Girls' Access to Education
Girls' Education Challenge

Sierra Leone

Maths Unit 1

Name of Learning Assistant _____

School _____

Tutor _____

Maths Unit 1: Week 1

Whole Numbers and Place Value

Welcome to the first maths unit. We hope you will develop a good knowledge of maths for yourself and also for your work in school. As you grow in confidence and knowledge in maths then you will be in a good position to help others by showing how enthusiastic and interested you are about maths.

Introduction

Numbers are all around us. For example you may have a mobile phone number, you see numbers on a car number plate and you read numbers on food packaging. It is important to understand when and how different numbers are used and to be confident saying and writing numbers – you will use these skills in many different situations.

In this first section you are going to revise how we say numbers and what they mean. You will also revise the words that we use to describe numbers such as hundreds, thousands and units. You will also learn how to multiply and divide numbers by 10, 100 and 1000.

Sizes of numbers

We use whole numbers to count exact numbers of things – for example you have ten (10) fingers. We use digits to write numbers and the position of each digit tells us about the size of the number it represents. Read the definition of a digit carefully.

> **Definition: Digit** – This is 0, 1, 2, 3, 4, 5, 6, 7, 8, 9; used to make up a number.

In the number 3724 there are 4 digits. Each digit tells us something about the size of the number. Beginning at the right we separate the number into groups of three digits. We insert a space after every three digits, this makes it easier to say the number. 3724 becomes 3 724.

3 724 is made from			
3 Thousands	3×1000	3 000
7 Hundreds	7×100	700
2 Tens	2×10	20
4 Units	1×4	4
		3 724

So we say the number as:
Three thousand, seven hundred and twenty-four

Now read the example carefully.

Example

How would you say this number?   **78 514**

First separate the number into groups of three digits:..

Then use this table to help you.

Thousands					
Hundreds	Tens	Units	Hundreds	Tens	Units
	7	8	5	1	4

Write your answer down here...

Sometimes we have zeros in our numbers, like this one: **130 709**

Thousands					
Hundreds	Tens	Units	Hundreds	Tens	Units
1	3	0	7	0	9

These zeros show us that there are some missing parts. There are no units in the thousand section and no tens.

We would say this number as:
One hundred and thirty thousand, seven hundred and nine.

Example

How would we write down this number in digits?

Two million, four hundred and seven thousand, three hundred and sixty-five

It can be helpful to write it in the table. Here we would have to make the table larger to include millions.

Millions			Thousands					
Hundreds	Tens	Units	Hundreds	Tens	Units	Hundreds	Tens	Units
		2	4	0	7	3	6	5

Be very careful with the words. For example it is 2 million and not two hundred million.

Each number has its own special place. This is why we talk about place value.

Don't forget to fill up any spaces. Here there are no tens in the thousand section, so we will need to put a zero. We do not need to put any zeros at the front because they have no value and do not help us to say the number.

The number is **2 407 365**

Task – these are for you to try. Write the answers here:

1. **Write down all of these numbers in words**

   a. 6 379

   ....

   ....

   b. 7 204

   ....

   ....

   c. 6 089

   ....

   ....

   d. 135 017

   ....

   ....

   e. 4 401 356

   ....

   ....

   ....

2. **Write these numbers in digits**

   a. three million

   ....

   b twenty-six thousand

   ....

   c. five thousand and twenty-one

   ....

   d. two hundred and sixty thousand, one hundred and fifty

   ....

   e. Fifty-two million, three hundred and forty two-thousand and six

   ....

   ....

3. **A teacher asks her pupils to write down the number for Two thousand and seventy-three in digits.**

   Olivette wrote 2 730 and Ishmael wrote 2073. Who was correct and why?

   ....

   ....

   ....

   ....

4. Largest cities or towns of Sierra Leone

The following table shows the population of the largest cities or towns in Sierra Leone in 2004.

Government of Sierra Leone 2002 Census			
Rank	City name	District	Pop
1	Freetown	Western Area Urban District	853 651
2	Bo	Bo District	233 684
3	Kenema	Kenema District	182 106
4	Makeni	Bombali District	109 125
5	Koidu Town	Kono District	92 770
6	Lunsar	Port Loko District	24 450
7	Port Loko	Port Loko District	23 195
8	Pandebu-Tokpombu	Kenema District	20 219
9	Kabala	Koinadugu District	19 074
10	Waterloo	Western Area Urban District	18 579

Freetown

Bo

Kenema

Makeni

Source: Wikipedia

Write down the population of each of these places in words.

Freetown
....

Bo
....

Kenema
....

Makeni
....

Koidu Town
....

Lunsar
....

Port Loko
....

Pandebu-Tokpombu
....

Kabala
....

Waterloo
....

5. Here are 4 cards:

| 2 | 7 | 8 | 3 |

For each part of the question write your answer two ways as digits (like in question 2) then in words (like in question 1).

(a) use all four cards to make the largest number possible

....

....

(b) use all cards to make the largest odd number possible

....

....

You can now add an extra card

0

(c) use all five cards to make the largest number

....

....

(d) use all five cards to make the largest odd number

....

....

You might like to discuss your answers with someone else before you check the answers. You could even draw these cards out on paper and move them around to help you.

6. Write the following numbers in order from biggest to smallest:
Hint: Write all the numbers underneath each other, lining them up from the units column (right to left).

a. 161 380;   600 765;   694 212;   612 005;   168 999

b. 888 024;   188 765;   808 765;   818 123;   82 364

c. 315 672;   333 289;   3 233 986;   3 402 987;   3 325 999

a)	b)	c)

Multiplying and dividing by 10, 100 and 1000

It's very useful to know how to multiply and divide by 10, 100 and 1000 as this helps you do a large number of calculations quickly in your head, for example when you are buying in the market or counting materials for pupils in school.

When you multiply by 10, all the digits in a number move one place to the **left and a zero moves into the units position**.

This makes the answer **bigger.**

Example

In this example we multiply 78 514 by 10. Look how we do this.

Thousands			X 10		
Hundreds	Tens	Units	Hundreds	Tens	Units
	7	8	5	1	4
7	8	5	1	4	0

The 7 originally had a value of seventy thousand and now it has a value of seven hundred thousand. Try to say the new number out loud to yourself.

Do not forget to add the zero to show that there are no longer any units.

There should never be any gaps on the right hand side of the table.

If you were multiplying by 100, how many places would you move the number to the left?............................ How many zeros would you add?...........................

And what about multiplying by 1 000? How many places?................................. and how many zeros would you add?...

Example

Multiply 4570 by 1000

The number will move **three** places to the left and we will add three zeros in the hundreds, tens and units positions.

Millions			Thousands			X 1 000		
Hundreds	Tens	Units	Hundreds	Tens	Units	Hundreds	Tens	Units
					4	5	7	0
		4	5	7	0	0	0	0

The answer is **4 570 000.**

Dividing

When you divide by 10, you move the digits in the number to the **right.** This makes the answer **smaller.**

When you divide by 100 you move the digits two places to the right. And when you divide by 1 000 you move the digits three places to the right.

Example

Divide 65 000 by 100

The number will move two places to the right.

Millions			Thousands			÷100		
Hundreds	Tens	Units	Hundreds	Tens	Units	Hundreds	Tens	Units
				6	5	0	0	0
						6	5	0

The answer is **650.**

You might need to use the tables to start with but try to work towards doing them without. Write any tables or working on rough paper.

Task

1. Multiply each of these numbers by 10

      A.   39 103..

      B.   5 592..

      C.   123..

      D.   7 801..

2. Multiply each of these numbers by 1 000

The first one has been done for you. Try to remember the spacing but if you do not put it in, it is still correct.

      a.   24 × 1 000 = 24 000...

      b.   201...

      c.   43...

      d.   12 567..

      e.   430 803...

3. Divide each of these numbers by 100

a.   56 000...

b.   7 500...

c.   340 800...

d.   2 000 000...

e.   82 050 000...

4. Which is bigger, A or B?

A 2 049 × 100 **or** B 204 900 ÷ 10...

....

....

5. The population of the city of Koidu Town in 2013 is approximately (roughly) 111 800 people.

One tenth of the population are left handed.

(a)   How many are left handed?...

(b)   How many are right handed?...

How can you check if you have got these right?

....

....

6.   (a)   Write down 'half a million' in digits.

....

Now divide this by one thousand.

(b) write this number in digits then in words

....

....

(c) Complete this sentence

One million is..thousands.

Well done for completing these! Try to compare your answers with another Learning Assistant – did you get the same answers?   Are there any questions that you find difficult? Mark these questions and remember to ask your tutor about them at your next Maths tutorial.

Now here are a few exam questions for you to try.

Exam questions: Take your answers to your next Maths tutorial.

1. Write down the value of the digit underlined 8 5̲23

Which of these is it? Choose the correct answer.

(a) 5 thousand   (b) 5 hundred   (c) 5 tens   (d) 5 units   *(FTC entrance exam)*

....

2. What is the value of the 6 in 2 643?

Which of these is it? Choose the correct answer.

(a) 6 Hundred   (b) 6 Thousand   (c) 6 units   (d) 6 items *(FTC entrance exam)*

....

3. Write the number nine thousand and ninety nine.

Which of these is it? Choose the correct answer.

(a) 999   (b) 9 009   (c) 1 999   (d) 9 099   *(FTC entrance exam)*

....

How am I doing?

	Easy (Tick this box if you feel confident that you **understand this section well)**	Fine (Tick this box if you still **need a little work** on this section)	Difficult (Tick this box if you still **need a lot of work** on this section)
I can write numbers in words.			
I can write numbers in digits.			
I can multiply numbers by 10,100 and 1000.			
I can divide numbers by 10,100 and 1000.			

Notes on what to do next:

....

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Signed (by learning assistant):

....

Date:

....

Signed (by tutor):

....

Date:

....

The Four Rules

In this section you are going to revise how to add, subtract, multiply and divide whole numbers. These different types of sums are called the four rules. You will also meet some problem questions involving these four rules. It is very useful to be able to do these sums without using a calculator; you will do these sums everyday in the school classroom and when you are at home.

There are four sections in this unit. In each section there is a small section to read and some examples to follow – read these carefully several times. Then try the sums in the tasks.

Addition

Addition sums can be done in any order.

3 + 5 gives the same answer as 5 + 3, which is 8.

When adding numbers we have to remember the place value of the digits.

Do you remember the **place value tables** in the last section?

Example: read this carefully and follow each step.

Add together these two numbers, **147 + 26**

Hundreds	Tens	Units
1	4	7
	2	6
1	**7**	**3**

1*

We follow these steps to do this calculation:

First add the units: 7 + 6 = 13

This means that the unit digit 3, must go in the unit column.

The digit 1* is worth 10 and the 1 must be placed underneath the answer line as a carry figure.

Then add the tens: 4 + 2 + 1 = 7 (don't forget to add in the 1)

Then add the hundreds: 1

Do not forget to add this in when you add the numbers in the tens column.

Remember

- We line the numbers up in columns so that the units are in the right hand column.

- We write carry figures in small type underneath the answer line

- We must not forget to add the carry figures.

It can take too much time, drawing out the place value tables.

We can leave them out, as long as we remember to line up the units.

This is called the **column method.**

Example

```
    3  5  2
 +  2  8  7
    6  3  9
    1
```

Working from right to left.

In the units column............2 + 7 = 9

In the tens column............5 + 8 = 13   (3 in the tens column and 1 to carry.)
We are really adding 50 + 80 = 130 which is why the carry figure goes underneath the hundreds column.

In the hundreds column.........3 + 2 + 1 = 6
We are really adding 300 + 200 + 100 which is why we have 6 in the hundreds column – 600

Can you explain how to do addition to another Learning Assistant? Try to do this, then do the sums in the tasks. You might like to work with another Learning Assistant. Write your answers in this workbook.

Task

1. **Complete these additions using the column or table method from above**

(a) 214 + 32

2 1 4
....

b) 23 + 17 + 42

....

....

(c) 374 + 137   ....

_____

_____

(d) 392 + 109   ....

_____

_____

(e) 279 +253 + 625   ....

_____

_____

2. Add the following numbers

(a) 514 + 56   ....

_____

_____

(b) 239 + 128   ....

_____

_____

(c) 594 + 19   ....

_____

_____

(d) 37 + 23 + 5 + 78   ....

....

....

_____

_____

(e) 1 238 + 3 536   ....

_____

_____

3. Sophia has answered this question incorrectly.

```
    3 9 7
  +  1 4 4
    4 3 1
    1 1
```

(a) Explain what she has done wrong.

....

....

....

(b) Work out the correct answer.

....

....

_____

4. There are 27 pupils in class 1, 36 pupils in class 2 and 29 pupils in class 3.

Find the total number of pupils in the school.

....

....

_____

_____

5. Zaria went shopping and she had to buy the following items:

One large bag of rice	120 000 LE
One loaf of bread	1 000 LE
12 eggs	12 000 LE
½ kg chicken breast	35 000 LE
6 oranges, which cost 500 LE for 3	

How much did she spend altogether?

....

....

....

....

_____

_____

Did you manage to complete all the addition sums? Remember to mark any sums that you found difficult and talk to another Learning Assistant.

Subtraction

This is another of the four types of sums. Subtraction gives us the difference between two numbers, this is useful for example when you are paying for a skirt and you want to know how much money you will have left.

Subtraction **cannot** be done in any order. You can also use the column method to find the difference between numbers of things. To do a subtraction sum we line up the numbers so that the units are in the same column.

Read this example carefully and follow each step.

Example

Aminata has 286 seeds and she plants 145 seeds, how many does she have left?

We set out the problem like this:

```
   2 8 6
 − 1 4 5
   ‾‾‾‾‾
   1 4 1
```

- Subtract figures in the same column
- Always work from right to left
- Always take the bottom number from the top number.
  This gives us 6 – 5; then 8 – 4 and finally 2-1. The answer is 141.

Sometimes the numbers do not work out so easily. Now read this example very carefully.

Example

There are 43 cans of fizzy drink in the shop. The shopkeeper sells 27, how many does she have left. To solve this problem we subtract 27 from 43.

```
   4 3
 − 2 7
   ‾‾‾
```

In the units column, 7 is bigger than 3. So we need to bring across one of the tens and leave 3 tens in the tens column instead of 4.

```
  ³4̶ ¹3
 −  2 7
   ‾‾‾‾
```

We can now say 13 take away 7, which is 6. Subtract the rest of the columns in the usual way.

```
   4 3
 − 2 7
   ‾‾‾
   1 6
```

The answer is **16.**

Now try these subtraction sums for yourself. You might like to work with another Learning Assistant. If you are not sure how to do the sum, look again at the examples above. Remember that the subtraction is the difference between the two numbers.

Task

1. Complete these subtractions

(a)   149 – 17

....

_____

_____

(b)   48 – 29

....

_____

_____

(c)   356 – 127

....

_____

_____

(d)   143 – 85

....

_____

_____

(e)   209 – 152

....

_____

_____

2. Subtract the following numbers

(a)   639 – 217

....

_____

_____

(b) 42 – 19

....

....
_____

(c) 454 – 46

....

_____

_____

(d) 302 – 154

....

_____

_____

(e) 500 – 287

....

_____

_____

3. Brima has made a mistake with his homework.

This is what he wrote.

```
    2 5 2
  – 1 8 9
    _____
    1 3 7
```

(a) Explain what he has done wrong

....

....

....

(b) Work out the correct answer.

....

_____

_____
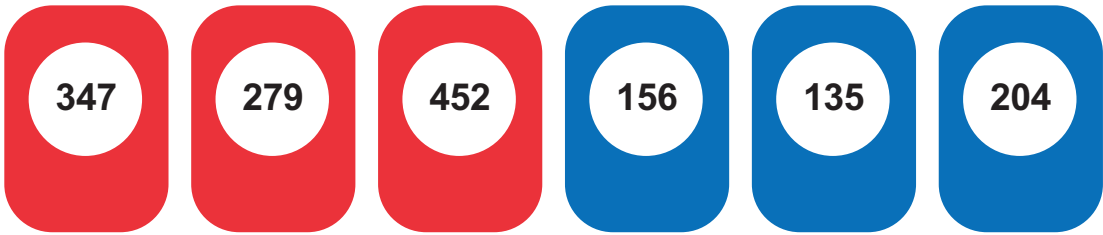
4. **When we take one number from another, we are finding the *difference* between the two numbers.**

Here are some cards.

347	279	452	156	135	204

Choose a red number and a blue number.

Subtract the blue number from the red number.

By choosing different cards

   (a) What is the largest difference you can get?

....

....

....

....

   b) What is the smallest difference you can get?

....

....

....

....

5. **The table shows some information about a farm**

Animals on the farm	
cows	3
chickens	56
goats	17

   (a) What is the total number of animals?

....

....

....

....

(b) How many more chickens are there than cows?

....

....

....

....

(c) How many more goats are there than cows?

....

....

....

....

Multiplication

Jenefa has three market stalls selling cloth. She has to pay rent for each of her stalls. The rent is 2000 LE on each stall, what is her total rent?

We solve this problem doing a multiplication sum: 3 x 2000 = 6000 LE.

When we multiply two or more numbers together, we are finding the **product** of the numbers.

There are two main methods for multiplying; the **grid method** and the **column method.**

Read this example carefully and follow each step.

Example

Ansarul Primary School has 254 pupils. Each pupil needs 5 pencils through the week. How many pencils are needed in total? We do this sum by multiplying 254 × 5.

There are two ways we can do this sum. Read them carefully and decide which method is best for you.

Grid method

254 is the same as 200 + 50 + 4

×	200	50	4	
5	1 000	250	20	= 1 270

Multiply each part of the 254 by 5; 5 x 1 000, 250 x 5 and 20 x 5.

Then add up all three answers in the table. The total is **1 270.**

Column method

Line up the numbers in the units column.

Work from right to left (←), multiplying each number by 5

```
    2  5  4          4 × 5 = 20
 ×        5          5 × 5 = 25
  1  2  7  0         2 × 5 = 10
     2  2
```

Do not forget to add in the carry figures.

Example

The same two methods can be used for harder questions.

There are 37 pupils in the class. Each pupil has been given 23 beads. How many beads are there altogether in the classroom?

We can solve this problem like this:

Grid method

37 is the same as 30 + 7
23 is the same as 20 + 3

We write these four numbers in a grid like this:

×	30	7
20		
3		

Then we multiply each of the numbers together: 30 x 20 = 600; 7 x 20 = 140; and so on.

×	30	7
20	600	140
3	90	21

Then we add up the numbers in each row

×	30	7	
20	600	140	= 740
3	90	21	= 111

Finally we add up these two numbers; 740 + 111 = 851. This is the answer.

There is another way to solve the problem, using the Column method.

First write out the 2 numbers in the correct columns:

```
    3  7
×   2  3
   ____
```

Now multiply the first number by 3:

```
    3  7              7 × 3 = 21
×   2  3              3 × 3 = 9, 2 carried over.
   ____
 1  1  1
    2
```

Next multiply the first number by 20. Add a zero in the units column on the next line. This is because we are multiplying 37 by 20 **not** 2.

and put the answers underneath

```
    3  7
×   2  3
   ____
 1  1  1
 7  4  0
   ____
 8  5  1
   ____
```

Add together the two lines above to give the answer.

Now try these tasks. Remember if you are not sure how to do the sum, look again at the examples here.

Task

1. Complete these multiplications.

(a) 52 × 8 ....

(b) 179 × 6 ....

(c) 42 × 5 ....

2. Work out:

(a) 42 × 11 ....

(b) 23 × 21 ....

(c) 72 × 37 ....

(d) 136 × 55 ....

(e) 234 × 158 ....

You can use either method

3. **4 × 6 = 24 and 6 × 4 = 24**

(a) Write down two other multiplications that give the same answer of 24.

....

....

....

(b) Write down the values of

(i)   4 × 60 ....

(ii)   400 × 60 ....

(iii) 2 400 ÷ 4 ....

4. **Here is a list of numbers   5   11   13   17   23**

(a) What is the largest number you can make by multiplying two different numbers from the list?

....

....

....

(b) What is the smallest number you can make by multiplying two different numbers from the list?

....

....

....

5. **There are usually 365 days in a year.**

There are 24 hours in a day.

How many hours are there in a year.

....

....

....

Well done! Now we will look at the last sum – division.

Division

Division is the opposite or **inverse** of multiplication.

We can use multiplication facts to write down division facts.

We know that 5 × 6 = 30

So 30 ÷ 6 = 5

So if we had 30 pupils and we wanted to put them into 6 groups, we can see that each group would have 5 pupils.

Dividing is the same as repeatedly taking away a number.

So 30 ÷ 6 = 5 because we can take 6 away 5 times before we get to zero.

30 – 6 – 6 – 6 – 6 = 0

With very large numbers this would take too long.

We need a neater way of writing down division sums.

This is called short division

$$6 \overline{)\ 3\ 0}^{\quad 5}$$

6 divides into 30, 5 times.

Read this example carefully and follow each step. Try to explain each step to another learning Assistant.

Example

Work out 152 ÷ 8

$$8 \overline{)\ 1\ 5\ ^7 2}^{\quad 1\ 9}$$

8's into 1, does not go
8's into 15, goes once, 7 left over
8's into 72, goes 9 times, none left over

So 152 ÷ 8 = **19**

Sometimes numbers do not divide into other numbers **exactly.**

We say that they have a **remainder.**

Now try these tasks, write your answers here in the workbook.

Task

1. **Work out these**

   (a) 132 ÷ 6 ....

   (b) 682 ÷ 11 ....

   (c) 513 ÷ 9 ....

   (d) 923 ÷ 13 ....

2. **The answers to this question, all have remainders.**

   (a) 748 ÷ 5 ....

   (b) 462 ÷ 4 ....

   (c) 309 ÷ 8 ....

   (d) 752 ÷ 7 ....

   (e) 1 004 ÷ 12 ....

3. **The whole of the school is going on a trip to the nearest large town.**

   There are 129 pupils and 5 members of staff.

   They are going in mini-buses that hold 15 people.

   How many mini-buses will they need to take them all to the town?

   ....

4. **A farmer is putting his eggs into boxes.**

   Each box holds 12 eggs.

   The farmer has 151 eggs.

   (a) How many full boxes can the farmer fill?

   ....

   (b) How many eggs will be left over?

   ....

5. **A car is travelling at an average speed of 40 kilometres per hour.**

   How long does it take the car to travel 120 kilometres?

   ....

Well done for completing these! Try to compare your answers with another Learning Assistant – did you get the same answers? Are there any questions that you find difficult? Mark these questions and remember to ask your tutor about them at your next Maths tutorial.

Exam questions

Here are a few exam questions for you to try. Take your answers to your next tutorial to show to your Maths tutor.

1. There are 1 224 people living in a village.

If there are 329 men and 408 women, how many children are there?

Which of these is it? Choose the correct answer.

   (a) 487   (b) 737   (c) 612   (d) 816   *(FTC entrance exam)*

....

2. Find the difference between 90 203 and 85 527.

Which of these is it? Choose the correct answer.

(a) 1 4676   (b) 4 676   (c) 676   (d) 6476   *(FTC entrance exam)*

....

3. What number divided by 9, gives an answer of 12 remainder 5?

Which of these is it? Choose the correct answer.

(a) 103   (b) 57   (c) 113   (d) 63   *(FTC entrance exam)*

....

4. A petrol tanker when full holds 12 630 litres. How many litres will it hold when half full?

Which of these is it? Choose the correct answer.

(a) 6 315   (b) 6 310   (c) 6 215   (d) 6 305   *(FTC entrance exam)*

....

5. Fill in the blank spaces

Eighteen pigs have a total of...........legs while fifty-six birds have...........legs.

(FTC entrance exam)

6. The number of legs from 5 pigs, 4 chickens and 3 cats altogether is:

....*(FTC entrance exam)*

7. (a)   Add 4 321, 345, 38 and 9

....*(FTC entrance exam)*

(b)   Subtract 3 842 from 5 843

....*(FTC entrance exam)*

   (c)   Find the product of 685 and 9

....*(FTC entrance exam)*

How am I doing?

	Easy (Tick this box if you feel confident that you **understand this section well)**	Fine (Tick this box if you still **need a little work** on this section)	Difficult (Tick this box if you still **need a lot of work** on this section)
I can add whole numbers			
I can subtract whole numbers			
I can multiply whole numbers			
I can divide whole numbers by one digit numbers and some two digit numbers			

Notes on what to do next:

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Signed (by Learning Assistant):

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Date:

....

Signed (by Tutor):

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Date:

....

Maths Unit 1: Week 3

Negative numbers

In this section you are going to learn about negative numbers. You will add and subtract negative numbers as well as being able to put them in order. You will also meet some problem questions involving negative numbers. Later in the section you will learn how to multiply and divide negative numbers. The very last section looks at how to work out sums that include a mixture of addition, subtraction, multiplication in them. Negative numbers are often used when talking about distances below sea level and in some colder countries they are used to write very cold temperatures that drop below zero degrees. Banks also use them to explain when someone is in debt or owes the bank money.

There are four parts to this section. In each part there is something to read and then some examples to follow – read these carefully several times. Then try the sums in the tasks.

Introducing negative numbers

Temperatures are usually measured in degrees Celsius (° C).

In Sierra Leone the temperature very rarely drops to below 20° C but in other countries, it can get very cold and the temperature drops down so low in the winter that the roads can freeze and the rain turns into snow. For this to happen, the temperature usually drops to below zero degrees Celsius.

This means that the temperature is described using a negative number.

Here is a thermometer showing negative numbers.
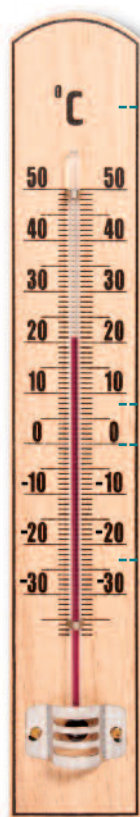
- That C means Celsius

- The lowest temperature recorded in Sierra Leone 8° C
- The freezing point of water

- The lowest temperature recorded in Africa (−24°C) in Morocco

A negative sign (−) shows that the number is less than zero (−7°C).

No sign in front of the number shows that it is positive (5°C).

We can use a number line to show negative numbers.

A number line is like a thermometer standing on its side. It shows negative numbers and not temperatures.

−20 −15 −10 −5   0   10   20   30   40

Negative   Positive
less than 0   greater than 0
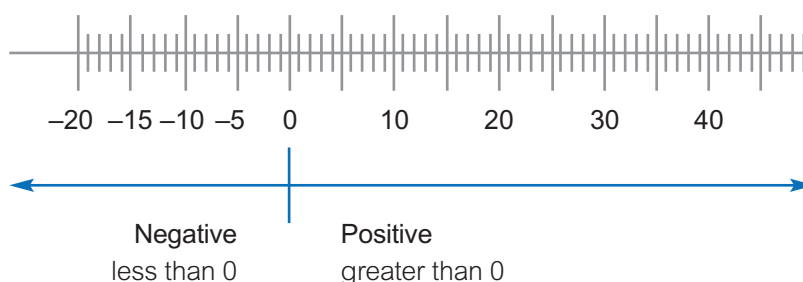
Sometimes it is easier to work with vertical number lines and sometimes it is easier to work with horizontal number lines. The following examples show one of each type.

Example

Early one morning in March the temperature in Russia was –2° C. Later in the day the temperature was 7°C.

By how many degrees had the temperature risen? We can use the diagram to count the number of degrees the temperature has risen; it rises 2 degrees to 0 °C and then another 7 degrees, the total increase is 9 degrees.
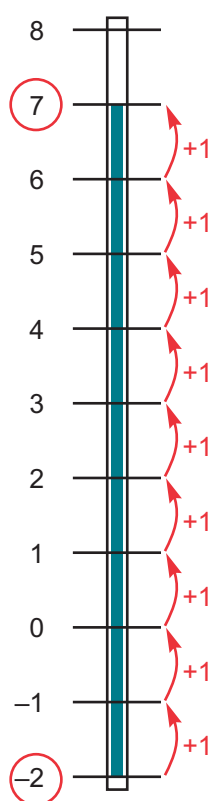
The temperature has risen by 9 degrees.

Example

Victor has 7 000 LE saved for his rent this month. His rent is 9 500 LE. By how much is he in debt? If he is in debt, this means that he owes the money and still has to find it somehow in order to pay his rent.

We can find out how much he is in debt by using a number line. We start at 7000 LE and then move back 9 500 LE (this is how much Victor needs).
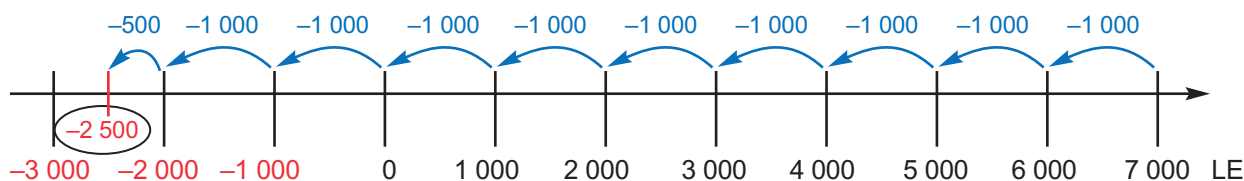
Victor is in debt by 2 500 LE

Notice that the negative numbers are written in red. There is a saying that if you 'go into the red' you are in debt as in old bank records these numbers were always written in red to show that you owe money.

Task: These are for you to try. Write the answers here.

1. Place the numbers   –3   3   0   –5   4   –1
On

a) this vertical number line.

b) this horizontal number line.

Hint: You will need to label your line with the numbers given in the question.

2. Put these temperatures in order. Put the warmest temperature first.
–9°C   5°C   11°C   –8°C   4°C   –1°C

3. Put these numbers in order without drawing a number line. Start with the smallest first.
–12   –15   15   8   –8   25   –4

4. **The water level in a river is at the moment 3 metres below sea level. The road is likely to flood when the water level rises to 2 metres above sea level.**

   By how much would the water level have to rise, for the road to be flooded?

   ....

   ....

5. **The lowest point in Ethiopia is Danakil which is 125 metres below sea level. The highest point in Ethiopia is Ras Dashen Terara which is 4 620 metres above sea level.**

   What is the difference in height between these two places?

   ....

   ....

   ....

6. **At the end of the month of April, Martha's bank account was over drawn by 4 000 LE.**

   To be overdrawn is to be in debt so we show this as –4 000 LE.

   The table shows the balances in her account for April and the following five months.

Month	April	May	June	July	August	September
Balance	–4 000 LE	–2 500 LE	2 000 LE	6 000 LE	–1 000 LE	3 000 LE

   a) what was the most that she was overdrawn by?

   ....

   b) Between which two consecutive months was the difference the greatest?

   ....

   Hint: Consecutive months are ones 'next door to each other'. So April and May are consecutive as are August and September.

   c) Between which two consecutive months was the difference the smallest?

   ....

Adding and subtracting positive and negative numbers.

In the last section, we have already started to add and subtract negative numbers.

There are two uses for the + and – signs in mathematics
- They show if a number is positive or negative   –3 or +3
- They show if you are adding or subtracting   3 + 4 or 3 –4

Questions on adding and subtracting positive and negative numbers can involve both uses of the signs.

For example
$$-3 + -4 \text{ or } -3 +(-4)$$

We can use number lines when adding and subtracting.

Example

Find the value of 2 + –4.
Notice that there are two signs together. To help us with this, we can use the following rules.

Adding a positive number	+ +	is the same as	+
Adding a negative number	+ –	is the same as	–
Subtracting a positive number	– +	is the same as	–
Subtracting a negative number	– –	is the same as	+

So 2 + –4 becomes 2 –4.
Start by finding the first number on a number line.
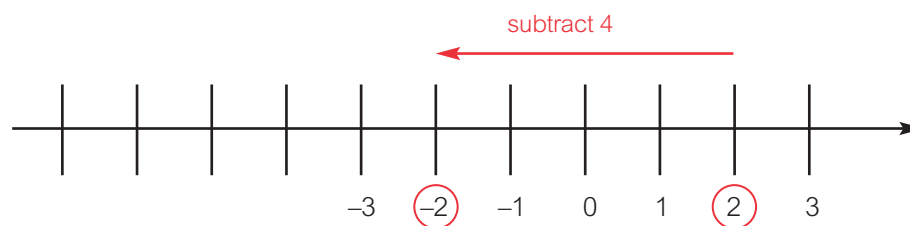
When adding a number we move to the right
When subtracting a number we move to the left

Here we have moved 4 units to the left.
So 2 + –4 = 2 – 4 = –2

Example
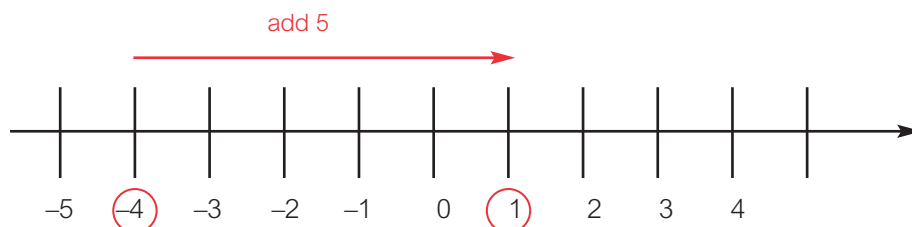
Find the value of $-4 + + 5$

Using the rules
  $-4 + + 5 = -4 + 5$
So we move 5 units to the right

add 5

$-5 \quad -4 \quad -3 \quad -2 \quad -1 \quad 0 \quad 1 \quad 2 \quad 3 \quad 4$

$-4 + + 5 = -4 + 5 = 1$

Example

Find the value of $2 - -3$
Using the rules
$2 - -3 = 2 + 3 = 5$

We could use a number line here but there is no need as we can all add 2 and 3 without a number line.

As you get more confident, you will be able to answer these questions without drawing number lines but at first you will need them.

Task: These are for you to try. Write the answers here.

You MUST use number lines for at least the first two questions.

1. Find the value of

a. $-3 + 5$ ....

b. $-4 + -3$ ....

c. $2 + -2$ ....

d. $5 + -6$ ....

e. $-1 + +3$ ....

2. Find the value of

a. $-3 - 5$ ....

b. $-2 - +5$ ....

c. $4 - -4$ ....

d. $3 - +4$ ....

e. $-4 + +3$ ....

3. **Bah says that –2 + –5 has the same answer as –2 – + 5.**
   Is he right? Explain your answer.

....

....

....

4. **What must be added to:**

   a. –1 to make 7   ....

   b. –1 to make 4   ....

   c. 3 to make 0   ....

   d. 2 to make –1   ....

   e. –4 to make –1?   ....

5. **What must be subtracted from:**

   a. 7 to make 4   ....

   b. 7 to make –4   ....

   c. –4 to make –8   ....

   d. –4 to make –3   ....

   e. –1 to make 6?   ....

6. **Work out**

   a. 12 – 30   ....

   b. –12 + 13   ....

   c. –56 + 22   ....

   d. 25 – 10   ....

   e. –14 – 12   ....

   f. 13 – +13   ....

   g. –27 + –20   ....

   h. –14 – –10   ....

   i. 17 – –5   ....

   j. –10 + +6   ....

7. **Here is a number pyramid.**

   Two numbers are added together to give the number in the box above.
   Copy and complete this pyramid.

| –3 | 4 | –10 | –4 | 6 |
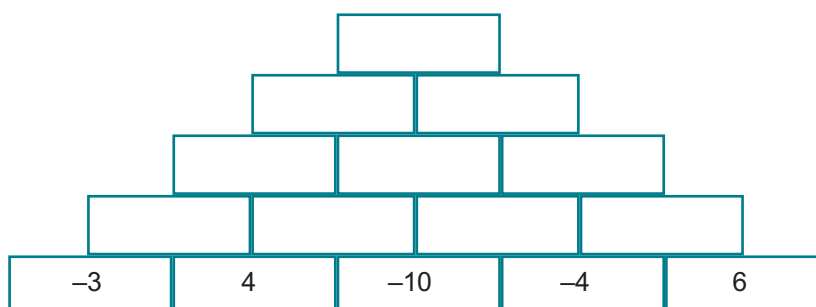
Multiplying and dividing positive and negative numbers

3 × 2 is the same as adding 3 lots of 2 (2 + 2 + 2) or 2 lots of 3 (3 + 3) = 6

So

3 × –2 is the same as adding 3 lots of –2 (–2 + –2 + –2) or 2 lots of –3 (–3 + –3) = –6

When we multiply a positive number by a negative number, we get a negative answer. So the answer to 3 x –2 is –6.

This is one of the rules shown in the table below.

positive × positive = positive	+ × + = +	When the signs are the same,
negative × negative = positive	– × – = +	the answer is positive
positive × negative = negative	+ × – = –	When the signs are different,
negative × positive = negative	– × + = –	the answer is negative

The same rules apply to division; just replace the multiplication sign by the division sign.

positive × positive = positive	+ ÷ + = +	When the signs are the same,
negative × negative = positive	– ÷ – = +	the answer is positive
positive × negative = negative	+ ÷ – = –	When the signs are different,
negative × positive = negative	– ÷ + = –	the answer is negative

Example

Find the value of

a. –4 × + 5.
b. –3 × –2
c. 5 × –3

a. –4 × + 5 = –20   signs different, negative
b. –3 × –2 = 6   signs the same, positive
c. 5 × -3 = –15   signs different, negative

Example

Find the value of

a. + 28 ÷ +7
b. –30 ÷ –5
c. –12 ÷ +8

a. +28 ÷ +7 = 4   signs the same, positive
b. –30 ÷ –5 = 6   signs the same, positive
c. –42 ÷ +6 = –7   signs different, negative

Task: These are for you to try. Write the answers here.

1. **Find the value of**

    a. $+5 \times +8$ ....

    b. -5×-4 ....

    c. $-3 \times +12$ ....

    d. -7×0 ....

    e. -6×9 ....

2. **Find the value of**

    a. $-64 \div +8$ ....

    b. $+32 \div -4$ ....

    c. $+100 \div -10$ ....

    d. $-63 \div -7$ ....

    e. $+11 \div 2$ ....

3. **Write in the missing number in each of these sums.**

    a. $-9 \times \ldots\ldots = -54$

    b. $120 \div \ldots\ldots = -6$

    c. $\ldots\ldots \times -8 = 72$

    d. $\ldots\ldots \times 13 = 0$

    e. $\ldots\ldots \div -3 = 11$

    f. $-13 \div \ldots\ldots = 6.5$

    g. $20 \times \ldots\ldots = -10$

    h. $\ldots\ldots \times -12 = 132$

    i. $\ldots\ldots \div 4 = -0.5$

    j. $-77 \div \ldots\ldots = -7$

4. **Two numbers multiply together to give the answer –20.**
    Write down five different multiplication sums that will give this answer.

    ....

    ....

    ....

    ....

    ....

5. **One number divided by another gives the answer –6.**
    Write down five different division sums that will give this answer.

    ....

    ....

    ....

    ....

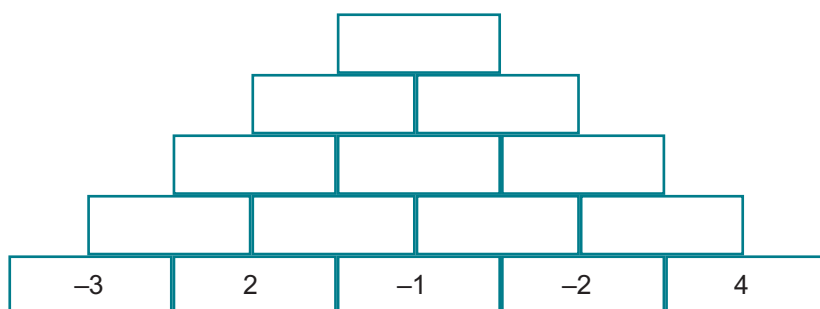   ....

6. Here is a number pyramid.

Two numbers are multiplied together to give the number in the box above.
Copy and complete this pyramid.

–3	2	–1	–2	4

Ordering Operations

Sometimes sums involve more than one operation.

$3 + 5 \times 2$ involves two operations; addition and multiplication.

If you add first, you will get

$3 + 5 \times 2 = 8 \times 2 = 16$

If you multiply first, you will get

$3 + 5 \times 2 = 3 + 10 = 13$

One of these answers is wrong. Which do you think it is?

The correct answer is 13. We have to do the multiplication first.

Mathematicians have decided on a rule for this based on the word BIDMAS.
This tells us the order to do the operations in.

B	Brackets	Do these first
I	Indices (or powers; squares and cubes...)	Then any indices
D	Division	Division and multiplication should be
M	Multiplication	worked together from left to right
A	Addition	Addition and subtraction should be
S	Subtraction	worked together from left to right

Example

Work out
- a. $12 - (4 - 5)$
- b. $7 \times -2 + 5$
- c. $-6 + 8 \times 5$

a. $12 - (4 - 5)$ We start with the sum in brackets, 4 take away 5. This
$= 12 - -1$ gives us –1. Using the rule; subtracting a negative
$= 12 + 1$ number is the same as adding the number.
$= 13$

b. $7 \times -2 + 5$ We need to do the multiplication first, 7×-2
$= -14 + 5$
$= -9$

c. $-6 + 8 \times 5$ Again we need to do the multiplication first 8×5
$= -6 + 40$
$= 36$

Examples

Here are some more examples, see if you can identify the first step before you look at the working:
- a. $16 - 4 \div -2$
- b. $20 \div (5 - 3)2$
- c. $3 + 5 \div 2 - (-1)2$

a. $16 - 4 \div -2$ The rules tell us we should do the division first
$= 16 - (-2)$
$= 16 + 2$
$= 18$

b. $20 \div (5 - 3)^2$ Brackets first, so 5–3 has been done first
$= 20 \div 2^2$ Indices 2^2 means 2×2
$= 20 \div 4$ Division next
$= 5$

c. $3 + 5 \div 2 - (-1)^2$ Brackets or indices first
$= 3 + 5 \div 2 - 1$ Division next
$= 3 + 2.5 - 1$ Finally, addition
$= 5.5 - 1$ and then subtraction.
$= 4.5$

Task: These are for you to try. Write the answers here.

1. Work out

    a. $6 + 2 \times 4$ ....

    b. $2 \times 9 - (3 + 8)$ ....

    c. $(5 \times 3) + 2$ ....

    d. $10 - (3 - 1)^2$ ....

    e. $4 \times 3 - 4 \div 2$ ....

2. Work out

    a. $-8 \div 2 + 3 \times -1$ ....

    b. $(-4)^2 - (1 + 2)^2$ ....

    c. $12 \div (-4) - 1$ ....

    d. $3 + 2 \times -2 + 3$ ....

    e. $(-3 \times -2)^2 + 4 \times -24$ ....

3. Yaema says that $11 \times 2 - 3 \times 3 = 51$.

    Is she correct? Explain your answer.

....

....

....

4. Explain why $2 \times 7 - 4 = 10$

....

....

....

5. Work out

    a. $\dfrac{(6 + 8 \times 2)}{11}$ b. $\dfrac{(4 \times -5 + 2)}{6}$ c. $\dfrac{105}{3 + 4 \times -2}$

6. Insert brackets to make this correct.

    a. $3 + 5 \times 2 = 16$ ....

    b. $14 - 6 - 2 = 10$ ....

    c. $6 + 10 \div -2 = -8$ ....

    d. $44 \div 13 - 2 + 7 = 11$ ....

    e. $5 - 1\ 2 + 3 - 2 = 17$ ....

Well done for completing these! Try to compare your answers with another Learning Assistant – did you get the same answers? Are there any questions that you find difficult? Mark these questions and remember to ask your tutor about them at the next Maths tutorial.

Now here is an exam question for you to try

Exam questions: take your answers to the next Maths tutorial

1. What is the value of the following?

   a. $4 + 3 \times 2 - 5$

   ....

   b. $4 + 3 \times 2 - (-5)$ *FTC entrance exam*

   ....

How am I doing?

	Easy (Tick this box if you feel confident that you **understand this section well)**	Fine (Tick this box if you still **need a little work** on this section)	Difficult (Tick this box if you still **need a lot of work** on this section)
I can write a mixture of positive and negative numbers in order.			
I can add and subtract positive and negative numbers			
I can multiply and divide positive and negative numbers			
I can use BIDMAS to find the value of sums involving positive and negative numbers and indices and brackets.			

Notes on what to do next:

....
....
....
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....
....

Signed (by Learning Assistant):

....

Date:

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Signed (by Tutor):

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Date:

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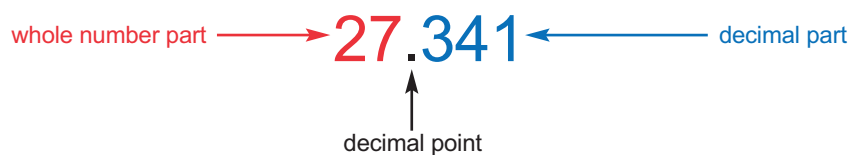
Decimals

In this section you are going to learn about decimals. Decimals are used to write numbers that are not exactly whole numbers. Using decimals allows us to write numbers very accurately. You will learn how to place decimal numbers in order of size and how to add, subtract, multiply and divide them. The weights of many everyday items can be written as decimals, for example 1.5 kilograms of potatoes. We can also write heights in metres and decimals of a metre for example, 1.62 metres for the height of a person.

There are three parts to this section. In each part there is something to read followed by some examples to follow – read these carefully several times. Then try the sums in the tasks.

Introducing decimals

A decimal has a whole number part, a decimal point and a decimal part.

The decimal point separates the whole number part from the decimal part.

The number 27.341 would be written in a place value table like this.

Hundreds	Tens	Units	.	Tenths	Hundredths	Thousandths
	2	7	.	3	4	1

Notice the headings in the tables

> Hundreds, if the value of the digit is greater than 1
>
> Hundredths, if the value of the digit is smaller than 1
>
> Tens, if the value of the digit is greater than 1
>
> Tenths, if the value of the digit is smaller than 1

We would read this number as

> Twenty seven point three four one.

and the total value is:

```
      2 0
       7
       0 . 3
       0 . 0 4
  +    0 . 0 0 1
      2 7 . 3 4 1
```

In the first week of the unit, you learnt how to put whole numbers into order of size. Sometimes you were asked to put them smallest first and sometimes biggest first.

This next example shows how to put decimals into order, this time smallest first.

Example

Write these decimals in order of size. Put the smallest number first.

2.356   2.4   2.34

Begin by putting them into a place value table.

Hundreds	Tens	Units	.	Tenths	Hundredths	Thousandths
		2	.	3	5	6
		2	.	4		
		2	.	3	4	

- Compare the whole numbers first, they are all 2.

- Now compare the tenths
    - 2.4 has a four in the tenths column so this is the biggest
    - 2.356 and 2.34 both have a three in the tenths column so one of these is the smallest.

- To find the smallest of 2.356 and 2.34, compare the hundredths
    - 2.34 has a 4 in the hundredths column so this is the smallest
    - 2.356 has a 5 in the hundredths column so this is the biggest

- We do not need to compare the thousandths column as only one of the numbers has a digit in this column.

Rewriting the decimals smallest first, they are:

2.34   2.356   2.4

Note that 2.356 is the longest decimal, but it is not the biggest. This is a common mistake.

Example

Write these numbers in order of size. Put the biggest number first.

    63.46   64.54   63.49   67.3   63

Hundreds	Tens	Units	.	Tenths	Hundredths	Thousandths
	6	3	.	4	6	
	6	4	.	5	4	
	6	3	.	4	9	
	6	7	.	3	0	
	6	3	.	0		

- Compare the tens column first, they are all 6

- Now compare the units
    - 67.3 has a 7 in the units column so this is the biggest.   67.3
    - 64.54 has a 4 in the units column so this is next biggest   64.54
    - The other three numbers all have threes.

- Now compare the tenths
    - The last number looks as though it has no digit in the tenths column.
    To make this easier to work out, put a zero in. 0
    This does not change its value.
    - 63 or 63.0 is the smallest so look at 63.46 and 63.49.
    - They both have fours in the tenths column so look at the hundredths column
    - 63.49 is the bigger as it has a nine in this column.   63.49
        63.46
        63

Rewriting the numbers biggest first, they are:

    67.3   64.54   63.49   63.46   63

When you get used to doing these type of questions, you will be able to write the numbers underneath each other rather than using a place value table.

67.3

64.54

63.49

63.46

63

Multiplying and dividing by 10, 100 and 1000.

When you multiply by 10, all the digits in a number move one place to the **left.**

This makes the answer **bigger.**

If multiplying by 100, all the digits move two places and if multiplying by 1000, the digits will move three places.

When you divide by 10, 100, 1000..., you move the digits in the number to the **right** instead of the left.

This makes the answer **smaller.**

Example

Multiply 0.451 by 100

Thousands									
Hundreds	Tens	Units	Hundreds	Tens	Units	.	Tenths	Hundredths	Thousandths
					0	.	4	5	1
				4	5	.	1		

The digits move two places to the left.

The answer is 45.1

Example

Divide 2.6 by 1000

Hundreds	Tens	Units	.	Tenths	Hundredths	Thousandths	Ten thousandths
		2	.	6			
		0	.	0	0	2	6

The digits move three places to the right.

This time, we have to fill the spaces with zeros to be able to give the complete number its correct place values.

The answer becomes 0.0026

Task: These are for you to try. Write the answers here.

1. This diagram shows 1.5 on a number line
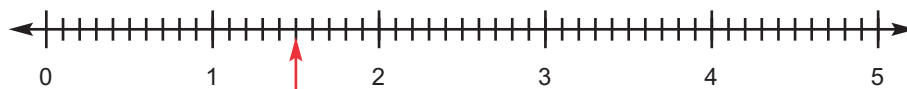
On the following number line, draw similar arrows to show the decimals given below. Label your lines.

   a) 4.7
   b) 1.2
   c) 2.0
   d) 0.1
   e) 4.9

2. Rewrite these numbers in order; smallest first.

a) 5.8	5.1	4.9	4.7	5

b) 0.3	0.23	0.32	0.2	0.223

c) 0.02	0.2	0.002	2	20

3. Rewrite these numbers in order; biggest first

a) 1.1	1.01	1.002	1.02	1.001

b) 32.15	31.5	32.05	33.25	31.05

c) 7.71	7.71	77.817	7.708	7.871

4. Multiply each of the following numbers by 1000

   a) 79   ....
   b) 7 900   ....
   c) 7.9   ....
   d) 0.079   ....
   e) 0.00079   ....

5. **Divide each of the following numbers by 100**

   a) 8 500 ....

   b) 85 ....

   c) 0.85 ....

   d) 0.0085 ....

   e) 8.5 ....

6. **Kilometres and metres are used to measure large distances.**

   To change kilometres to metres you multiply by 1 000.

   Complete this sentence.

   To change metres to kilometres you.................. by......................

   When we change from one measure to another we are converting.

   Convert the following:

   a) Convert 3000 metres to kilometres ....

   b) Convert 3.4 kilometres to metres ....

   c) Convert 0.8 kilometre to metres ....

7. **George buys some crain-crain at the market. He buys 0.7 kilograms of this vegetable.**

   How many grams does he buy?

   There are 1 000g in a kg.

   ....

Addition and subtraction of decimals

We will again start off with an example using the place value tables but as soon as you are ready, you can do the sums, without the tables; using the column method.

Example

Add together the following decimals

25.06, 8.72 and 1.07

Hundreds	Tens	Units	.	Tenths	Hundredths
	2	5	.	0	6
		8	.	7	2
		1	.	0	7
	3	**4**	**.**	**8**	**5**
	1			1	

$6 + 2 + 7 = 15$

This means that the unit digit 5, must go in the hundredths column.

The digit 1 is worth 1/10 and the 1 must be placed underneath the answer line as a carry figure.

Do not forget to add this in when you add the numbers in the tenths column. $5 + 8 + 1 = 14$

This means that the unit digit 4, must go in the units column.

The digit 1 is worth 10 and the 1 must be placed underneath the answer line as a carry figure.

Do not forget to add this in when you add the numbers in the tenths column.

Remember
- Line the numbers up in columns by the decimal points
- Write carry figures in small type underneath the answer line
- Do not forget to add the carry figures

Example

Subtract the following numbers using the column method.

6.27 − 3. 5

Subtraction **cannot** be done in any order so make sure that you put the first number on the top.

Line up the numbers so that the decimal points are underneath each other. It is helpful to put in the zero (0) to make the decimals the same length.

$$
\begin{array}{r}
5\,\cancel{6}.^{1}27 \\
-\ 3.\ 50 \\
\hline
2.\ 77
\end{array}
$$

In the tenths column, 5 is bigger than 2.

Bring one of the units across and leave 5 units in the units column instead of 6.

We can now say 12 take away 5, which is 7.

Subtract the rest of the columns in the usual way.

Remember
- Subtract figures in the same column.
- Always work from right to left
- Always take the bottom number from the top number

Task: These are for you to try. Write the answers here.

1. Work out these without a calculator. Show all your working.

a)　12.4
　　+ 3.2
　　───────

b)　27.9
　　+ 5.6
　　───────

c)　104.32
　　　57.1
　　+ 33.05
　　───────

d)　　0.7
　　　0.05
　　+ 0.003
　　───────

e)　120.3
　　　77.09
　　+ 44.7
　　───────

2. a)　25.9
　　　− 12.5
　　　───────

b)　34.9
　　− 17.2
　　───────

c)　132.0
　　− 99.9
　　───────

d)　3.750
　　− 2.382
　　───────

e)　1.002
　　− 0.009
　　───────

3. a) Zainab says that 3.4 + 0.05 equals 3.45
   Karamoh says that 3.4 + 0.05 equals 3.9

Who is correct?...
Explain your answer.

....

....

b) Momka says that 5.34 – 2.73 is 2.51
   Roberta says that 5.34 – 2.73 is 3.41

Who is correct?...
Explain your answer.

....

....

4. These are number pyramids.

Two numbers are added together to give the number in the box above. Complete these number pyramids.

a)

| 1.1 | 0.3 | 0.1 | 1.4 | 0.2 |

b)

6.6

2.9   8.2

1.9   0.6
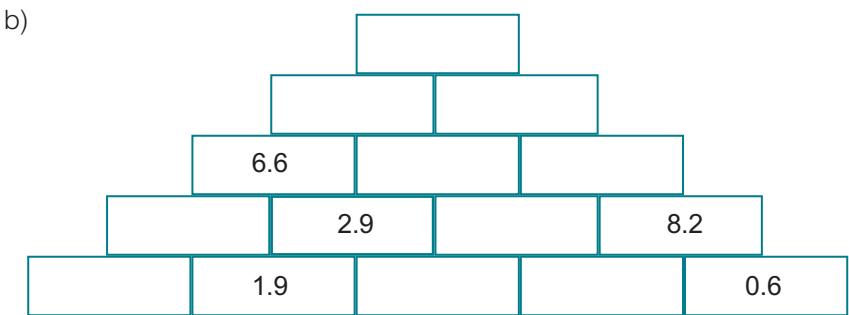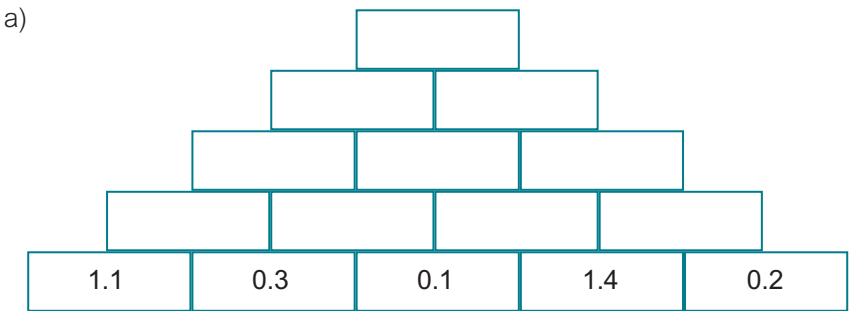
5. Four runners were running a 100 metre relay race. To find the total time for the team, each of the four times must be added together.

Name	Time taken in seconds
Vera	13.2
Aminata	13.9
Hannah	14.6
Tenneh	14.5

Find the total time for the team.

....

....

6. A wooden box contains 4.3 kg of guavas and 1.9 kg of pawpaws. The total weight of the box itself and its contents is 9.1 kg.
How much does the box weigh?

....

....

7. **Joshua wants to put a shelf up on the wall of his house. He has two pieces of wood. One piece is 1.1 metre long and the other is 75 cm long. The shelf needs to be 1.5 metres long.**

Explain how he could make this shelf.
Hint: What are the sizes of the two pieces of wood that he needs to use?

....

....

....

....

Multiplication and division of decimals

In an earlier session you learnt that there were two main methods for multiplication; the grid method and the column method.

Example

Multiply 2.8 by 3.4

We need to take out the decimal points and do the sum 28×34.

When taking these out we have multiplied 2.8 by 10 and multiplied 3.4 by 10.

The whole sum has been multiplied by 100.

This means that once we have found the answer to 28×34, we need to divide the answer by 100.

Grid method
28 is the same as 20 + 8
34 is the same as 30 + 4

×	20	8	
30	600	240	= 840
4	80	32	= 112
			= 952

Column method

```
    2  8        7 × 3 = 21, 3 × 3 = 9
 ×  3  4        7 × 2 = 14, 3 × 2 = 6
 1  1₃ 2
 8₂ 4  0
 9  5  2
```

- Multiply 28 by 4
- Add a zero in the units column on the next line.
  This is because we are multiplying 28 by 30 NOT 3.
- Add together the two lines above to give the answer.

Whichever method you have used, you should get the answer 952.

Earlier, we multiplied the sum by 100.

Now, we need to divide this answer by 100.

$952 \div 100 = 9.52$

So $2.8 \times 3.4 = 9.52$

Hint: We know our answer is going to be a bit bigger than $2 \times 3 = 6$, so we expect it to be around 9 rather than around 90 or even 900. This is called doing a rough **estimate.**

Example

The same idea is used when dividing decimals. We need to change the division sum so that the numbers can easily be divided.

Divide 482.4 by 0.04

We need to divide by a whole number.

$0.04 \times 100 = 4$

This means that we have to multiply each number by 100.

So $482.4 \div 0.04$

Is the same as $48\ 240 \div 4$

$$\begin{array}{r} 1\ 2\ 0\ 6\ 0 \\ \hline 4\ )\ 4\ 8\ 2^2 4\ 0 \end{array}$$

4's into 4, goes once, none left over

4's into 8, goes twice, none left over

4's into 2, does not go, two left over

4's into 24, goes 6 times, none left over

4's into 0, does not go or goes 0 times.

So $482.4 \div 0.04 = 12\ 060$

Task: These are for you to try. Write the answers here. These questions should all be done without a calculator.

1. **Work out**

   a) 3.7×4 ....

   b) 0.3×5 ....

   c) 1.3×2.3 ....

   d) 0.72×4.5 ....

   e) 3.67×2.1 ....

2. **Work out**

   a) 60 ÷ 0.6 ....

   b) 14.4 ÷ 8 ....

   c) 0.56 ÷ 0.07 ....

   d) 7.2 ÷ 0.12 ....

   e) 0.36 ÷ 0.0009 ....

3. **Suzan is making school dresses for her children and her sister's children to wear to school. Each dress takes 1.8 metres. Suzi has twins and her sister,   Martina has three girls.**

   How much material will she need to make dresses for all of the girls?

   ....

   ....

4. **A factory makes fizzy drinks. The drink is sold in cans which hold 0.3 litres. In one day, the factory makes 3477 litres of drink.**

   How many cans will be filled?

   ....

   ....

5. **Favour wants to cover the floor of her house with matting. Matting comes in squares 0.5 of a metre by 0.5 of a metre. Here is a plan of the floor of the house.**

   2.5 metres

   2 metres
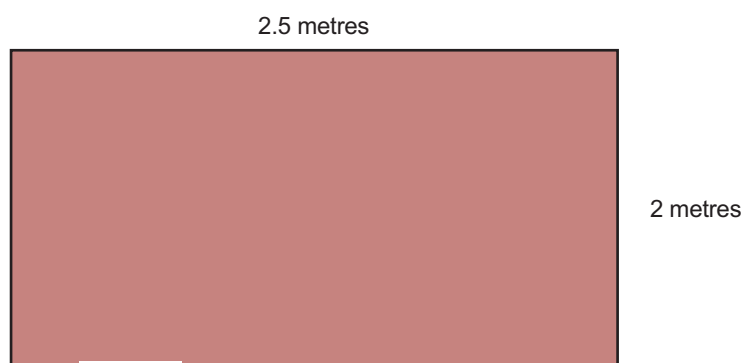
   How many squares will she need to cover the floor?

6. **Look at this sum carefully**

   7.5 ÷ 0.6 = 12.5

   Use this answer to find out the missing numbers in these questions

   a)   7.5 ÷ 0.6 = ...

   b)   .... ÷ 0.6 = 1250

   c)   0.75 ÷ 0.6 = ...

7. **Henry says that when you divide one number by another number the answer is always smaller than the first number.**

Find three examples that show that Henry is not always right.

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Well done for completing these! Try to compare your answers with another Learning Assistant – did you get the same answers? Are there any questions that you find difficult? Mark these questions and remember to ask your tutor about them at the next Maths tutorial.

Now here are a few exam questions for you to try

Exam questions: take your answers to the next Maths tutorial

1. Multiply 4.32 by 6.5.

   Choose from the following answers

   a) 18.04   b) 28.08   c) 30.25   d) 28.15   ....

2. Calculate 1.93×0.3

   Choose from the following answers

   a) 5.79   b) 57.9   c) 0.579   d) 579   ....

3. a) Add 23.4, 3.86 and 0.431

....

   b) Simplify 0.30×0.87

....

   c) Simplify $4.77 \div 0.009$

....

4. What is the value of the following?

   a) 1.8×0.06

....

   b) $1.8 \div 0.06$

....

How am I doing?

	Easy (Tick this box if you feel confident that you **understand this section well)**	Fine (Tick this box if you still **need a little work** on this section)	Difficult (Tick this box if you still **need a lot of work** on this section)
I can rewrite decimal numbers in order.			
I can multiply and divide decimals by 10, 100 and 1000			
I can add and subtract decimals			
I can multiply and divide decimals			

Notes on what to do next:

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Signed (by Learning Assistant):

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Date:

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Signed (by Tutor):

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Date:

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Rounding and Significant figures

In this section you are going to learn about rounding to the nearest ten, hundred and thousand as well as to the nearest tenth, hundredth or thousandth. You will also learn how to round numbers to a given number of decimal places or to a number of significant figures. We often round amounts in real life, for example, when buying fruit or vegetables, we can never buy exactly 1kg of cassava; the seller will weigh roughly one kilogram. Another example is when we are buying building materials, we might need 466 bags of sand but we might round the number of bags to the nearest hundred so that we have some spare ones just in case we waste any.

There are three parts to this section. In each part there is something to read followed by some examples to follow – read these carefully several times. Then try the sums in the tasks.

Introduction to rounding

We do not always have to give answers exactly. Sometimes it is enough to give a rough or an approximate answer. This answer can be found by rounding.

Numbers can be rounded to the nearest whole number, to the nearest 10, 100 or 1000.

Decimals can also be rounded to the nearest ten<u>th</u>, hundred<u>th</u> or thousand<u>th.</u>

Example

Round the number 1 248 to the nearest hundred.

Look at the hundreds column 1 248

This number lies between 1 200 and 1 300

1 248 is nearer 1 200 than 1 300

```
|---|---|---|---|---|---|---|---|---|---|---|---|---|--->
 1 200               1 250                       1 300
```
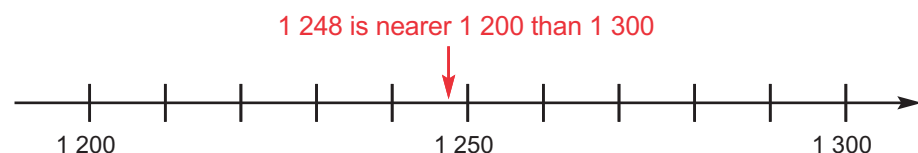
So 1248 is 1200 (to the nearest hundred).

Example

Round 13.47 to the nearest tenth

Look at the ten<u>ths</u> column. 13.47

This number lies between 13.4 and 13.5. You might like to think of this as 13.40 and 13.50.

13.47 is nearer to 13.50 than it is to 13.40

So 13.47 is 13.5 (to the nearest tenth).

You will notice that we do not write 13.50 as it would look like we had rounded this to the nearest hundredth and not the nearest tenth.

If a number is exactly halfway or in the middle of two numbers, we would round it up.

Example

Round 585 to the nearest 10

Look at the tens column 585

585 is exactly halfway between 580 and 590.

585 is exactly halfway between 580 and 590
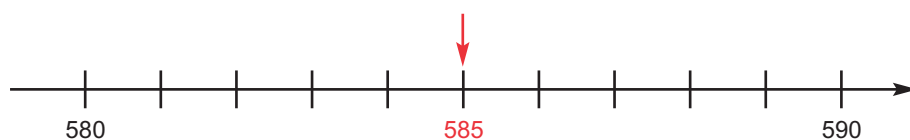
This means it rounds **up** to 590.

So 585 is 590 (to the nearest 10)

After a while you should be able to do these without drawing a number line.

One way is to put a line in the number.

The last example would be written as follows:

Example

Round 585 to the nearest 10

Look at the tens column 585

5 8 | 5

Draw a line straight after the tens column.

If the number after the line is 5 or more, round up.

If the number after the line is less than 5 round down.

Task: These are for you to try. Write the answers here.

1. **Round each of the following numbers to the nearest ten:**

    a. 26 ....

    b. 134 ....

    c. 155 ....

    d. 8 729 ....

    e. 56 452 ....

    f. 12.99 ....

    g. 457.8 ....

    h. 1 268.4 ....

    i. 5 ....

    j. 99 ....

2. **Round each of the following numbers to the nearest whole number**

    a. 19. 2 ....

    b. 405.7 ....

    c. 2.03 ....

    d. 72.9 ....

    e. 72.09 ....

    f. 0.98 ....

    g. 12.635 ....

    h. 40.202 ....

    i. 0.499 ....

    j. 0.51 ....

3. **Round each of the following numbers to the nearest hundredth**

    a. 563.287 ....

    b. 0.066 ....

    c. 3.005 ....

    d. 0.022 ....

    e. 0.999 ....

    f. 2.341 ....

    g. 0.004 ....

    h. 4.678 ....

    i. 231.745 ....

    j. 172.727 ....

4. **Momka measured his height to the nearest cm. He was 135.8 cm tall.**

    a. What is his height to the nearest centimetre?

    ....

    b. What is his height to the nearest metre?

    ....

5. **Brookfields stadium in Freetown can hold at the most 45 000 people. On a particular day, 37 459 people attended a match with Nigeria.**

    How many attended to the nearest 500.

    ....

6. **Here are the heights of the five highest mountains in Africa.**

Mountain	Country	Height
Kibo (Uhuru Peak)	Tanzania	5 895 metres
Mount Kenya (Bhatian)	Kenya	5 199 metres
Mawenzi (Hans Meyer Peak)	Tanzania	5 148 metres
Ngaliema/Mt Stanley (Margherita Peak)	DR Congo/Uganda	5 109 metres
Mount Kenya (Lenana)	Kenya	4 985 metres

http://en.wikipedia.org/wiki/Highest_mountain_peaks_of_Africa

Rewrite each of the heights of these mountains

a, To the nearest 100 metres.

b. To the nearest 5 metres

....

....

....

....

....

....

....

....

....
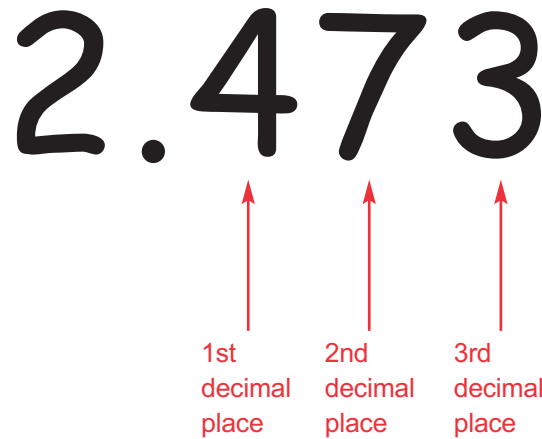
....

Rounding to a given number of decimal places

Numbers can be rounded to a given number of decimal places. These decimal places are counted from the right of the first decimal place.

$$2.473$$

1st decimal place   2nd decimal place   3rd decimal place

Example

Round the number 5.231 to 2 decimal places

Draw a line straight after the second decimal place.

$$5.23|1$$

The number after the line is less than 5, so we round down.

5.231 is 5.23 (to 2 decimal places)

Instead of 'to 2 decimal places, we can write 'to 2 d pl'.

Rounding to 2 decimal places is the same as rounding to the nearest hundredth.

Example

Round the number 0.01497 to 4 decimal places

Draw a line straight after the fourth decimal place.

$$0.0149|7$$

The number after the line is 5 or more. so we round up.

0.01497 is 0.0150 (to 4 d pl)

It is very important that we show four decimal places in our answer,

We MUST NOT write 0.015 even though this is worth the same as 0.0150

Rounding to 4 decimal places is the same as rounding to the nearest ten thousandth.

Task: These are for you to try. Write the answers here.

1. **Round each of the following numbers to 1 decimal place**

    a. 8.32 ....

    b. 5.98 ....

    c. 53.44 ....

    d. 123.99 ....

    e. 0.36 ....

    f. 0.07 ....

    g. 0.005 ....

    h. 34.049 ....

    i. 211.11 ....

    j. 0.399999 ....

2. **Round each of the following numbers to 3 decimal places**

    a. 5.8994 ....

    b. 0.0736 ....

    c. 19.4975 ....

    d. 0.0032 ....

    e. 0.0038 ....

    f. 348.5555 ....

    g. 99.9999 ....

    h. 78.425262 ....

    i. 0.7477 ....

    j. 0.05444 ....

3. **A patient who was suffering with a fever, saw a doctor at a community health centre. The patient's temperature was measured as 35.67 degrees Celsius. Write this temperature**

    a. to the nearest degree.

    ....

    b. to 1 decimal place.

    ....

4. **In 1999, Quintin Saliah Koneh set the men's high jump record for Sierra Leone at 2.07m. Eunice Barber set the women's record in 1997 at 1.83m.**

    Round each of these heights to the nearest 10 centimetres.

    ....

5. Here are the times for the women's 400 metres in the 2013 World Athletics Championships.

Rank ⇕	Lane ⇕	Name ⇕	Nationality ⇕	Time ⇕	Notes ⇕
1	4	Christine Ohuruogu	Great Britain	49.41	NR
2	5	Amantle Montsho	Botswana	49.41	
3	8	Antonina Krivoshapka	Russia	49.78	
4	2	Stephanie McPherson	Jamaica	49.99	
5	3	Natasha Hastings	United States	50.30	
6	6	Francena McCorory	United States	50.68	
7	7	Kseniya Ryzhova	Russia	50.98	
8	1	Novlene Williams-Mills	Jamaica	51.49	

http://en.wikipedia.org/wiki/2013_World_Championships_in_Athletics_%E2%80%93_Women%27s_400_metres

Round each of these runner's times correct to one decimal place. The table shows that the first and second place runners have got the same time? Why is this? They cannot have the same times or they would be joint first.

1 ....   2 ....

3 ....   4 ....

5 ....   6 ....

7 ....   8 ....

....

....

6. The earth moves around the sun in 365.26 days. This is called the orbital period.

The following table shows how long it takes for the planets in our solar system to move around the sun.

Planet	Orbital period
Mercury	87.969 days
Venus	224.701 days
Earth	365.256 days
Mars	686.98 days
Jupiter	11.862 years
Saturn	29.457 years
Uranus	84.011 years
Neptune	164.79 years
Pluto	247.68 years

Rewrite each of the orbital periods correct to 2 decimal places.

....

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....

This table was adapted from Nick Strobel's Astronomy Notes.
Go to his site at http://www.astronomynotes.com/ for the full version.

Rounding to a given number of significant figures

Significant figures are counted form the first non-zero digit. It does not matter where the decimal points are.

$$24.305$$

1st	2nd	3rd	4th	5th
sig. fig	sig. fig	sig. fig	sig. fig	sig. fig

The 1st significant figure is worth the most; twenty (20)

The 5th significant figure is worth the least; five thousandths (5/1000)

$$0.0273$$

1st	2nd	3rd
sig. fig	sig. fig	sig. fig

The 1st significant figure is worth the most; two tenths (2/10)

The 3rd significant figure is worth the least; three ten thousandths (3/10 000)

Here the zero's at the beginning do not count as significant.

Example

Round each of these numbers to 2 significant figures.

a. 5 472 b. 7.445 c. 0.0795

a. Draw a line straight after the second significant figure

5 4|7 2

The number after the line is 5 or more so we round up.

This time we cannot round five thousand, four hundred and seventy two to fifty five.

We need to add two zeros to make it the right size.

So 5 472 is 5 500 (to 2 sig fig)

b. Draw a line straight after the second significant figure

7.4|45

The number after the line is less than 5, so we round down

So 7.445 is 7.5 (to 2 sig fig)

c. Draw a line straight after the second significant figure

0.079|5

The number after the line is 5 or more, so we round up

So 0.0795 is 0.080 (to 2 sig fig)

We must always show two significant figures in the answer even if one of them is zero.

0.0<u>80</u> has two significant figures.

Task: These are for you to try. Write the answers here.

1. Round the following numbers to 1 significant figure

a. 78 ....

b. 32 ....

c. 761 ....

d. 986 ....

e. 18 945 ....

f. 0.034 ....

g. 0.78 ....

h. 2.67 ....

i. 0.00036 ....

j. 0.99999 ....

2. Round the following numbers to 3 significant figures

a. 4.037 ....

b. 909.5 ....

c. 1 367 ....

d. 6 899 ....

e. 23.73 ....

f. 0.0481 ....

g. 0.000828282 ....

h. 1.8282 ....

i. 0.05076 ....

j. 10.999993 ....

3. **Sierra Leone has a total area of 71,740 km² (27,699 sq mi), divided into a land area of 71,620 km² (27,653 sq mi) and water of 120 km² (46 sq mi).**

Round all the numbers shown above to two significant figures.

Write them in the correct place on the dotted lines below.

Sierra Leone has a total area of.................. km² (.................sq mi), divided

into a land area of.................. km² (....................... sq mi) and water of

.... km² (............................sq mi).

In your answer, the area of land plus the area of water adds up to more than the total area. Explain why this is?

....

....

....

4. **Pi is a special number in mathematics. It is sometimes written as π, which is a Greek letter.**

   Pi has a decimal value of 3.14159265.

   The dots after the decimal shows that it keeps on going and that you can never write down an exact value for pi.

   To make our calculations easier we sometimes round the value of pi.

   What is pi rounded to

   a. 4 significant figures   b. 6 significant figures?

   ....

5. **Give an example of a number that when rounded to 2 significant figures is the same as rounding to the nearest 1000.**

   ....

6. **Zacharias bought two books and placed them side by side on a shelf. Each book was 8cm thick when rounded to the nearest cm. He had a space of exactly 16cm wide.**

    He could not fit them in. Why not?
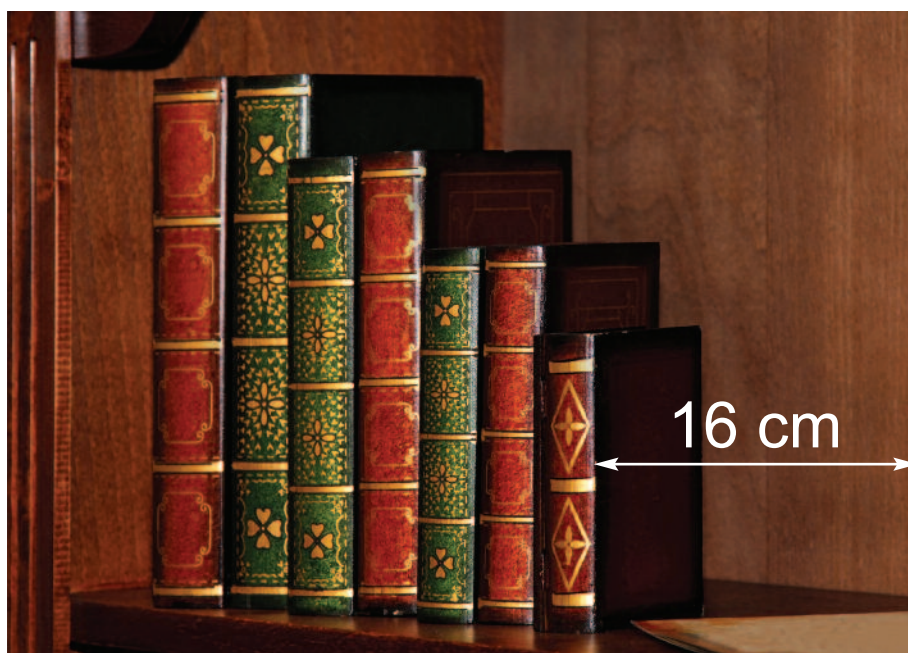
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Well done for completing these! Try to compare your answers with another Learning Assistant. Did you get the same answers? Are there any questions that you find difficult? Mark these questions and remember to ask your tutor about them at the next Maths tutorial.

How am I doing?

	Easy (Tick this box if you feel confident that you **understand this section well)**	Fine (Tick this box if you still **need a little work** on this section)	Difficult (Tick this box if you still **need a lot of work** on this section)
I can round numbers to the nearest 10, 100 and 1000.			
I can round numbers to the nearest tenth, hundredth and thousandth			
I can round numbers to a given number of decimal places			
I can round a number to a given number of significant figures.			

Notes on what to do next:

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Signed (by Learning Assistant):

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Date:

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Signed (by Tutor):

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Date:

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Acknowledgements

Maths Unit 1