Year 3

Number and Place Value

I can statements

- count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number
- recognise the place value of each digit in a three-digit number (hundreds, tens, ones)
- compare and order numbers up to 1000
- identify, represent and estimate numbers using different representations
- read and write numbers up to 1000 in numerals and in words
- solve number problems and practical problems involving these ideas.

Exemplification

Examples of what children should be able to do, in relation to each (boxed) Programme of Study statement

Count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number

a) Count on from zero in steps of 2, 3, 4, 5, 8, 50, 100; b) Give me the number 100 less than 756

recognise the place value of each digit in a three-digit number (hundreds, tens, ones)

For each of these numbers: 428, 205, 130, 25, 7, 909.

Tell me:

How many hundreds? How many tens it has? How many ones?

Compare and order numbers up to 1000

Sort these numbers into ascending order: 95, 163, 8, 740, 25, 0, 400, 303

Identify, represent and estimate numbers using different representations

a) Show me 642 on a number line, with Dienes apparatus, with place value cards, on a Gattegno grid; b) What number is halfway between 65 and 95? How do you know?

Read and write numbers up to 1000 in numerals and words

Read these numbers 428, 205, 130, 25, 7, 909

Solve number problems and practical problems involving these ideas

a) Jack walks 645 metres to school. Suzy walks 100 metres less. How far does Suzy walk?; b) What is 1 more than 485? Than 569? Than 299?; c) What number needs to go into each triangle? Explain why?

642 = 600 + Δ + 2 967 = Δ + 60 + 7

Activities

Programme of Study statement	Activity				
	A	B	C	D	E
Count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number					
Recognise the place value of each digit in a three-digit number (hundreds, tens, ones)					
Compare and order numbers up to 1000					
Identify, represent and estimate numbers using different representations					
Read and write numbers up to 1000 in numerals and words					
Solve number problems and practical problems involving these ideas					

Activity A – Ordering 2 digit numbers; creating 2-digit numbers from 3 or 4 digits

Year 3 Lessons 66 – 70 from Centre for Innovation in Mathematics Teaching: MEP scheme of work

These resources comprise lesson plans. Scroll through the pdf to find Lesson 66. Thecorresponding pupil worksheet can be found on Page 66. There are further resourcesthat can be projected onto an interactive whiteboard or other screen.

Again scroll through until you find a sheet with LP 66/2 in the bottom right hand corner – the '2' refers to task 2 on the lesson plan. Further lessons 67 – 70 are on the same topic. Use practical apparatus such as Dienes' blocks to support the children's reasoning. These resources are quite demanding mathematically and arranged to be taught through whole class teaching which is a different approach from differentiating by task. The idea is that every child in the class is exposed to each of a number of short tasks and sees the correct answers which are shared at frequent intervals even though they may not all manage to complete everything.

The scheme of work to help you find more resources like this can be found in CIMT.

Activity B – Which Scripts? NRICH

This rich activity encourages children to think deeply about place value and the nature of numbers. It requires children to sort out the information and to work out what they know in order to solve the problem. Suggestions about how to structure a lesson around using it are included in the notes.

Activity C – Which is quicker? NRICH

This activity explores what happens when you count in jumps of different steps. How many steps will you need to make to reach your target number? Which will be quicker counting in 3s or 30s to reach 1000? Why? Plenty of scope for extension and exploring the meaning of the children's findings as well as opportunities to practice counting in jumps in a meaningful context.

Activity D – The Deca Tree NRICH

An exploration of the ways in which our place value system works by exploring a fantasy problem. Detailed suggestions of approaches, extension and support are offered and there are, as usual from NRICH, some real examples of children's response to the task which help to see where it might lead.

Activity E – Exploring Place Value or the Value of Place

Take 3 digit cards and see how many different numbers you can make. Write them in words and symbols. Order them from smallest to largest. Order them from largest to smallest. How many do you think you can make? How do you know that you have got them all? These ideas are explored further by Mike Ollerton in his task Exploring Place Value which you can find on his website.

Useful Resources

- Dienes apparatus
- Place value cars
- Digit cards
- Number lines
- Dice
- Dominoes
- Calculators
- Bead strings
- Unifix or multi link cubes
- Cuisenaire rods
- Numicon
- 100 square

Addition and Subtraction

I can statements:

- add and subtract numbers mentally, including:
    - a three-digit number and ones
    - a three-digit number and tens
    - a three-digit number and hundreds
- add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction
- estimate the answer to a calculation and use inverse operations to check answers
- solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.

Exemplification

Examples of what children should be able to do, in relation to each (boxed) Programme of Study statement

Add and subtract numbers mentally, including a three-digit number and ones, a three-digit number and tens, three-digit number and hundreds

Add and subtract numbers with up to three digits, using formal written methods of column addition and subtraction

Estimate the answer to a calculation and use inverse operations to check answers

Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

Examples below, addressing combinations of the requirements above, are taken from a variety of publications.

What number is 27 more than 145? What number is 19 more than 145? Explain how you worked out these two calculations.

Work out the missing digits:

3□ + □2 = 85

Work out these subtraction calculations:

72 – 5 372 – 68 270 – 3
82 – 15 132 – 28 70 – 66

Did you use the same method for each calculation? If not, why not? Explain your methods to a friend and compare your methods with theirs.

Paul says 172 – 15 = 163. Write down an addition calculation that you could do to check this.

Paul's working is: 170 – 10 = 160 and 5 – 2 = 3 so 172 – 15 = 163

Can you identify where Paul has gone wrong?

Layla has 45p in her money bank and 28p in her purse. How much more money does she need to buy a comic that costs £1?

Ben and Jess are answering this problem:

Mary has collected 61 key rings, Jo has 45. How many more key rings does Mary have than Jo?

Ben does the calculation 61 + 45. Jess does the calculation 61 – 45. Who is correct? Explain how you know.

Josh buys one coconut and half a kilogram of bananas. What does he pay?

Coconut
78p

Bananas
£1.50 per kg

Show your working.

Explain your method to a friend.

Holly has these coins.

She wants to buy a notebook costing £1.50.

How much more money does she need?

I pay for a coach trip costing £7.80 with a £10 note. How much change should I get?

A film starts at 6:30 pm and ends at 8:10 pm. How many minutes does the film last?

I travel on a journey lasting 1 hour 25 minutes. The train leaves the station at 7:45 am. What time does the train arrive?

What number is 199 more than 428?

What is the difference between 1999 and 4003?

One orange costs 15p. How much wo

Would you use a mental, written or calculator method to solve each of these? Explain your choice.

23.05 + ☐ = 176.25

What is the total cost if I buy food costing £3.86 and £8.57?

These are the start and finish times of a film.

START 14:05 FINISH 16:25

How long was the film?

A packet of crisps costs 32p. Josh buys two packets.
How much change does he get from £1?

Ryan buys sunglasses for £4.69 and a sun hat. How much change does he get from £10?

Activities

Programme of Study statement	Activity							
	A	B	C	D	E	F	G	H
add and subtract numbers mentally, including: • a three-digit number and ones • a three-digit number and tens • a three-digit number and hundreds								
add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction								
estimate the answer to a calculation and use inverse operations to check answersy								
solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction								

Activity A – Reach 100 NRICH

The challenge is to find four different digits that give four two-digit numbers, which add to a total of 100. A good way to practise a particular method of written addition.

Activity B – Consecutive numbers NRICH

An investigation looking at consecutive numbers, adding and subtracting them and looking for patterns. A great context for gaining a deeper understanding of our number system. It offers opportunities to work together by sharing results and making decisions.

Activity C – Five Coins NRICH

An open-ended activity to practise addition and subtraction in the context of money.

Activity D – Super Shapes NRICH

A good starter activity that provides an opportunity for pupils to practise using addition and subtraction, and it reinforces their inverse relationship. It also helps them become familiar with the idea of a symbol (in this case a shape) representing a number.

Activity E – Triangular cards NRICH

An interactive resource, which is useful for demonstrating inverse operations. You can select different number bonds including decimals or input your own numbers. Useful for mental maths starters and plenaries. Children could also make their own cards and play hide and reveal as a group activity.

Activity F – Addition of three digit numbers NRICH

A good visual aid to show regrouping.

Activity G – The missing digit trick! NRICH

A great magical activity for rehearsing addition and subtraction.

Activity H – Conductor counting

Split the whole class into three ability groups. Tell each group how they will be counting, i.e. one group could count in threes forwards, another group could count in threes backwards and another group could count in tens forwards etc. Teacher stands at the front of the class as the conductor and points to each group at different times.

This is a great way of differentiating whole class counting. It keeps the children on their toes, as they need to keep looking and listening, so that they know at which point they will need to be continue the count. You could stop at different intervals and ask what the calculation would be to get from one number to the next.

Useful Resources

- digit cards
- digit fans
- number lines (blank, numbered, partly numbered)
- bead strings
- place-value cards
- base 10
- multilink cubes
- 100 squares
- money
- counters
- place-value counters
- whiteboards
- whiteboard pens

Multiplication and Division

I can statements:

- recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
- solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

Exemplification

Examples of what children should be able to do, in relation to each (boxed) Programme of Study statement

Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables

- multiply seven by three; what is four multiplied by nine? Etc.
- Circle three numbers that add to make a multiple of 4

  11 12 13 14 15 16 17 18 19

- Leila puts 4 seeds in each of her pots. She uses 6 pots and has 1 seed left over. How many seeds did she start with?
- At Christmas, there are 49 chocolates in a tin and Tim shares them between himself and 7 other members of the family. How many chocolates will each person get?

Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods

- One orange costs nineteen pence. How much will three oranges cost?
- Mark drives 19 miles to work every day and 19 miles back. He does this on Mondays, Tuesdays, Wednesdays, Thursdays and Fridays. How many miles does he travel to work and back in one week?

Solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects

Miss West needs 28 paper cups. She has to buy them in packs of 6

How many packs does she have to buy?

Activities

Programme of Study statement	Activity				
	A	B	C	D	E
recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables					
write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods					
solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.					

Activity A – Always, Sometimes, Never NRICH

A wonderful, generic resource that can be adapted to suit learners of different abilities as well as different aspects of the curriculum. Versatile resource to use to spark discussion and gain a deep

insight into pupils' understanding of a concept. This set is specifically for division and multiplication.

Activity B – Using pendulum to count in equal steps

Children choose their individual target table and count in steps of their chosen multiple silently in their head in time to pendulum / counting stick etc. Teacher stops and children give the number they have reached and times table facts for that multiple.

Activity C – Arrays for TU x U NRICH

Interactive website that gives the array model for the calculation and children input the missing numbers. Also provides an empty numberline representation of the calculation to support children's developing mental strategies. Arrays can be printed / matched to word problems or children can write their own word problems for the arrays/ calculations.

Activity D – Multiplication involving multiples of 10 and 100, describing effects and moving onto modelling multiplication of 2 digit numbers NRICH

Year 3 lessons 131 – 140 from the Centre for Innovation in Mathematics Teaching: MEP

- **Lesson plans**
- **Workbooks with pupil exercises**
- **Copymasters**

These activities are quite challenging and are based around whole class interactive teaching with pupils having regular opportunity to explain, self correct and reason. There are a number of shorter tasks in each lesson, giving the children chance to engage with a concept in different ways.

Activity E – Andy's Marbles NRICH

A challenging problem that requires children to link multiplication, division and fractions to find the number of marbles Andy started with. A perfect example for the use of the Bar Model.

Useful Resources

- Counters
- Hundred squares
- Times table squares
- Counting stick
- Cuisenaire rods
- Place value discs

Fractions

I can statements:

- count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10
- recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators
- recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators
- recognise and show, using diagrams, equivalent fractions with small denominators
- add and subtract fractions with the same denominator within one whole [for example, $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$]
- compare and order unit fractions, and fractions with the same denominator
- solve problems that involve all of the above

Exemplification

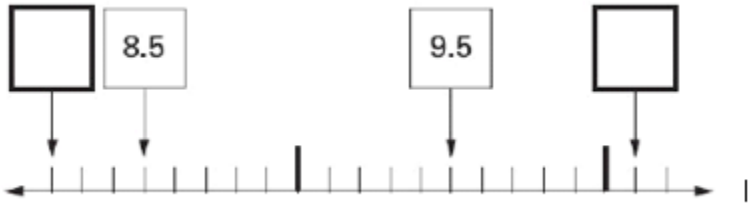
Examples of what children should be able to do, in relation to each (boxed) Programme of Study statement

Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10

Children should be able to:

- Use decimal notation for tenths
- Divide single digits or whole numbers by 10
- Explain how finding 1/10 is the same as dividing by 10

Here is part of a number line. Write in the numbers missing from the two empty boxes.



Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators

Children should be able to:

- Recognise and write unit and non-unit fractions of shapes.

Unit Fractions. Unit means one. Here are some examples of unit fractions.

Can you spot the pattern? A unit fraction is one part of a whole that is divided into equal parts.

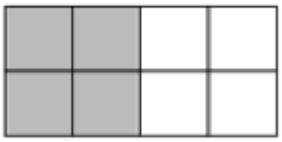
Non-unit fractions. Unit means one, so non-unit is any number apart from one. Here are some examples of non-unit fractions.

Many (or, rather, more than one of the) parts, of an equally divided whole, is a non-unit fraction.

Taken from: BBC skillswise different types of fraction

- Understand that the number on the bottom of a fraction tells me how many pieces the whole is divided into

What fraction of this shape is shaded? How do you know? Is there another way that you can describe the fraction?



- Find fractions of amounts

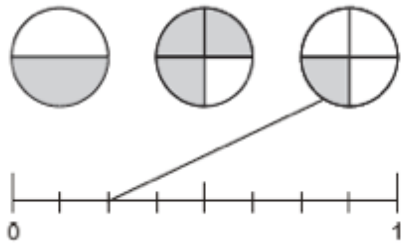
Here are 21 apples. Put a ring around one third of them.

Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators

Children should be able to:

- Position fractions on a number line; eg. mark fractions such as ½, 3 ½ and 2 3/10 on a number line marked from zero to 5.

A fraction of each shape is shaded. Match each fraction to the correct place on the number line. One has been done for you.



Recognise and show, using diagrams, equivalent fractions with small denominators

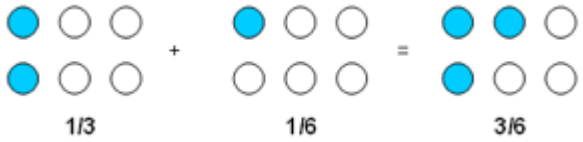
Children should be able to:

- Identify pairs of fractions that total 1.
- Circle two fractions that have the same value.

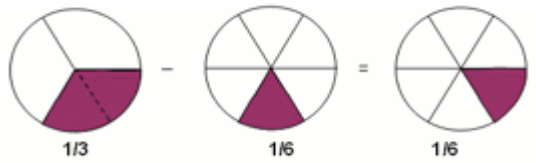
Add and subtract fractions with the same denominator within one whole (e.g. 5/7 + 1/7 = 6/7)

This could also be done by using drawings and in the array form:

For addition:



and for subtraction:



Compare and order unit fractions, and fractions with the same denominators

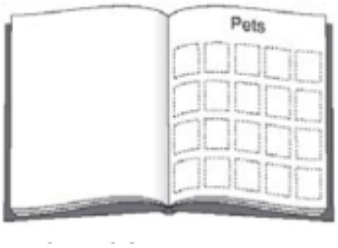
Children should be able to:

- Would you rather have 1/3 of 30 sweets or 1/5 of 40 sweets? Why?

Solve problems that involve all of the above

Children should be able to answer questions like:

- 15 grapes are shared equally onto five plates. What fraction of the grapes is on each plate?
- Meg has 20 pet stickers to go on this page:



1/4 of them are dog stickers
1/2 of them are cat stickers
The rest are rabbit stickers

How many rabbit stickers does she have?

Activities

Programme of Study statement	Activity						
	A	B	C	D	E	F	G
count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10							
recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators							

recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators							
recognise and show, using diagrams, equivalent fractions with small denominators							
add and subtract fractions with the same denominator within one whole (e.g. 5/7 + 1/7 = 6/7)							
compare and order unit fractions, and fractions with the same denominators							
solve problems that involve all of the above							

Activity A – visualising fractions along a line

- Use counting sticks and bead strings to help children visualise fractions.

If the bead string represents one whole, then each set of ten coloured beads could represent one tenth and each individual bead could represent one hundredth.

1. Label the two ends of the bead string as 0 and 1. Give students tags to place each tenth on the bead string. You could use a 1-10 bead string instead of a 1-100 bead string.

2. Join several bead strings together to create fraction lines that extend over one. For example, five bead strings allow fractional numbers from 0 to 5. Label simultaneously in mixed numbers (2 ½) and improper fractions (5/2).
3. Ask the pupils to represent each tenth with a variety of manipulatives, for example, Numicon, Dienes (Big Base) and coins.
4. Extend pupils' understanding to include the equivalence of fractions, decimals and percentages. For example, ½ = 0.5 = 50% or 2 2/10 = 2.2 = 220%

Activity B

- **Fractional Triangles** NRICH

This practical activity develops an understanding of the part and the whole,

- **Understanding unit fractions: A Hungarian Approach** NRICH

A series of lessons on finding fractions of amounts from Lesson 11, page 9 onwards based on an alternative, Hungarian approach, to teaching maths.

Activity C

- **Trains** NRICH

An activity from New Zealand that involves using number rods to develop children's understanding that fractions can extend beyond 1.

- Children can make number lines for display around the classroom, that demonstrate counting in different fractional steps. For example counting in steps of ½ an apple, 1/4s of pizza, 1/10 of a £1 (steps of 10p)
- Daily practice of counting forwards and backwards in 1/2s, 1/4s, 1/10s and 1/3s, including extending to below zero

Activity D – equivalent fractions

- **Fractional Walls** NRICH

An activity based on Cuisenaire / number rods.

- **Matching Fractions** NRICH

A 'pelmanism' style matching activity based on fractions.

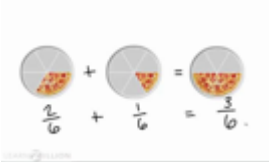
- Use equivalence circles, for example pizza or cake slices in a variety of activities for pupils to explore equivalence.

Activity E – adding fractions

- **Addition, subtraction and equivalent fractions** NRICH

A series of activities based on deepening students' understanding of adding and subtracting fractions with the same denominator.

- Use a variety of representations, for example, number rods, paper strips and equivalence circles to model what happens when you add or subtract fractions with the same denominator. This will help children understand why the denominator doesn't change.



Activity F

- **Fractions interactive teaching programme** NRICH

NB This resource was produced for the Primary National Strategy, which was formally discontinued in 2011. However, the resource has the potential to complement teaching in line with the new 2014 mathematics curriculum)

This ITP allows you to divide a green strip into a number of equal parts and colour the individual parts in yellow, clearly showing any comparison.

- **Smartie Fractions**

Use mini packets of smarties for children to find the fraction of each colour in a packet. This is useful for comparing fractions with the same denominator and for adding and subtracting fractions

More wonderful '**Maths and Smarties**' ideas. NRICH

Activity G – solving problems

- **Use the Bar Model to solve problems** NRICH

Use the 'Thinking blocks on the maths playground' website to model word problems involving fractions and to model adding and subtracting unit fractions. There are video demonstrations, guided problems and the ability to use the blocks to solve your own problems.

- **Fair Feast** NRICH

Assess and develop children's understanding of equal sharing with this picnic problem.

Useful Resources

- **Mental Images for Fractions, Decimals, Percentages, Ratio and Proportion (FDPRP)** www.annery-kiln.eu

A list of models and images to support the development of children's understanding of fractions. Includes ideas on how to use them in the classroom.

- **Overcoming Barriers in Fractions** TES

All the Overcoming Barriers materials from level 1 to level 5 linked to fractions, decimals and percentages contain useful assessment questions and a range of models and images.

Measurement

I can statements:

- measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)
- measure the perimeter of simple 2-D shapes
- add and subtract amounts of money to give change, using both £ and p in practical contexts
- tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks
- estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, a.m./p.m., morning, afternoon, noon and midnight
- know the number of seconds in a minute and the number of days in each month, year and leap year
- compare durations of events [for example to calculate the time taken by particular events or tasks].

Exemplification

Examples of what children should be able to do, in relation to each (boxed) Programme of Study statement

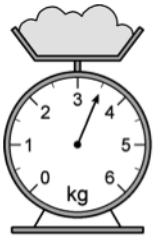
Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/m)

Children should be able to:

Length: Show something that they think is just shorter/longer than a metre/centimetre/millimetre. They should be able to check whether they are right.

Mass: Say which object in the classroom is heavier than 100 g/kilogram/half-kilogram and know how to check if they are correct.

Read scales such as this:



Capacity: Find a container that they think would hold one litre and check to find out if they were correct.

General: Say what each division on this scale is worth and explain how they worked this out.

Measure the perimeter of simple 2-D shapes

Children should be able to:

Measure the sides of regular polygons in centimetres and millimetres and find their perimeters in centimetres and millimetres?

Add and subtract amounts of money to give change, using both £ and p in practical contexts

Children should be able to:

Solve problems like this:

- Jake wants to buy a comic that costs £1. He saves 25p one week and 40p the next. How much more money does he need to buy the comic?
- Add these prices: £6.73, £9.10 and £7.00 to find the total. Find out how much they need to add to get £23?

Tell and write the time from an analogue clock, including Roman numerals from I to XII, and 12-hour and 24-hour clocks How would this time appear on a 12-hour digital clock?

Children should be able to:

Read times like this in analogue and digital formats, including those with Roman numerals.

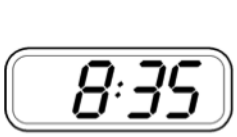
Solve problems such as: Ben's clock says 7:50 when he gets up. Place the hands on this clock to show this time.

Estimate and read time with increasing accuracy to the nearest minute, record and compare time in terms of seconds, minutes, hours and o'clock; use vocabulary such as a.m./p.m., morning, afternoon, noon and midnight

Children should be able to:

Solve problems such as:

- Kevin leaves home at quarter past 8 and arrives in school at 20 to 9. How long is his journey? How did you work this out?
- How long is it between the times shown on these two clocks? How did you work it out?(oral question)



Know the number of seconds in a minute and the number of days in each month, year and leap year

Children should be able to:

Solve problems such as: Milly uses a stop-watch to time her cat eating its breakfast one morning. The reading on the stop-watch, once the cat had finished eating, says 135 seconds. Can you convert this into minutes and seconds?

Compare durations of events, for example to calculate the time taken by particular events or tasks

Children should be able to:

Solve problems such as:

- Estimate how long your favourite TV programme lasts. Use a television guide to work out how close your estimation was.
- It takes 35 minutes to walk from home to school. I need to be there by 8.55 am. What time do I need to leave home?
- How much does it cost to hire a rowing boat for three hours?

Boat Hire	
Motor boats £1.50 for 15 minutes	Rowing boats £2.50 for 1 hour

- Sasha pays £3.00 to hire a motor boat. She goes out at 3:20 pm. By what time must she return? Explain how you solved this problem. Could you have done it in a different way?
- Sally and Maria both went to the gym on Saturday. Sally was there from 2 pm until 3.30pm. Maria was there from 12.30 pm until 3.15 pm. Who spent the longer time at the gym? How much longer was she there than her friend?

Activities

Programme of Study statement	Activity			
	A	B	C	D
measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/m)				
measure the perimeter of simple 2-D shapes				

add and subtract amounts of money to give change, using both £ and p in practical contexts				
tell and write the time from an analogue clock, including Roman numerals from I to XII, and 12-hour and 24-hour clocks				
estimate and read time with increasing accuracy to the nearest minute, record and compare time in terms of seconds, minutes, hours and o'clock; use vocabulary such as a.m./p.m., morning, afternoon, noon and midnight				
know the number of seconds in a minute and the number of days in each month, year and leap year				
compare durations of events [for example to calculate the time taken by particular events or tasks].				

Activity set A

- This is a simple but effective way to practise estimating, measuring and comparing lengths: give each learner a small piece of plasticine or modelling clay. They work in groups of about four. Give them 30 seconds to roll the longest worm that they can. As a group, they order the worms from shortest to longest. They then estimate the length of the shortest worm and once they have, they measure it. They use this knowledge to estimate the length of the next worm and then measure it. They continue to do this for all the worms. They can then find the differences in length between their worms and also add pairs of their lengths together.

Resources required: plasticine or modelling clay

- You could adapt this **mass investigation** from Nrich. You could set this up for the learners to work on practically with balance scales.

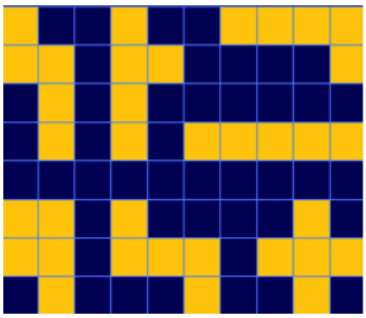
Resources required: balance scales

- This **Nrich investigation** involves capacity:

There are 4 jugs which hold 9 litres, 7 litres, 4 litres and 2 litres. Find a way to pour 9 litres of drink from one jug to another until you are left with exactly 3 litres in three of the jugs.

Activity B - Perimeter

- Give the children a piece of squared paper and ask them to draw a variety of shapes by shading sets of 5 squares. They then find their perimeters.



Resources required: centimetre squared paper

- This **Smaller and smaller** investigation from Nrich asks the learners to predict, without drawing, the perimeters of shapes in a pattern.

Activity C – Add and subtract amounts of money

- Set problems that involve finding totals and change. For example: Mike spent 76p on a bar of chocolate and £1.35 on a packet of biscuits. How could he have paid for them using the least number of coins? If he had a £5 note, how much change will he need?

Resources required: coins

- Make a collection of take-away menus and store catalogues (particularly those that include toys). The children can use these to make up meals, wish lists for birthdays and so on to practice finding totals and amounts left from a given budget.

Resources required: take-away menus, store catalogues

Activity D – Time

- Give learners sets of digit cards. They pick three and make up as many times as they can using their cards. They then draw their times on analogue clock faces and label them with the 12-hour and 24-hour times.

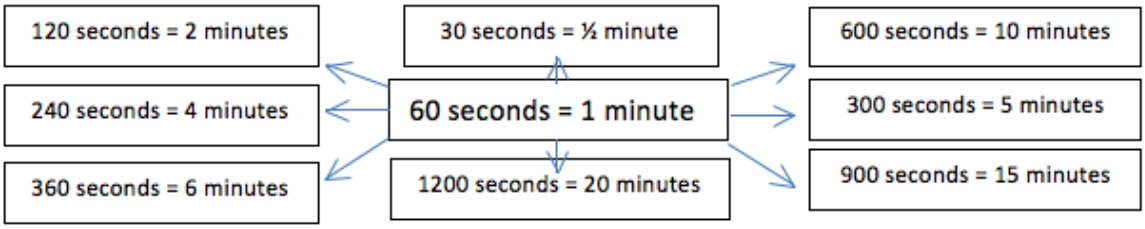
Resources required: digit cards, pre-prepared analogue clock faces without hands

- The **'Two Clocks' investigation** from Nrich asks the learners to find the times on a clock with no minute hand and to solve problems involving a clock with no hour hand!
- 'Just a minute' type activities for practising the vocabulary of time (or any other concept) are fun and the learners really enjoy playing them. Write the words that you wish to practice on pieces of paper or card. Pile the words together and then, taking one at a time, give the meaning of each (without saying the word) How many do the learners successfully guess in one minute. Repeat this a few times. Ensure you begin with the words they guessed correctly – to build on their success. Do they improve their score?

You could also do this in mixed ability groups with the most confident learner taking the first turn.

Resources required: vocabulary cards for the words you wish the learners to focus on

- Give the children practice sessions where they use their mental calculation skills of, for example, addition, subtraction, multiplication, doubling and halving to deduce new information:



You could repeat this for days in different numbers of weeks, months in different numbers of years and so on.

- You could adapt **this investigation** from Nrich which asks:

During the third hour after midnight the hands on a clock pointed in the same direction (so one hand was over the top of the other). At what time, to the nearest second, did this happen?

For Roman Numerals this **interactive clock** can be set to display Roman numerals for a variety of 'Time' activities.

Geometry: Properties of Shapes

I can statements:

- draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them
- recognise angles as a property of shape or a description of a turn
- identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle
- identify horizontal and vertical lines and pairs of perpendicular and parallel lines

Exemplification

Examples of what children should be able to do, in relation to each (boxed) Programme of Study statement

Draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them

Recognise angles as a property of shape or a description of a turn

Identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle

Identify horizontal and vertical lines and pairs of perpendicular and parallel lines.

The requirements for Year 3 in Geometry: Properties of Shapes are quite explicit and exemplars are not particularly helpful. It is helpful, however, to understand that, in Year 3, pupils should be expected to demonstrate understanding in this area by:

- using appropriate mathematical vocabulary to describe the features of common 2-D and 3-D shapes including semicircles, hemispheres and prisms
- sorting and classifying collections of 2-D shapes in different ways using a range of properties including: 'all sides are of equal length,' 'has at least one right angle' or 'has at least one line of symmetry'
- recording their classifications on Venn and Carroll diagrams, including diagrams involving more than one criterion.

Activities

Programme of study statements	Activities			
	A	B	C	D
draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and				

describe them				
recognise that angles are a property of shape or a description of a turn				
identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle				
identify horizontal and vertical lines and pairs of perpendicular and parallel lines				

Activity set A

You could ask the children to make a repeating pattern by drawing squares or equilateral triangles in different orientations.

Ask the children to look at pictures in magazines and books and identify and draw the 2D shapes that they can see.

You could give the children card and a polyhedron, for example a cube or a cuboid. Ask the children to make their shape using the card. It is interesting to observe the children as they do this. Some children may draw around each face, cut them out and stick the pieces together. Others might draw around several faces side by side so beginning to make a net. These methods produce useful discussion. For example, if they have drawn this for a cube:

You could discuss what they could have done to make a closed cube (add another square to one of the four exterior squares).

You could give each child a piece of plasticine and ask them to make a sphere. Discuss how they do this. Once they have a sphere talk about its properties: one curved surface, no edges, no vertices. It might be worth pointing out that an edge occurs when two faces meet and a vertex occurs when three or more edges meet. Discuss what a sphere can do and where one can be seen in real life. Next, ask the children to turn their sphere into a cube. What do they need to do? Flatten the curved surface to make flat faces. Recap the properties of a cube, including the shape of the faces and the lines of symmetry in each one. Where would they see one in real life? Follow this process for a cuboid and then a square based pyramid. When they have the pyramid, ask them to visualise what it would look like opened up and draw what they see. Most children will draw this:

You could ask them to cut their drawing out and put it together to make a pyramid. As this is made from a sketch it might not fit exactly. Discuss what the children would need to do to make it more accurate. Agree that the square base must be square and the triangles must be the same size. You could ask them to draw an accurate net and then make the shape. You could repeat this for a cube.

Activity set B

The children need to recognise that angles can be found where the sides of a 2D shape meet. You could ask the children to draw an irregular shape on a piece of paper. Once they have done this ask them to identify the angles according to whether they are acute, right, obtuse or greater than a straight line.

You could ask them to identify angles in paintings, such as, Kandinsky's Composition VII which can be found in **The Art of Mathematics** in issue 9 of the Primary Magazine.

You might like to try the activity from Nrich **'More Transformation on a Pegboard'** which asks the children to make triangles with different angles.

The children also need to recognise that angles are a description of a turn (dynamic angles). When the children are familiar with what a right angle looks like, you could ask them to stand and make a turn of the same size. Repeat this for half a turn and point out that this is equivalent to two quarter turns or a straight line. Repeat again for three and four quarter (whole) turns.

'How Safe are You?' from Nrich asks the children to explore the angles of turn needed to open a safe.

Activity set C

Children need to identify whether angles are greater than or less than a right angle and name these as acute of obtuse. You could ask the children to draw different acute and obtuse angles and give their drawings to a friend to label with the correct vocabulary. They could also draw stick men with joints such as elbows, knees and ankles positioned to show acute, right and obtuse angles.

You could follow the suggestions for the painting 'Ballet' by Laura Knight in **The Art of Mathematics** in issue 56 of the Primary Magazine.

You might like to explore **'Right Angle Challenge'** from Nrich which asks the children to explore right angles using sticks.

Activity set D

As well as angles the artist Kandinsky's **Composition VII** is a great painting to explore perpendicular and parallel lines.

Another good painting for this is Mondrian's Komposition which can be found in **The Art of Mathematics** in issue 11 of the Primary Magazine.

After exploring these paintings and asking the children to identify all the perpendicular and parallel lines that they can, you could ask them to make their own versions of the paintings. Great for a classroom display!

Statistics

I can statements:

- interpret and present data using bar charts, pictograms and tables
- solve one-step and two-step questions [for example, 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables

Exemplification

Examples of what children should be able to do, in relation to each (boxed) Programme of Study statement

Interpret and present data using bar charts, pictograms and tables

- Process, present and interpret data to pose and answer questions. They use all representations such as Venn and Carroll diagrams, bar charts, pictograms. They collect data quickly onto a class tally chart. Children recognise that a tally involves grouping in fives and that this helps them to count the frequencies quickly and accurately. They produce a simple pictogram and/or bar chart, where a symbol represents 2 units.
- Children sort and classify objects, numbers or shapes according to two criteria, and display this work on Venn and Carroll diagrams.

Solve one-step and two-step questions such as ‘How many more?’ and ‘How many fewer?’ using information presented in scaled bar charts and pictograms and tables

- Collect, represent and interpret data in order to answer a question that is relevant to them, for example:
    - What new addition to the school play equipment would you like?
    - Which class race shall we choose for sports day?
- They decide on the information they need to collect and collect it efficiently. They collate the information on a tally chart or frequency table, then use this to make simple frequency diagrams such as bar charts, using ICT where appropriate. They discuss the outcomes, responding to questions such as:
    - Which items had fewer than five votes?
    - Would the table be the same if we asked Year 6?
    - How might the table change if everyone had two votes?
- Children present their conclusions to others, identifying key points that should be included. They make suggestions as to how this data could be used; for example, they may decide that they need to investigate the price of different equipment or discuss what they need to do to prepare for their chosen race.

Activities

Programme of study statements	Activities	
	A	B

interpret and present data using bar charts, pictograms and tables		
solve one-step and two-step questions such as ‘How many more?’ and ‘How many fewer?’ using information presented in scaled bar charts and pictograms and tables		

Activity set A

You could carry out a human bar graph activity. Think of a scenario such as favourite sports. Give each child a Post-it note and ask them to draw them

playing their favourite sport onto it – no words, just pictures. Next ask them, in small groups, to stick the Post-it notes on the board to make a bar chart. As they do this, listen to what they say. Someone might wonder what one of the drawings is and this can lead into a discussion about the importance of labels. You could then ask some of the children to write labels for the different sports and add them to the board to form a horizontal axis. Once all the Post-it notes are on the board, discuss the scale size of the vertical axis. If you decide to go up in steps of two, double up the Post-it notes for all the sports and then ask some children to write the appropriate numbers and add these to the bar chart. When you have done that discuss why a title would be useful and add this. The children could then draw the bar chart on paper and write some statements about the information it shows.

You could display a pictogram similar to the one below. Ask the children to work out what the scenario for the pictogram could be and to tell you what it shows.

You could then give the children some plain paper and ask them to make a pictogram to show which of the food choices from the pictogram in the picture the class would make or they could do their own survey, make a tally and then a table before constructing their pictogram. They should consider how many children each symbol will represent.

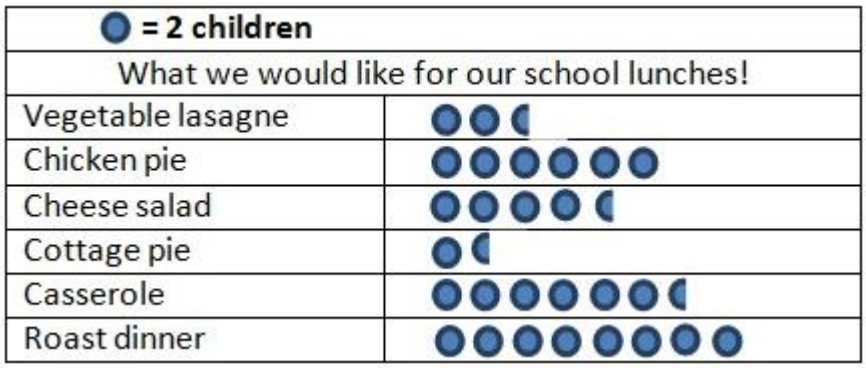
= 2 children	
What we would like for our school lunches!	
Vegetable lasagne	
Chicken pie	
Cheese salad	
Cottage pie	
Casserole	
Roast dinner	

You could ask the children to work with a partner and make a list of 6 pieces of information that the pictogram gives them. Encourage them to include statements that involve addition and subtraction, e.g. 3 more children prefer roast dinner than casserole, 58 children took part in the survey, 17

children voted for vegetable lasagne and chicken pie. They then share these with another pair and add any new statements the other pair made to their list.

You could show some of the existing data from the **Data Handling ITP** and ask the children to analyse them.

You could use this pet graph and ask the children to make up and answer questions from it. Encourage them to make up questions that involve addition and subtraction.



Activity set B

There are several activities on the NRICH website which ask the children to solve problems within the context of statistics. Why not try these with your children:

- **Match the Matches** could be used at the start of a series of lessons on data handling, or as an assessment opportunity at the end of the unit. It will get children talking meaningfully about mathematics, presenting and justifying arguments.
- **It's a Tie** allows children to simulate a probability experiment, to be involved, be creative, and construct their own meanings and explanations for the results they come up with.
- **More Carroll Diagrams** gives children a way of sorting numbers according to different properties and also forces them to consider more than one aspect at once. It also provides opportunities for children to explain their placing of the numbers, using appropriate language.
- **Venn Diagrams** provides an opportunity for children to become familiar with Venn diagrams, whilst reinforcing knowledge of number properties. Placing numbers in a Venn diagram requires children think of more than one property of a number at the same time and this problem will encourage them to explain their reasons for placing the numbers.