That will fix the cell reference so it does not change when it is copied down.

Here is what the new formula will look like.

Stock used	Yearly estimate	One clinic
125	375	=[@[Yearly estimate]]/D$2
53	159	

Clinics next year

Now you must add a new value at the top of the spreadsheet. You must show the number of clinics for next year. Set the value at 20 for now. Enter this number at the top of the spreadsheet. Here is an example of what it might look like. The new value is in cell F2.

	A	B	C	D	E	F
1	**Supply Depot Four - Stock count**					
2	Number of clinics :		(this year)	16	(next year)	20

Stock for next year

Now create a column to show the amount of stock needed in a year. Enter a suitable column header.

You have worked out the average amount of stock needed to supply one clinic for a year. You have also entered the number of clinics there will be next year.

So, our final best estimate for the amount of stock we need next year is:

- the year average for one clinic
- multiplied by the number of clinics.

The number of clinics is in cell F2. Use a cell reference to F2. Remember to add a $ to make an absolute cell reference.

Yearly estimate	One clinic	Next year
375	23.4375	=[@[One clinic]]*F$2
159	9.9375	

Activity

Find the estimated stock requirements for the depot if the number of clinics increases to 20 in the next year.

Extra challenge

From: Director of Mobile Medical Services

Thank you for the annual estimate. I am planning deliveries for next year. You will get a monthly delivery of stock. Please let me know how many of each item I should send in the monthly delivery.

This is the final request from the director. He wants to know how many items to send in your monthly deliveries next year.

You have an estimated yearly figure. Divide this by 12 to give a rough idea of how much stock will be needed each month. Format the result so it is displayed as a whole number.

Email the director with this information. You can send the email to your teacher to show the work you have done.

Yearly estimate	One clinic	Next year	Per month
375	23.4375	468.75	39
159	9.9375	198.75	17
270	16.875	337.5	28
18	1.125	22.5	2
9	0.5625	11.25	1
0	0	0	0
42	2.625	52.5	4
12	0.75	15	1
24	1.5	30	3
21	1.3125	26.25	2

Test

The depot estimated how many items they would supply to clinics in the year ahead. Estimates are important, but they are never completely reliable.

1. If you have a yearly estimate, how do you calculate a monthly estimate?
2. How can you make sure that your estimates are as good as they can be?
3. Give one reason why the amount of supplies needed by a clinic might be different from the estimate.
4. The manager of the depot used the estimate for the year ahead to plan deliveries. Explain one other reason that the manager of a depot might want to know the amount of items in stock.

Explore more

Carry out independent research into the cost of the spreadsheet items, for example, by looking at online shops. Add the information you have found to the spreadsheet. Multiply the number of items used in a year by the cost of each item. What is the total cost of all the items used in one year?

Digital citizen of the future

Young people do voluntary work for charities and welfare organisations. It is a good way to gain experience and help people. This unit is about using computer skills to help a medical charity. But there are many different types of volunteer work that you can try. You don't always need specialist skills. When you are old enough, look out for adverts and appeals for help.

Be creative

Produce a poster for Mobile Medical Services. It should encourage people to make donations to buy supplies. Use information from the spreadsheet in the poster (for example, 'Just one of our clinics uses xxxxx bandages a year').