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Introduction and guidance

About this free course

This free course is an adapted extract from the Open University course .

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Contents

Introduction

Introduction and guidance

This free badged course, *Everyday maths 1*, is an introduction to Level 1 Functional Skills in maths. It is designed to inspire you to improve your current maths skills and help you to remember any areas that you may have forgotten. Working through the examples and interactive activities in this course will help you to develop the numerical and problem solving skills required for work in the Health and Social Care and Education Support sectors.

You can work through the course at your own pace. To complete the course you will need access to a calculator and a notepad and pen.

The course has four sessions, with a total study time of approximately 48 hours. The sessions cover the following topics: numbers, measurement, data, and shapes and space. There will be plenty of examples to help you as you progress, together with opportunities to practise your understanding.

The regular interactive quizzes form part of this practice, and the end-of-course quiz is an opportunity to earn a badge that demonstrates your new skills. You can read more on how to study the course and about badges in the next sections.

After completing this course you will be able to:

- understand practical problems, some of which are non-routine
- identify the maths skills you need to tackle a problem
- use maths in an organised way to find the solution you're looking for
- use appropriate checking procedures at each stage
- explain the process you used to get an answer and draw simple conclusions from it.

Moving around the course

The easiest way to navigate around the course is through the 'My course progress' page. You can get back there at any time by clicking on 'Back to course' in the menu bar.

It's also good practice, if you access a link from within a course page (including links to the quizzes), to open it in a new window or tab. That way you can easily return to where you've come from without having to use the back button on your browser.

What is a badged course?

While studying *Everyday maths 1* you have the option to work towards gaining a digital badge.

Badged courses are a key part of The Open University's mission *to promote the educational well-being of the community*. The courses also provide another way of helping you to progress from informal to formal learning.

To complete a course you need to be able to find about 48 hours of study time. It is possible to study them at any time, and at a pace to suit you.

Badged courses are all available on The Open University's OpenLearn website and do not cost anything to study. They differ from Open University courses because you do not receive support from a tutor. But you do get useful feedback from the interactive quizzes.

What is a badge?

Digital badges are a new way of demonstrating online that you have gained a skill. Schools, colleges and universities are working with employers and other organisations to develop open badges that help learners gain recognition for their skills, and support employers to identify the right candidate for a job.

Badges demonstrate your work and achievement on the course. You can share your achievement with friends, family and employers, and on social media. Badges are a great motivation, helping you to reach the end of the course. Gaining a badge often boosts confidence in the skills and abilities that underpin successful study. So, completing this course should encourage you to think about taking other courses, for example enrolling at a college for a formal qualification. (You will be given details on this at the end of the course.)

How to get a badge

Getting a badge is straightforward! Here's what you have to do:

- read all of the pages of the course
- score 70% or more in the end-of-course quiz.

For all the quizzes, you can have three attempts at most of the questions (for true or false type questions you usually only get one attempt). If you get the answer right first time you will get more marks than for a correct answer the second or third time. Therefore, please be aware that for the end-of-course quiz it is possible to get all the questions right but not score 50% and be eligible for the OpenLearn badge on that attempt. If one of your answers is incorrect you will often receive helpful feedback and suggestions about how to work out the correct answer.

If you're not successful in getting 70% in the end-of-course quiz the first time, after 24 hours you can attempt it again and come back as many times as you like.

We hope that as many people as possible will gain an Open University badge – so you should see getting a badge as an opportunity to reflect on what you have learned rather than as a test.

If you need more guidance on getting a badge and what you can do with it, take a look at the OpenLearn FAQs. When you gain your badge you will receive an email to notify you and you will be able to view and manage all your badges in My OpenLearn within 24 hours of completing the criteria to gain a badge.

Now get started with Session 1.

Session 1: Working with numbers

Introduction

It is very difficult to cope in everyday life without a basic understanding of numbers.

Calculators can be very useful, for example helping you to check your working out, or converting fractions to decimals.

To complete the activities in this course you will need some notepaper, a pen for taking notes and working out calculations and a calculator.

Session 1 includes many examples of numeracy from everyday life and from a variety of roles within the Health and Social Care and Education Support sectors, including nursing, midwifery and social work. There are lots of learning activities related to them that involve whole numbers, fractions, decimals, percentages, ratios and proportion. The activities in this session are quick and easy tasks that should not take long to do.

By the end of this session you will be able to:

- work with whole numbers
- use rounding
- understand fractions, decimals and percentages, and the equivalencies between them
- use ratios and proportion
- understand word formulas and function machines.

Video content is not available in this format.

1 Whole numbers

What is a whole number? The simple answer is ‘any number that does not include a fraction or decimal part’.

So for example, 3 is a whole number, but 3 or 3.25 are NOT whole numbers.

Numbers can be positive or negative.

Positive numbers can be written with or without a plus (+) sign, so 3 and +3 are the same.

Negative numbers always have a minus (–) sign in front of them, such as –3, –5 or –2.

1.1 Positive numbers and place value

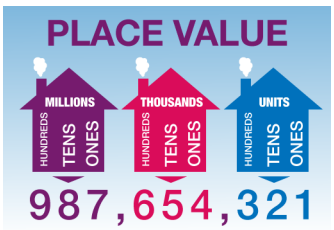

Figure 1 Place value

Let’s look at positive numbers in more detail.

The place value of a digit in a number depends on its position or place in the number:

The value of 8 in 58 is 8 units.

The value of 3 in 34 is 3 tens.

The value of 4 in 435 is 4 hundreds.

The value of 6 in 6,758 is 6 thousands.

Look at the following example, which shows the place value of each digit in a seven-digit number.

Example: What's in a number?

Take the number 9,046,251. The value of each digit is as follows:

9 millions

0 hundred thousands

4 ten thousands (or 40 thousand)

6 thousands

2 hundreds

5 tens

1 unit

To make large numbers easier to read, we put them in groups of three digits starting from the right:

6532 is often written as 6,532 (or 6 532).

25897 is often written as 25,897 (or 25 897).

596124 is often written as 596,124 (or 596 124).

7538212 is often written as 7,538,212 (or 7 538 212).

Use the example above to help you with the following activity. Remember to check your answers once you have completed the questions.

Activity 1: Working with place value

1. Write 4,025 in words.

Th	H	T	U
4	0	2	5

Answer

4,025 in words is four thousand and twenty-five.

2. Write six thousand, four hundred and seventy-two in figures.

Th	H	T	U
six	four	seven	two

Answer

Six thousand, four hundred and seventy-two in figures is 6,472.

3. Here are the results of an election to be school governor at Hawthorn School:

   John Smith: 436 votes

   Sonia Cedar: 723 votes

   Pat Kane: 156 votes

   Anjali Seedher: 72 votes

   Who won the election?

   Check your answer with our feedback before continuing.

Answer

The person who wins the election is the person who gets the most votes.

To find the biggest number we need to compare the value of the first digit in each number. If this is the same for any of the numbers, then we need to go on to compare the value of the second digit in each number and so on.

The value of the first digit in 436 is 4 hundreds.

The value of the first digit in 723 is 7 hundreds.

The value of the first digit in 156 is 1 hundred.

The value of the first digit in 72 is 7 tens.

Comparing the values of the first digit in each number tells us that the biggest number is 723, so Sonia Cedar is the winner of the election.

1.2 Negative numbers

So far you have only looked at positive numbers, but negative numbers are just as important. Negative numbers have a minus sign (–) in front of them.

Some examples of where negative numbers will apply to real life is with temperatures and bank balances, although hopefully our bank balances will not display too many negatives!

Perhaps you've seen negative numbers in weather reports where a temperature is below freezing, for example –2°C. Extreme cold weather can present a risk to life. Healthcare professionals need to be aware of when these risks could affect the patients that they are responsible for, so that they can respond accordingly.

If you ever have an overdraft at the bank, you may see minus signs next to the figures. If a bank statement reads –£30, for example, this tells you how much you're overdrawn. In other words, what you owe the bank!

Where have you seen negative numbers recently? Look at this thermometer:

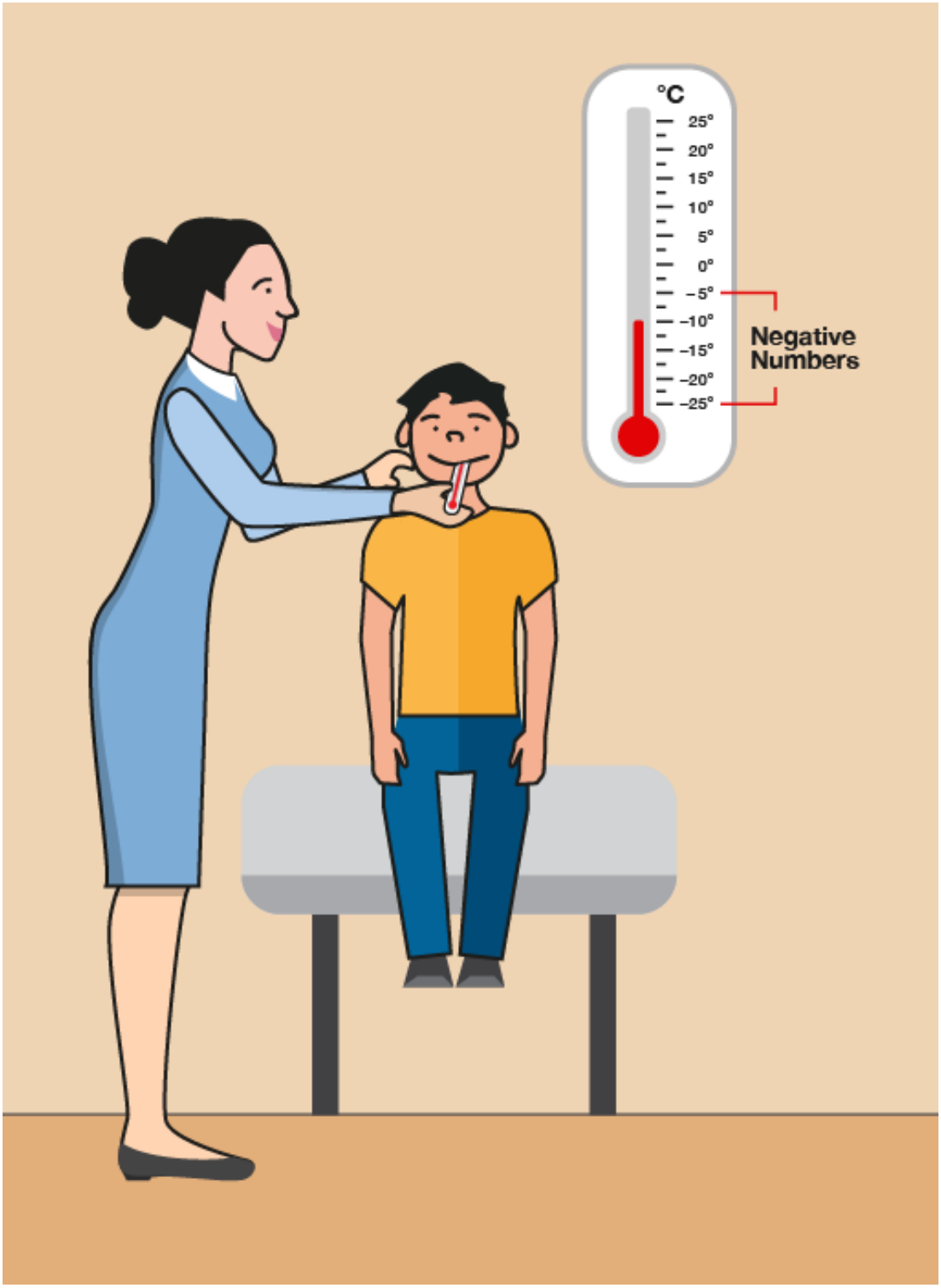

Figure 2 A nurse taking a patient's body temperature in extreme cold weather

It shows us that:

- –10°C is a lower temperature than –5°C
- –15°C is a lower temperature than –10°C.

Hint: 'Lower' means 'less than'.

The lower the temperature, the colder it is.

Activity 2: Using negative numbers in everyday life

1. The following table shows the temperatures in several cities on one day.

City	Temperature
A	–2°C
B	–5°C
C	–1°C
D	–8°C
E	–3°C

Which are the coldest and warmest cities?

2. A particular brand of ice cream includes the following note in its storing instructions:

For best results, store in temperatures between –10°C and –6°C

If your freezer's temperature was –11°C, would it be OK to keep this ice cream in it?

Answer

1. City D is the coldest because it has the lowest temperature. City C is the warmest because it has the highest temperature.
2. No, because –11°C is colder than the recommended range of between –10°C and –6°C. Keeping the ice cream in your freezer would probably damage the ice cream.

You have now seen how we use negative numbers in everyday life, for example bank balances and temperatures. Try practising using them when you are out and about. You will also use this skill within some simple questions that are coming up.

1.3 Working with whole numbers

The following activities cover everything in the whole numbers section. As you attempt the activities, look for key words to identify what the question is asking you to do.

Remember to check your answers once you have completed the questions.

Activity 3: Looking at numbers

1. Look at this newspaper headline:

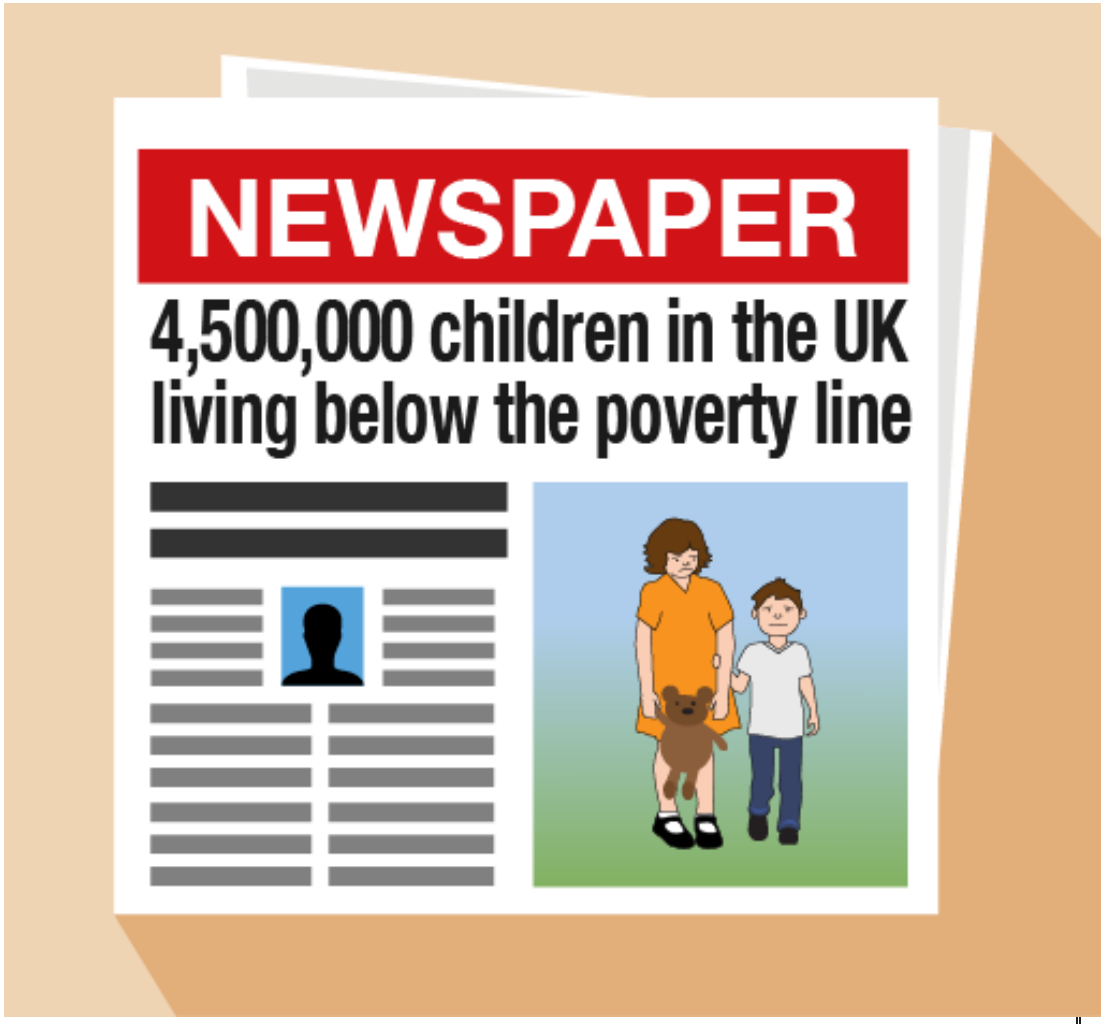

Figure 3 A newspaper headline

a. Write down the number in millions.

b. Write down the number in thousands.

c. Previously published figures showed that 4,100,000 children in the UK were living in poverty. According to the article, has the number increased or decreased?

2. Look at the data in the following table. It gives the temperatures of five cities on a Monday in January.

City	Temperature
London	0°C
Paris	–1°C
Madrid	10°C
Delhi	28°C
Moscow	–10°C

a. Which city was the coldest?
b. Which city was the warmest?
c. How many cities have a temperature below 5°C?

3. You buy a blood pressure monitor for £18 and a stethoscope for £71. How much do you spend altogether?

4. You have £48. You spend £26. How much do you have left?

Answer

1. The answers are as follows:
   a. 4 million
   b. 0 thousands
   c. The number has increased
2. The answers are as follows:
   a. Moscow
   b. Delhi
   c. London, Paris and Moscow
3. £18 + £71 = £89
4. £48 – £26 = £22

Activity 4: Using multiplication and division

You can use a calculator in this activity.

1. What are the answers to these sums?
   a. 6 × 4
   b. 3 × 9
   c. 5 × 7
   d. 36 ÷ 9
   e. 48 ÷ 6
   f. 15 ÷ 3
2. Bandages come in rolls of 10. There are 25 rolls in a box. How many bandages are there in one box?
3. Emma works as a teaching assistant for 16 hours per week. She earns £8.40 per hour. Work out Emma's weekly wage

Now check your answers to make sure you are ready to move on.

Answer

1. The answers are as follows:
   a. 6 ×4 = 24
   b. 3 × 9 = 27
   c. 5 × 7 = 35
   d. 36 ÷ 9 = 4

e. 48 ÷ 6 = 8

f. 15 ÷ 3 = 5

2. 10 × 25 = 250 bandages.

3. 16 × 8.40 = £134.40

Emma's weekly wage is £134.40.

1.4 A note on the four operations

The four operations are addition, subtraction, multiplication and division. You will already be using these in your daily life (whether you realise it or not!). Working within Health & Social Care requires us to carry out maths all the time – for example, working out how many staff need to be on duty for a night shift in a hospital, calculating how many times a patient needs to take their medication each day or supporting a family with planning a weekly budget.

Everyday maths 1 allows the use of a calculator throughout, so you do not need to be able to work out these calculations by hand – but you do need to understand what each operation does and when to use it.

- **Addition (+)** is used when you want to find the total, or sum, of two or more amounts.
- **Subtraction (−)** is used when you want to find the difference between two amounts or how much of something you have left after a quantity is used. For example, calculating a patient's weight loss.
- **Multiplication (×)** is also used for totals and sums, but when there is more than one of the same number. For example, if you bought five packs of disposable gloves that cost £1.20 each, to find out the total amount of money you would spend the sum would be 5 × £1.20.
- **Division (÷)** is used when sharing or grouping items. For example, if there are 35 patients on a ward and 7 staff nurses, you would work out 35 ÷ 7 to find out how many patients each nurse would need to look after.

Summary

In this section you have:

- learned how to read, write, order and compare positive numbers
- looked at different ways of using negative numbers in everyday life
- learned about the four operations.

2 Rounding

Approximating answers to calculations is a very useful skill to have. Ambulance dispatchers can use estimations to calculate which ambulance crew can arrive at the scene of an accident in the quickest time, or determine whether a rapid response car is required.

Remember the rounding rhyme that will help you:

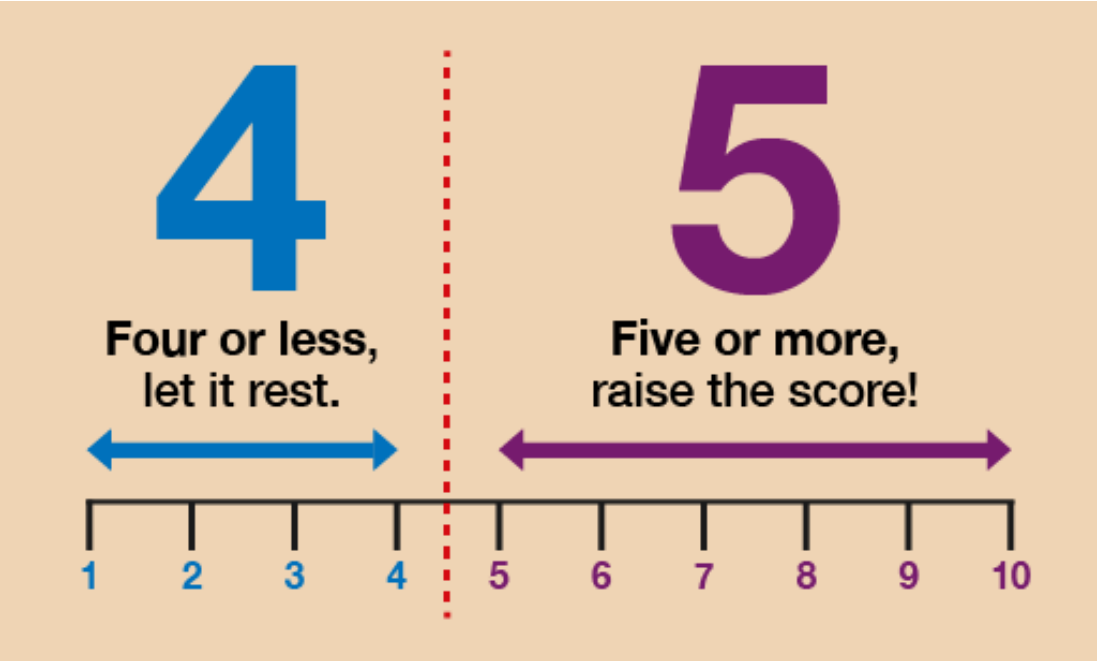

Figure 4 ‘Four or less, let it rest. Five or more, raise the score!’

Watch this video to refresh your knowledge on rounding. You should make notes throughout:

View at: youtube:LGRoPAPMZhA

Now try the following activities. Remember to check your answers once you have completed the questions.

Activity 5: Rounding to 10, 100 and 1,000

1. Round these numbers to the nearest 10:
   a. 64
   b. 69
   c. 65

Check with our suggestions before continuing.

Answer

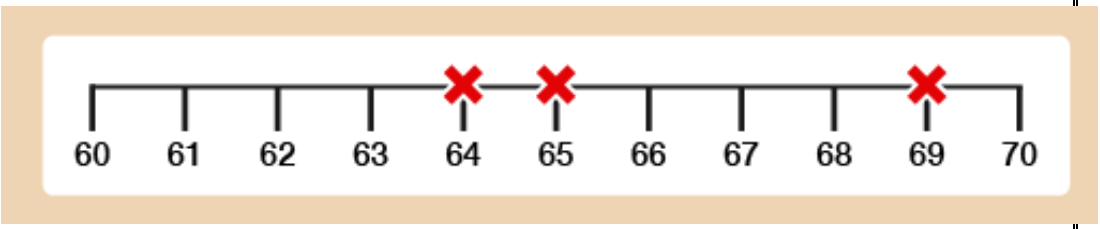

Figure 5 A number line

You can see that:

a. 64 rounded to the nearest 10 is 60.
b. 69 rounded to the nearest 10 is 70.
c. 65 rounded to the nearest 10 is 70. (Remember: when a number is exactly halfway, you always round up. As the rhyme goes, 'Five or more, raise the score!')

Now practise rounding to the nearest 100. The rule is exactly the same.

2. Round these numbers to the nearest 100:
   b. 325
   c. 350
   d. 365

Check with our suggestions before continuing.

Answer

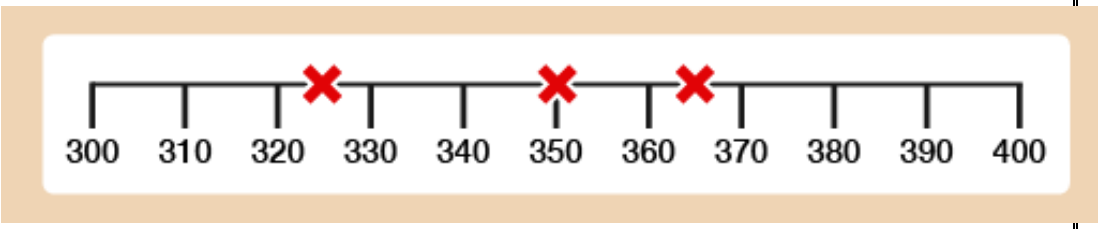

Figure 6 A number line

You can see that:

a. 325 rounded to the nearest 100 is 300.
b. 350 rounded to the nearest 100 is 400.
c. 365 rounded to the nearest 100 is 400.

Now practise rounding to the nearest 1,000.

3. Round these numbers to the nearest 1,000:
   c. 4,250
   d. 4,650
   e. 4,500
   f. 4,060

Answer

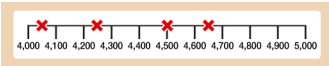

Figure 7 A number line

You can see that:

a. 4,250 rounded to the nearest 1,000 is 4,000.
b. 4,650 rounded to the nearest 1,000 is 5,000.
c. 4,500 rounded to the nearest 1,000 is 5,000.
d. 4,060 rounded to the nearest 1,000 is 4,000.

Hint: In this activity you should round to the nearest pound, so £4.67 would be rounded to £5.

Activity 6: Bill's shopping

1. Bill has £20 to spend on supplies for a hospital ward. Here's a list of the items he selects, along with how much they cost:

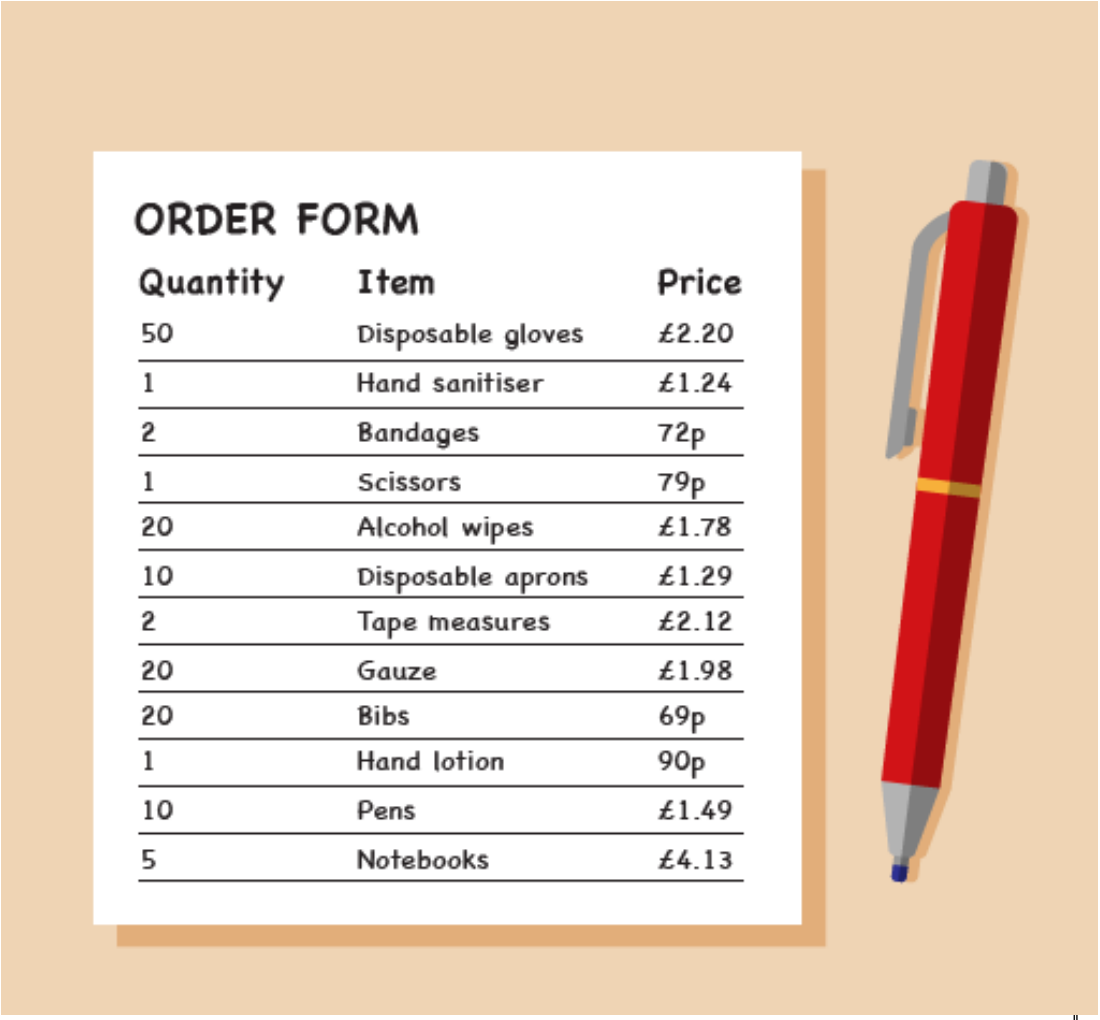

Figure 8 An order form

Use your rounding skills to work out whether Bill has enough money to pay for all of his order.

Answer

Rounding all of the items should give you a total of £19 – so yes, Bill probably has enough money to pay for all of his order.

2. Can you total all of the items on the order to see what the actual cost of Bill's order is?

Answer

The total cost of all of the items on the order comes to £19.33, which is very close to the answer you achieved through rounding.

Well done! You have now successfully rounded and carried out some basic number work. Can you see the importance of rounding? This is especially important when sticking to a budget.

2.1 Estimating answers to calculations

Throughout this course you will be asked to estimate or approximate an answer in a scenario. If you do not use rounding to provide an answer to this question your answer will be incorrect.

Try the following activity using rounding throughout. Pay particular attention to the language used.

Activity 7: Rounding

1. An NHS trust covers a catchment area with population of 6,439,800. Round this number to the nearest million.
2. In a school, 308 girls were vaccinated against the HPV virus last year. This year 198 girls were vaccinated. Estimate the total number of girls in the school who have received the vaccine over the past two years.
3. A GP's appointments last approximately 9 minutes. Use rounding to work out how many patients the GP can see in 1 hour (60 minutes).
4. Denise is purchasing four new armchairs for a residential care home. The total cost is £595. What is the approximate cost of one armchair?

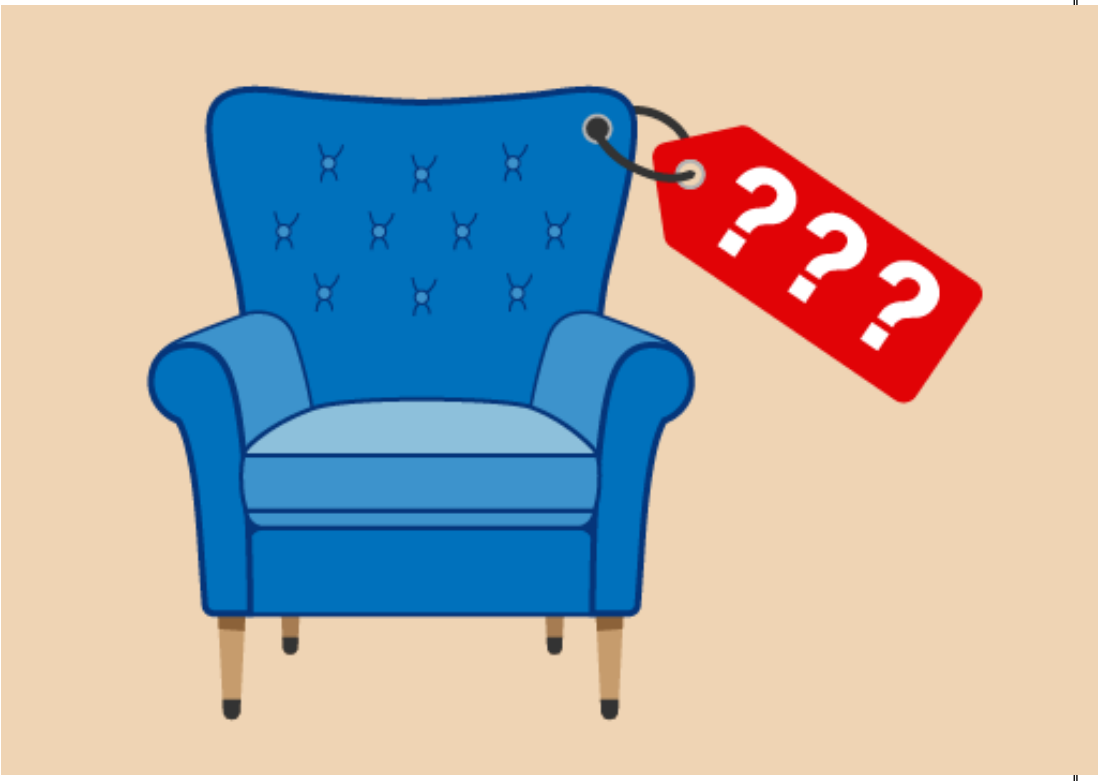

Figure 9 How much for one armchair?

5. A box contains 18 disposable aprons. A residential care home orders 50 boxes. Approximately how many aprons is that?

Answer

1. The population rounds to 6,000,000 (six million). This is because 6,439,800 is nearer to 6 million than 7 million.
2. 308 will round to 300
   198 will round to 200
   300 + 200 = 500
   So approximately 500 girls were vaccinated
3. 9 minutes will round to 10
   60 ÷ 10 = 6
   So the GP can see approximately 6 patients in 1 hour
4. £595 to the nearest hundred is £600. So the approximate cost of one armchair is:
   £600 ÷ 4 = £150
5. 18 rounded to the nearest 10 is 20. So the approximate total number of aprons is:
   20 × 50 = 1,000 aprons
   Note: 50 × 20 = 50 × 2 × 10 = 100 × 10 = 1,000

Summary

So far you have worked with negative numbers, whole numbers, estimation and multiples. All of the practised skills will help you with everyday tasks such as making purchases in the workplace, working with a budget and reading temperatures. The objectives that you have covered are:

- the meaning of a positive and negative number
- how to carry out calculations with whole numbers
- how an approximate answer can help to check an exact answer
- multiples and square numbers.

Later in this course you will be looking at inverse calculations. This means reversing all operations to check that your answer is correct.

3 Fractions

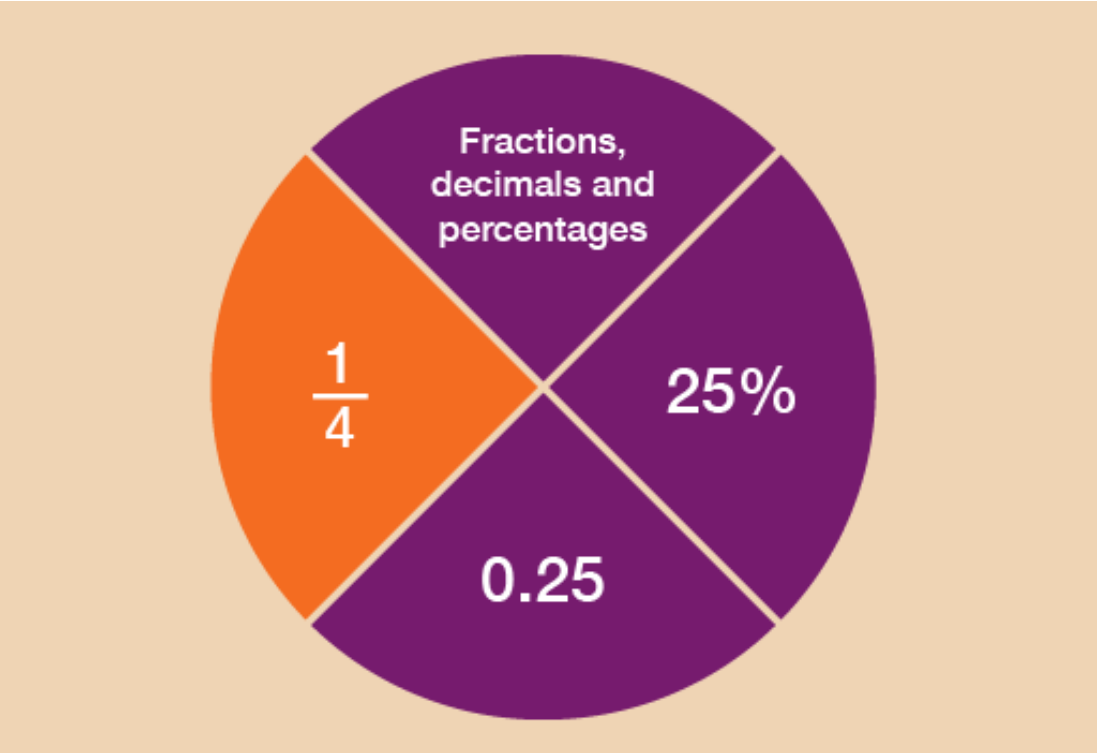

Figure 10 Looking at fractions

What is a fraction?

A fraction is defined as a part of a whole. So for example , or ‘one third’, is one part of three parts, all of equal size.

Fractions are an important feature of everyday life. For example, a healthy diet is based on eating appropriate fractions of each food group at each meal. The NHS recommends that more than of the food we eat each day should be fruit and vegetables. As you go through this section, you’ll see how fractions could be used to lead a healthier lifestyle or used within the workplace.

Fractions are related to decimals and percentages, which you’ll look at in the sections that follow this one.

This section will help you to:

- order and compare fractions
- identify equivalencies between fractions
- calculate parts of whole quantities and measurements (e.g. calculate discounts in sales).

Please look at the following example before you carry out the activity:

A **half** can be written as , i.e. one of two equal parts.

A **quarter** can be written as , i.e. one of four equal parts.

An **eighth** can be written as , i.e. one of eight equal parts.

Hint: The top of the fraction is called the numerator. The bottom of the fraction is called the denominator. Notice that is bigger than , even though the denominator 2 is smaller than the denominator 4. How would you explain one third? How would you write it as a fraction? Which is bigger: one third or two quarters?

Example: Cooking a healthy meal

Sandra is cooking an evening meal. Half of her plate is made up of meat, one third is vegetables and one sixth is dairy products.

1. Which food group is Sandra eating the most of?
2. Which food group is Sandra eating the least of?

Method

When numerators of fractions are all 1, the larger the denominator of the fraction, the smaller the fraction.

Looking at the example above, the fractions can be put in order of size starting from the smallest:

, ,

So:

1. The food group Sandra is eating the most of () is meat.
2. The food group Sandra is eating the least of () is dairy.

If you're asked to arrange a group of fractions into size order, it's sometimes helpful to change the denominators to the same number. This can be done by looking for the lowest common multiple – that is, the number that all of the denominators are multiples of.

Example: Looking at equivalent fractions

Arrange the following fractions in order of size, starting with the smallest:

, ,

Method

The lowest common multiple is 12:

6 × 2 = 12

3 × 4 = 12

12 × 1 = 12

Whatever you do to the bottom of the fraction you must also do to the top of the fraction, so that it holds the equivalent value. The third fraction, , already has 12 as its

denominator, so we don't need to make any further calculations for this fraction. But what about and ?

2 × means calculating (2 × 3 = 6) and (2 × 6 = 12), so the equivalent fraction is

4 × means calculating (4 × 1 = 4) and (4 × 3 = 12), so the equivalent fraction is

Now you can now see the size order of the fractions clearly:

, ,

So the answer is:

, ,

Use the examples above to help you with the following activity. Remember to check your answers once you have completed the questions.

Activity 8: Fractions in order of size

1. Put these fractions in order of size, with the smallest first:

   , , , ,

Answer

Remember that when the numerator of a fraction is 1, the larger the denominator, the smaller the fraction.

From smallest to largest, the order is:

, , , ,

2. What should you replace the question marks with to make these fractions equivalent?

   =

   =

   =

   =

Answer

=

=

=

=

Example: Drawing the fractions

If you need to compare one fraction with another, it can be useful to draw the fractional parts.

Look at the mixed numbers below. (A mixed number combines a whole number and a fraction.) Say you wanted to put these amounts in order of size, with the smallest first:

2 , 3 , 1

Method

To answer this you could look at the whole numbers first and then the fractional parts. If you were to draw these, they could look like this:

Figure 11 Drawing the fractions

So the correct order would be:

1 , 2 , 3

Use the example above to help you with the following activity. Remember to check your answers once you have completed the questions.

Activity 9: Putting fractions in order

1. Put these fractions in order of size, smallest first:

   5 , 6 , 2

2. Put these fractions in order of size, smallest first:

   2 , 1 , 2

Answer

1. The correct order would be:

   2 , 5 , 6

   In this case, even though is bigger than and is bigger than , you need to look at the whole numbers first and then the fractions. The diagram illustrates this more clearly:

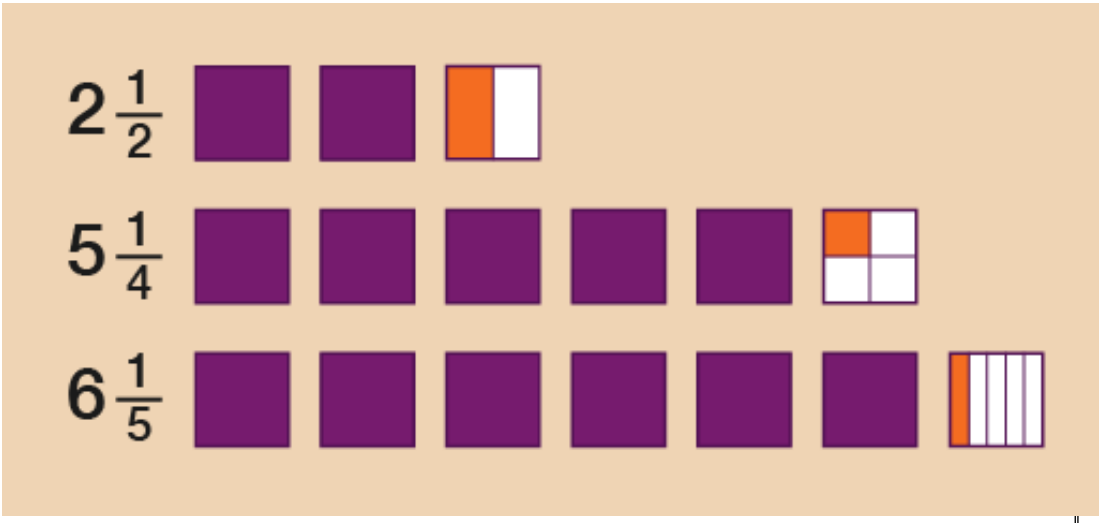

Figure 12 Drawing the fractions

2. The correct order would be:

   1 , 2 , 2

3.1 Fractions of amounts

Have a look at the following examples, which demonstrate how you would find the fraction of an amount.

Example: Finding fractions

Sarbjit is selling tickets for a charity concert at a school.

Figure 13 A singer

of the funds raised will go to the school. Sarbjit makes £90 from selling tickets, so how much money will the school receive?

Method

The basic rule for finding a unit fraction of an amount is to divide by the how many parts there are (the number on the bottom of the fraction) and multiply the result by the number at the top of the fraction:

of £90 is the same as £90 ÷ 3 = £30

The sum £30 × 1 = £30, so you would get £30 off.

Survey

In a survey, of respondents said that they eat less than five portions of fruit and vegetables each day. If 800 people were surveyed, how many people eat less than five portions of fruit and vegetables each day?

Method

Again, to find a fraction of an amount you need to divide by the number at the bottom of the fraction and then multiply that result by the number at the top of the fraction:

To answer this you need to first work out what of 800 people is.

of 800 = 800 ÷ 4 = 200

Then use the numerator (the top of the fraction) to work out how many of those unit fractions are needed:

of 800 = 3 × 200 = 600

So 600 people eat less than five portions of fruit and vegetables each day.

Use the example above to help you with the following activity. Remember to check your answers once you have completed the questions.

Activity 10: Paying in instalments

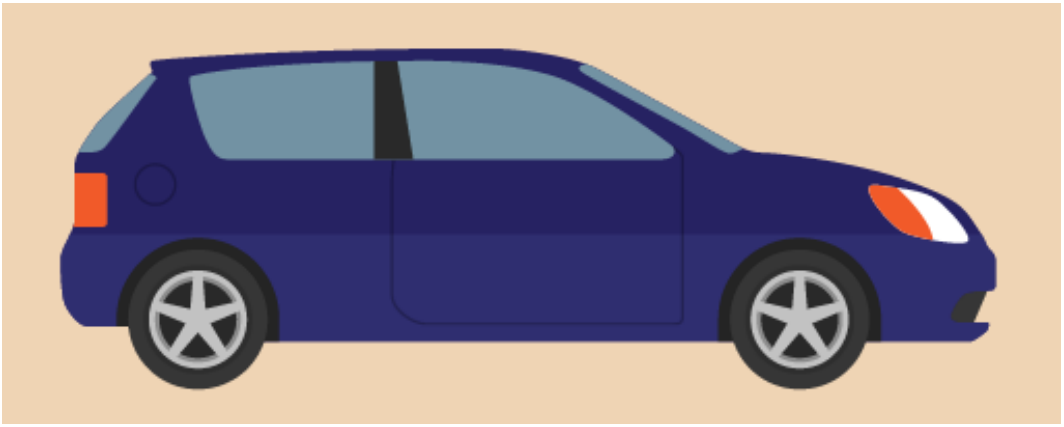

Figure 14 How much would a car cost?

Paul has recently qualified as a midwife and is going to be working out in the community. He needs his own car to travel to visit all of his patients.

Paul signs up to a 4-year PCP deal to purchase a car for £12,000. He needs to pay the money in stages:

1. of the money to be paid as an initial deposit.
2. of the money is to be paid over 4 years.
3. The remainder is to be paid at the end of the 4-year contract.

How much money will Paul need to pay at the end of the 4-year contract?

Answer

First you need to work out the initial deposit that Paul pays. So to work out of £12,000 you need to divide £12,000 by 5.

12,000 ÷ 5 = 2,400

So the deposit Paul has to pay is £2,400.

Then you need to work out of the £12,000 Paul needs to pay over the 4 years. Start by working out of £12,000. To do this you need to divide £12,000 by 3.

$$12{,}000 \div 3 = 4{,}000$$

So of £12,000 is:

$$4{,}000 \times 2 = 8{,}000$$

So Paul will pay £8,000 over the 4 years.

Subtract these two amounts from the total cost to see how much Paul will have left to pay at the end of the contract.

$$12{,}000 - 2{,}400 - 8{,}000 = 1{,}600$$

Paul will need to pay £1,600 at the end of the 4-year contract.

Summary

In this section you have learned how to:

- find equivalencies in fractions
- order and compare fractions
- find the fraction of an amount.

The skills listed above can be used when you are shopping and trying to get the best deal, or when you are splitting a cake or a pizza, say, into equal parts for a birthday celebration at a children's care home.

It's important to be able to compare fractions, decimals and percentages in real-life situations. You'll be looking at percentages later, but first you can look at decimals.

4 Decimals

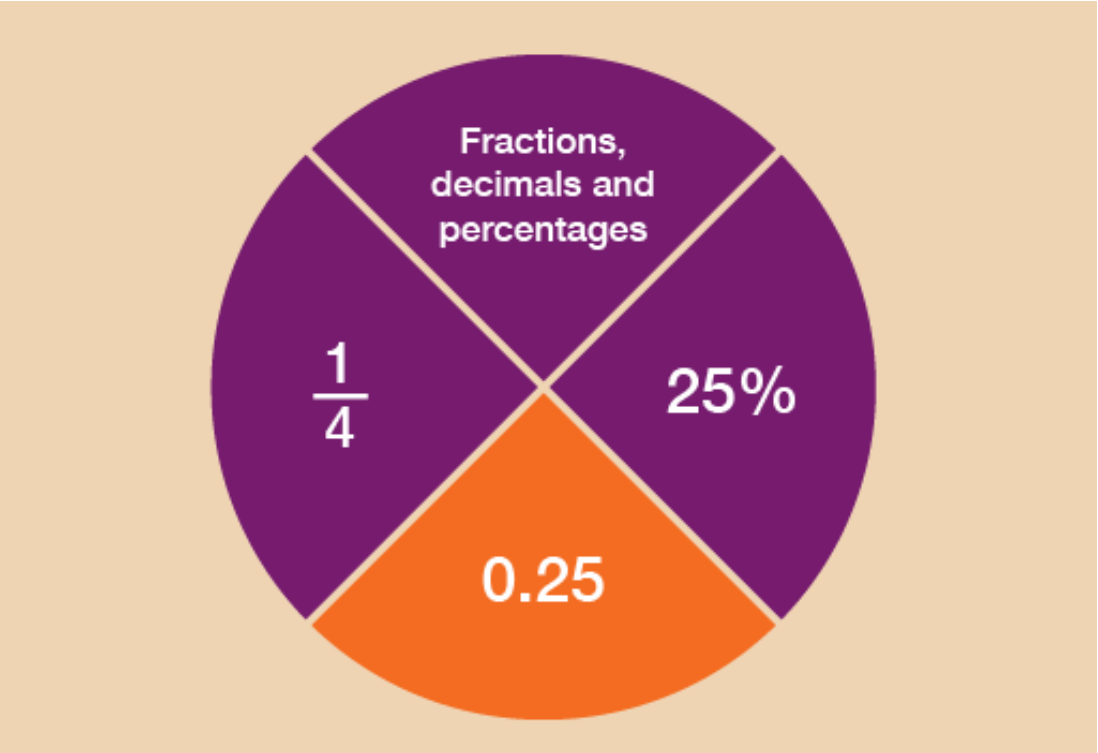

Figure 15 Looking at decimals

Can you think of any examples of when you might come across decimal numbers in everyday life?

If you're dealing with money and the decimal point is not placed correctly, then the value will be completely different, for example, £5.55 could be mistaken for £55.50.

Likewise with weights and measures: if a nurse gave the wrong measure of medicine to a patient this could make them very ill or put their life at risk.

This section will help you to understand:

- the value of a digit in a decimal number
- ways of carrying out calculations with decimal numbers
- approximate answers to calculations involving decimal numbers.

You looked at place value in the section on whole numbers. Now you'll take a look at decimals.

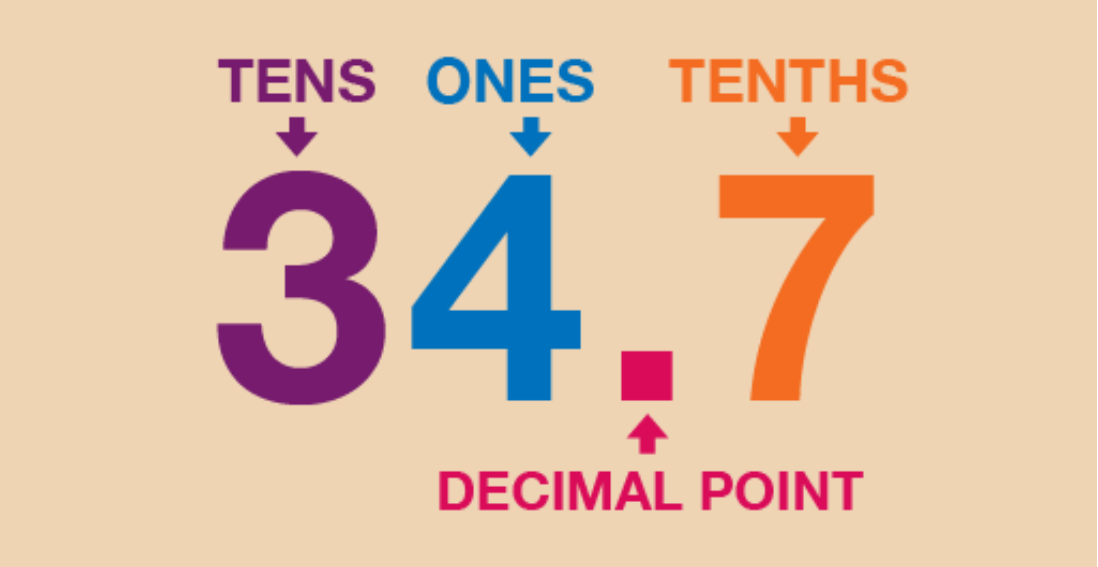

Figure 16 What is a decimal point?

So what is a decimal point?

It separates a number into its whole number and its fractional part. So in the example above, 34 is the whole number, and the seven – or 0.7, as it would be written – is the fractional part.

Each digit in a number has a value that depends on its position in the number. This is its place value:

Whole number part				.	Fractional part		
Thousands	**Hundreds**	**Tens**	**Units**	**.**	**Tenths**	**Hundredths**	**Thousandths**
1000s	100s	10s	1s	.	s	s	s

Look at these examples, where the number after the decimal point is also shown as a fraction:

5.1 = 5 and

67.2 = 67 and

8.01 = 8 and

Example: Finding values

If you were looking for the place value of each digit in the number 451.963, what would the answer be?

Hundreds	Tens	Units	.	Tenths	Hundredths	Thousandths
4	5	1	.	9	6	3

So the answer is:

4 hundreds

5 tens

1 unit

9 tenths ()

6 hundredths ()

3 thousandths ()

Use the example above to help you with the following activity. Remember to check your answers once you have completed the questions.

Activity 11: Decimal dilemmas

1. Jo works as a learning support assistant in a school. She accompanies four of the children to a funfair. One of the rides, the Wacky Wheel, has the following notice on it:

   For safety reasons, children must be over 0.95 m tall to go on this ride.

   Margaret is 0.85 m tall.

   David is 0.99 m tall.

   Suha is 0.89 m tall.

   Prabha is 0.92 m tall.

   Who is allowed to go on the ride?

2. Six ambulance drivers are responding to the scene of a major incident. The time it takes each person to arrive, in minutes, are as follows:

Sonia	10.95
Anjali	10.59
Anita	10.91
Aarti	10.99
Sita	10.58
Susie	10.56

   Who arrives at the scene first, second and third?

3. Prospective nursing students are required to complete a maths assessment under timed conditions. The test times of four students are shown below. Who completed the assessment in the fastest, second fastest and third fastest time?

Janak	23.95
Nadia	23.89

Carol	23.98
Tracey	23.88

Answer

1. Any child that is more than 0.95 m tall will be allowed on the ride. So to answer the question you need to compare the height of each child with 0.95 m.

	Tenths	Hundredths
Margaret	8	5
David	9	9
Suha	8	9
Prabha	9	2

Comparing the tenths tells us that only two children may possibly be allowed on the ride: David and Prabha.

If we go on to compare the hundredths, we see that only David is taller than 0.95 m.

So only David would be allowed on the Wacky Wheel.

2. You need to compare the tens, units, tenths and hundredths, in that order.

	Tens	Units	.	Tenths	Hundredths
Sonia	1	0	.	9	5
Anjali	1	0	.	5	9
Anita	1	0	.	9	1
Aarti	1	0	.	9	9
Sita	1	0	.	5	8
Susie	1	0	.	5	6

All of the times have the same number of tens and units, so it is necessary to go on to compare the tenths.

The three times with the lowest number of tenths are 10.59, (Anjali), 10.58 (Sita) and 10.56 (Susie). If we now go on to compare the hundredths in these three times, we see that the lowest times are (lowest first): 10.56, 10.58 and 10.59.

So the first, second and third drivers to arrive were:

Susie (10.56 secs): first

Sita (10.58 secs): second

Anjali (10.59 secs): third

3. Again, we need to compare the tens, units, tenths and hundredths, in that order.

	Tens	Units	.	Tenths	Hundredths
Janak	2	3	.	9	5
Nadia	2	3	.	8	9
Carol	2	3	.	9	8
Tracey	2	3	.	8	8

All the times have the same number of tens and units. Looking at the tenths, two scores (23.95 and 23.98) have 9 tenths. If you compare the hundredths in these two numbers, you can see that 23.98 is bigger than 23.95.

To find the third highest number, go back to the other two numbers, 23.89 and 23.88. Comparing the hundredths, you can see that 23.89 is the higher number. So the three fastest times are:

Carol (23.98)

Janak (23.95)

Nadia (23.89)

4.1 Approximations with decimals

Now you have looked at the place value system for decimals, can you use your rounding skills to estimate calculations using decimals? Healthcare workers use this skill to approximate measures such as a patient's weight or height.

Example: Approximations with decimals

Give approximate answers to these. Round each decimal number to the nearest whole number before you calculate.

1. 2.7 + 9.1
2. 9.6 – 2.3
3. 2.8 × 2.6
4. 9.6 × 9.5

Method

1. 2.7 lies between 2 and 3, and is nearer to 3 than 2.

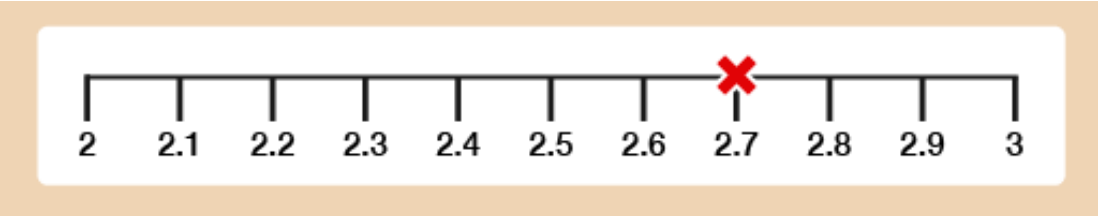

Figure 17 A number line

9.1 lies between 9 and 10, and is nearer to 9 than 10.

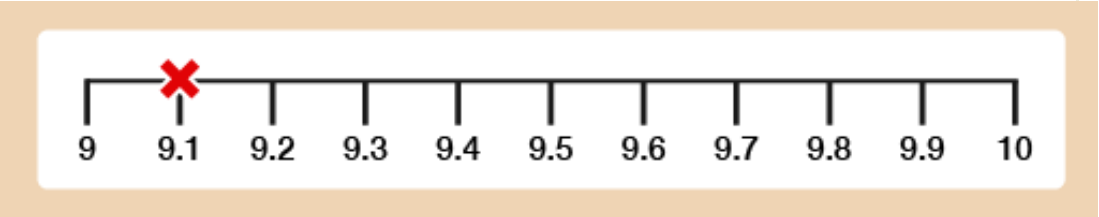

Figure 18 A number line

So our approximate answer is:

3 + 9 = 12

2. Similarly, 9.6 lies between 9 and 10 and is nearer to 10 than 9, and 2.3 is nearer to 2 than 3. So our approximate answer is:

   10 – 2 = 8

3. 2.8 is nearer to 3 than 2, and 2.6 is also nearer to 3 than 2. So our approximate answer is:

   3 × 3 = 9

4. 9.6 is nearer to 10 than 9. 9.5 is exactly halfway between 9 and 10. When this happens we always round up, meaning that 9.5 is rounded up to 10. So our approximate answer is:

   10 × 10 = 100

Example: Rounding to two decimal places

You may be asked to round a number to two decimal places. All this means is if you are faced with lots of numbers after the decimal point, you will be asked to only leave two numbers after the decimal point. This is useful when a calculator gives us lots of decimal places.

1. Round 3.426 correct to two decimal places (we want two digits after the decimal point).

Method

Look at the third digit after the decimal point.

If it is 5 or more, round the previous digit up by 1. If it is less than 5, leave the previous digit unchanged.

The third digit after the decimal point in 3.426 is 6. This is more than 5, so you should round up the previous digit, 2, to 3.

So the answer is 3.43.

2. Round 2.8529 to two decimal places.

Method

As in part (a) above, the question is asking you to round to two digits after the decimal point.

Look again at the third digit after the decimal point.

This is 2 (less than 5) so we leave the previous digit (5) unchanged.

The answer is 2.85.

3. Round 1.685 to two decimal places.

Here, the third digit after the decimal point is 5, which means the previous digit (8) needs to be rounded up.

The answer is 1.69.

Use the example above to help you with the following activity. Remember to check your answers once you have completed the questions.

Hint: 'Five or more, raise the score!'

Activity 12: Rounding

1. Work out approximate answers to these by rounding each decimal number to the nearest whole number:
   a. 3.72 + 8.4
   b. 9.6 – 1.312
   c. 2.8 × 3.4
   d. 9.51 ÷ 1.5
2. Round the following numbers to two decimal places:
   a. 3.846
   b. 2.981
   c. 3.475

Answer

1. The answers are as follows:
   a. The nearest whole number to 3.72 is 4.
      The nearest whole number to 8.4 is 8.
      So our approximate answer is:
      4 + 8 = 12
   b. The nearest whole number to 9.6 is 10.

The nearest whole number to 1.312 is 1.

So our approximate answer is:

10 – 1 = 9

c. The nearest whole number to 2.8 is 3.

The nearest whole number to 3.4 is 3.

So our approximate answer is:

3 × 3 = 9

d. The nearest whole number to 9.51 is 10.

The nearest whole number to 1.5 is 2.

So our approximate answer is:

10 ÷ 2 = 5

2. The answers are as follows:

a. To round to two decimal places, look at the third digit after the decimal point. This is more than 5, so round the previous digit (4) up to 5.

The answer is 3.85.

b. In this case, the third digit after the decimal point is less than 5, so leave the previous digit unchanged.

The answer is 2.98.

c. The third digit after the decimal point here is 5. Remember in this case we always round up.

The answer is 3.48.

4.2 Calculations using decimals

When you make any calculation with decimals – that is, addition, subtraction, multiplication and division – you may use a calculator. When using a calculator it is very important to make sure that the decimal point is in the correct place. If you don't, you'll get the wrong answer.

Now try the following activity. Remember to check your answers once you have completed the questions.