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What is numeracy?

Numeracy is the ability to use numbers to do a range of things like:

- shopping for your groceries
- buying things in a sale
- buying new carpets for your home, or even just
- following a recipe or the weather forecast.

Measuring

When we want to buy new carpets or new curtains it is important that we get the size right. To do this we need to use a measuring tape. Measuring tapes can be made of metal, cloth or paper — but you can also get digital tools which are sometimes called ‘electronic measuring tapes’.

Photo: (c) i-stockphoto/jili fromer
Each measuring tape is laid out in divisions. Large divisions tell you the number, eg 1, 5, 10, 15.

![Measuring tape diagram]

Small divisions tell you the small numbers between the large numbers, eg 2, 3, 4 are the numbers between 1 and 5. When we use a measuring tool, we need to record both the large and the small divisions.

When we measure things we need to know two main measurements. These are the **length** of something and the **width** of something.

If we were measuring furniture we might also need to know the **depth** of something — like how deep were the shelves in a bookcase.
When we measure we can use both electronic and standard measuring tools but they all record the measurement in **centimetres (cm)**, or **metres (m)**. Centimetres go up in 10s and 100 centimetres equals 1 metre. When we record measurements we often draw a diagram. For example, here are the measurements for a living room:

![Diagram of a living room with dimensions 3m x 5m.]

The width of the room is 3 metres and the length of the room is 5 metres. To find the **area** (which is measured in the square metres) we multiply the width by the length:

\[ 5 \times 3 = 15 \text{ square metres}. \]
When we measure curtains we need to know two things. The length (often referred to as the drop) from the curtain rail to where you want the curtain to finish below the window. We also need to add extra length for things like headings and hems on curtains.

Once we have the length we need to know the width of the curtains. When making curtains you normally use double the width of the window to ensure that they hang correctly once closed over the window.
We can measure many things. You might use:

- a tape measure to work out the size of a room
- electronic scales to weigh yourself, or the ingredients for a recipe, or a parcel at the post office
- a thermometer to measure the temperature in a room, or outdoors, or if someone is ill

If we were going to print a document to a printer, we need to know what size the paper is and how the page has been set-up in the document.

Word processing programs will often have a ‘display ruler option’ on the document screen to allow you to adjust how your document is laid out. Often looking up the file menu in a word processing program will give this information, but you can also use the rulers up and down the page to adjust text to fit on a page correctly.
ACTIVITY 1

Try some measuring using a tape measure, ruler or kitchen scales (electronic if possible). You may also need a calculator.

Follow the steps on the following pages to carry out this activity.
Measuring for curtains
To measure a curtain you must measure both the length and the width of the window you want to put the curtain over. A curtain must be long enough and wide enough to fit the window.

Steps:
1. Measure from the top of the window to the bottom in centimetres.
2. Record the measurement.
3. Add an extra 50 centimetres to allow for the heading and hem of the curtain fitting on the curtain rail.
4. Measure from one side of the window to the other in centimetres.
5. Record the measurement.
6. Multiply the measurement you took of the window from side to side by 2.
7. Measure at least two other windows and record the size of curtain you need for each.
**Worked example**

1. Measured the length of curtain from top to bottom (called the drop).

2. It was 100 centimetres.

3. Added 50 centimetres for the heading and hem of the curtain. 100 + 50 = 150 centimetres.

4. Measured the width of the curtain from side to side.

5. It was 60 centimetres.

6. Multiplied the width by 2 to make sure curtain closes correctly.
   
   60 * 2 = 120 centimetres.

This will give you the right size to make sure your curtain is full enough to close. I need to buy curtains with a length of 150 centimetres and a width of 120 centimetres to fit my window.
Measuring for a carpet

To measure for a carpet you need to measure the length of the room and the width of the room, and then work out the amount of carpet (square metres) you will need to cover the area of the room.

Steps:

1. Measure the length of the room (the longest part) in metres and centimetres. Be sure to measure from one end of the room to the other.

2. Record the measurement.

3. Measure the width of the room in metres and centimetres. Be sure to measure the widest part of the room from side to side.

4. Record the measurement.

5. Multiply the length of the room by the width of the room. This will give you the correct square metre size of carpet to fit the floor.
Worked example

Steps:

1. Measured length of room.
2. Recorded the measurement as 4.1 metres long.
3. Measured the width of the room.
4. Recorded the measurement as 3.1 metres long.
5. Multiplied the length by the width.
   \[4.1 \times 3.1 = 12.71\] square metres.

When measuring for carpets it is important to round up to the nearest whole number to make sure you have extra for fitting the carpet under doors and around the walls. So I would buy 13 square metres of carpet.
Measuring ingredients for a recipe

You are going to be making a Victoria sponge cake and need to measure out the ingredients using an electronic scale.

Steps:

1. Measure 225 grams of butter and place in a mixing bowl.

2. Measure 225 grams of castor sugar and place in the mixing bowl with the butter and beat together.

3. Get 4 large eggs, beat and place in a separate bowl. Add beaten eggs slowly to the bowl containing the beaten butter and sugar. Beat again.


5. Measure 1 teaspoon of baking powder, into the bowl containing the cake mixture.

6. Add water or milk if required. You will also need jam and cream for the filling.
This cake mixture will make a Victoria sandwich cake in two 20 centimetre sandwich tins. Bake the mixture in a pre-heated oven at Gas mark 4 or 182 degrees for 20–30 minutes.

**Measuring temperatures**

Look at either of these two weather web sites and check the weather for Edinburgh and Glasgow today.

www.metoffice.gov.uk/

www.bbc.co.uk/weather/ukweather/

Steps:

1. Use a thermometer to check the temperature outside. Measure it again the next day.

2. How different is it from the forecast temperature on the weather sites?
Measuring paper sizes

Standard paper and envelopes come in different sizes. Paper is often measured in millimetres (mm). For example:

- A4 paper (used in printers) is 297 x 210 mm and fits into a C4 envelope (unfolded) which measures 324 x 229 mm.
- If you fold A4 paper in half it will fit into a C5 envelope which measures 229 x 162 mm.
- An A5 sheet of paper measures 210 x 148 mm and will fit into a C5 enveloped unfolded.

Steps:

1. Open a word processing software program.
2. Check the paper settings in the page set-up options. This may be in the File, or Format menu under a sub-menu heading like Page set-up. It will list the default page settings for the word processing program.
3. There may be a ruler in your word processing application. Use it to measure the page size, up and down and across.
## Working with spreadsheets

We use spreadsheets to record information about numbers. In each spreadsheet there are three references.

The **cell** contains information in one area only. The cell is a single piece of data. It can be formatted using text, numbers, currency, percentages, fractions or decimals – anything you like. The cell is always referenced by its location eg in column A, row 3 so the cell is known as A3.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vegetables</td>
<td>Number</td>
</tr>
<tr>
<td>2</td>
<td>Cabbage</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>Turnip</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Carrots</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Onions</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>Potatoes</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>Peppers</td>
<td>7</td>
</tr>
</tbody>
</table>
The **column** contains data going down the spreadsheet and can be formatted any way too. Columns are labelled A, B, C, D, etc.

The **row** information contains data going across the spreadsheet and it can be formatted any way too. Mostly it will contain headings. Rows are numbered 1, 2, 3, 4 etc.

If there is a lot of data, it can sometimes be difficult to see a trend or pattern to the data. A graph or chart often helps you see this more clearly.

This data can be used to produce different types of diagrams, charts or graphs to show you different ways of looking at the data you typed in the spreadsheet.
Creating a chart or graph

Step 1:
Open the spreadsheet program and enter the data. This could be several columns or rows of data.

Step 2:
Highlight data to be drawn as a graph by clicking in the start area (this is the first cell in the first row, in the first column). Hold down the mouse button till you reach the stop area (this is the last cell, in the last row, in the last column).

Step 3:
Select the Chart Wizard by going to the Insert menu and selecting Chart. You can also click on the Chart Wizard button on the Standard toolbar.
Step 4:

From the Chart Wizard box that opens you can select different chart types.

![Chart Wizard Screenshot]

Step 5:

The next dialog box allows you to add a title to the chart, make changes on the legend (the legend tells you about the different parts of the graph) or make changes on the data labels (data labels indicate on the graph what the data is about).
Step 6:
The final dialog box, allows you to see the chart as a new worksheet (a worksheet is the work area containing the cells, rows and columns of your data) or place it on one of the worksheets in your workbook. A workbook contains all the worksheets you might be working on. This may include a worksheet for the data and a worksheet for the graph or chart you create.
ACTIVITY 2

WORKING WITH NUMBERS IN A SPREADSHEET

Follow the steps below to carry out this activity.

Access to spreadsheet software is essential.

Steps:

1. Open your spreadsheet software program. It will open on a new blank worksheet. Begin by entering these whole numbers in the first column, in different cells going down: 24, 32, 12, 23, 57, 109.

2. Use the same worksheet to write the same numbers with two decimal places eg 24.00 in the next column.

3. Use the same worksheet to write the numbers as a percentage with no decimal places eg 24% in the third column.

4. Use the same worksheet to write the numbers as currency with two decimal places eg £24.00 in the fourth column.
5 Enter the following data:

<table>
<thead>
<tr>
<th>Spending Money</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
</tr>
<tr>
<td>Magazines</td>
</tr>
<tr>
<td>Sweets</td>
</tr>
<tr>
<td>Movies</td>
</tr>
<tr>
<td>Travel</td>
</tr>
<tr>
<td>Savings</td>
</tr>
<tr>
<td>Birthday cards</td>
</tr>
<tr>
<td>Clothes</td>
</tr>
</tbody>
</table>

Now we are going to do some sums. To do this you need to tell the spreadsheet program you want to perform a sum. This is done in the cell you want the result of the sum to appear.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Spending Money</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Item</td>
<td>Quantity</td>
<td>Cost</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Magazines</td>
<td>3</td>
<td>2.2</td>
</tr>
<tr>
<td>6</td>
<td>Sweets</td>
<td>5</td>
<td>0.45</td>
</tr>
<tr>
<td>7</td>
<td>Movies</td>
<td>3</td>
<td>4.5</td>
</tr>
<tr>
<td>8</td>
<td>Travel</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>9</td>
<td>Savings</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>Birthday cards</td>
<td>1</td>
<td>2.49</td>
</tr>
<tr>
<td>11</td>
<td>Clothes</td>
<td>2</td>
<td>5.99</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
For example I want to multiply the quantity of magazines by the cost (3 * 2.20) and put the result (answer) in the first cell under total cost (D5). This is indicated by the column D and the row number 5 ie D5. I start by telling the spreadsheet program I want to do a SUM. In the cell D5 I put =SUM(B5 * C5) and press enter on the keyboard. The result (6.60) is displayed in D5.

6 Use data in the worksheet to calculate the total amount of money spent for the other items in column D.

Note: Remember to use the =SUM calculation in the total column.
7 We are going to change the way the total cost is displayed. First we need to highlight the figures in column D5 to D11, by putting the cursor in D5 and holding the mouse button down till we reach D11.

8 Now we are going to use the Format menu to change the way the total cost data looks.
9 We pick Format cells from the format menu options. The format cells box should appear. You can change the category of number to anything in the list — we want **currency**. In the decimal places we want to make sure it is **set to 2** and in the symbol box we want to make sure **the £ sign is visible**. We click OK and all of our data in the total cost column is changed — see below.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Spending Money</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td><strong>Item</strong></td>
<td><strong>Quantity</strong></td>
<td><strong>Cost</strong></td>
<td><strong>Total Cost</strong></td>
</tr>
<tr>
<td>5</td>
<td>Magazines</td>
<td>3</td>
<td>2.20</td>
<td>£6.60</td>
</tr>
<tr>
<td>6</td>
<td>Sweets</td>
<td>5</td>
<td>0.45</td>
<td>£2.25</td>
</tr>
<tr>
<td>7</td>
<td>Movies</td>
<td>3</td>
<td>4.50</td>
<td>£13.50</td>
</tr>
<tr>
<td>8</td>
<td>Travel</td>
<td>2</td>
<td>1.50</td>
<td>£3.00</td>
</tr>
<tr>
<td>9</td>
<td>Savings</td>
<td>1</td>
<td>5.00</td>
<td>£5.00</td>
</tr>
<tr>
<td>10</td>
<td>Birthday cards</td>
<td>1</td>
<td>2.49</td>
<td>£2.49</td>
</tr>
<tr>
<td>11</td>
<td>Clothes</td>
<td>2</td>
<td>5.99</td>
<td>£11.98</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Spreadsheet graphs, charts and diagrams
Access to spreadsheet software is essential. You are going to create information as a graph and a chart in a spreadsheet program.

A sweet shop has carried out a chocolate survey. The owner of the shop wants a graph produced about the survey results.

Steps:
Open a spreadsheet software package.

Enter the data to be graphed. Use the data below.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Chocolate Survey</strong></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Chocolate Bar</td>
<td>Pupils</td>
</tr>
<tr>
<td>3</td>
<td>Mars Bar</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>Snickers</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>Crunchy</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>Milky Way</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Topic</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Lion Bar</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Drifter</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Twix</td>
<td>1</td>
</tr>
</tbody>
</table>
Highlight the data to be graphed. Do not include the headings. If your worksheet looks like the one above, put your cursor in cell A3, click, hold the mouse button down and drag to cell B10.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chocolate Survey</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Chocolate Bar</td>
<td>Pupils</td>
</tr>
<tr>
<td>3</td>
<td>Mars Bar</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>Snickers</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>Crunchy</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>Milky Way</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Topic</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Lion Bar</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Drifter</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Twix</td>
<td>1</td>
</tr>
</tbody>
</table>

Select the Chart Wizard. This is done by going to the Insert menu and selecting Chart. You can also click on the Chart Wizard button on the Standard toolbar.
From the Chart Wizard box that opens, select Chart type. For this activity, select a pie chart.

After you have selected the Chart type, click and hold your mouse pointer down on the Press and Hold... button to see what your data looks like in the chart type you selected.

If you do not like the look, select another chart type. After you have selected the chart type you will have two options:
• select Next, and let Chart Wizard show you a series of options to make changes to your chart
• select Finish, and Chart Wizard puts your completed chart on the spreadsheet.

The second step taken by Chart Wizard is to verify the range of data being used for this chart.

The Data range displayed below is read ‘all cells from A3 to B10.’

If the data range needs to be changed, click on the data range box.
You can edit the data range in this small window. Select Next to go to the dialog box below. This box allows you to add a title to the chart, or make changes on the data labels.

Select Next to move to the final dialog box, which allows you to see the chart as a new sheet or place it on one of the sheets in your workbook.
If you let the Chart Wizard finish your chart after the first dialog box, or work through each of the four steps, your chart will look something like the one below.

Repeat the chocolate survey chart steps, but this time, choose a bar chart instead of the pie chart. It should be similar to the one below:
Repeat the chocolate survey chart steps, but this time, choose a line graph instead of the bar chart. It should be similar to the one below:

Spreadsheets, graphs, charts and diagrams are all good ways of displaying information.
Working with numbers

When we use numbers we need to be able to add, subtract, multiply and divide.

We work with whole numbers which use numbers from 0-9. In decimal notation we might see numbers like this: 1.0
or like this: 9.5

We do not always use the zeros after a number, for example, we might pick up a new shirt with a price ticket of £10, but when it gets rung up at the till the price will display as £10.00 — the ticket missed off the decimal places, but the price is the same.

The common number system we use is called base 10, because the symbols for whole numbers are written using ten digits, 0 through 9.

For numbers greater than nine, we start another column: eg 10 = the number ten.

Similarly, after ninety-nine:

100 = the number one hundred.

This is known as a place value system.
It is useful if you can recognise numbers in different ways. You might see numbers written like this:

1, 2, 3, 4 or 5.

You might see them spelled as words:

one, two, three, four or five.

They both mean the same thing. When you write a cheque you might have to use both ways to write a number.

For example, you need to write a cheque for your train ticket. It costs £11. In the number box you would write £11 and in words you would write eleven pounds.
We also need to be able to add numbers together, subtract numbers, divide numbers and multiply them.

The symbols below are what we use to show what we are doing with the numbers:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Use</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>To add numbers together</td>
<td>2 + 3 = 5</td>
</tr>
<tr>
<td>-</td>
<td>To subtract numbers from each other</td>
<td>3 – 2 = 1</td>
</tr>
<tr>
<td>÷</td>
<td>To divide one number by another number</td>
<td>9 ÷ 3 = 3</td>
</tr>
<tr>
<td>×</td>
<td>To multiply one number by another number</td>
<td>3 × 3 = 9</td>
</tr>
<tr>
<td>=</td>
<td>This symbol is used to give the answer. It is called the equals symbol</td>
<td>3 + 3 + 3 = 9</td>
</tr>
</tbody>
</table>
Let’s look at some more examples.

When we add numbers together we need to know what the correct answer will be. A good way of checking your answer is to take your answer and deduct the numbers you added together to see if you have the correct answer. For example:

You go into a shop and buy three items:

1 baked potato, cost = £2.49.
2 sausage rolls, cost = £1.50 each.

Your total bill is £5.49.
Working back from the total bill, we can check it is correct.

£5.49 - £1.50 - £1.50 = £2.49.

The total bill less the cost for the sausage rolls leaves the cost of the baked potato.

Or

£5.49 - £2.49 = £3.00.

The total bill less the cost of the baked potato leaves the cost for the sausage rolls.

You can see the total bill is correct.
If we wanted to find out how many people we would need to act as stewards at a fireworks display, we would need to know two things:

- How many stewards do you need per group of people? The organisers have estimated 1 steward for every 50 people.
- How many people will be at the fireworks display? The organisers have sold 850 tickets.

Now we can work with our numbers. First we need to decide which way to do this.

We could add the groups of 50 people together until we reach 850, eg 50+50+50+ etc.
We could subtract groups of 50 people from the total number of 850 people, e.g. 850-50-50-50 etc.

We could divide the total number of people by 50 to get the answer, e.g. $850 \div 50 = 17$ stewards.

We can check the answer by multiplying 50 by 17 to see if it comes to 850, e.g. $50 \times 17 = 850$.

You can see there are different ways to get the same answer, you can use any one of them to get the answer, but it’s good if you can use the quickest one and always check your answer.
Decimals
Numbers can also be written as **decimals**. Numbers can be placed to the left or right of a decimal point, to indicate values greater than one or less than one.

The number to the left of the decimal point is a whole number.

The first digit on the right means tenths (1/10)

As we move further right, every number place gets 10 times smaller (one-tenth as big).

As we move left, every number place gets 10 times bigger.
Ways to think about at decimal numbers
You could think of a decimal number as a whole number plus tenths, hundredths, etc.

Example 1
What is ‘2.3’?
On the left side is ‘2’, that is the whole number part.
The ‘3’ is in the tenths’ position, meaning ‘3-tenths’, or ‘3/10’.
So, 2.3 is ‘2 and 3 tenths’.

Example 2
What is ‘13.76’?
On the left side is ‘13’, that is the whole number part.
There are two digits on the right side, the ‘7’ is in the tenths’ position, and the ‘6’ is the hundredths’ position.
So, 13.76 is ‘13 and 7 tenths and 6 hundredths’.
Or, you could think of a decimal number as a whole number plus a decimal fraction, in which case we would say that 13.76 was:

$$13 \text{ and } \frac{76}{100}.$$  

**Fractions**

A fraction is a part of a whole. Slice a pizza, and you will have fractions:

- $$\frac{1}{2}$$ (One-half)
- $$\frac{1}{4}$$ (One-quarter)
- $$\frac{3}{8}$$ (Three-eighths)

The top number tells how many slices you have and the bottom number tells how many slices the pizza was cut into.
Equivalent fractions
Some fractions may look different, but are really the same, for example:

\[
\frac{4}{8} = \frac{2}{4} = \frac{1}{2}
\]

(Four-eighths) Two-quarters (One-half)

It is usually best to show an answer using the simplest fraction (1/2 in this case). That is called simplifying, or reducing the fraction.
Adding fractions

You can add fractions easily if the bottom number (the denominator) is the same:

\[
\begin{align*}
\frac{1}{4} + \frac{1}{4} &= \frac{2}{4} = \frac{1}{2} \\
(\text{One-quarter}) + (\text{One-quarter}) &= (\text{Two-quarters})
\end{align*}
\]

Another example:

\[
\begin{align*}
\frac{5}{8} + \frac{1}{8} &= \frac{6}{8} = \frac{3}{4} \\
(\text{Five-eighths}) + (\text{One-eighth}) &= (\text{Six-eighths}) = (\text{Three-quarters})
\end{align*}
\]
Using percentages
Because ‘percent’ means ‘per 100’ you should think ‘this should always be divided by 100’.

So 75% really means 75/100.

And 100% is 100/100, or exactly 1 (100% of any number is just the number, unchanged).

And 200% is 200/100, or exactly 2 (200% of any number is twice the number).

A percentage can also be expressed as a decimal or a fraction.
A half can be written...

- as a percentage: 50%
- as a decimal: 0.5
- as a fraction: 1/2

A quarter can be written...

- as a fraction: 1/4
- as a decimal: 0.25
- as a percentage: 25%

Decimals, fractions and percentages are just different ways of showing the same value.
Example values

Here is a table of commonly occurring values shown in percent, decimal and fraction form:

<table>
<thead>
<tr>
<th>Percent</th>
<th>Decimal</th>
<th>Fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>0.01</td>
<td>1/100</td>
</tr>
<tr>
<td>5%</td>
<td>0.05</td>
<td>1/20</td>
</tr>
<tr>
<td>10%</td>
<td>0.1</td>
<td>1/10</td>
</tr>
<tr>
<td>12½%</td>
<td>0.125</td>
<td>1/8</td>
</tr>
<tr>
<td>20%</td>
<td>0.2</td>
<td>1/5</td>
</tr>
<tr>
<td>25%</td>
<td>0.25</td>
<td>1/4</td>
</tr>
<tr>
<td>33⅓%</td>
<td>0.333...</td>
<td>1/3</td>
</tr>
<tr>
<td>50%</td>
<td>0.5</td>
<td>1/2</td>
</tr>
<tr>
<td>75%</td>
<td>0.75</td>
<td>3/4</td>
</tr>
<tr>
<td>80%</td>
<td>0.8</td>
<td>4/5</td>
</tr>
<tr>
<td>90%</td>
<td>0.9</td>
<td>9/10</td>
</tr>
<tr>
<td>99%</td>
<td>0.99</td>
<td>99/100</td>
</tr>
<tr>
<td>100%</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>125%</td>
<td>1.25</td>
<td>5/4</td>
</tr>
<tr>
<td>150%</td>
<td>1.5</td>
<td>3/2</td>
</tr>
<tr>
<td>200%</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
Converting between percentage and decimal

Percentage means ‘per 100’, so 50% means 50 per 100, or simply 50/100. If you divide 50 by 100 you get 0.5 (a decimal number). So:

- to convert from percentage to decimal: divide by 100 (and remove the ‘%’ sign).
- to convert from decimal to percentage: multiply by 100 (and add a ‘%’ sign).

The easiest way to multiply (or divide) by 100 is to move the decimal point 2 places. So:

<table>
<thead>
<tr>
<th>From decimal</th>
<th>To percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.125</td>
<td>0.125</td>
</tr>
<tr>
<td>12.5%</td>
<td>12.5%</td>
</tr>
</tbody>
</table>

Move the decimal point 2 places to the right, and add the ‘%’ sign.

... or ...

<table>
<thead>
<tr>
<th>From percent</th>
<th>To decimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>75%</td>
<td>75%</td>
</tr>
<tr>
<td>0.75</td>
<td>0.75</td>
</tr>
</tbody>
</table>

Move the decimal point 2 places to the left, and remove the ‘%’ sign.
Converting between fractions and decimals
The easiest way to convert a fraction to a decimal is to divide the top number by the bottom number (divide the numerator by the denominator in mathematical language).

Example
Convert 2/5 to a decimal.

Divide 2 by 5: 2 ÷ 5 = 0.4

Answer: 2/5 = 0.4

To convert a decimal to a fraction needs a little more work:
First, write down the decimal ‘over’ the number 1.

Then multiply top and bottom by 10 for every number after the decimal point (10 for 1 number, 100 for 2 numbers, etc).

(This makes it a correctly formed fraction.)

Then **simplify** the fraction

<table>
<thead>
<tr>
<th>Steps</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>First, write down the decimal ‘over’ the number 1.</td>
<td>0.75 / 1</td>
</tr>
<tr>
<td>Then multiply top and bottom by 10 for every number after the decimal</td>
<td>0.75 × 100 / 1 × 100</td>
</tr>
<tr>
<td>point (10 for 1 number, 100 for 2 numbers, etc).</td>
<td></td>
</tr>
<tr>
<td>(This makes it a correctly formed fraction.)</td>
<td>= 75 / 100</td>
</tr>
<tr>
<td>Then <strong>simplify</strong> the fraction</td>
<td>3 / 4</td>
</tr>
</tbody>
</table>
Converting between percentages and fractions

The easiest way to convert a fraction to a percentage is to divide the top number by the bottom number then multiply the result by 100 (and add the ‘%’ sign).

Example

Convert 3/8 to a percentage.

First divide 3 by 8:  \(3 \div 8 = 0.375\)

then multiply by 100:  \(0.375 \times 100 = 37.5\)

and add the ‘%’ sign:  \(37.5\%\)

Answer: 3/8 = 37.5%

To convert a percentage to a fraction, first convert to a decimal (divide by 100), then use the steps for converting decimal to fractions.
Binary memory

Computers use their own special language called **binary**.

Binary is represented as a **bit** (**binary digit**) which refers to a single digit which can have only two possible values: 0 or 1.

For example, the number 10010111 is 8 bits long.

Binary digits are almost always used as the basic unit of information storage and communication in digital computing.
A **byte** is a collection of 8 bits. The eight-bit byte is often called an **octet** in formal contexts such as industry standards, as well as in networking and telecommunication.

Every time you access your computer it converts every action you make into a sequence of binary digits of 1s and 0s. When the computer responds back to you it converts the binary digit back into a language you can understand.

Bits and bytes use memory which could be in your computer’s hard disk, on a floppy disk, a flash pen drive or memory stick, a CD-ROM or DVD.

A single byte will often represent a single character you might type in a word processor.

Computer bytage is measured in orders of two, so a **kilobyte (kb)**, is $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$ (210) bytes, or 1024 bytes.

A **megabyte (Mb)** is $1024 \times 1024$ bytes, which is roughly 1048576 bytes. It's not exactly a million bytes; it's about 5% more than that. So if you buy a hard disc drive and its so-many ‘megabytes’, it should be that many times 1048576.
A **gigabyte (Gb)** is roughly 1 billion bytes or just over 1074 megabytes

A **terabyte (Tb)** is roughly one trillion bytes, one million megabytes, or 1099 gigabytes.

<table>
<thead>
<tr>
<th>Size</th>
<th>Approximate storage capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 byte</td>
<td>A single character</td>
</tr>
<tr>
<td>10 bytes</td>
<td>A word or two</td>
</tr>
<tr>
<td>100 bytes</td>
<td>A few sentences</td>
</tr>
<tr>
<td>1 kb</td>
<td>A very short story</td>
</tr>
<tr>
<td>10 kb</td>
<td>An encyclopaedia page</td>
</tr>
<tr>
<td>100 kb</td>
<td>A medium-resolution photograph</td>
</tr>
<tr>
<td>1 Mb</td>
<td>A short novel</td>
</tr>
<tr>
<td>10 Mb</td>
<td>Two copies of the complete works of Shakespeare</td>
</tr>
<tr>
<td>100 Mb</td>
<td>1 metre of shelved books</td>
</tr>
<tr>
<td>1 Gb</td>
<td>a pickup truck filled with pages of text</td>
</tr>
<tr>
<td>1 Tb</td>
<td>50,000 trees of paper</td>
</tr>
<tr>
<td>10 Tb</td>
<td>The printed collection of the British Library</td>
</tr>
<tr>
<td></td>
<td>archive</td>
</tr>
</tbody>
</table>
When you go to buy a computer, you need to be able to calculate how much memory you want so you can run applications and games. For example, a typical game always has somewhere on its box a list of things you need in your computer to make it run eg Microsoft’s Dungeon Siege II requires the following system requirements:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating system</strong></td>
<td>Windows XP with at least Service pack 1 installed.</td>
</tr>
<tr>
<td><strong>Processor</strong></td>
<td>The Central Processing Unit – often a chip on the motherboard/circuit board in the computer) which needs at least a 1.0Ghz processor speed.</td>
</tr>
<tr>
<td><strong>RAM</strong></td>
<td>Is Random Access Memory, used for temporarily saving the game while you are playing. Needs 265 megabytes installed to ensure the game will run.</td>
</tr>
<tr>
<td><strong>Hard disk drive</strong></td>
<td>The drive inside your computer which needs at least 4 gigabytes of space free to hold all the game files and any permanent save games you have.</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>Type of video card, input devices and whether your computer needs a CD-ROM, DVD to install the game.</td>
</tr>
</tbody>
</table>
**ACTIVITY 3**

Follow the steps below to carry out this activity. Access to spreadsheet software and a calculator is essential.

Steps:

1. A car’s milometer reads 106,491. What is the mileage to the nearest 100 miles?
   - A 106,000
   - B 106,400
   - C 106,490
   - D 106,500

2. A customer’s car needs to be serviced when the milometer reads 48,000 miles. The milometer currently reads 33,650 miles. How many more miles does the car need to travel before it needs its service?
   - A 14,350
   - B 14,450
   - C 15,350
   - D 15,650
3 A cable television company has 89,062 subscribers. In words this is...?
   A Eight million, nine thousand and sixty-two
   B Eighty nine thousand and sixty-two
   C Eight thousand, nine hundred and sixty-two
   D Eighty nine hundred and sixty-two

4 A television channel broadcasts a total of 15 hours of television a day. Three hours per day are children’s programmes. What percentage of programmes are children’s?
   A 3%
   B 5%
   C 15%
   D 20%
5 You and your 3 friends are going to the pictures. The total price for all four tickets is £20.00. What fraction of the £20.00 will you pay?
   A  1/3rd
   B  1/4th
   C  1/5th

6 You are going to buy a new shirt that is reduced by 25% in the sale. It cost £50.00. How much will it now cost?
   A  £45.00
   B  £40.00
   C  £37.50

7 You are going to pay for a new shirt by cheque. The cost is £37.99. Write out the amount in words.
8 Eight friends are going to a fireworks display.
   The table shows the entry cost:

<table>
<thead>
<tr>
<th>Adults 16 years and over</th>
<th>£5.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children Over 2 years and below 16 years</td>
<td>£3.00</td>
</tr>
<tr>
<td>Infants aged under 2 years</td>
<td>FREE</td>
</tr>
</tbody>
</table>

Six of the friends are 16 years old.

Two of them are 14 years old.

How much is the total entry cost for the friends?

A £28.00
B £36.00
C £38.00
D £40.00
9 A garage floor space measures 11.8 metres long and 6.1 metres wide. The garage owner has calculated the total size as 71.98 square metres. Which calculation below gives the closest estimate of the area of the garage floor?

A 11×6  
B 11×7  
C 12×6  
D 12×7

10 A bottle of mayonnaise holds 375 ml. The waiter fills the containers on each table with 25 ml of mayonnaise from the big bottle every day. There are five tables with containers on them. How many days will it take to finish the bottle of mayonnaise?

A 1 day  
B 3 days  
C 5 days
11 You have just purchased a new computer game. It tells you on the back that it needs 10 gigabytes of hard disk space, 128 Mb RAM and a 128 Mb graphics card to install correctly. You have the following computer specification. Will the game install? State why.

- Hard disk space: 11 Gb
- RAM: 512 Mb
- Graphics card: 256 Mb
- CD/DVD drive: Yes

12 You have an old computer. It is has a very low specification.

- Hard disk space: 20 Mb
- RAM: 32 Mb
- Graphics card: 8 Mb
- CD drive: Yes

The game you want to buy needs 32 Mb of RAM, an 8 Mb graphics card, a CD drive and 25 Mb of hard disk space. Will the game install on this computer? State why.