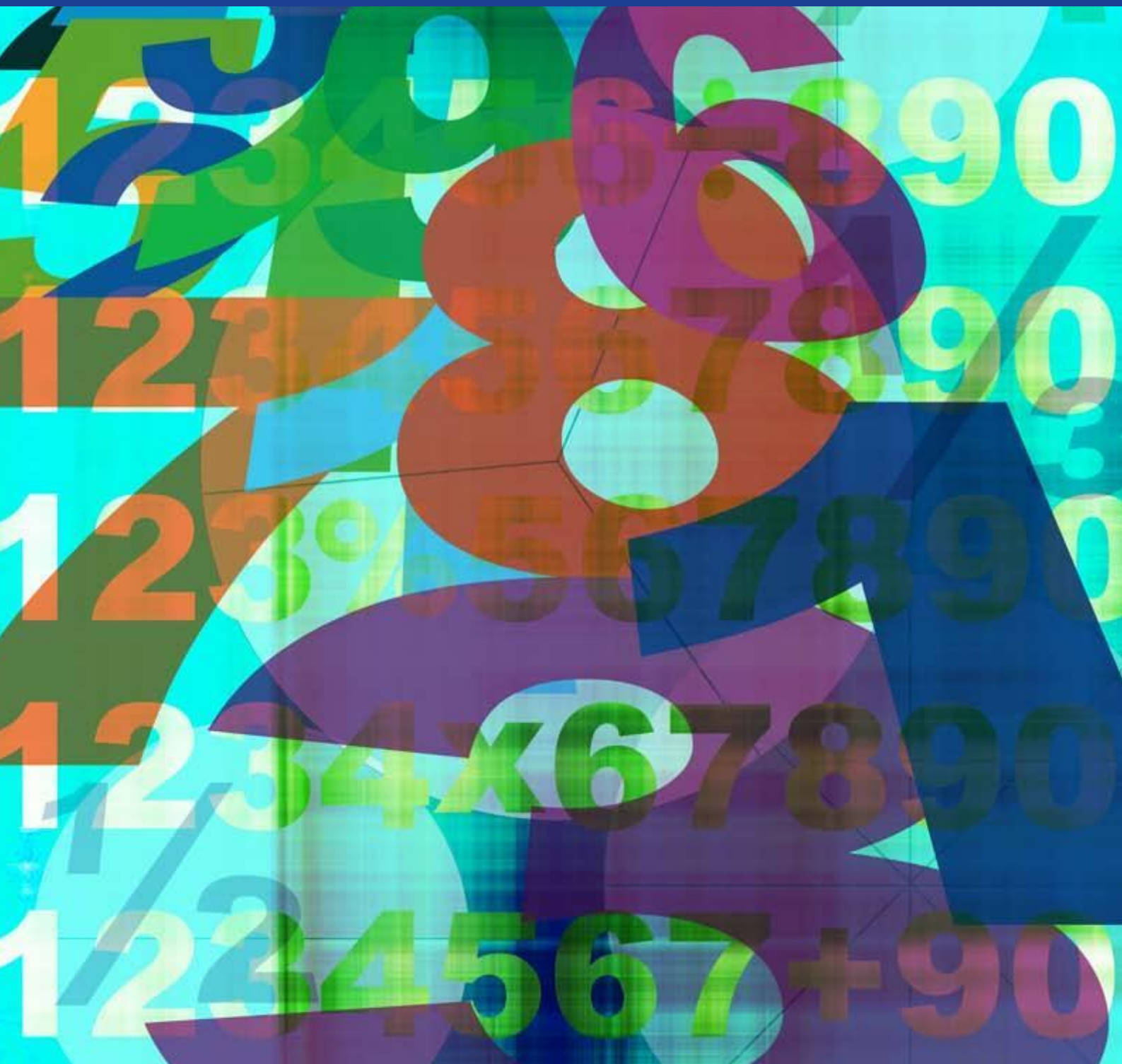
Learner Pack

Level 3: Application of Number
Unit 1: Number



Activity # Using the calculator **Code N1**

This activity links to **Award Learning Outcome 1.3**

Introduction

Calculators can make adding, subtracting, multiply and dividing much easier. Most calculators also work out percentages, fractions and decimals. Scientific calculators are larger and have more buttons than a normal calculator and hence are able to do even more maths than a normal calculator.

Learning Outcomes

1. Perform addition, subtraction, multiplication and division on a calculator.
2. Use the clear key of your calculator .

Key Learning Points

1. Calculator

Materials you will need for this activity

- Calculator
- Task sheets in this section

What do you need to know before you start?

Sometimes we make mistakes inputting numbers into the calculator so it is important that you have a rough idea of what your answer might be before you use your calculator.

Task 1: Addition and Subtraction

Example

Michelle has €10.00 in her purse she needs to buy milk which costs €1.26, bread which costs €1.89 and a packet of ham which costs €4.99.

i. How much did Michelle spend in the shop?

_____

ii. What change will Michelle get from her €10.00?

_____

iii. She would also like to buy HEY magazine which costs €2.15. Does she have enough money for the magazine?

_____

Task 2: Multiplication & Division

Example

Harry Norman's electrical store is stocking up on 8GB iPods before Christmas. Each iPod is costing him €183.28.

i. How much will it cost Harry to buy 37 of these 8BG iPods?

ii. If Harry has €8,500 to spend how many of these iPods could he buy?

Now try the following tasks on your calculator. Check the answers with your tutor.

Task 3: I'll guess your secret number!

Try this calculator trick on a friend.

Give your friend the calculator and ask them to do this:

Pick any number and write it down on a sheet of paper. Keep it secret!

Type that number into your calculator. Don't let me see it! Then:

- Multiply the number by 2 and press =
- Add 4 to your answer and press =
- Divide your answer by 2 and press =
- Add 7 and press =
- Multiply by 8 and press =
- Subtract 12 and press =
- Divide by 4 and press =
- Subtract 11 and press =

Now ask your friend to give you back the calculator. Tell them that you will soon be able tell them the secret number they wrote on the piece of paper at the start!

Then use the calculator to do this:

- Subtract 4 and press =
- Divide by 2 and press =

You will now have the number that your friend wrote down at the start!

Tip: Try this yourself first before playing the trick on a friend.

Task 4: A calculator story!

Hand the calculator to a friend or family member. Tell them the following story and ask them to punch in the numbers as they appear on the story:

A man aged **45** drinks **1** pint of beer, **7** whiskeys and **7** gin and tonics between **3** and **4** o'clock. How does the man feel?
On your calculator you should have typed: 4517734

Turn your calculator upside down and you will have the answer!

Task 5: Use your calculator to work these out!

1. Ian brings home an income of €515.50 euro each week. There are four weeks in February. How much will he earn in February?

_____

2. In the month of February Ian pays €78.60 for ESB and €67.80 for Gas. Ian's monthly shopping bill totals €155.69 and his Cable TV, internet and phone bill is €78. How much of his income has Ian left over after he has paid his bills?

_____

Practise your calculator skills

- As you go through this pack, first try to do the maths calculations without the calculator. Then **use the calculator to check your calculations and answers.**

- Use Practice Sheet N1**.**

Activity

Playing Darts

Code N2

This activity is linked to the **Award Learning Outcomes 1.1 and 1.5.**

Introduction

The game of darts is popular in Ireland. To keep score or to follow the score we need to recognise, understand and use natural numbers. We use natural numbers every day in many different places and ways. This activity will help you with this.

What will you learn?

Learning Outcomes

1. Understand the concept of a natural number.
2. Recognise natural numbers.
3. Add natural numbers.

Key Learning Points

1. Natural Numbers
2. Addition

Materials you will need

- A darts board or a picture of a dart board
- Coloured markers and pencils
- Practice Sheet N2
- Solution Sheet N2

What do you need to know before you start?

Maths

- What is a positive number?
- What is a negative number?
- What is a whole number?

Darts

- The rules of darts
- How to keep the score
- How to play safely

How can you find this out?

- Ask a friend.
- Ask your tutor.
- Find instructions on the internet.
- Watch a game of darts on TV, DVD or online - www.youtube.ie
- Play a game of darts with friends.

Getting started

What are natural numbers?

Natural numbers are also called counting numbers or **whole** numbers.

Examples of natural numbers are **4 9 16 378**.

0 (zero) is also natural number.

Natural numbers are **always positive** numbers.

A number with a fraction or a decimal **is not** a natural number, for example, 20.5 or 20 ½ .

N is the **symbol** we use for the set of **natural** numbers.

Tip:

A **negative** number is one that has a minus sign in front of it, for example, -3.

When we write a negative number we must always write the minus sign.

A **positive** number is one that has a plus sign in front of it, for example + 3.

However, when we write a positive number, we usually don't write the plus sign.

So instead of +3 we usually just write 3.

Task 1: What are natural numbers?

Fill in the gaps in the sentences below, by using the correct word from this list:

negative positive zero

Natural numbers are always _____ numbers.

Natural numbers include _____.

Natural numbers do not include _____ numbers.

Task 2: Recognising Natural Numbers

Look at the numbers below.

Put a circle around any number that is a natural number.

12	14	-34	0	34.5	21 ½
65	-5	$34\frac{1}{4}$	234	-45	4568

Did you remember?

- Natural numbers include zero (0).
- Natural numbers are always positive.
- A negative number is **not** a natural number.
- A number with a decimal point is **not** a natural number.
- A number with a fraction is **not** a natural number.

Answer

The natural numbers are:

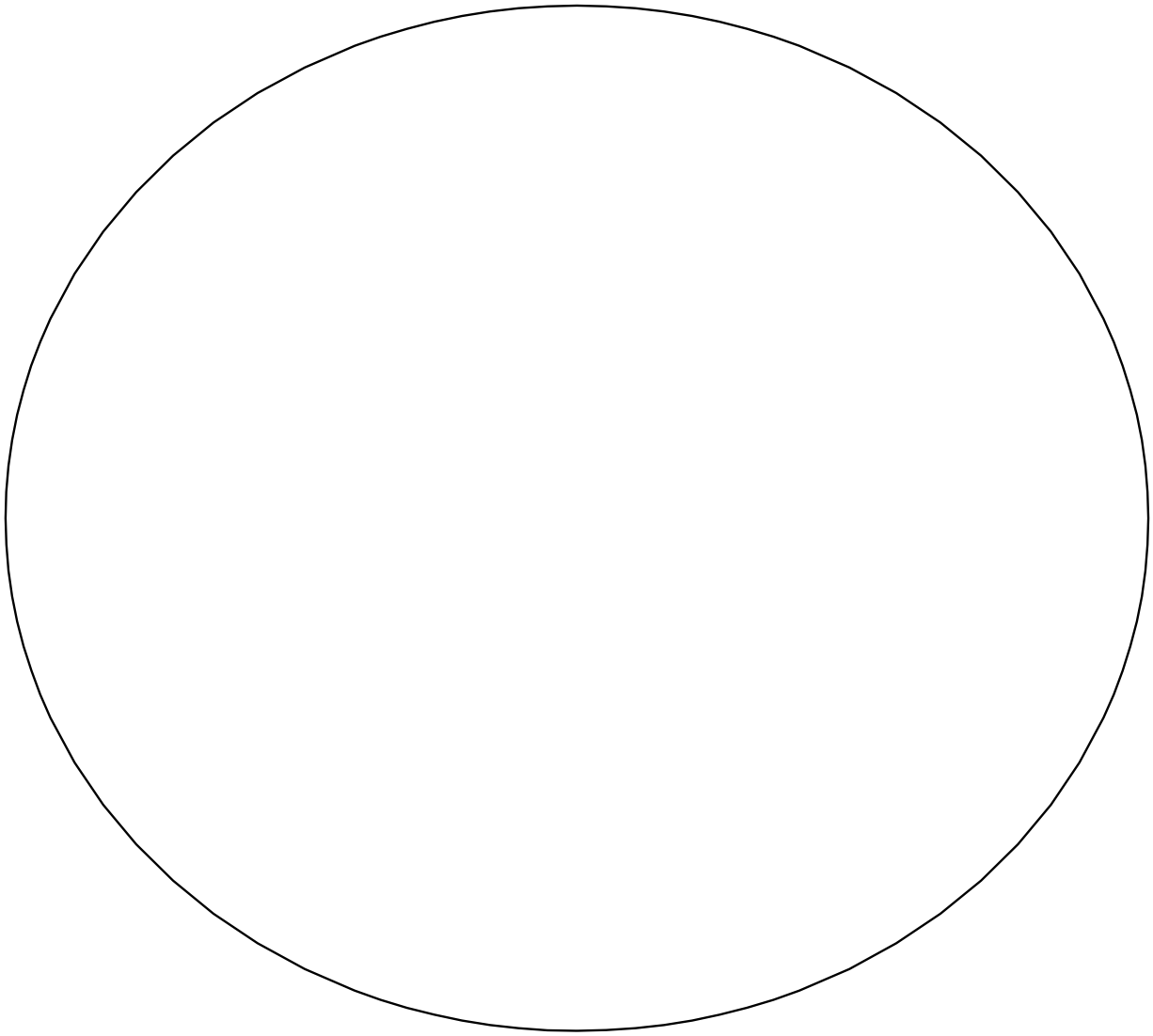
12 14 0 65 234 4568

Task 3: Darts board

Use the space below to draw a picture of a darts board.

You could also find one on the internet and paste it into the space below.

Make sure that the picture shows all the numbers clearly.



Tip: **The numbers on a darts board are all natural numbers.**

Task 4: Adding Natural Numbers (1)

Without using your calculator add the following natural numbers.

18	**191**	**1632**
20	**23**	**1101**
10	**247**	**137**

Task 5: Adding Natural Numbers (2)

Phil 'The Power' Taylor played in the 2010 World Grand Prix Darts Tournament in Dublin.
In his first match he played against Adrian Lewis.
During one game in his first match Phil threw a **19**, an **8** and a **12**.

What was Phil's total score for this throw? _____

How do you work this out?

To calculate Phil's total score we must **add** the three positive whole numbers that Phil threw. So that's 19 **+** 8 **+** 12 = **39**

Now try this!

1. If Phil had thrown an 18, a 3 and a 19 what would his score have been? _____

2. Phil's opponent Adrian Lewis threw his three darts next.
   He hit a 14, a 6 and a 20. What was Adrian Lewis's score? _____

3. From 1994 -1998 Phil Taylor played 35 darts matches
   From 1999-2004 he played 30 matches
   From 2004-2008 he played 20 matches

How many matches did he play altogether from 1994-2008? _____

Practise your skills

To improve your skills in adding natural numbers you could:

- Play a game of darts and keep score! Or keep score in another game that you like to play or watch.

- Add up all the natural numbers you see on your way home! For example you might see natural numbers on the front doors of houses or flats, or on the front of buses, or on car registration plates.

- Walk around the inside of the centre. List all the natural numbers you see and where they are. Add them up and see what total you get!

- Ask a friend to do this too. See if you both get the same answer. If not, compare your list.

- Use Practice Sheet N2.

Activity

Rugby Union

Code N3

This activity is linked to the **Award Learning Outcomes 1.1 and 1.5.**

Introduction

Rugby union is a full contact team sport and is popular in Ireland. There are a number of divisions in which rugby is played in Ireland. Four of the most successful teams are the teams representing the four provinces of Ireland: Munster, Leinster, Ulster and Connaught.
In this Activity we will use the topic of rugby to learn about subtracting natural numbers.

What will you learn?

Learning Outcomes

1. Understand the concept of a natural number.
2. Recognise where subtraction of natural numbers is necessary .
3. Subtract natural numbers.

Key Learning Points

1. Natural Numbers
2. Subtraction

Materials you will need

- The tasks this section.
- Practice Sheet N3
- Solution Sheet N3

What do you need to know before you start?

Maths

- You need to be comfortable with the maths learning from Activity N2.
- Natural numbers are also known as counting numbers or whole numbers.
- N is the symbol we use for natural numbers.

Rugby

- You need to know or find out some rules of rugby. In particular, find out the rules about gaining ground on the opposing team.

How can you find this out?

- Ask a friend, especially about ‘gaining ground’ in rugby.
- Ask your tutor.
- Watch a game of rugby on TV, DVD or online - www.youtube.ie.
- Search the internet for the rules.
- Try it out: See if you can arrange with your tutors and other groups to play a game of rugby.

Getting started

Example Task 1: Gaining ground

In pairs, discuss the following rugby question.
See if you can work it out yourselves before you look at the answer below!

In a rugby game between Munster and Leinster, the Munster team gained 30 metres ground. The Leinster team then forced Munster back 12 metres. How many metres did Munster gain on the attack?

Answer

Munster gained 18 metres during that attack. First, they gained 30 metres. Then they lost 12 metres. To **calculate** how much ground Munster gained we take away the 12 metres from the 30 metres. That leaves 18 metres.

We write it like this: 30 - 12 = 18

Tip: The language of maths

Another way of saying **'take away'** is: **subtract**. You will use the words 'subtract' and 'subtraction' a lot in your maths work.

Tip:

The language of maths
Make a note of any new maths words that you are learning and use those words more often.
It will make the maths learning easier if you really understand and use the maths words.

Take some time now to start your **personal maths dictionary.**

Task 2: Gaining ground (2)

1. If Munster gained 21 metres and were forced back 7 metres, how many metres would they have gained?

2. During the game Leinster made a good run and gained 22 metres, but Munster defended well and forced Leinster back by 10 metres on the next play. How many metres did Leinster gain altogether?

Task 3: Natural numbers

Look at the box below.
Put a circle around the numbers that are natural numbers.

15	23	-46	0	64.5	$91\frac{1}{2}$
75	-8	$76\frac{1}{2}$	196	-45	7465

Did you remember?

- Natural numbers include zero (0).
- Natural numbers are always positive.
- A negative number is **not** a natural number.
- A number with a decimal point is **not** a natural number.
- A number with a fraction is **not** a natural number.

Practise your skills

To improve your skills in subtracting natural numbers you could

- Play or watch a game of rugby and try to estimate the ground gained and lost during different phases of the game.
- Play a game of darts and keep score! This involves subtracting scores from a starting total of 501.
- Notice where you use subtraction in your everyday life - for example, when you are shopping you calculate how much change you will have.
- Use Practice Sheet N3.

Activity

Playing Darts 2

Code N4

This activity is linked to the **Award Learning Outcomes 1.1** and **1.5.**

Introduction

In darts you have to be able to add natural numbers and to subtract natural numbers.
This activity will help with that

What will you learn?

Learning Outcomes

1. Recognise where subtraction and addition of number is relevant and necessary
2. Add and subtract natural numbers

Key Learning Points

1. Natural Numbers
2. Subtraction
3. Addition

Materials you will need

- A darts board
- Task Sheets in this section
- Practice Sheet N4
- Solution Sheet N4

What do you need to know before you start?

Maths

You need to be comfortable with the learning outcomes and key points from previous activities.

Darts

You will also need to know the rules of playing darts.
The game starts with each player having a starting total of 501. The players throw 3 darts at the board, they total up their score from those three darts, and they subtract that total score from the starting 501.
In that way, each time they score they reduce the starting total. The winner is the person who gets to 0 (zero) first.

How can you find this out?

- Ask a friend
- Ask your tutor
- Find instructions on the internet
- Watch a game of darts on TV, DVD or online - www.youtube.ie

Getting started

Task 1: Example

We discussed Phil Taylor's total score for his throws during the World Grand Prix in Citywest, Dublin. We know that during his first match Phil throws a 19, an 8 and a 12. We also know that before that throw, he had a total of 296 remaining.

Calculate what total Phil now has left to hit.

Try working it out before you look at the answer below.

Answer:

We calculated Phil's total score by adding the three positive whole numbers that Phil threw.

19 + 8 + 12 = **39**

Now to see what total remains for Phil we must subtract this number from our previous total of 296.

296 - 39 = **257**

Task 2: What is the remaining total?

1. If Phil had 196 remaining on his score and he threw a 20, 18 and 4, what is his remaining total?

_____

2. If Phil's opponent had 187 remaining and hit a 19, 15 and 2 on his next go, how much has he left to hit?

_____

Practise your skills

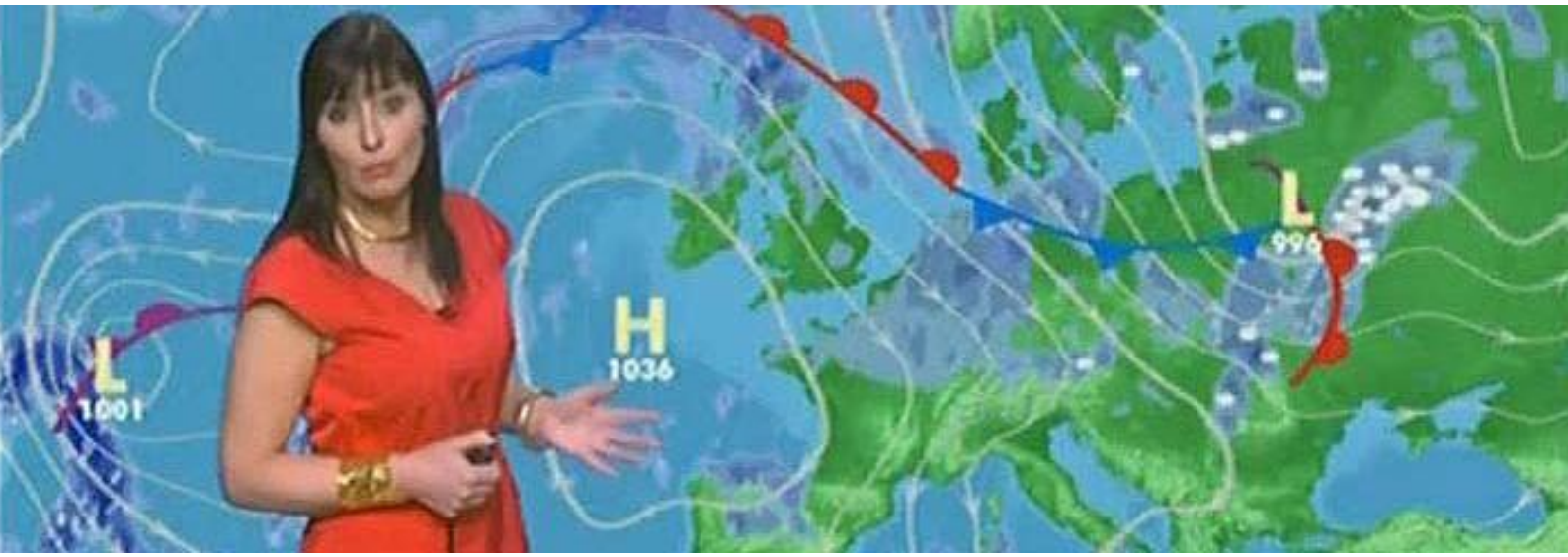
To improve your skills in adding natural numbers you could

- Practise keeping the score in a game of darts, using addition and subtraction.
- Practice Sheet N4

Activity

Temperature

Code N5



This activity is linked to the **Award Learning Outcomes 1.1 and 1.5.**

Introduction

The temperature is something we hear about everyday when listening to weather forecasts.

Temperatures vary greatly within a year in Ireland. For example, it could be as high as 24 degrees Celsius **(24°C)** in July and as low as **-10** degrees Celsius **(-10°C)** in January.

Temperatures of **-12°C** were recorded in January 2010. This contrasts to temperatures in May 2010 which reached 25°C in some parts of the country.

When we read temperatures we read negative numbers as well as positive numbers.

This activity will help you read, understand and use negative numbers in everyday life.

What will you learn?

Learning Outcomes

1. Understand the concept of integers.
2. Recognise negative numbers .
3. Realise the role of negative numbers in everyday life .

Key Learning Points

1. Integers
2. Negative Numbers

Materials you will need

- Temperature Cards from the resource pack
- The task sheets in this section
- Practice Sheet N5
- Solution Sheet N5

What do you need to know before you start?

- Integers are all whole numbers.
- Integers include all positive and negative numbers.
- All natural numbers are integers.
- Examples of integers include: 0, 2, -2, 65, - 736, 10034.

Maths symbols

- Z is the symbol used to represent integers.

Getting started

Task 1: Recognising integers

Example

Look at the numbers in the box below.

1. Put a circle around any number that is an integer.(Paul- layout numbers)

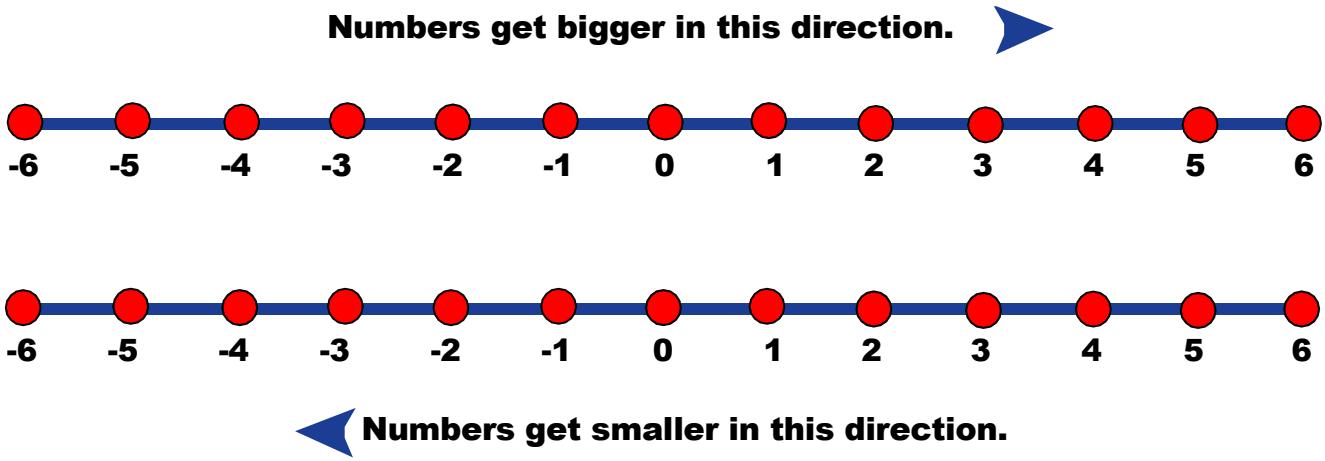
12	14	-34	0	34.5	$21\frac{1}{2}$
65	-5	$34\frac{1}{4}$	234	-45	4568

Did you remember?

- Integers are all **whole** numbers.
- Integers include all **positive and negative** numbers.
- All natural numbers are integers.
- A number with a fraction or a decimal point is not a natural, whole number and is **not** an integer.

Task 2: The number line

The number line below shows some positive and negative whole numbers (integers).



1. What are the negative numbers?

_____

2. What are the positive numbers?

_____

3. Is **-5 greater than** -4 or **less than** -4?

-5 is _____ than -4.

4. Decide if the following are true or false:

True or false? -3 is greater than -2 _____

True or false? 2 is greater than -1 _____

Task 3: Temperature Cards

Draw a number line from - 20 to 20.

In groups you are given cards, each with a different temperature. Each group is given the same cards.

Together, put the cards in order of lowest temperature to highest temperature.

Answer the following questions:

1. What is the highest temperature?

_____

2. What is the lowest temperature?

_____

3. Is -18°C **greater than** or **less than** -17°C?

_____

4. True or False: 4°C is six degrees hotter than -1°C? _____

Task 4: Temperature Challenge!

In your small group, think up some questions to give to another group using the temperature cards.

The language of maths

Common maths symbols

In the maths world we use different symbols. For example:

✚ This is a plus or addition sign, a sign for adding up.

▬ This is a subtraction sign, a sign for taking away one number from another.

✖ This is a multiplication sign, a sign for multiplying a number by another number.

➗ This is a sign for dividing a number by another number. For example, if you divide something by 2 then you are halving it.

More maths symbols

Greater than and less than

The symbol > means **greater than,** or bigger than.
The symbol < means **less than,** or smaller than.

So, we can say that 5 is greater than 3, and we can write it like this: **5 > 3**

We can say that **-3 is less than -10,** and we can write it like this: **-3 < -10**

The symbol ∑

The **symbol** ∑ shows if a number **belongs to** a particular set of numbers.
In activity N2 you learned that the **symbol** for the set of natural numbers (1, 2, 3 etc.) was **N**.
In this activity you learned that the **symbol for integers** is Z.

Example:
5 is a natural number.
We can say: 5 belongs to the set of natural numbers.
Or we could write it like this: **5** ∑ **N**.

5 ∑ **N**. This is a shorter way of writing '5 belongs to the set of natural numbers'.

2 is also a natural number. To write that '2 belongs to the set of natural numbers' you can simply write: **2** ∑ **N**

Practise your skills

- Practice sheet N5

Activity

Climate

Code N6

This activity is linked to the Award Learning Outcomes **1.1, 1.3 and 1.5.**

Introduction

We have seen in previous activities that negative numbers, as well as positive numbers, are something that you come across in everyday life, for example in reading temperatures or in goal difference in soccer leagues.

It is also extremely important to understand and use adding and subtracting integers, that is positive and negative whole numbers.

What will you learn?

Learning Outcomes

1. Further understand the concept of integers.
2. Appreciate the use of addition and subtraction of integers in real world situations.
3. Add and subtract integers.

Key Learning Points

1. Integers
2. Addition
3. Subtraction

Materials you will need

- The task sheets in this section
- Practice Sheet N6
- Solution Sheet N6

What do you need to know before you start?

- You need to be comfortable with the maths in Activities N1-N5.
- You should be familiar with temperature and negative numbers from the previous activity.

Getting started

Integers include all positive and negative numbers.

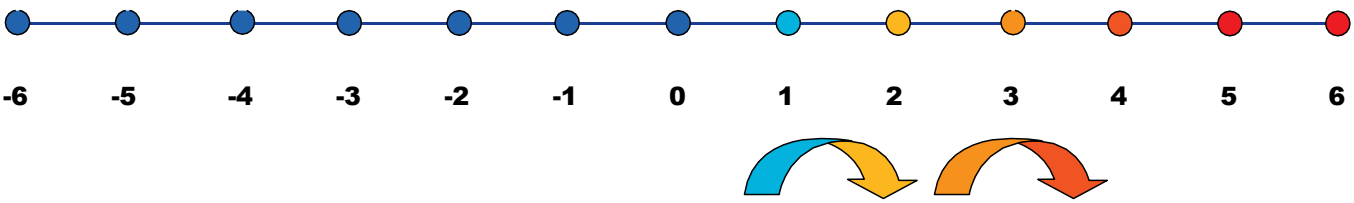
Examples of integers are 0, 2, -2, 65, - 736, 10034.

Adding and subtracting integers means being able to add and subtract numbers that are negative and positive.

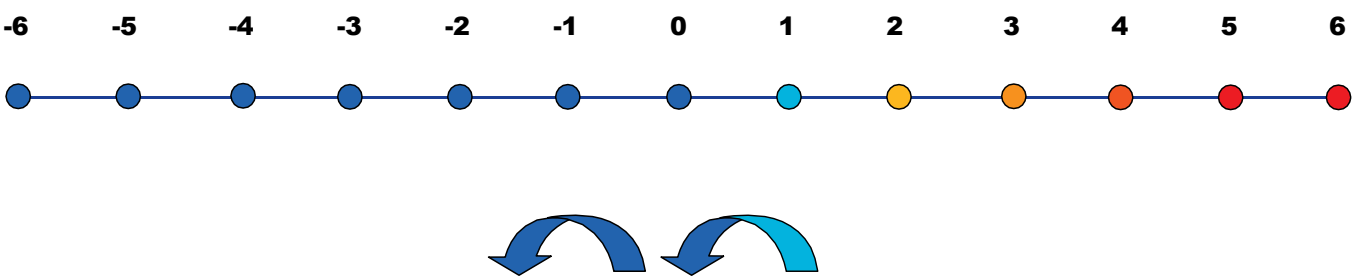
For addition we are moving in a positive direction - to the right on the number line.

For example
- 4 + 2 = - 2

Use the number line to help.



For subtraction we move in the negative directon. That is, we move to the left on the number line. For example:
- 3 - 1 = - 4



Task 1: Comparing temperatures

We discussed temperature in the last activity. Notice again how we use positive and negative numbers when describing temperature.

To compare temparatures in Ireland with that of other countries, we need to add or subtract both positive and negative numbers.

Example

Look at the table below. It shows the temperature recorded in Moscow and Dublin in January and July. Answer the questions that follow.

	January	**July**
Moscow	- 19^{o}C	31^{o}C
Dublin	- 12^{o}C	18^{o}C

1. Where was the highest temperature recorded? _____

2. Where was the lowest temperature recorded? _____

3. When was the lowest temperature in Dublin? _____

4. In which month was the temperature in Moscow 7^{o}C (7 degrees) lower than in Dublin?

_____

Now try this.

Task 2: Finding the difference

Look again at the temperature chart for Moscow and Dublin and answer these questions.

1. What was the difference in degrees in the temperature between Moscow and Dublin in July?

   The difference was: _____

2. What was the difference in degrees in the temperature between Moscow and Dublin in January:

   The difference was: _____

Practise your skills

Practice sheet N6

Activity

Calories

Code N7

This activity is linked to the **Award Learning Outcomes 1.1, 1.3** and **1.5.**

Introduction

What will you learn?

Learning Outcomes

1. Recognise the need for multiplication of integers.
2. Multiply integers.

Key Learning Points

1. Integers
2. Multiplication
3. Addition and Subtraction

Materials you will need

- The task sheets in this section
- Practice Sheet N7
- Solution Sheet N7

What do you need to know before you start?

- You need to be comfortable with the maths knowledge and skills in Activities N1-N5.
- Find out the recommended daily calorie intake for males and females.
- Know about calories, how they are consumed and burned up.

How can you find this out?

- Search the internet for information on calories.
- Ask your tutors or group members or friends.
- Find the information in the library.

Getting started

Adding and multiplying

Think back to the activity of playing darts.

If your dart landed on a **double 20** you worked out that score by **adding two twenties:**
20 + 20 = 40

If you scored a **'triple'**, you worked that out by **adding three twenties:**
20 + 20 + 20 = 60

You could also have used **multiplication** to work out the score:

Example

Double 20 = **20 × 2** = 40

multiplied by

Treble 20 = **20 × 3** = 60

Task 1: Doubles and trebles

Work out these darts scores by using multiplication. Fill in the gaps in the chart below to show how you did it and what the scores were.

Dart lands on this number	Work out by multiplying	This is the score
Double 10	**10 × __**	
Treble 15	**__ × __**	

Task 2: Working out calorie intake

Example

The table below outlines Elaine's food intake and the calories consumed last Monday.

Read it and then try answering the questions below. Try it yourself before checking your answer on the next page.

Food eaten	Calorie intake	total calorie intake
2 slices of wholegrain toast (no butter)	75 (per slice)	
Banana	105	105
Bowl of vegetable soup	30	30
2 slices of brown bread	65 (per slice)	
Yogurt	170	170
Chicken Breast	258	258
2 potatoes	58 (per potato)	
Small tin of beans	82	82
Dairy Milk Bar	255	255

1. Fill in the gaps in the table above.

2. Write here the multiplication that you did to fill in the gaps:

_____

_____

_____

3. How many calories in total did Elaine consume?

Task 3: Recommended calorie intake

Find out the recommended calorie intake per day for women. Then fill in this section using the maths symbols you have learned so far.

Elaine's calorie intake is: _____

The recommended calorie intake for women is _____

What is the **difference** between Elaine's and the recommended intake?
Show how you worked it out using subtraction:

Decide is Elaine's intake **greater than** or **less than** the recommended intake? Then write that information here using the maths symbols you have learned.

_____

Task 4: At the gym

- Elaine also attended the gym last Monday and ran for 3 lots of 10 minutes on the treadmill. She burned 54 calories every ten minutes she spent exercising on the treadmill.

  How many calories did Elaine burn altogether in that time?

_____

Task 5: Multiplying to find scores

Think about the example of Phil Taylor's darts match, from previous activities. We used it then to practise adding and subracting. It will help in practising multiplication as well.

Phil's play improved significantly in the second set. During one of his throws he hit **three triple 19's.**

1. What was his score for this throw? _____

2. Write here how you worked it out, using multiplication:

_____

_____

_____

Multiplying numbers with different signs: positive and negative

So far you have been multiplying **positive** numbers only. That is, you have been multiplying numbers that have the same sign, in this case +.

Tip: + is the sign for 'positive'. However, we can write positive numbers without putting the + sign in front. For example, when we see the number 2, it has no sign in front of it, so we know it is a positive number.
When we write a negative number, we must always put the negative sign in front of it: for example, -2.

If you multiply a positive number by a positive number you always get a positive number, never a negative one. For example:
6 × 4 = 24
7 × 2 = 14

Also, if you multiply a negative number by a negative number you always get a positive number as the answer. For example:
- 6 × -4 = - 24
- 7 × - 2 = 14

What do you notice about this?

Notice that: If you **multiply** numbers that have **the same signs**, you will always get a positive **number** as the answer.

Task 6: Multiplying numbers with the same signs

Try these.

6 × 8 =

10 × 7 =

-5 × -3 =

-6 × -8 =

Practise your skills

- Play or watch a game of darts and keep the score, as you did in previous activites. This time, when keeping score, make sure to multiply the numbers when a double or treble is scored.

- Look up recommended calorie intake for men and women. Then use that information to make a table or chart about yourself, like the one shown above for Elaine.

- Use Practice Sheet N7

Activity

Working with money

Code N8

This activity is linked to the **Award Learning Outcomes 1.1 and 1.5.**

Introduction

We use the mathematical skill of division often in everyday life. For example, we use it when dealing with money, such as if we want to working out how much we get paid per day or per hour.

This activity will help you with division.

What will you learn?

Learning Outcomes

1. Recognise the need for division of integers in real life situations.
2. Divide positive and negative whole numbers.

Key Learning Points

1. Integers
2. Division

Materials you will need

- Task sheets in this section
- Practice Sheet N8
- Solution Sheet N8

What do you need to know before you start?

- You should be familiar with the concept of integers.
  Integers include all positive **and** negative numbers.
  Examples of integers are 0, 2, -2, 65, - 736, 10034.

- Z is the symbol used to represent integers.

Getting started

We would like to thank Newbridge Youth Training & Development Centre who have given us permission to use the following extract from their induction pack: You and your money.

We know from activities in N6 that when multiplying whole numbers sign with the same sign then the answer is positive and if the signs are different then the answer will be negative. For example:

- 3 x -6 = + 18
- 5 x 4 = - 20

The exact same is true for **division** of integers. For example:

16 ÷ 8 = 2
-8 ÷-2 = 4
56 ÷ -7 = -8
-16 ÷ 4 = -4

Task 1: You and your money

Read through the Training Allowances and Travel sheet on the next page. Then answer these questions:

(a) What age are you? _____

(b) How much is your trainee allowance? _____

(c) How far away is your home? _____

(d) What is your travel allowance? _____

(e) What is your meal allowance per day _____? For the week _____?

(f) What is your total weekly allowance? _____

Trainee Allowances and Travel

Weekly Trainee Allowances

18 years old €197.80
17 years old €100.70
15 - 16 years old € 80.60

Travel Allowance

0 - 3 miles from home nil
3 - 5 miles from home: €4.60
5 - 10 miles from home €11.60
10 - 20 miles from home €17.60
20 - 30 miles from home €21.60
30 - 40 miles from home €27.70
40 0 50 miles from home €32.50

Meal Allowance

€4.00 per week or 0.80 c per day

Task 2: How much per day?

Example

Try to work out the answer to this yourself before you check the answer given below. If you are 18, your training allowance is **about €195** per week. **What is that per day?**

Use this space to work it out.

Answer:

You attend the centre 5 days a week. If you divide your week's pay into 5 equal parts, you will know how much you get paid per day.

€195 ÷ 5 = €39

Task 3: Sharing the winnings!

Grand Draw

1st place	**€20,000**
2nd place	**€15,000**
3rd place	**€12,500**
4th place	**€10,000**
5th place	**€8,000**
6th place	**€5,000**

Ciaran bought a ticket for this draw.

He and Mary have 2 grown up children.

If Ciaran wins, he wants to divide his winnings equally between Mary, the children and himself.

He won 5th prize.

How much will each person get? _____

Write here how you worked that out:

_____

_____

_____

_____

Task 4: Sharing

James won €12,800 in a raffle. He kept €4,400. He divided the remainder equally between his 7 children.

How much did each of the children get from James?

Write here how you worked it out. Show your calculations.

Task 5: Budgeting

Visit the website of the Money Advice and Budgeting Service: www.mabs.ie

Click on 'budgeting'. Use the information MABS give there to help you to complete a Personal Budget Sheet.

You can download a Personal Budget Sheet from the website.

Practise your skills

- Practice Sheet N8

Activity

Construction

Code N9

This activity is linked to the **Award Learning Outcome 1.5.**

Introduction

In mathematics, there are various operations which may be required to carry out such as addition, subtraction, multiplication. How do we know which order to carry out these operations so we always get to the one correct answer? This activity will help you with this.

What will you learn?

Learning Outcomes

1. Understand the importance in which operations are carried out
2. Apply the order of operations to a real life situation

Key Learning Points

1. Natural Numbers
2. Integers
3. Addition, Subtraction, Multiplication and Division

Materials you will need

- Practice Sheet N9

What do you need to know before you start?

You should be familiar with the maths knowledge and skills from previous activities.

Getting started

So far you have learned and practised how to

✚ add integers

▬ subtract integers

✖ multiply integers

➗ divide integers.

Tip: The language of maths

The maths word **operation** means the things we do in maths, such as multiplication, division, addition and so on.

But what happens if you have to work something out but need to add and subtract and multiply and divide to get the answer?

In the real world, the order in which we do the operations is important: that is, the order that we add, subtract, divide and multiply is important.

Example

Look at the following calculation.

3 + 2 × 4 = 11

There are two different operations in it: addition and multiplication.

This is the order we did those operations in:

First, we did the **multiplication:** **2 × 4** = 8
Then, we did the **addition:** **3 + 8** = 11.

If we did it in a different order, we would get a different answer - and it would be wrong. Try this and see for yourselves.

Now look at the BIDMAS rule on the next page: it will help you to remember the correct order of operation.

The BIDMAS rule

We can remember the correct order of operation by following the clues in the word BIDMAS. Each letter in that word stands for a maths operation:

- **Brackets** (always do any work inside the bracket first)
- **Indices** (evaluate the index e.g. 23) - **we are not concerned with this for now**
- **Division** (carry out the division)
- **Multiplication** (perform the multiplication)
- **Addition** (do the addition)
- **Subtraction** (do the subtraction)

We should always use the BIDMAS order of operations.

For example, look at this maths problem:

16 4 + 14 × 8 - (15 - 7)

It has lots of maths operations in it: addition, multiplication, subtraction, and some numbers linked in brackets.

What order should we do those operations in?

B	16 4 + 14 +×÷ 8 - (8)	First, do the calculation in the **brackets.**
I	There are no indices in this one, so skip I this time.	
D	**4** + 14 × 8 - 8	Then, do any **division.**
M	4 + **112** - 8	After that, do any **multiplication**.
A	**116** - 8	Then, the **addition**
S	**108**	**Finally, do the subtraction**

That is the correct order to carry out the maths operations. If we did them in a different order, we would get a wrong answer.

Task 1: Does order of operations really matter?

Individually, calculate the following operations.

Try to do so in more than one way. Make sure that one of those ways is that you will apply the BIDMAS rule.

(i) - 8 - 12 - 4 + 9

(ii) - 7 - 4 + 6(5 - 8)

(iii) 16 ÷ 8 - 2 × 4 + (5 - 6)

In pairs, discuss your findings with your partner.

Did you always get the same answer?

Is there more than one correct answer?

Why? Why not?

What happened when you did not follow the correct order of operations?

Task 2: The cost of a construction job

You have been hired to build a timber fence around the centre. You

need to calculate the cost of the job.

First, you need to get timber. You estimate you need 12 panels of timber.

The hardware will sell you the first six panels at a cost of €25 each.

They will sell you the remaining six panels at a reduced price of €20 each.

You and two others will work on this job.

Two of you will work for the full day and will earn €76 a day. The third worker will work for a half day and so will get half a day's pay.

Work out the cost of the job.

Remember to use the BIDMAS rule to help!

Tip: We put **brackets** around numbers that are linked together. In this example we put brackets around (6 X 20) and around (6 x 25). We do that to show that they are linked: 6 panels at €20 each, and 6 panels at €25 each.

Check your answer on the next page.

Answer: €450

(25 × 6) is the cost of the first 6 panels.

(20 × 6) is the cost of the remaining 6 panels.

(2 × 76) is two workers' pay for a full day.

(76 x 2) is the other worker's pay for a half day.

To cost the job you need to do those calculations and add up your answers.

So the maths calculation is:

(25 × 6) + (20 x 6) + (2 × 76) + (76 2)
Cost of timber + Cost of wages

The **BIDMAS** order of operations means:

- First, work out what's in the four brackets;
- Then, add them.

B 150 + 120 + 152 + 38

A 460

Practise your skills

- Practice Sheet N9

Activity

Recipes

Code N10

This activity links to **award learning outcome 1.1.**

Introduction

When we go for dinner in a restaurant or cook at home we often follow the directions from a recipe. We could not follow these directions without an understanding of different types of numbers. This activity will help you with this.

What wil you learn?

Learning Outcomes

You will be able to:

1. Understand the concept of a real number.
2. Recognise real numbers.

Key Learning Points

1. Real numbers

Materials you will need

- A recipe
- Practice Sheet N10

What do you need to know before you start?

Maths

You are familiar with natural numbers (whole numbers) and integers (positive and negative numbers).

Real numbers include almost all numbers. They include whole numbers, positive and negative numbers and numbers such as $^{1}/_{2}$ (this is called a fraction) or 20.25 (this is called a decimal).

We have seen where natural numbers and integers are used. We come across fractions regularly also. For example, buy one, get one $^{1}/_{2}$ price offers. Decimals are also used in our daily lives. For example, the distance from our house to the nearest shop is 1.5 kilometres.

Recipes

- Information found on a recipe

How can you find this out?

- Ask a friend.
- Ask your tutor.
- Find instructions on the internet.
- Look up a cook book.
- Any other way that suits you

Task 1: Understanding Real Numbers

Example

Look at the numbers in the box below.

Are there any numbers in this box that are not real numbers?

12	14	-34	0	34.5	21
65	-5	34 º	234	-45	4568

Did you remember?

- Real numbers include whole numbers, positive and negative numbers, fractions and decimals.

Answer

All numbers in the above box are real numbers.

Task 2: Recognising Real Numbers

Example

Look at the following recipe. Can you recognise the real numbers?

Recipe for mushroom soup

Ingredients

1 teaspoon vegetable oil

10 mushrooms chopped

50g/2oz flour

575ml stock or 2 stock cubes dissolved in 575ml of boiling water

$^{3}/_{4}$ pt milk

pinch of salt if desired

pepper

1.5 finely chopped onions

Instructions

1. Heat the oil in a saucepan. Add the mushrooms and onion and fry, stirring continually for 5 minutes.
2. Add the flour and stir well. Cook for another 2 minutes.
3. Gradually stir in the stock and milk and bring to the boil. Keep stirring.
4. Simmer for 20 minutes, until thickened.
5. Add salt and pepper to taste

We can identify and list real numbers from the ingredients:

The real numbers in the recipe are: 1, 10, 50, 2, 575, 2, $^{3}/_{4}$, 1, 1.5

Now you try this

Write out a recipe that you like.

Or: Find a recipe that you like in a magazine or on the internet.

Cut it out, or print it out, and paste it here.

- **What are the real numbers in the recipe?**

Practise your skills

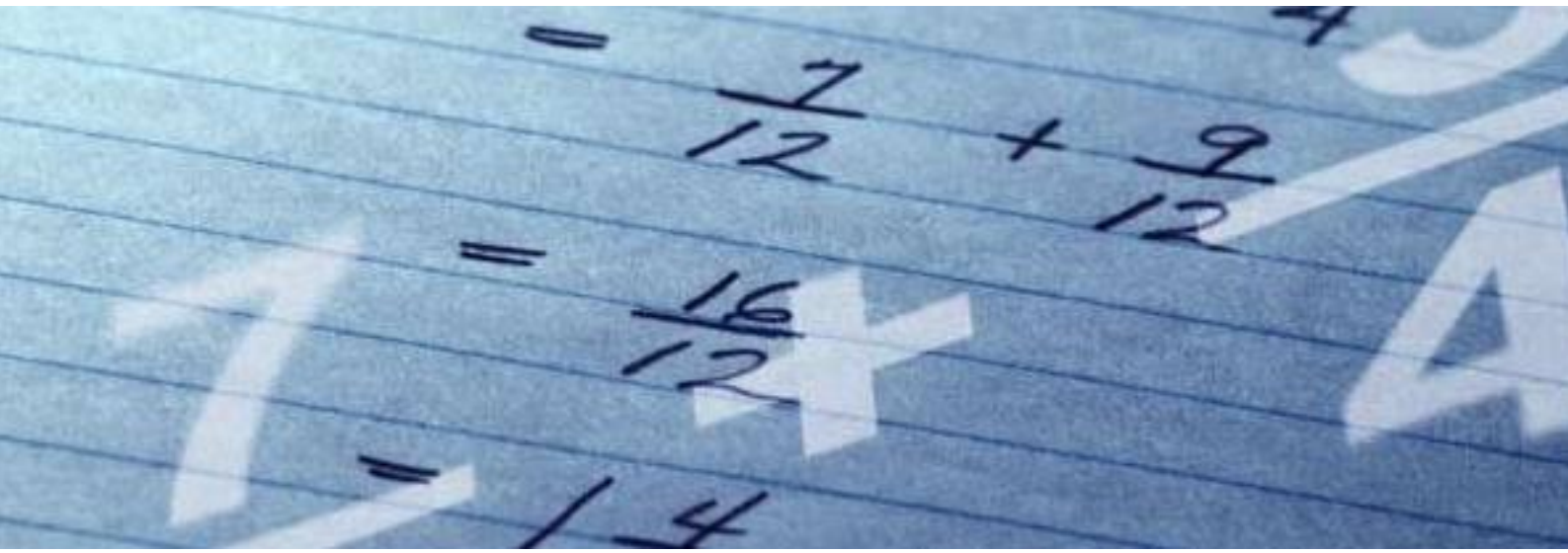
- Practice sheet N10

- Can you think of three other examples where real numbers (whole numbers, positive and negative numbers, fractions and decimals) are used regularly?

Activity

Introducing fractions: Circles 1

Code N11



This activity is linked to the **Award Learning Outcomes 1.1**, **1.2** and **1.5.**

Introduction

Every day we meet numbers that are not whole numbers. For example we might buy clothes in a half price sale. A **half** is a fraction and we write it like this:

This activity will help you to learn about fractions.

What will you learn?

Learning Outcomes

1. Understand the concept of common fractions.
2. Recognise the use of fractions in everyday life.
3. Know how to name and write common fractions.

Key Learning Points

1. Fractions

Materials you will need

- The circle fraction kit that your tutor will give you
- The task instructions
- Practice Sheet N11

Fractions in the real world

We meet fractions in everyday life. For example we use fractions when we are

- measuring objects: for example, we might need ″ metre of wood for a specific task;
- sharing food: for example, if we divide a pizza evenly between four friends each friend gets one quarter;
- reading the time: for example, a quarter of an hour;
- cooking: a recipe might say we need a third of a cup of sugar.

What does ‘fraction’ mean?

To understand what a fraction is, think of dividing up one whole thing such as a pizza or cake:

- The whole thing is divided up.
- There are a certain number of parts.
- All those parts together make up the whole thing.
- Each of those parts is called **a fraction** of the whole thing.

Tip: Think of the darts board you drew or used in Activity N1. It was divided into 20 parts called ‘beds’. Each one of those beds is a fraction of the whole darts board.

Task 1: Using parts to make a whole

Use the Circles Fraction Kit that your tutor will put on the table.

In small groups use the pieces in the kit to make up as many **single coloured circles** as you can.

When you have done this, look at the circles you have made. What do you notice about the circles and the parts? What does this tell you about fractions? Tell your group and the tutor.

Task 2

Fill in the table below.

Colour of circle	How many parts make the whole circle?
Yellow	
Green	
Blue	
Red	
Purple	
Orange	
Pink	
Pale Blue	
Green	
Deep red	

How to name and write fractions

In the coloured circles, each of the parts that made up a whole is a fraction.
Each fraction has a name. The name depends on the number of parts that make up the whole.

Examine your coloured circles. If the whole circle is made up 2 equal parts, **each part** is **one of two** parts. We call it a half and we write it as one **over two: ½**. **½** is the **symbol** for **one half**.

If **3** equal parts make up the whole circle, **each part** is **one of three parts**. We call it a **third** and we write it as **one over three**: ⅓

One part of the whole	**Its name**	**Its symbol** The total number of parts that make up the whole is **under** the line.
1 part of 3 is called ►	**One third** and we write it like this ►	$\frac{1}{3}$
1 part of 4 is called ►	**One quarter** and we write it like this ►	$\frac{1}{4}$
1 part of 5 is called ►	**One fifth** and we write it like this ►	$\frac{1}{5}$
1 part of 10 is called ►	**One tenth** and we write it like this ►	$\frac{1}{10}$

Task 3: Naming fractions

Look at the coloured circles that you made. Your tutor will call out the colour and ask your group to **say the name of each part:** one third, one fifth, one sixth, one half and so on. Your tutor or a member of the group will write the name and symbol on the flipchart or whiteboard.

Task 4: Writing fractions

Fill in the table for each of the coloured circles.
The second one is done for you.

Colour of circle	How many parts make the whole circle?	Each part is named...	Symbol for each part
Yellow			
Green	**2**	**One half**	**½**
Blue			
Red			
Purple			
Orange			

Task 5: Naming more than one part

What happens when you put more than one part of the circle together - what do you call that and how can you write it?

Do this in the same way as above. For example: Three parts make up the whole of the blue circle. So each one of those parts is one part out of three. We call it a third and we write it ⅓.

So, if you put **two** of the **third** parts together, that is **two parts out of three**. We call it **two thirds** and we write it like this: ⅔

Now you try this: **Write the names of these fractions:**

⅔ _____

⅘ _____

_____

⅚ _____

_____

Task 6: Fractions challenge

Your tutor will put together parts of the coloured circles and ask you to answer these questions:

1. What is the fraction called?

2. How would we write it?

Task 7: Fractions challenge 2

Work in pairs. Take turns to make fractions using the fractions kit and to ask each other to name the fractions that you have made.

Practise your skills

To improve your skills in fractions you could do the following:

- Practice Sheet N11
- Notice where fractions appear in everyday life: for example, a football match is made up of two halves. Think of other examples from your own life.

- Talk to your tutors in art or pottery or woodcraft. Perhaps you could make your own fraction kits. For example, you could make a pottery 'cake' made out of equal parts that fit together. Decide what fractions you want it to be divided into. Or you could make a wooden tray or box divided into sections that you can fit together to make the whole. Decide how many parts will you divide it into: halves? quarters? fifths? eighths? tenths? A mixture?

Activity

Circles 2 and fraction snap

Code N12

This activity is linked to the **Award Learning Outcomes 1.1, 1.2** and **1.5.**

Introduction

$\frac{3}{1}$ and $\frac{6}{2}$ are equivalent fractions. Equivalent means that they have the same value or are equal to each other. This activity will help you to understand and use equivalent fractions.

Learning Outcomes

1. Understand the term equivalence of fractions.
2. Demonstrate an ability to recognise where fractions are equivalent.

Key Learning Points

1. Equivalence
2. Fractions

Materials you will need

- Fraction circles
- Fraction cards
- Practice Sheet N12
- Solution Sheet N12

What do you need to know before you start?

You should be familiar with the maths knowledge and skills from Activity 11.

You need to be familiar with the rules of the card game **Snap**.
If you haven't played already, get a friend to teach you, or look up the rules.

Getting started

The language of maths

Q is the symbol used to represent rational numbers.

Rational numbers are any numbers that can be written in fraction form.

For example: **3** = $\frac{3}{1}$ = $\frac{6}{2}$ and **4** = $\frac{4}{1}$ = $\frac{8}{2}$

Equivalent fractions: Example

In the diagrams below the first circle is divided into four equal parts (quarters). The second circle is divided into eight equal parts (eighths). Notice that the same portion of each circle is shaded. In other words $\frac{2}{4}$'s of the first circle **is equal to** - or **equivalent to** - $\frac{4}{8}$'s of the second circle. We write that like this:

$$\frac{2}{4} = \frac{4}{8}$$

Now notice that half of each circle is shaded.

So we see that:
$\frac{2}{4}$ is the same as $\frac{4}{8}$ and the same as $\frac{1}{2}$

In the maths world we write it like this: $\frac{2}{4}$ = $\frac{4}{8}$ = $\frac{1}{2}$

Any fraction can be written in equivalent forms. Another example is $\frac{1}{3}$ = $\frac{2}{6}$ = $\frac{3}{9}$.

In this example $\frac{1}{3}$ is called the **Simplest Form**. 1 and 3 have no **common factors** except 1, so it cannot be simplified any further.

Task 1: Finding equivalent fractions (1)

1. Use the fraction circles kit to find fractions that are equivalent.

This is what you should do:

- Make a whole circle of one colour.
- Use parts from another colour circle to cover exactly half (½) of your first circle.
- How many parts did you use? _____
- What is the fraction name for those parts? _____
- Use that information to write down the fraction that covered ½of your circle: _____

So, that fraction is **equivalent** to ½.

Now use that to fill in the gaps below:

½ is equivalent to _____.

½ = _____

½ and _____ are equivalent fractions.

Task 2: Finding equivalent fractions (2)

This time choose a different colour circle from the fraction kit. Again, cover half of that circle with parts from another colour circle.

Repeat what you did in Task 1, to find equivalent fractions.

Task 3: Show equivalent fractions

Working in pairs, use the fractions circle kit to make circles that show that the following are equivalent fractions:

$\frac{1}{3} = \frac{2}{6}$

$\frac{2}{10} = \frac{1}{5}$

Task 4: Fraction Circles

This task involves using the fraction circles kit.

The tutor will show the group $\frac{1}{2}$ from one of the coloured fraction circles.

Together, say the number of ways we can make a piece equivalent to $\frac{1}{2}$, from the other colour circles your tutor will show you.

Record your answers on the whiteboard or flipchart or computer in table format, such as this one:

1/2	$\frac{2}{4}$ $\frac{3}{6}$ $\frac{4}{8}$ $\frac{6}{12}$
1/3	$\frac{2}{6}$ $\frac{3}{9}$ $\frac{4}{12}$ $\frac{5}{15}$
1/4	$\frac{2}{8}$ $\frac{3}{12}$

Task 5: Finding equivalent fractions (3)

Using the fraction circles answer the following question:

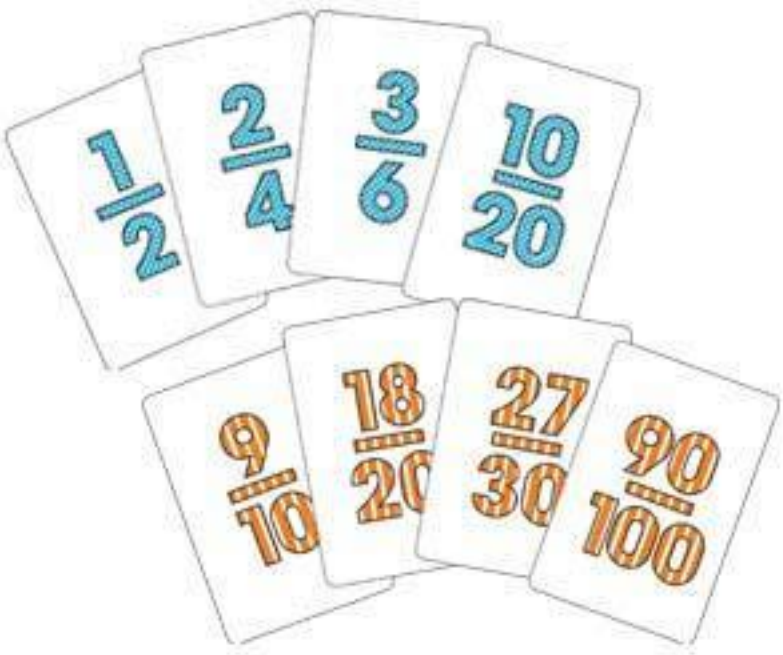
What other fractions are exactly the same size as the following?

⅔, ⅕ and ⅚

Task 6: Fraction Snap

Use the set of fraction cards in the resources section to play the card game “Snap”. Play in groups of 4.

Deal the cards out equally between the players. Players take it in turn to place their card face up in the middle of the table, each player adding to the pile. If the fraction on the card that is turned over is equivalent to the card underneath it, all players try to be the first to place their hand on top of the pile and call ‘snap!’ For example, if ⅜ is the card at the top of the pile of cards and the next card to come out is ⅓, then players should try to place their hand at the top of the pile and call “snap”, because these fractions are equivalent. Whoever is first to call ‘snap’ in that way picks up the pile of cards. The object of the game is to win all the cards.



Practise your skills

- Use the fraction circles kit.
- Use the fraction cards to play snap, fish-in-the-pond and other matching card games.
- Use Practice Sheet N12
- Use Solution Sheet N12

Activity

Come dine with me

Code N13

This activity is linked to the **Award Learning Outcomes 1.2 and 1.5.**

What will you learn?

Learning Outcomes

1. Recognise proper, improper fractions and mixed numbers
2. Convert improper fractions to mixed numbers and mixed and whole numbers to improper fractions.

Key Learning Points

1. Improper Fractions
2. Mixed Numbers
3. Proper Fractions

Materials you will need

- Practice Sheet N13
- Solution Sheet N13

Getting started

Naming the parts of a fraction

When we write a half as a fraction we write it in the following form: $\frac{1}{2}$

In the same way we write one quarter like this: $\frac{1}{4}$

And we write two thirds like this: $\frac{2}{3}$

Tip: The language of maths

We call the number **over** the line the **numerator.**

We call the number **under** the line the **denominator**.

Task 1: Numerator and denominator

Fill in the blanks in the table below to name the parts of the fraction. The first one is done for you.

Fraction	Numerator	Denominator
$\frac{1}{2}$	1	2
$\frac{2}{3}$		
$\frac{4}{5}$		
$\frac{3}{4}$		

Task 3: Preparing a meal

Example

You are making a dinner for your friends and you are going to serve cakes for dessert. You know that most people can only eat half of one of these cakes.

If you are having **six** people to lunch **how many cakes would you need? Use the fraction circles kit to help work this out.**

Try it yourselves before looking at the answer below.

There are 6 people, who might eat half a cake each.

So there are 6 lots of $^{1}/_{2}$. We can write this as $^{6}/_{2}$.

$^{6}/_{2} = 3$

So you need 3 cakes.

Now try these

How many cakes would you need if:

7 people were coming? _____

9 people were coming? _____

12 people were coming? _____

Task 3: Quiche for lunch

You are serving quiche for lunch and you know that people usually have about **a third** of a quiche each.

If there are 7 people for lunch, how many quiches will you need?

Use fraction circles to help you work it out.

Task 4: Come dine with me

You and your friends have decided to imitate the TV programme 'Come dine with me'.

It is your turn to prepare dinner.

You have decided to serve cakes for dessert. You know that people can only eat half of one of these cakes.

You have 5 cakes and there are 9 people attending dinner. Will you be able to give them all cake?

Task 5: Try these!

1. Jack has three bars of chocolate to share among his friends. He breaks them into quarters.

   How many pieces of chocolate does he have?

   _____

2. Mary has made three cakes and she decides to cut them in sixths ($^1/_6$) so they are the size she wants.

   How many slices will Mary have from the three cakes?

   _____

Practise your skills

- Practice sheet N13

Activity

Pizza

Code N14

This activity is linked to the **Award Learning Outcomes 1.2 and 1.5.**

Introduction

It is not only integers, or whole numbers, that are used in everyday life.
We also need to understand how to add and subtract fractions. This activity aims to help you with that.

What will you learn?

Learning Outcomes

1. Add and subtract fractions with same denominator.
2. Visualise addition and subtraction using pizza image or fraction circles.

Key Learning Points

1. Addition of fractions
2. Subtraction of fractions

Materials you will need

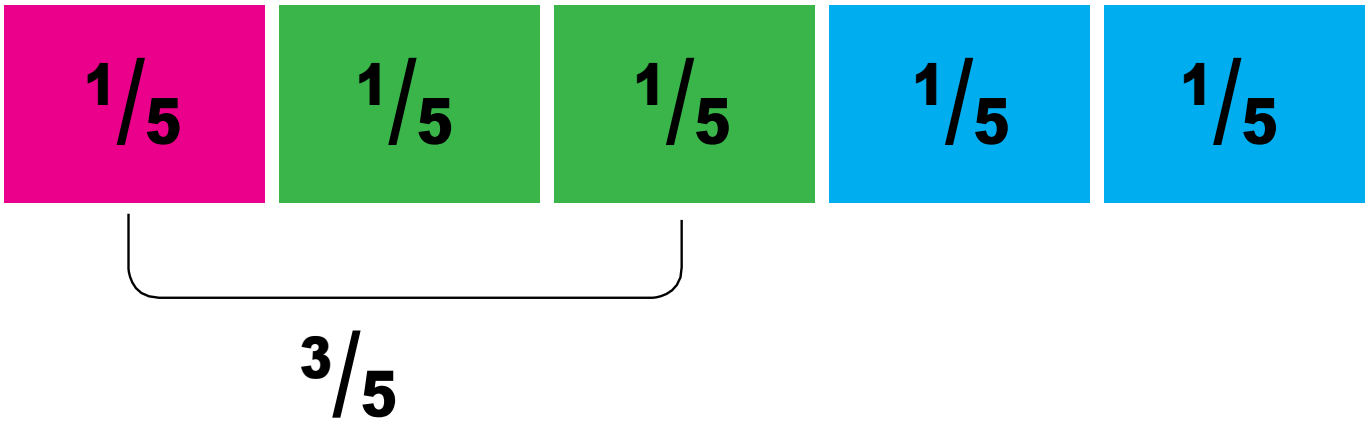
- Practice sheet N14
- Solution sheet N14
- The task sheets in this section
- Fraction circle kit from the resources section.

What do you need to know before you start?

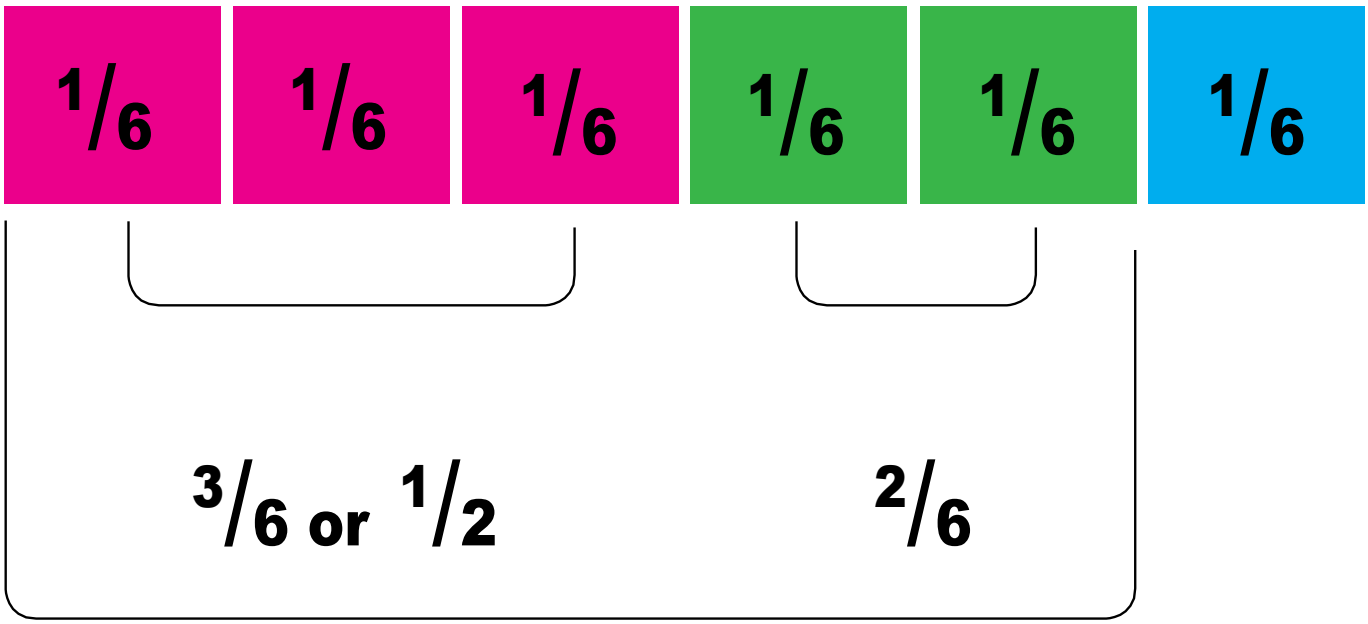
* You need to be familiar with the previous fraction activities in this pack.

Getting started

Look at the illustrations below. They will help to show how we add and subtract fractions with the **same denominator**, for example $^{1}/_{5} + {}^{2}/_{5} = {}^{3}/_{5}$:



For example : $^{5}/_{6} - {}^{2}/_{6} = {}^{3}/_{6}$ or $^{1}/_{2}$



$\frac{5}{6}$

Task 1: The pizzeria

Example

Your local pizzeria sells individual pizza slices.

They cut one full pizza into **eight slices** or **eighths.**

On Wednesday last one customer bought **three** slices of the pizza below. On

the same night, another customer bought **two.**

Try to calculate this yourself before checking the answer on the next page.

Tip: You could use the fraction circle kit from the resources section to help you to work this out.

What fraction of the pizza remains after these purchases?

Answer: _____

Write or draw here how you worked it out.

Solution

When three of the eight slices have been sold and removed the pizza will look like this:

When a further two of the eight slices are taken away the pizza will look like this:

So these pictures show that there are $\frac{3}{8}$ of the pizza left.

Task 2: More pizza please

Try to work this out on your own or with a partner in the group.
You can use the fraction circles to help you.

The next night the staff in the pizzeria cut up the pizza into 8 equal slices again.

Three customers come in.

One buys one slice, another buys two slices and the third customer buys one slice.

What fraction of the pizza now remains after these purchases?

_____

Write or draw here how you worked it out.

Using maths symbols write here the adding and subtracting of fractions that you did to work it out.

Task 3: Using fractions to help make decisions

Joan is running a small bakery shop and needs to decide how many cakes to bake.

On Tuesday she baked two sponge cakes. She cut them into **six slices** each. So

each cake was divided into **sixths**.

She put the cakes at opposite ends of the counter.

That day, she sold **three slices** from one cake.

She also sold **four slices** from the other cake.

Joan thinks the sales will be like this again the next day, Wednesday. She is trying to decide how many cakes to bake for Wednesday. **What decision would you make?**

In pairs,discuss this and decide: would you bake one sponge cake or two sponge cakes as normal?

Decision

How many cakes would you bake? _____

Give the reason for your answer.

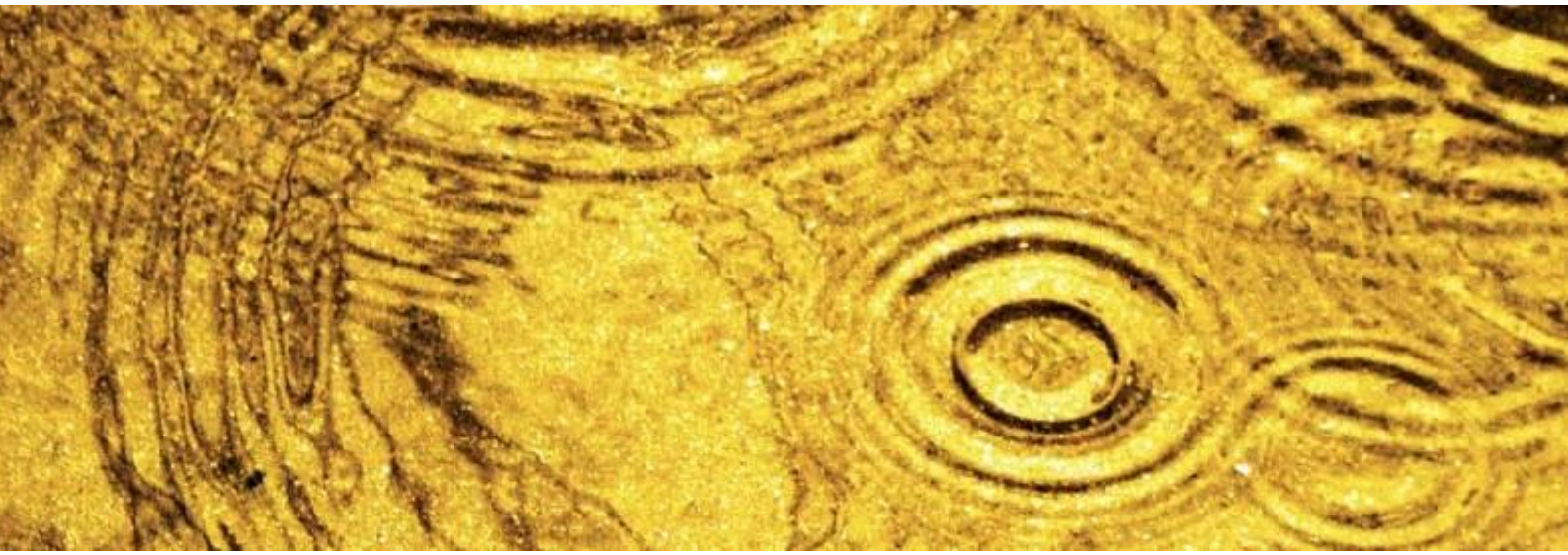
Practise your skills

- Practice Sheet N14
- Use the fraction circles kit from the Resources Pack.

Activity

Circles 3

Code N15



This activity is linked to the **Award Learning Outcomes 1.2 and 1.5.**

Introduction

We have seen in previous activities how to add and subtract fractions with the same denominator. This activity will help you to be able to add and subtract fractions with different denominators.

What will you learn?

Learning Outcomes

1. Add and subtract fractions with **different denominators.**
2. Visualise addition and subtraction using fraction circles.
3. Recognise the need to add or subtract fractions in real life situations.

Key Learning Points

1. Addition of fractions
2. Subtraction of fractions

Materials you will need

- Practice sheet N15
- Solution sheet N15
- The fraction circles kit from the resources section

What do you need to know before you start?

You must be familiar with the previous fraction activities in this pack.

Getting started

Task 1: Adding fractions with different denominators

Example

Your tutor will give you circles from the fraction circle kit. They will include $^1/_6$ and $^1/_4$ and some other fraction circles.

With a partner or in small groups, try to work this out on your own before your tutor helps you find the answer:

What fraction do you get when you add $^1/_6$ and $^1/_4$ together?

Write your answer here:

Write or draw here what you did to work it out:

Task 2: Add and subtract fractions with different denominators

Use the fraction circles in the same way as you did in the example, to add and subtract the following fractions.

$$^1/_5 + ^1/_3 =$$

$$^2/_3 + ^1/_4 =$$

$$^1/_3 - ^1/_6 =$$

$$^1/_2 - ^2/_5 =$$

Task 3: Pizza

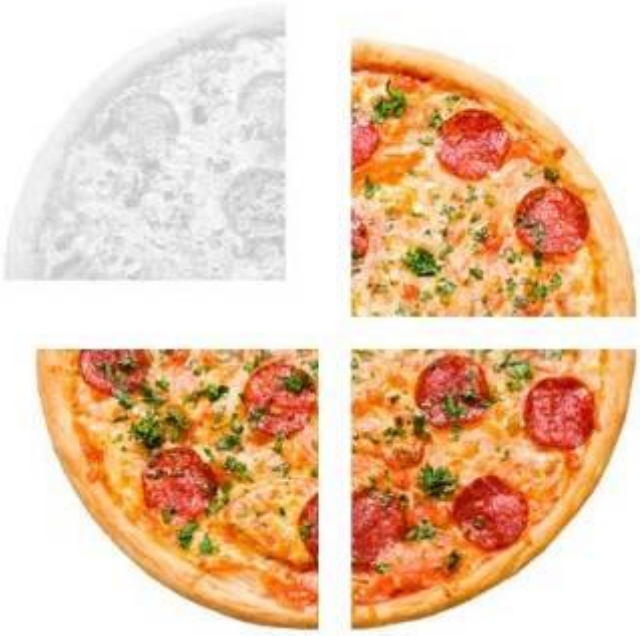
Your local pizza place has decided to sell large and small pizza slices.

They cut one pizza into quarters to make the large slices.

They cut the other pizza into six slices, so each small slice is one sixth of the whole pizza.

A mother and child come into the pizzeria. The mother buys one large slice of pizza for herself and a small slice for her child.

Big Pizza Slices



Small Pizza Slices

1. In the boxes below, write in fractions how much is left in each of the pizza after the sale.

Big Pizza Slices

Small Pizza Slices

2. How much overall pizza is left?

Tip: First you must find a **common denominator** for those two fractions. You can use your fraction circles to help.

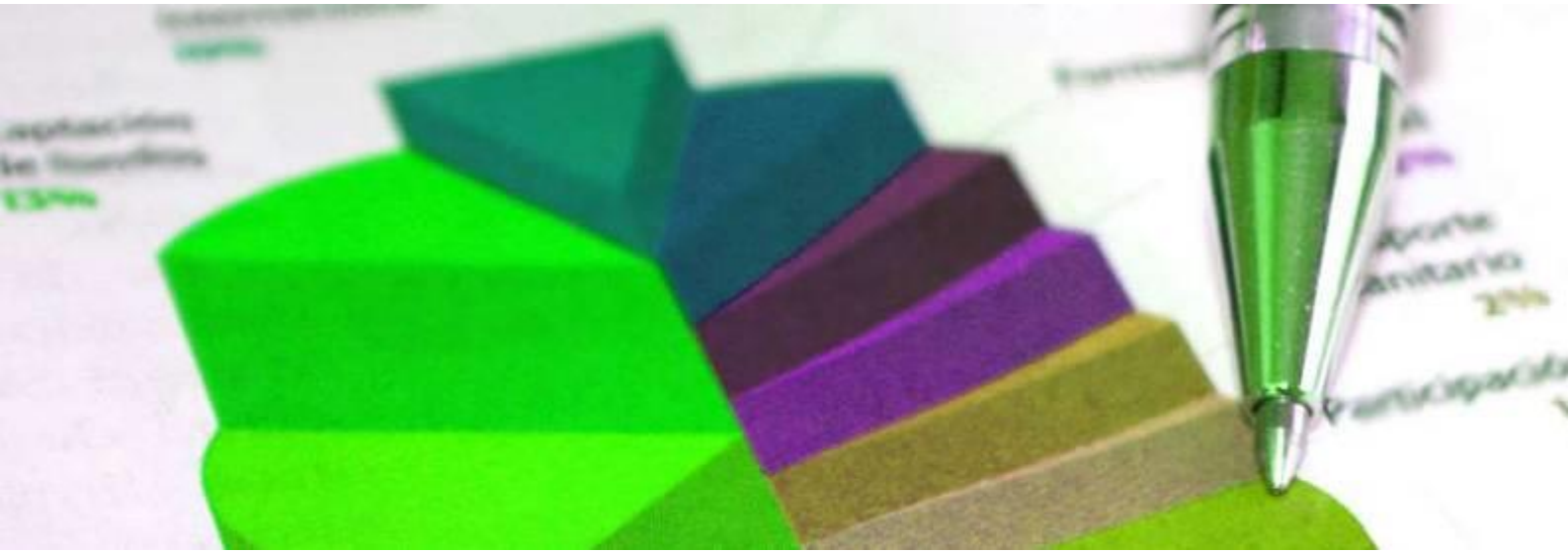
Practise your skills

- The fraction circles kit.
- Practice Sheet N15.

Activity

A poll

Code N16



This activity is linked to **Award Learning Outcomes 1.1, 1.2, 1.3 and 1.5.**

Introduction

Similar to the addition and subtraction of fractions we rely on multiplication of fractions every day, often without even realising it.

What will you learn?

Learning Outcomes

1. Understand the concept of multiplying fractions.
2. Recognise the need to multiply fractions in real life situations.
3. Multiply fractions

Key Learning Points

1. Multiplication of fractions

Materials you will need

- Practice sheet N16
- Solution sheet N16
- The fraction circles kit from the resources section

What do you need to know before you start?

You must be familiar with the previous fraction activities. You need to know what a poll is and how it is conducted.

How can you find this out?

- Ask your tutor or family member or friend.
- Find a recent poll in a newspaper or on the internet .

Getting started

Task 1: Using fraction circles.

Firstly let's use fraction circles to see how multiplication of fractions works.

Take a **1/4** piece. **What is half of this?**

Tip: Find two equal shapes that fit exactly over it.
You will see that these two shapes are an eighth. In other words, a ½ **of** ¼ is ⅛.

Tip: A half **of** a quarter is the same as saying 'A half **multiplied** by a quarter'.
A half multiplied by a quarter is one eighth. In maths language we write it like this:

$\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$

Tip: To multiply fractions we multiply the numerators together and we multiply the denominators together.

Task 2: Multiply fractions with the same numerator

Multiply these fractions. You can use your fraction circles to work these out.

$\frac{1}{3} \times \frac{1}{6} =$

$\frac{1}{2} \times \frac{1}{6} =$

Task 3: Multiply fractions with different numerators

So far the numerators of the fractions have been the same.

What happens when the numerators are different? How do you multiply the fractions then?

Look at these examples and try to find the pattern.

$\frac{2}{3} \times \frac{3}{6} = \frac{6}{18}$

$\frac{1}{2} \times \frac{3}{4} = \frac{3}{8}$

$\frac{1}{4} \times \frac{2}{3} = \frac{2}{12}$

Do you notice the pattern?

To multiply fractions we multiply the numerators together and we multiply the denominators together. For example:

$\frac{1}{2} \times \frac{3}{4} = \frac{(1 \times 3)}{(2 \times 4)} = \frac{3}{8}$

Task 4: A Poll

Read this and answer the questions below.

Researchers carried out a poll that surveyed 275 people. Those people were asked if they were happy or unhappy with the Government.

The researchers who carried out the poll reported that of $^{3}/_{5}$ the 275 people surveyed were unhappy with the current Government.

1. If we wanted to work out how many of the 275 people were unhappy with the Government **what would we do?**

2. How many of the 275 people said they were unhappy with the Government?

Now try this. Use the information above to work this out:

One fifth of the $^{3}/_{5}$'s who said they were unhappy with the Government were from the Dublin area.

So, how many Dubliners in the poll said they were unhappy with the Government?

_____

Task 5: The January Sales

Example

In a half- price sale the original price of a coat was €100. How much do you have to pay for the coat in the sale?

Answer: _____

You can work that out using multiplication of fractions. Here are the steps you would take:

You need to find half of 100, so that is $\frac{1}{2} \times \frac{100}{1}$

Write 100 as an improper fraction: $\frac{100}{1}$

$\frac{1}{2} \times \frac{100}{1} = \frac{100}{2}$

$\frac{100}{2} = \mathbf{50}$

So the half-price cost of the coat is €50.

Now you try these:

1. The clothes shop was having a sale with $\frac{1}{3}$ off the prices. A dress cost €150 originally.

- How much was it in the sale?

_____

Write out the steps you took, as in the example above:

_____

_____

- What fraction of the original cost did you save on the dress?

_____

Write out the steps you took to find that answer:

_____

_____

2. In another shop, the January sales had $\frac{1}{3}$ off all coats. A coat cost €180 before the sale.

- How much would you get off the cost of the coat in the sale?

_____

- How much would you have to pay for the coat in the sale?

_____

Practise your skills

- Use the fraction circles
- Use Practice Sheet N16
- Write new words and symbols into your personal dictionary and practise using those.

Activity

At the salon

Code N17

This activity is linked to the **Award Learning Outcomes 1.2** and **1.5.**

Introduction

Similar to the addition and subtraction of fractions we often rely on division of fractions, sometimes without even realising it.

What will you learn?

Learning Outcomes

1. Understand the concept of dividing fractions.
2. Recognise the need to divide by fractions in real life situations.

Key Learning Points

1. Fractions
2. Division

Materials you will need

- Practice Sheet N17
- Solution Sheet N17
- Fraction circles may be useful for some tasks.

What do you need to know before you start?

You need to be familiar with previous fraction activities in this pack.

Getting started

Dividing integers

6 ÷ 3 means: How many threes are in six? It is exactly the same when dividing fractions.

For example, 1 ÷ ½ means: How many halves are in one full unit?

The diagram below may help us to understand this further.

From this diagram it is clear that there are two halves in one unit.

Therefore we can say that 1 ÷ ½ = 2.

It is the same if we want to evaluate 4 ÷ ⅓.

We know that there are three one thirds in every unit. So in 4 units we have

4 × 3 = 12.

So we know that 4 ÷ ⅓ = 12.

Task 1: Dividing whole numbers by fractions

Fill in the gaps in the following table.

You could use the fraction circles to help work it out.

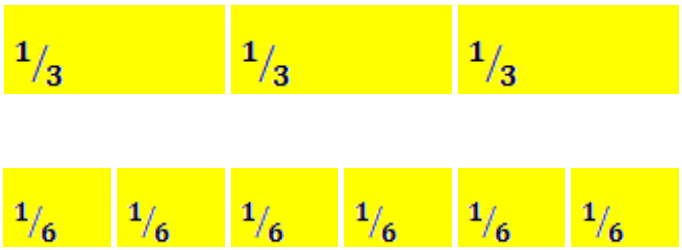
	Question	**Answer**
$4 \div \frac{1}{3}$	How many thirds are there in 4?	There are 3 thirds in 1 whole. 4 × 3 = 12. So there are 12 thirds in 4.
$6 \div \frac{1}{3}$	How many thirds are there in 6?	There are 3 thirds in 1 whole. _____× 3 =__ ___ So there are _____ thirds in 6.
$9 \div \frac{1}{3}$	How many thirds are there in 9?	There are 3 thirds in 1 whole. ____× 3 = _____. So there are ____ thirds in 9.

Dividing one fraction by another fraction

We use the same approach to dividing one fraction by another, for example $\frac{2}{3} \div \frac{1}{6}$.

The question is **how many sixths there are in two - thirds?**

We can see this in the diagram below.



We can see that in every one third there are two sixths. So in two thirds we can see that there are four sixths.

So $\frac{2}{3} \div \frac{1}{6} = 4$

Mathematicians noticed a short cut for this.

Look at this diagram. What do you think the rule is for the short cut for dividing fractions?

Division	Short cut
$\frac{3}{6} \div \frac{1}{2} = 1$	$\frac{3}{6} \times \frac{2}{1} = \frac{6}{6} = 1$
$\frac{6}{8} \div \frac{1}{4} = 3$	$\frac{6}{8} \times \frac{4}{1} = \frac{24}{8} = 3$

So, the shortcut is that you can **flip the second fraction** and **change the division sign to a multiplication sign**. Look again at the diagram above for $\frac{2}{3}$ divided by $\frac{1}{6}$. To get the same answer without using the diagram, flip the $\frac{1}{6}$ and use multiplication, like this:

$\frac{2}{3} \div \frac{1}{6} = \frac{2}{3} \times \frac{6}{1} = \frac{12}{3} = 4$

That is the method to use when dividing any fractions.

Task 2: The short cut for dividing fractions

Fill in the blanks in the table below. Write the short cut and the answer. The first one is done for you.

Division	Short cut	Answer
$^1/_4 \div {}^1/_2$	$^1/_4$ x $^2/_1$	$^2/_4$
$^1/_3 \div {}^1/_8$	$^1/_3 \times$ /	/
$^3/_4 \div {}^1/_3$	/ x /	/
$^5/_8 \div {}^2/_3$	/ x /	/

Task 3: At the salon

Example

The local hairdresser uses an industrial sized bottle of shampoo. It contains $^8/_{10}$ of a litre of shampoo.

For every customer who gets their hair washed the hairdresser uses $^1/_{20}$ of a litre is used.

How many customers can get their hair washed from one bottle of shampoo?

Try to work it out yourself before you check the answer on the next page.

Answer

We are essentially being asked: how many $^1/_{20}$ are in $^8/_{10}$?

That is, $^8/_{10} \div {}^1/_{20}$

Tip: Use the short cut rule!

$^8/_{10} \div {}^1/_{20} = {}^8/_{10} \times {}^{20}/_1 = {}^{160}/_{10} = 16$

Therefore one bottle of industrial shampoo will serve **16 customers**.

Task 4: At the salon (2)

If the same hairdressers have 39 customers in one day how many bottles of shampoo are needed on that day?

Practise your skills

- Practise Sheet N17

Extension Activity N17

Dividing the wood

John is a carpenter. He has an extra supply of wood that he has decided to cut into strips. It is a 6 metre length of wood and he is going to cut it into $^{3}/_{5}$ of a metre strips.

1. How many strips of wood can John make? _____

2. Show how you worked it out.

Activity

Breaking Olympic Records

Code N18

This activity is linked to **Award Learning Outcomes 1.1, 1.2 and 1.5.**

What will you learn?

Learning Outcomes

1. Recognise decimals.
2. Understand the concept of place value.

Key Learning Points

1. Decimals
2. Place Value

Materials you will need

- Practice Sheet N18
- Solution Sheet N18
- The tasks in this section

What do you need to know before you start?

- You need to be comfortable with the maths from the activities so far in this pack.
- For some of the tasks it would be useful to know something about how time is recorded during major sporting events, and about the Olympic Games.

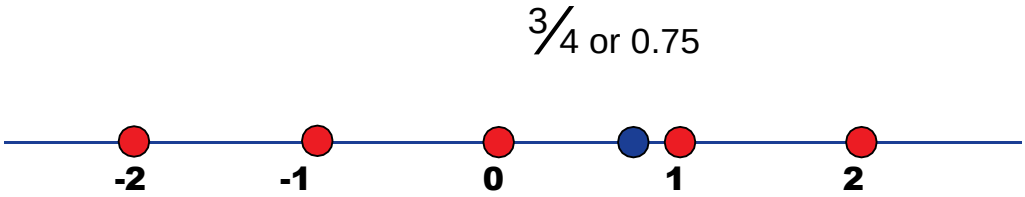
How can you find that out?

- Ask a friend or your tutor
- Search for the information on the internet or in the local library

Getting started

Another way we can write fractions is in **decimal** form. For example, ¾ is the same as **0.75.**

We can show both of these on the number line as seen below.



Decimal numbers are any numbers that contain a decimal point, for example 4.3, 7.55, 5.178.

Each digit in the above numbers has a different **place value.** Its place value depends on how close or far it is from the decimal point and what side of the decimal point it is on.

Moving **to the left** of the decimal place, each place represents **ones, tens, hundreds,** thousands etc. Moving **to the right** of the decimal point the first two places are **tenths** and **hundredths.**

Here is an example:

5 2 · 7 6

.

hundreds	tens	ones	decimal point	tenths	hundredths
052.76	052.76	052.76	052.76	052.76	052.76

5 is in the place representing tens, so it stands for 50.
2 is in the place representing ones, so it stands for 2 .
7 is in the place representing tenths. So it stands for 7/10
6 is in the place representing hundredths. So it stands for 6/100

You will meet decimals often in your daily lives, for example when dealing with money, quantities, time and measurement.

Task 1: Olympic record in swimming

Example

The 100 metre butterfly is one of approximately 300 events which athletes participate in during the Olympic games. Michael Phelps, the American swimmer, won this event in the Olympic Games of 2004 and 2008. He broke an Olympic record in the 2004 games in Athens. He beat his own Olympic record again in 2008 in Beijing.

The Olympic record set by Michael Phelps in 2008 was 50.58 seconds.

This time was **0.18 seconds slower** than the World Record set by Ian Crocker in 2005. **Try to work this out before checking the answer on the next page.**

How many seconds, tenths of seconds and hundredths of seconds did it take Michael Phelps to complete the record?

How many tenths and hundredths of a second quicker was Ian Crocker in 2005?

Answer to Task 1

It took Michael Phelps 50 seconds and 5 tenths and 8 hundredths of a second to complete the hundred metre butterfly in 2008.

Ian Crocker's World Record is 1 tenth and 8 hundredths of a second quicker than the record set by Phelps in 2008.

Task 2: Olympic record in swimming

1. In 2004 Phelps swam the 100 metre butterfly in 51.25 seconds. How many seconds, tenths of seconds and hundredths of seconds did it take him to complete this event?
2. Phelps new record (50.58 seconds) is 0.67 seconds faster than the original record which he set in Athens. How many tenths and hundredths of a second quicker was Phelps in 2008?

Task 3: Find out

1. What other sports are thousandths of seconds used to separate out the winners?
2. Look up the current world records for three sports. Use the information to complete this table. Include decimal point where necessary.

Sport	World record	Holder of record

Task 4: Shopping for groceries

Last week Mr. O Brien's weekly shopping bill amounted to €112.47. When he handed in €120 euro he got the change in Euros, ten cent coins and one cent coins. The total change he got was €8.53.

- How many Euro coins, ten cent coins and cent coins did Mr. O Brien receive in his change?

- If Mr. O Brien paid with the exact change how many one cent coins would he have needed?

Practise your skills

- Practise Sheet N18

Activity

Touring the west of Ireland

Code N19

This activity is linked to the **Award Learning Outcomes 1.2 and 1.5.**

What will you learn?

Learning Outcomes

1. Add decimals.

Key Learning Points

1. Addition of Decimals

Materials you will need

- Practice Sheet N19
- Solution Sheet N19
- Map of Ireland

What do you need to know before you start?

- You need to be comfortable with the maths from N18.
- You need to know the counties that are in the West of Ireland.

Getting started

Addition of decimals is very similar to the addition of integers. If you recall, when adding 15 to 23 we would add the 5 and 3 first (these are our ones or units). Next we would add 1 and 2 (these are our tens). It is the exact same for decimals: we can only add tenths to tenths, hundredths to hundredths and so on. The easiest way to add decimals is to line up the decimal points directly under each other.

For example we can write 2· 653 + 4· 17 like this:

```
  2· 653
+ 4· 17
-----------
  6· 823
```

Task 1: Touring the west of Ireland

Example


Mr and Mrs Hodge live in New York. They recently came to Ireland to do a three day trip around the west of Ireland. They stayed in a hotel near Dublin Airport on their first night. The next morning they travelled by car to the Burren in Co. Clare. The distance from Dublin Airport to the Burren is **266.67** kilometres. Later that day they drove to Lahinch, Co. Clare, to stay the night. The distance they drove to Lahinch was **12.39** kilometres. The next day they drove to Connemara, for a distance of **159.65** kilometres from Lahinch. They then drove another **78.21** kilometres to Galway city.

(i) How long did the Hodges travel on the first day of their tour?

(ii) How many kilometres had they travelled by the time they reached Galway city?

Try to work this out yourself, or with a partner in the group, before looking at the answer on the next page.

Answer

(i) On the first day they travelled from Dublin → The Burren (266.67 km) and from The Burren → Lahinch (12.39 km).
So the total distance travelled on Day 1 of the tour is 266.67 + 12.39

266.67
+ 12.39
———
279.06

On the first day of their tour the Hodges travel 279.06 km.

(ii) By the time they reached Galway City they had travelled 279.06 km (Day 1) as well as the trip from Lahinch → Connemara (159.65 km) and Connemara → Galway City (78.21).

So the total distance travelled by the time they reached Galway was
279.06 + 159.65 + 78.21

279.06
159.65
+ 78.21
———
516.92

By the time the Hodges had reached Galway City they had travelled **516.92 km.**

Task 2: Adding decimals to calculate time

The Jamaican National 4 x 100 metre relay team won gold at the 2008 Beijing Olympics. The first Jamaican athlete completed his 100m in 9.24 seconds. The second athlete completed his 100m in 9.46 seconds. The third athlete, Usain Bolt, ran 100m in 8.8 seconds. The final athlete ran his 100m in 9.6 seconds. In doing so, the team set a new world record.

- How quick were the Jamaican team in the first half of the race?

- What was the new World Record that the Jamaican Team set?

Practise your skills

- Practice Sheet N19

Activity

Baking Cakes

Code N20

This activity is linked to the **Award Learning Outcomes 1.2, 1.3 and 1.5.**

Introduction

Subtraction of decimals is very similar to the subtraction of real numbers. This activity will help with that.

What will you learn?

Learning Outcomes

1 Subtract decimals.
2 Combine addition and subtraction to solve problems.

Key Learning Points

1. Subtraction of decimals

Materials you will need

- Practice Sheet N20
- Solution Sheet N20
- The tasks in this section

What do you need to know before you start?

- The relationship between grams and kilograms. 1 kilogram = 1000 grams and so 0.54 kilograms is 540 grams.
- The relationship between litres and millilitres. 1 litre = 1000 millilitres and so 0.05 litres is 50 millilitres.

Getting started

To subtract 23 from 45 we would first subtract the ones (5 - 3 = 2) and then subtract the tens (4 - 2 = 2).

That gives an answer of 22. It is the exact same for decimals and for this reason, as with addition, we must line up the decimal points before subtracting.

For example: 5.67 - 2.15

```
  5.67
- 2.15
------
  3.52
```

Task 1 Baking Cakes

Example

The two most important ingredients for bakers around the country are sugar and flour. If bakeries were to run out of any of these it would be difficult for them to bake anything and they would then lose money. So it is very important for bakers to keep track of their supplies at all times.

Try this before checking the answer on the next page.

Barney's Bakery specialises in sponge cakes and chocolate cakes.

On Thursday last the head baker bought **2.25 kg of flour** and **4.45 kg of caster sugar**.

The following day, Friday, the baker began by baking 16 chocolate cakes.

In total these used 1.65 kg of flour and 2.55 kg of caster sugar.

The baker also got an order for two sponge cakes later that day. The two sponge cakes needed 0.43 kg of flour and 0.35 kg of caster sugar.

How much of each ingredient did Barney's Bakery use on Friday?

Did they have enough supplies to make the cakes needed?

If so how much was left over?

Answer

In order to find out how much of each ingredient was used we must add the flour used in both cakes and then the sugar used in both cakes

Flour used: 1.65 + 0.43

1.65
+ 0.43
_____
2.08

Caster Sugar used: 2.55 + 0.35

2.55
+ 0.35
_____
2.9

In order to see if they had enough supplies we must see if what the baker used was less than what he bought the previous day:

2.08 < 2.25

2.9 < 4.45

Therefore we know that the baker had the supplies to make the required cakes.

In order to find out exactly what quantity is remaining the baker must take away what he used from what he originally started with.

Flour remaining: 2.25 – 2.08

2.25
– 2.08
_____
0.17

Caster Sugar remaining: 4.45 – 2.9

4.45
– 2.9
_____
1.55

So we know that Barney's have 0.17 kg (or 170 grams) of flour remaining and 1.55 kg (or 1550 grams) of sugar remaining for the following day.

Task 2: Barney's bakery supplies

1. Before starting work on the Saturday the head baker again went to the suppliers and bought 2.8 kg of flour and 1.4 kg of caster sugar.

How much flour and sugar did he have when he got to the bakery on the Saturday morning?

Tip: Remember to include what was left over on Friday!

2. By 11:00 on the Saturday Barney's had received all the orders from their customers. The head baker then made 4 chocolate cakes. This used up 0.66 kg of caster sugar and 0.44 kg of flour. There was also an order for 8 sponge cakes and they used up 1.72 kg of flour and 1.4 kg of caster sugar. The final order was for 2 deluxe chocolate layer cakes which required 0.73 kg of caster sugar and 0.6 kg of flour.

How much of each ingredient was used on Saturday?

Caster sugar: _____ used.

Flour: _____used.

How much flour and caster sugar was left over?

Caster sugar: _____ left over.

Flour: _____ left over.

Practise your skills

- Practice Sheet N20

Activity

Bathroom Design

Code N21

This activity is linked to **Award Learning Outcomes 1.2, 1.3 and 1.5.**

Introduction

When deciding how much to charge a customer trades people and small businesses must take a lot of factors into consideration. For example they must calculate the cost of the supplies needed to complete the job and the cost of labour. To estimate the cost of a job in total it is necessary to work with decimals a lot. The activity will help you to be able to do that.

What will you learn?

Learning Outcomes

1. Multiply decimals by whole numbers.
2. Combine multiplication, addition and subtraction to solve problems.
3. Use decimals and fractions together when solving a problem.

Key Learning Points

1. Multiply Decimals
2. BIDMAS

Materials you will need

- Practice Sheet N21
- Solution Sheet N21
- The tasks in this section

What do you need to know before you start?

- You should be comfortable with the previous decimal activities.

Getting started

We have already seen the importance of place value and how moving the decimal point to the right or left significantly changes the value of the number.

When we multiply by 10, 100, 1000 and so on, we move the decimal place to right.

For example: $3.75 \times 10 = 37.5$

$42.896 \times 100 = 4289.6.$

Notice that the numbers are getting larger. Notice how many places the decimal point moved to the right.

When multiplying by numbers other than 10, 100, 1000 etc., we multiply just as we did when dealing with whole numbers and the decimal point does not move position.

For example: $5.1 \times 2 = 10.2$ and $4.35 \times 3 = 13.05$

Also it is important at this stage to remember that the correct order of operations, BIDMAS, also applies when working with decimals.

Task 1: Making decimal numbers bigger

1. Talk in pairs and agree how you would make the following numbers 10 times bigger. Then fill in the gaps in this table.

Number	Number 10 times bigger	How you did it
20		
50		

Can you write a rule for making a whole number ten times bigger?

2. Now see if your rule works for decimal numbers.
Discuss how you would make these decimal numbers bigger.
Then fill in the gaps in this table.

Number	Number 10 times bigger	How you did it
2.5		
3.5		
7.5		

What happens to the decimal point when you make the number ten times bigger?

3. Make the following numbers 10 times bigger. Do not use a calculator.

3.6		12.8		6.8	
11.5		122.2		7.8	

Task 2: Bathroom design

1. In order to complete a construction job Bathroom Mania Ltd must purchase the following items:
100 small screws, 50 large tiles, 10 small light fittings and 1 shower unit.

Their local hardware store quotes them the following prices:

- 79 cent for 10 screws
- €5.78 per large ceramic tile
- €1.78 per light fitting
- €1078 for the shower unit.

What is the total cost of the supplies Bathroom Mania Ltd. need?

2. Bathroom Mania Ltd. charge their customer €2,000 in total. This price included the cost of materials, the cost of labour and the profit. When the cost of materials was taken away they put aside half the remaining money for labour costs.

What profit did the company make on this job?

Task 3: Tiling the floor

1. When Bathroom Mania Ltd. completed this job their customer asked them to tile the floor in their second bathroom. The company must buy

- 30 small tiles costing €4.56 each
- 5 boxes of large tiles costing €63.52 each
- a bag of tile spacers costing €5.96
- 5 tubes of tile adhesive costing €8.29 each.

How much will the materials cost?

_____

2. The company wants to make a profit that is **€30.65 greater** than the profit made for the first job. (See Task 2 for the profit of the first job).

The company spends €456.78 on labour.

How much should they charge their customer?

_____

Task 4: Paying tax

Jack Darcy got a new job on the 1st March.

Every month his gross pay is €3,825.44. However from that he then must pay income tax of €765.08, a health levy of €153.22 and €300 a month goes towards his pension.

1. By the end of the year how much income tax will Jack have paid?

2. Over the ten months from March - December how much money will Jack take home with him after all deductions are made?

Practise your skills

- Practice Sheet N21

Activity

Healthy Eating

Code N22

This activity is linked to the **Award Learning Outcomes 1.2, 1.3 and 1.5.**

Introduction

To have a healthy diet we should know our daily intake of calories, fat, carbohydrates, salt and so on. When we buy food, the label should contain information about the amounts of these that are in that particular product. We can use division, multiplication, addition and subtraction of decimals to work out how of these we eat. This activity will help you to be able to do that.

What will you learn?

Learning Outcomes

1. Divide decimals by whole numbers.
2. Combine division, multiplication, addition and subtraction to solve problems.

Key Learning Points

1. Divide decimals

Materials you will need

- Practice Sheet N22
- Solution Sheet N22
- The tasks in this section

What do you need to know before you start?

- You should be comfortable with the previous decimal activities.
- Know the relationship between grams and kilograms and between millilitres and litres.

Getting started

Multiplication of decimals by 10, 100 etc. causes the decimal to move to the right.

Division is the opposite of multiplication.

So, **when dividing by 10, 100 etc the decimal point moves to the left.**

For example: $4.6 \div 10 = 0.46$
$11.35 \div 100 = 0.1135$

If dividing by numbers other than 10, 100 etc. we just divide as normal keeping the decimal point in the same place.

For example: $4.56 \div 2 = 2.28$ and $11.75 \div 5 = 2.35$

Task 1: Making decimal numbers smaller

1. Talk in pairs and agree how you would make the following numbers 10 times smaller. Then fill in the gaps in this table.

Number	Number 10 times smaller	How you did it
220		
520		

Can you write a rule for making a whole number ten times smaller?

2. Now see if your rule works for decimal numbers.
Discuss how you would make these decimal numbers smaller.
Then fill in the gaps in this table.

Number	Number 10 times smaller	How you did it
12.5		
23.5		
7.5		

What happens to the decimal point when you make the number ten times smaller?

3. Make the following numbers 10 times smaller. Do not use a calculator.

43.6		12.8		6.8	
11.5		122.2		7.8	

Task 2: Healthy eating

Example

Last Saturday Elaine visited her friend Patricia.

Between them, during their chat, they shared a bar of chocolate and some crisps.

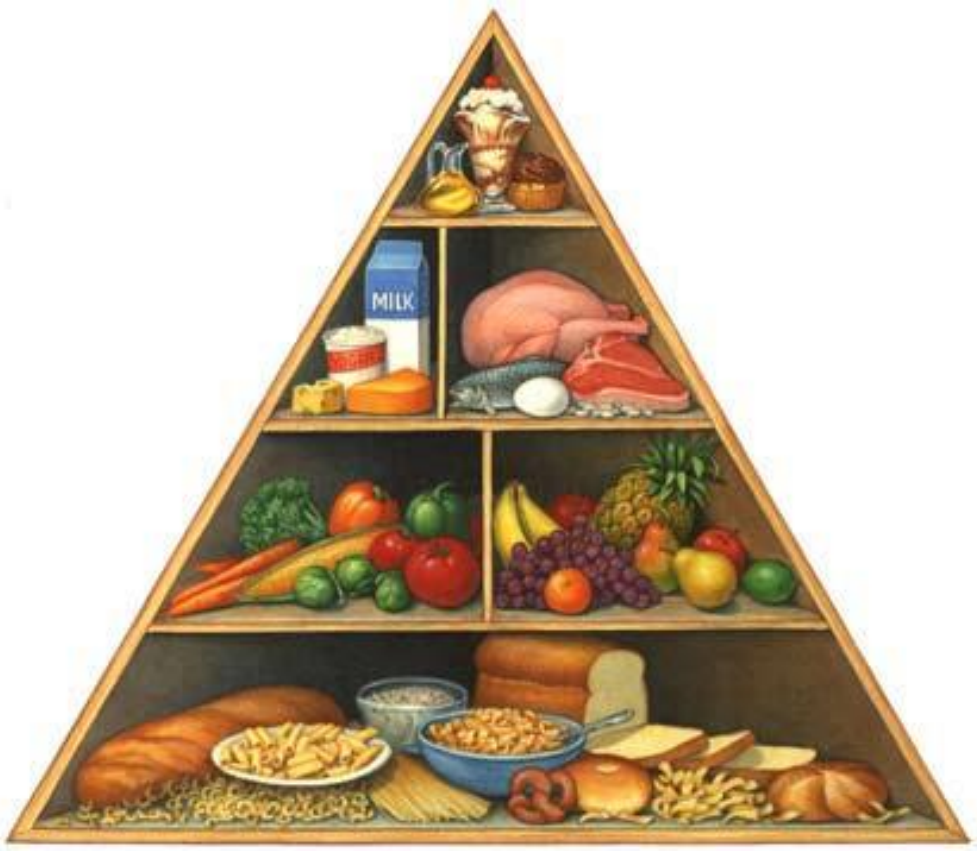
The bar of chocolate contained **14.26** grams of saturated fat. Elaine and Patricia each had a half a bar of chocolate.

The 150 gram bag of crisps has **5.68** grams of saturated fat in it. Elaine ate a quarter of the bag of crisps.

Try working these questions out before checking the answer on the next page:

1. How many grams of saturated fat did Elaine eat when visiting Patricia?

2. Patricia ate half of the large bag of crisps. How many more grams of saturated fat did Patricia eat?



Task 2 Answer

1. Elaine ate half a bar of chocolate and a quarter of the bag of crisps. So we can work out her intake of saturated fat as follows:

Chocolate: 14.26 ÷ 2 = 7.13 grams
Crisps: 5.68 ÷ 4 = 1.42 grams

Altogether during her time with Patricia, Elaine ate 7.13 grams + 1.42 grams of saturated fat. So Elaine ate a total of **8.55 grams** of saturated fat.

2. Patricia had half a bar of chocolate and half the bag of crisps.

Chocolate: 14.26 ÷ 2 = 7.13 grams
Crisps: 5.68 ÷ 2 = 2.84 grams

Altogether Patricia consumed 7.13 + 2.84 = **9.97 grams** of saturated fat.

To calculate how much more saturated fat Patricia ate we must subtract their two totals:

9.97 - 8.55 = 1.42

So, Patricia consumed **1.42 grams** more saturated fat than Elaine.

Task 3: Healthy eating (2)

The **recommended intake of saturated fat** varies between men and women and between different individuals. However, it should not be more than 20 grams per day.

On the same day as Elaine and Patricia shared the chocolate and crisps, this is what else Elaine ate:

100 grams of Rice Krispies with 200 millilitres of milk, half
a portion of lasagne for dinner,
2 slices of toast, and
100 grams of cheese.

Fill in the table below using this information.

A 1 kilogram box of Rice Krispies contains 3.6 grams of saturated fat.
A 1 litre carton of milk contains 21.54 grams of saturated fat.
The full portion of lasagne has 6.2 grams of saturated fat.
One slice of toast contains 0.2 grams of saturated fat.
200 grams of cheese contains 18.6 grams of saturated fat.

Elaine ate this food	It had this much saturated fat

Did Elaine go over the recommended daily intake of saturated fat?

Remember to include what she shared with Patricia.

Task 4: Buying in Bulk

A local shopkeeper always buys their stock in bulk from the wholesalers.

A box of 50 bags of crisps costs the shopkeeper €17.50.

A crate of 48 cans of coke cost them €31.20.

1. How much does a single bag of crisps cost the shopkeeper?

   _____

2. How much does one can of coke cost the shopkeeper?

   _____

3. If the shopkeeper wishes to make an 11 cent profit on each bag of crisps, how much should she charge for each bag?

   _____

4. If the shopkeeper wishes to make a 26 cent profit on each can of coke, how much should she charge for each bag?

   _____

Practise your skills

- Practice Sheet N22

Activity

Bargain Hunting

Code N23

This activity is linked to the **Award Learning Outcomes 1.2, 1.3** and **1.5.**

Introduction

As with fractions and decimals, percentages are used in everyday life. For example, shops advertise their sales by saying what percentage reduction they will give. In order to work with percentages we must be able to convert them into fractions first. This activity will help you with this.

What will you learn?

Learning Outcomes

1. Understand what is meant by the term percentage.
2. See where percentages are used in the world around us.
3. Solve problems involving percentages.
4. Convert percentages to fractions.

Key Learning Points

1. Percentages
2. Conversion

Materials you will need

- Practice Sheet N23
- Solution Sheet N23
- The tasks in this section

Getting started

Another way of expressing fractions is as percentages.

Tip: The language of maths.

The word percent means per hundred, or out of a hundred. We represent it mathematically by the symbol %. For example, 3% means three out of a hundred.

We can also write 3% as a fraction, like this: $^{3}/_{100}$

If you got 6 questions correct out of 10 in an exam you could say you got $^{6}/_{10}$ or 0.6 or 60% of them right. That is 60 out of every hundred.

Another example is in polls or surveys. In October 2010, the Irish Times did a poll about a plan for a new children's hospital. They found that 56% of people who participated in the poll were opposed to putting the new children's hospital on the campus of Dublin's Mater hospital. That meant that 56 of every hundred people surveyed opposed the plan. You could write that as $^{56}/_{100}$ or .56 or 56%.

Converting from percentages to fractions

In order to work with percentages we must be able to convert them into fractions first.

Tip: Convert means **change.**

Remember that percent means 'per hundred'. So, to convert a percentage to a fraction we write the percentage over a hundred.

For example: 26% = $^{26}/_{100}$
Then, if possible, **simplify** that fraction, like this: $^{26}/_{100} = {}^{13}/_{50}$

So, 26% = $^{26}/_{100} = {}^{13}/_{50}$

Task 1: Converting percentages, decimals and fractions

Fill in the gaps in the following table.

The first row is done for you.

% percentage	Fraction	Decimal
20%	$^{20}/_{100}$	0.2
	$^{30}/_{100}$	
		0.65
75%		
	$^{99}/_{100}$	

Task 2: Bargain hunting

Your town has a shop that offers designer labels at reduced prices.

Their website offers a new range of coats which have a recommended retail price of €65.00.

The website states that they were taking **20% off** the recommended retail price.

1. How much was the shop reducing the price by?

2. What price were they selling the coat for in the sale?

Task 3: Bargain hunting

On their website in November a clothes shop advertised a hoody that had a recommended retail price of €27.00.

They also advertised tracksuit bottoms with a recommended retail price of €24.00.

They were taking **24% off** the recommended retail price of the hoody and **19% off** the recommended retail price of the tracksuit bottoms.

1. If you were to buy the hoody and the tracksuit bottoms at the original recommended retail price how much would they cost you together?

   _____

2. In the sale, how much would you save on the hoody?

   _____

3. In the sale, how much would you save on the tracksuit bottoms?

   _____

4. What would the two items cost you in the sale?

   _____

Task 4: Earthquake

On the 12th January 2010 a devastating earthquake hit Haiti. Immediately charities around the world made appeals to people to donate and help with the relief effort.

The charity organisation Concern asked people to donate €40.00 to help the people of Haiti. According to the website Charity Navigator:

- 3% of all money received by Concern was spent on administrative expenses
- 4.6% was spent on fundraising expenses
- The rest of the money went directly to the people in need.

If you donated €40, how much of it would go towards the fundraising expenses?

_____

Practise your skills

- Practice sheet N23

Activity

Big Brother Task

Code N24

This activity is linked to **Award Learning Outcomes 1.2, 1.3 and 1.5.**

Introduction

In this activity you will use a mixture of fractions, decimals and percentages to solve a problem that contestants in the 'reality TV show' Big Brother had to tackle.

What will you learn?

Learning Outcomes

1. Convert decimals to fractions.
2. Solve problems that involve a mixture of fractions decimals and percentages.

Key Learning Points

1. Conversion

Materials you will need

- Practice Sheet N24
- Solution Sheet N24

What do you need to know before you start?

- You need to be comfortable with the previous fractions, decimals and percentages activities.
- It would be useful to know something about the reality TV show Big Brother or similar shows where groups are set tasks and problems to solve.

Getting started

Converting percentages to fractions allows us to solve problems that combine both of these ideas.

Decimals are just another way of writing fractions and every decimal can be written in fraction form.

It is really important for us to have a good understanding of **place value** in order to convert decimals to fractions.

Digits placed immediately to the right of the decimal point are **tenths**.
So if there is one digit to the right hand side of the decimal point, to turn the number into a fraction we place it over ten and simplify it.
For example:

$$0.6 = \frac{6}{10} = \frac{3}{5}.$$

Here is another example: $3.5 = \frac{35}{10} = \frac{7}{2} = 3\frac{1}{2}$

If there are two digits to the right hand side of the decimal point we place the number over a hundred and simplify it.

For example:

$$0.45 = \frac{45}{10} = \frac{9}{20}$$

$$5.26 = \frac{526}{100} = \frac{263}{50} = 5\frac{13}{50}$$

Task 1: Big Brother Task

Example

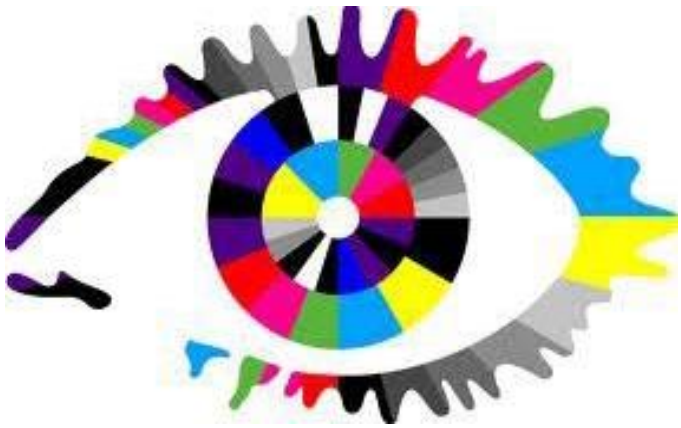
Big Brother is a reality television show in which a group of people live together in a large house isolated from the outside world but continuously watched by television cameras. Each week the housemates are set tasks and the outcome of these tasks determine how much money they have for their weekly shopping budget.

Try doing the calculations in this task before you check the answer on the next page.

In 2005 Derek was one of the contestants in the Big Brother house. In Week 3 Derek and his housemates were given a task that required them to create a shopping list based on a set of instructions Big Brother gave them.

Big Brother gave the housemates €75. They must spend $^{2}/_{5}$ on dairy products, 25% on carbohydrates and 0.35 on red meat.

Can you help Derek and the housemates decide how much money to spend on each item?



Task 2: Big Brother Task

If the housemates were given **€80** and were told to break down their shopping as follows, **how much money would they be able to spend on each food type?**

$^1/_5$ on carbohydrates €_____

20% on protein enriched foods €_____

0.3 on snacks €_____

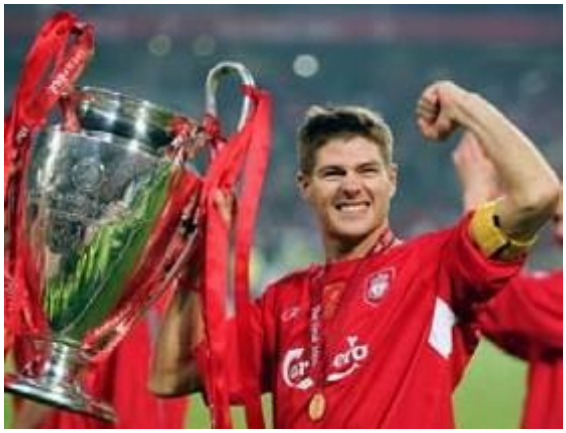
$^1/_{10}$ on dairy products €_____

0.2 on red meat €_____

Task 3: Change these percentages into decimals

Percentages	**Decimals**	
20%		
30%		
10%		

Task 4: Footballers' Wages



In England, at the time of writing (2010), Liverpool F.C. spend a total of **€295,000** per week on these three players' wages: Fernando Torres, Steven Gerrard and Jay Spearing.

Fernando Torres earns 45% of this weekly amount.
Steven Gerrard earns 0.39 the weekly amount.
Jay Spearing earns $^{4}/_{25}$ of the weekly amount.

1. How much does each of these three players earn per week?

Fernando Torres: _____

Steven Gerrard _____

Jay Spearing _____

2. If Gerrard's wages were reduced by 20% how much would he then earn? _____

Practise your skills

- Practice Sheet N24

Activity

Analysing Exam Results

Code N25

This activity is linked to **Award Learning Outcomes 1.2, 1.3 and 1.5.**

Introduction

What will you learn?

Learning Outcomes

1. Convert fractions to percentages.
2. Convert decimals to percentages.

Key Learning Points

1. Conversion

Materials you will need

- Practice Sheet N25
- Solution Sheet N25

What do you need to know before you start?

- You should be comfortable with all the fractions, decimals and percentages activities so far.

- This activity uses the example of Leaving Cert results. An honour in a Leaving Certificate Paper means getting an A, B or C grade. Each year all Leaving Certificate Exam results are released on the website www.examinations.ie.

Getting started

During the previous two activities we looked at converting decimals and percentages to fractions. Sometimes we also need to rewrite fractions and decimals as percentages.

In order to change fractions to percentages we must remember what the term 'per cent' means. For example: 40% means forty out of a hundred or $^{40}/_{100}$.

To change $^{40}/_{100}$ back to a percentage we would multiply it by 100. Therefore to convert any fraction to a percentage we multiply the fraction by $^{100}/_{1}\%$ and simplify. For example:

$$\frac{1}{2} = \frac{1}{2} \times \frac{100}{1}\% = \frac{100}{2} = 50\%$$

$$\frac{2}{5} = \frac{2}{5} \times \frac{100}{1}\% = \frac{200}{5} = 40\%$$

In order to change a decimal to a percentage we must first convert the decimal to a fraction and then change the fraction to a percentage as we showed earlier. For example:

$$0.8 = \frac{8}{10} \times \frac{100}{1}\% = \frac{800}{10}\% = 80\%$$

$$2.85 = \frac{285}{100} = \frac{285}{100} \times \frac{100}{1}\% = \frac{28500}{100}\% = 285\%$$

Task 1: Analysing exam results

In 2010, 8,390 students sat Higher Level mathematics for their Leaving Certificate.
Of those, 15% got an A, 30% got a B and 35% got a C.
All the rest of the students did not get an honour - that is, an A, B or C grade.

What percentage of students did not get an honour in higher level mathematics in 2010?

Task 2: Exam results table

We can also write the percentages from Task 1 as decimals or fractions.

Practise converting from percentages to fractions and decimals, by filling in the gaps in this table:

Percent	is equal to	Fraction	is equal to	Decimal
15%	=		=	
30%	=		=	
35%	=		=	

Task 3: Exam results

In the same year, 2010, 37,903 students sat the Ordinary Level mathematics exam.

Of those students, $^{7}/_{25}$ got a B grade; 0.29 got a C grade, 0.22 got a D grade, $^{9}/_{100}$ and students got an E/F grade.

1. What percentage of students who sat the 2010 Ordinary Level mathematics paper obtained an A?

   _____

2. What was the difference in the percentage of students who got a C grade and the percentage who got a B grade?

   _____

Practise your skills

- Practice sheet N24

Activity

Rounding off

Code N26

This activity is linked to the **Award Learning Outcome 1.4.**

Introduction

In the real world we often say things like 'there were about 50,000 people there'. We know that is not the **exact** number: there might really have been 51,283 people there! In the maths world we call this 'rounding off' numbers. 'Rounding off' means choosing to use a number that is very, very close to the exact one. This activity will help you to learn when and how to round off numbers.

What will you learn?

Learning Outcomes

1. Round off large natural numbers.
2. Understand the need to round off numbers.

Key Learning Points

1. Round off

Materials you will need

- Practice Sheet N26
- Solution Sheet N26

What do you need to know before you start?

- You need to understand **place value**.

Getting started

When dealing with large numbers it is often necessary to round off so that the number is easier to deal with. In order to understand how to round off numbers we need to have a thorough understanding of **place value**. For example if given the number **13, 457** we know that we have:

1 ten thousand
3 thousands
4 hundreds
5 tens
7 units

Now, if I were asked to round **13, 457** to the nearest **thousand** I would round it to 13,000, because the hundred value is **less than 5**. This makes sense because 13, 457 is closer to 13,000 than it is to 14,000.
If I were asked to round it to the nearest **hundred** I would round the number to 13,500 as the tens value is **greater than 5**. Again this makes sense as 13,457 is closer to 13,500 than it is to 13,400.

When rounding off to the nearest thousand, hundred or ten this is what to do:

- When the digit in the next place is greater than 5 increase the previous digit by 1.
- When the digit in the next place is less than 5 don't change the previous digit.

Task 1: Ladies Gaelic Football Association Finals 2010

The **exact** number of people who attended the 2010 Ladies Gaelic Football Association finals (Junior, Intermediate and Senior) was 21,760.
Each person there paid €25 for their ticket.

1. Round off the attendance figure to the nearest thousand.

---

2. Approximately how much did the association make on the ticket sales for the final?

---

3. The next day a newspaper rounded off the 21,760 figure to the nearest hundred and gave that as the approximate attendance figure in their reports. What attendance figure did that newspaper give?

Solutions:

1. 22,000
2. 21,760 x 25 = €544,000
3. 21,800

Task 2: Hurling Final

The Hurling Final in the same year attracted a crowd of 81,765.

1. If the newspaper also rounded this figure off to its nearest hundred what figure would they have included in their articles the following day?

_____

2. Calculate to the nearest thousand the combined attendance at the 2010 hurling final and the ladies football final.

_____

Task 3: Rounding decimal numbers

You can round off decimal numbers in the same way that you round off whole numbers.
We round off decimals to a particular number of decimal places, depending on how precise we want to be.

For example, we can round off to 2 decimal places or to 3 decimal places.
Another way of saying 'Round off to 2 decimal places' , is 'Give your answer correct to 2 decimal places'.

How to round off to 2 decimal places
If you want your answer correct to 2 decimal places, you **look at the digit to the right of the second decimal place**.
If this digit is 5 or bigger you increase the previous digit.
However, if the digit to the right of the second decimal place is less than 5, you don't change the previous digit.

For example:

Multiply 6.86 by 7.35 and give your answer correct to 2 decimal places.
You may use the calculator:
6.86 x 7.35 = **50.421**
In the number **50.421, 1** is the number to the right of the 2nd decimal place.
It is less than 5. So do not change the previous digit.
So, 50.421 correct to 2 decimal places is **50.42.**

Now you try this.

Round off the following decimal numbers to 2 decimal places.

1. 5.9760
2. 1.2376
3. 1.5001
4. 1.7171
5. 4.6262

Task 4: Unemployment figures

In January 2010 the number of people registered as unemployed was 436,936.
This figure had risen to 442,417 by September 2010.

1. How many people, to the nearest hundred, were registered as unemployed in January 2010?

_____

2. How many people to the nearest thousand were registered as unemployed in January and September?

_____

3. Approximately what was the difference (to the nearest thousand) between the unemployment figures in January and the figures in September?

_____

Practise your skills

- Practice sheet N26
- Read reports in newspapers about different events: sports, concerts, marches. Look out for how they report the attendances. Do they use exact or approximate figures?

- Search the internet for current unemployment figures. Do the reports give exact or approximate figures?

- Find out what various organisations say should be done to increase employment. Do they give approximate figures in their proposals? Discuss what you think should be done about unemployment.

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