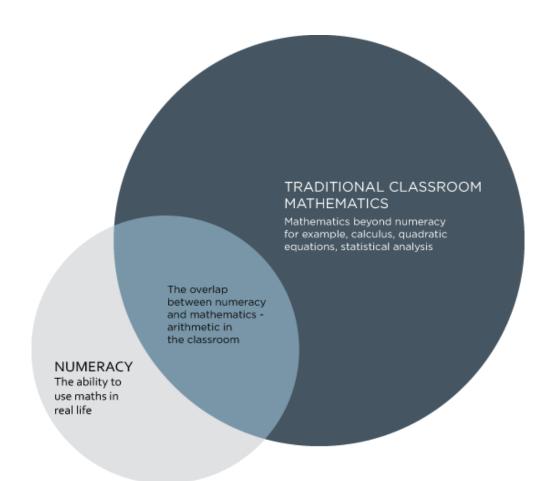# Numeracy

Information for Parents and Carers

What is numeracy?

Numeracy is different to mathematics. Your child will learn most of their numeracy skills in their mathematics lessons but being numerate means them being able to apply these skills in both mathematics and all of their other subjects. Numeracy is an essential skill which must be sufficiently developed in order to be ready for adult life.
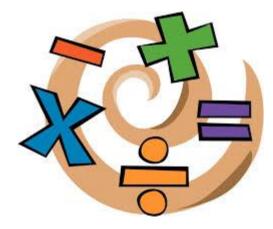
TRADITIONAL CLASSROOM MATHEMATICS
Mathematics beyond numeracy for example, calculus, quadratic equations, statistical analysis

The overlap between numeracy and mathematics - arithmetic in the classroom

NUMERACY
The ability to use maths in real life

Taken from nationalnumeracy.org.uk

This booklet aims to...

- Explain what we do at Islwyn High School to support your child's numeracy development
- Outline the requirements of the National Curriculum and the Literacy and Numeracy Framework (LNF)
- Provide ideas for what can be done at home to help
- Outline sources of further information

What we do in school to support numeracy development

- We put students in the group where we can best cater for their ability. In Year 7 they are placed in sets for mathematics based on tests and the information provided from their primary school.

- Students are provided with regular numeracy practice in their mathematics lessons. They may complete mental practice at the start of lessons or complete written tasks. They are also provided with opportunities to apply their numeracy skills in other areas of the curriculum. Opportunities exist in most subjects but are more prevalent in Science, Geography and Design & Technology.

- In form times students are involved in Numeracy Ninjas once a week. This is designed to fill gaps in students' basic mental calculation strategies and also to empower them with the numeracy skills and fluency required to fully access GCSE Maths concepts when they move to Key Stage 4 study.

- We provide additional support to students when necessary. This takes a variety of forms. Some students/classes receive support in their mathematics lessons via an additional adult who may be a teacher or teaching assistant. Another form of support is when students are withdrawn from lessons other than mathematics and taught by a teacher or a specialist teaching assistant.

- Detailed data analysis of numeracy tests is provided to all teaching staff so that they are able to provide additional support and challenge to any students who require it when tackling numeracy based tasks in subjects other than mathematics.

- The school provides in-service training for all teachers to enable them to deliver effective numeracy support within their subjects.

Ensuring your child fulfils their potential

We have high expectations of all students; we expect them to perform to the best of their ability in both lessons and assessments.

During Key Stage 3 your child is assessed against the National Curriculum in Mathematics and will also be assessed against the Literacy and Numeracy Framework (LNF).

The National Curriculum

All students in Wales are assessed against the National Curriculum at the end of each Key Stage and are awarded a National Curriculum Level. At Islwyn High School we continually assess against the National Curriculum so we can monitor your child's progress and intervene where necessary. When necessary we may provide extra support in lessons, additional to lessons and contact home.

We hope that most students will make two levels of progress per key stage so if, for example, a student is working at level 4 at the end of Key Stage 2 they would be aiming for a level 6 at the end of Key Stage 3.

In order to have the best possible chance of achieving a grade C in GCSE mathematics students should be aiming for a level 6 or higher at the end of Key Stage 3.

The following two pages contain a table outlining some examples of what each level looks like.

The Literacy and Numeracy Framework (LNF)

From September 2013 the Literacy and Numeracy Framework has been introduced to all schools in Wales. Its sets out annual end of year expectations in both literacy and numeracy for all students from Year 2 to Year 9. The pages following the National Curriculum Levels contain a checklist of the end of year expectations for numeracy for Years 7, 8 and 9.

National Testing

In addition to the LNF the Welsh Government has introduced annual literacy and numeracy tests for all students from Year 2 to Year 9 assessing the objectives outlined in the LNF. In numeracy students will sit two tests, one in procedural numeracy lasting 30 minutes, the other in numerical reasoning also lasting 30 minutes. Calculators are not permitted. All students sit the same test regardless of ability. In June 2013 students sat only the procedural numeracy test.

The results of these tests are reported to parents and carers annually.

STAGE NOT AGE!

When looking at the LNF expectations please bear in mind that the framework is a progression and there are students that will be performing above their age related expectations and also those working below. For some students it would be inappropriate to work on the objectives contained in the LNF for their year group as they do not have the prerequisite skills required to be able to access these.

Level (KS3)	Mathematical skills	Number	Measures and money	Algebra	Shape, position and movement	Handling data
4	• develop my own strategies for solving problems, and present information and results systematically. • search for a solution by trying out ideas of my own.	• multiply and divide whole numbers by 10 and 100. • use a variety of mental and written methods for computation, including recall of multiplication facts up to 10 x 10. • add and subtract decimals to two places. • check results are reasonable by considering the context or the size of the numbers. • use simple fractions and percentages to describe approximate parts of a whole.	• choose and use suitable units and instruments, reading, with appropriate accuracy, numbers on a range of measuring instruments. • find perimeters of shapes, areas by counting squares, and volumes by counting cubes	• recognise and describe number patterns and relationships • use simple formulae expressed in words.	• use my knowledge of shape to make 3-D mathematical models, draw common 2-D shapes in different orientations on grids, and reflect simple shapes in a mirror line. • use and interpret co-ordinates in the first quadrant.	• collect discrete data, group data where appropriate, and use the mode and median as characteristics of a set of data. • draw and interpret frequency diagrams and construct and interpret simple line graphs. • understand and use simple vocabulary associated with probability.
5	• identify and obtain information to solve problems, and check whether my results are sensible in the context of the problem. • describe situations mathematically using symbols, words and diagrams and draw my own conclusions, explaining my reasoning. • make general statements of my own, based on available evidence.	• use their understanding of place value to multiply and divide whole numbers and decimals. • order, add and subtract negative numbers. • check my solutions by applying inverse operations or estimating using approximations. • calculate fractional or percentage parts of quantities and measurements.	• make sensible estimates of a range of everyday measures. • convert one metric unit to another and know the rough metric equivalents of imperial units in daily use. • find areas of rectangles and triangles and volumes of cuboids. They read scales on maps, plans and graphs.	• construct and use simple formulae involving one or two operations.	• Measure and draw angles to the nearest degree. • recognise, identify and describe all the symmetries of 2-D shapes. • use co-ordinates in all four quadrants.	• use the mean of discrete data and compare two simple distributions. • Interpret graphs, diagrams and pie charts. • use the probability scale from 0 to 1, and appreciate that different outcomes may result from repeating an experiment.
6	• solve complex problems by breaking them down into smaller tasks, and give some mathematical justifications to support their methods, arguments or conclusions. • interpret, discuss and synthesise information presented in a variety of mathematical forms.	• Use trial-and-improvement methods involving approximating and ordering decimals. • calculate one number as a fraction or percentage of another. • use the equivalences between fractions, decimals and percentages and calculate using ratios in appropriate situations.	• use formulae for finding circumferences and areas of circles, areas of plane rectilinear figures and volumes of cuboids	• find and describe in words the rule for the next term or nth term of a sequence where the rule is linear • formulate and solve a variety of simple linear equations. • represent mappings expressed algebraically.	• use common 2-D representations of 3-D objects, and the properties of quadrilaterals to classify different types of quadrilateral. • solve problems using angle and symmetry properties of polygons and properties of intersecting and parallel lines. • enlarge shapes by a positive whole-number scale factor.	• collect and record continuous data, and construct and interpret frequency diagrams, pie charts and scatter diagrams. • use their knowledge that the total probability of all the mutually exclusive outcomes of an experiment is 1, and find and justify probabilities.

						• identify all the outcomes when dealing with a combination of two experiments.
7	• justify my generalisations, arguments or solutions, consider alternative approaches and appreciate the difference between mathematical explanation and experimental evidence. • examine critically and justify their choice of mathematical presentation.	• In making estimates, round to one significant figure and multiply and divide mentally. • understand the effects of multiplying and dividing by numbers between 0 and 1, • calculate proportional changes. • solve numerical problems with numbers of any size, using a calculator efficiently and appropriately	•calculate lengths, areas and volumes in plane shapes and right prisms •appreciate the imprecision of measurement, and use compound measures such as speed.	• describe in symbols the next term or nth term of a sequence with a quadratic rule. • use algebraic and graphical methods to solve simultaneous linear equations in two variables • solve simple inequalities.	• use Pythagoras' theorem in two dimensions • enlarge shapes by a fractional scale factor.	• Specify and test hypotheses, taking account of bias. • analyse data to determine modal class and estimate the mean, median and range of sets of grouped data. • use measures of average and range to compare distributions, and draw a line of best fit on a scatter diagram by inspection. • use relative frequency as an estimate of probability and use this to compare outcomes of experiments.
8	• develop and follow alternative approaches, reflecting on their own lines of enquiry and using a range of mathematical techniques. • examine and discuss generalisations or solutions they have reached. • convey mathematical or statistical meaning through precise and consistent use of symbols.	• solve problems involving calculating with the extended number system, including powers, roots and standard form.		• manipulate algebraic formulae, equations and expressions. • solve inequalities in two variables. • sketch and interpret graphs of linear, quadratic, cubic and reciprocal functions, and graphs that model real situations.	• understand congruence and mathematical similarity • use trigonometry (sine, cosine and tangent) in right-angled triangles.	• interpret and construct cumulative frequency tables and diagrams. • compare distributions and make inferences, using estimates of the median and inter-quartile range. • solve problems using the probability of a compound event.
Exceptional performance	• give reasons for the choices I make when investigating within mathematics. • Use mathematical language and symbols effectively in presenting a convincing reasoned argument, including mathematical justification. • express general laws in symbolic form.		•calculate lengths of circular arcs, areas of sectors, surface areas of cylinders, and volumes of cones and spheres	• solve problems using intersections and gradients of graphs.	• use, generate and interpret graphs based on trigonometric functions. • solve problems in two and three dimensions using Pythagoras' theorem and trigonometric ratios.	• interpret and construct histograms. • understand how different sample sizes may affect the reliability of conclusions. • recognise when and how to use conditional probability.

NUMERACY FRAMEWORK

YEARS 7, 8 AND 9

Developing numerical reasoning

Identify processes and connections

Learners are able to:

- transfer mathematical skills across the curriculum in a variety of contexts and everyday situations
- select, trial and evaluate a variety of possible approaches and break complex problems into a series of tasks
- prioritise and organise the relevant steps needed to complete the task or reach a solution
- choose an appropriate mental or written strategy and know when it is appropriate to use a calculator
- use a scientific calculator to carry out calculations effectively and efficiently using the available range of function keys
- identify, measure or obtain required information to complete the task
- identify what further information might be required and select what information is most appropriate
- select appropriate mathematics and techniques to use
- estimate and visualise size when measuring and use the correct units.

Represent and communicate

Learners are able to:

- explain results and procedures precisely using appropriate mathematical language
- refine methods of recording calculations
- use appropriate notation, symbols and units of measurement, including compound measures
- select and construct appropriate charts, diagrams and graphs with suitable scales
- interpret graphs that describe real-life situations, including those used in the media, recognising that some graphs may be misleading.

Review

Learners are able to:

- select and apply appropriate checking strategies
- interpret answers within the context of the problem and consider whether answers, including calculator, analogue and digital displays, are sensible
- verify and justify results or solutions, including discussion on risk and chance where relevant
- interpret mathematical information; draw inferences from graphs, diagrams and data, including discussion on limitations of data
- draw conclusions from data and recognise that some conclusions may be misleading or uncertain.

YEAR 7

Using number skills

Use number facts and relationships

Learners are able to:

- read and write numbers of any size and use the four operations and the connections between them, e.g. apply division as the inverse of multiplication
- recognise and apply key mental facts and strategies
- use appropriate strategies for multiplication and division, including application of known facts
- use the terms square and square root.

Fractions, decimals, percentages and ratio

Learners are able to:

- use equivalence of fractions, **decimals** and percentages to compare proportions
- recognise that some fractions are recurring decimals, *e.g. 1⁄3 is 0.333*
- calculate percentages of quantities using non-calculator methods where appropriate
- use ratio and proportion including map scales.

Calculate using written and mental methods

Learners are able to:

- use efficient written methods to add and subtract numbers with up to 2 decimal places
- multiply and divide 3-digit by 2-digit whole numbers, extending to multiplying and dividing decimals with 1 or 2 places by single-digit whole numbers
- multiply and divide whole numbers by 0.5, 0.2, 0.1
- use the order of operations.

Estimate and check

Learners are able to:

- use a range of strategies to check calculations including the use of inverse operations, equivalent calculations and the rules of divisibility
- use rounding to estimate answers
- present answers to a given number of decimal places.

Manage money

Learners are able to:

- use profit and loss in buying and selling calculations
- understand the advantages and disadvantages of using bank accounts, including bank cards
- make informed decisions relating to discounts and special offers.

Using measuring skills

Length, weight/mass, capacity

Learners are able to:

- find perimeters of shapes with straight sides
- read and interpret scales on a range of measuring instruments
- convert between units of the metric system and carry out calculations.

Time

Learners are able to:

- measure and record time in hundredths of a second
- use time zones.

Temperature

Learners are able to:

- record temperatures in appropriate temperature scales.

Area and volume
Angle and position

Learners are able to:

- use formulae for the area of rectangles and triangles
- measure and draw angles.

Using data skills

Collect and record data
Present and analyse data
Interpret results

Learners are able to:

- collect own data for a survey, e.g. through designing a questionnaire
- construct frequency tables for sets of data, grouped where appropriate, in equal class intervals (groups given to learners)
- construct a wide range of graphs and diagrams to represent the data and reflect the importance of scale
- interpret diagrams and graphs (including pie charts)
- use mean, median, mode and range to compare two distributions (discrete data).

YEAR 8

Using number skills

Use number facts and relationships

Learners are able to:

- recognise and apply key mental facts and strategies
- use known facts to derive others, e.g. use 7 x 6 to derive 0.7 x 6
- use the terms cube, cube root and reciprocal.

Fractions, decimals, percentages and ratio

Learners are able to:

- use equivalence of fractions, decimals and percentages to select the most appropriate for a calculation
- simplify a calculation by using fractions in their simplest terms
- calculate a percentage, fraction, decimal of any quantity with a calculator where appropriate
- calculate the outcome of a given percentage increase or decrease
- use ratio and proportion to calculate quantities.

Calculate using written and mental methods

Learners are able to:

- use efficient written methods to add and subtract numbers with up to 2 decimal places
- use efficient methods for multiplication and division of whole numbers and decimals, including decimals such as 0.6 or 0.06
- use the order of operations including brackets.

Estimate and check

Learners are able to:

- use rounding to estimate answers to a given number of significant figures
- present answers to a given number of significant figures.

Manage money

Learners are able to:

- carry out calculations relating to VAT, saving and borrowing
- appreciate the basic principles of budgeting, saving (including understanding compound interest) and borrowing.

Using measuring skills

Length, weight/mass, capacity

Learners are able to:

- use the common units of measure, convert between related units of the metric system and carry out calculations
- use rough metric equivalents of imperial units in daily use.

Time

Learners are able to:

- interpret fractions of a second appropriately
- use timetables and time zones to calculate travel time.

Temperature

Learners are able to:

- convert temperatures between appropriate temperature scales.

Area and volume
Angle and position

Learners are able to:

- calculate areas of compound shapes (e.g. consisting of rectangles and triangles) and volumes of simple solids (e.g. cubes and cuboids)
- use compass bearings and grid references to specify locations.

Using data skills

Collect and record data
Present and analyse data
Interpret results

Learners are able to:

- plan how to collect data to test hypotheses
- construct a wide range of graphs and diagrams to represent discrete and continuous data
- construct frequency tables for sets of data in equal class intervals, selecting groups as appropriate
- construct graphs to represent data including scatter diagrams to investigate correlation
- interpret diagrams and graphs to compare sets of data
- use mean, median, mode and range to compare two distributions (continuous data).

YEAR 9

Using number skills

Use number facts and relationships

Learners are able to:

- use powers and understand the importance of powers of 10
- show awareness of the need for standard form and its representation on a calculator.

Fractions, decimals, percentages and ratio

Learners are able to:

- use equivalence of fractions, decimals and percentages to select the most appropriate for a calculation
- use and interpret different representations of fractions, e.g. mixed numbers and improper fractions
- express one quantity as a percentage of another
- calculate a percentage increase or decrease
- use ratio and proportion to calculate quantities.

Calculate using written and mental methods

Learners are able to:

- use efficient written methods to add and subtract numbers and decimals of any size, including a mixture of large and small numbers with differing numbers of decimal places
- multiply and divide whole numbers and decimals
- use the order of operations including brackets and powers.

Estimate and check

Learners are able to:

- make and justify estimates and approximations of calculations
- choose the appropriate degree of accuracy to present answers.

Manage money

Learners are able to:

- calculate using foreign money and exchange rates
- understand the risks involved in different ways of saving and investing
- describe why insurance is important and understand the impact of not being insured.

Using measuring skills

Length, weight/mass, capacity

Learners are able to:

- find circumferences of circles
- make links between speed, distance and time.

Temperature

Learners are able to:

- convert temperatures between appropriate temperature scales.

Area and volume
Angle and position

Learners are able to:

- find areas of circles
- apply understanding of bearings and scale to interpret maps and plans, and to create plans and drawings to scale.

Using data skills

Collect and record data
Present and analyse data
Interpret results

Learners are able to:

- test hypotheses, making decisions about how best to record and analyse the information from large data sets
- construct and interpret graphs and diagrams (including pie charts) to represent discrete or continuous data, with the learner choosing an appropriate scale
- select and justify statistics most appropriate to the problem considering extreme values (outliers)
- examine results critically, select and justify choice of statistics recognising the limitations of any assumptions and their effect on the conclusions drawn
- use appropriate mathematical instruments and methods to construct accurate drawings.

What you can do to help your child?

The importance of parents

As a parent/carer, you are there to give your child their first experiences of maths: from sorting toys to baking cakes, from going shopping to learning to ride a bike (and if you're wondering about the maths in riding a bike, just think about speed, distance, balance, wheels etc - it's all maths!).

Even if you don't feel confident with maths, you can still make a huge difference to your child's numeracy confidence and ability.

Key Points

- Helping your child feel positive about maths is really important and it's something every parent can do.
- Maths is everywhere – pointing this out helps children understand the importance of maths, and enjoy it too.

What is numeracy about?

Being numerate is a life skill that will help your child at home, at school, and one day in their work lives too.

At all levels learning maths is about solving problems, thinking logically and being creative in finding ways of working things out.

A good understanding of numeracy will help your child with everyday tasks like

- Solving problems
- Making decisions
- Understanding information

For everyone, for life

Numeracy is still important even after children leave school. Children with good numeracy skills are more likely to

- Stay in education longer
- Be in work as adults
- Earn more throughout their lives

What you can do to help your child

The most important thing to do is help your child to feel positive about maths and have fun with it whenever possible.

In the UK people are often negative about maths and this makes it harder for children to understand the reasons why we need to learn maths. Follow our top tips and help your child develop maths confidence.

1. **Don't** say things like 'I can't do maths' or 'I hated maths at school'… your child might start to think like that themselves…
2. **Do** talk about the maths in everyday life, and ask your child how they work out problems or questions.
3. **Do** let your child enjoy talking about what they've learned, and praise them when they try hard.

4. **Don't** put pressure on your child to do written or timed sums – use time at home to do more practical maths like shopping or cooking.
5. **Do** try out the National Numeracy Challenge yourself – the more confident you feel, the more you'll be able to help your child.

The other really important thing is to give your child the opportunity to use and talk about maths every day. This will help them to become a mathematical problem solver, and develop lifelong skills such as:

- Sorting – into groups, into order, and comparing
- Measuring
- Calculating – adding, subtracting, multiplying, dividing etc
- Organising and understanding information
- Looking for patterns and relationships between numbers
- Making sense of and checking information – learning to ask 'is this answer sensible'?
- Communicating and presenting information

Children learn maths best through activities and tasks where they have to make choices in order to solve a problem or a puzzle and where they can explore and talk about their ideas and approach to the problem. The more variety they experience with maths, the more comfortable they will feel.

The above has been taken from nationalnumeracy.org.uk

In addition to the above advice you can also encourage your son/daughter to

- Spend time on their mathematics homework ensuring they complete and understand the tasks set.
- Seek support when necessary. If they are struggling in class or with homework they should ask their maths teacher for help. If homework is proving challenging they should see their teacher before it is due to be handed in, if possible.
- Come well equipped to their mathematics lessons and tests. They will need a pen, pencil, ruler, a pair of compasses, an angle measurer or protractor and a scientific calculator. We recommend the Casio Scientific calculators that are available to buy in school or most supermarkets as the screen allows the user to see the entire calculation entry, thus reducing the chance of errors.
- Pay attention to and act on the advice of their teacher's feedback. Feedback may be verbal or written. If they have missed work or not completed tasks this will be identified in their exercise books and should be completed as soon as possible. They should always try to correct any incorrect work and ensure they understand where they have gone wrong.

Some practical ideas

It is really important that students know their multiplication facts. It is good if they can work them out but even better if they know them by heart. They will use them in many different areas of mathematics such as fractions, percentages, ratio and proportion and algebra. They may know them well but repeated practice is important as they are easily forgotten. Firing some questions at them when in the car, eating dinner, or out and about will keep their minds sharp.

Sometimes mathematics can seem too abstract to students. They struggle to see how it is relevant in our day-to-day activities. Take opportunities to identify the numeracy that we undertake daily in our lives. For example:

- If you bake a batch of cupcakes if the recipe is for 12 cakes ask them to explain what they would need to do to work out the quantities of ingredients for 24, 6 or 18 cakes.
- When filling the car up with fuel, tell them the cost per litre and total cost of the fuel and ask them how they would work out how many litres of fuel went into the car.
- Show them utility bills and explain how they are calculated.
- When shopping ask them to calculate how much change they should be due to receive at the till.
- Ensure that they are able to tell time on both analogue and 24-hour clocks.
- Talk to them about home finance so that they understand what mortgages, insurance, loans and savings are. Playing the game Monopoly, may be a good starting point for this. Find out what they think a salary would be for a variety of occupations, and how much outgoings such as mortgages, rent, utilities and childcare cost. Do they know what a payslip looks like and what deductions might be for?
- When planning a journey look at bus/train timetables together and ask which service you need to catch to arrive at a particular time.
- When shopping, if there is a 10% off sale ask them to work out the new cost of the product and the saving.
- When supermarket shopping, ask them to keep an estimated running total in their heads of the cost of all the food in the trolley. Turn it into a game and whoever gets the closest to the actual total at the checkouts is the winner.
- If they know their height in feet and inches, can they convert it to centimetres?
- If they would like to have a new mobile phone ask them to compare tariffs themselves and try to work out the best buy.
- If they would like to buy a new computer game/console can they work out how many weeks pocket money it would take for them to save. Or, if they wanted to buy it by a certain date, how much would they need to save each week?
- If driving in the car pose questions such as "It's 50 miles to Swansea, if our average speed is 30 miles per hour how long will it take us to get there?"
- When cooking ask them to work out the timings so that all aspects of the meal are ready to be served at the same time. Or say "This stew takes 2 hours 15 minutes to cook. If we want to eat at 1.10pm what time should we put it in the oven?" Or tell them that a joint of beef takes 25 minutes per kilogram + 25 minutes, tell them the weight and get them to work out the cooking time.

Sources of support

Websites

www.mymaths.co.uk
We subscribe to this website as a school. The site provides online, interactive lessons with games and "online homeworks" that provide instant feedback. It covers the vast majority of the mathematics curriculum. These tasks can also be repeated to improve scores with the questions changing each time. Your child should see their mathematics teacher for their log in.

www.nrich.org.uk
A site devoted to enriching mathematics. It includes something for everyone. It has an emphasis on problem solving and links with all areas of the curriculum, with different challenge levels for students in Foundation Phase right through to Key Stage 5. It features monthly problems that students can submit their solutions to and these solutions can be published to the site.

www.hegartymaths.com
This website contains wealth of instructional videos from a secondary mathematics teacher for many topics in the mathematics curriculum from Key Stage 3 to Key Stage 5.

www.mathsisfun.com
A website that explains mathematics in a simple way and provides printable worksheets

http://www.bbc.co.uk/bitesize/ks3/maths
Huge coverage of the Key Stage 3 mathematics curriculum that provides students with opportunities to revise, try an activity and then test themselves.

http://ws.mathsdoctor.tv/
Aimed more at GCSE level so would be more appropriate for Year 9 but contains worksheets with video tutorials.

http://www.moneysavingexpert.com/financial-education/
This site provides a guide for parents to work on financial literacy with their teenagers, educating them about making the most of their money in the modern world.

Gaming sites –
These provide online maths games for students to play either on their own or against other students around the world. They provide a fantastic opportunity for learners to have lots of repeated practice whilst having fun. Some require an individual login and we are in the process of providing students with these.
www.sumdog.com
www.mangahigh.com
www.tutpup.com
www.TTRockstar.com