



Ashton on Mersey Numeracy Policy

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2.0		
3.0		

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Policy Review Frequency:	4 years
Next Review:	November 2021
Signature of Chairman of Governors: 	Signature of Vice-Chairman of Governors: 

Ashton on Mersey School – Numeracy Policy

1. Vision

Numeracy is fundamental to all areas of learning as it unlocks access to the wider curriculum. Being numerate increases opportunities for the individual in all aspects of life and lays the foundations for lifelong learning and work. A whole school numeracy policy at Ashton on Mersey is required to ensure that numeracy teaching is: highly effective; cohesively planned and implemented across the curriculum; endorsed by all teachers regardless of their subject specialism. This policy must be read in conjunction with the following policies:

- Teaching & Learning Policy
- Assessment & Feedback Policy.
- Special Educational Needs Policy.

Regular reviews with the Headteacher, Assistant Principal and Curriculum Managers will inform updates to these key skills (Please see Appendix 3 – Update sheet).

2. Aim

- a. Developing, maintaining and improving standards in numeracy across the school.
- b. Ensuring consistency of practice, including methods, vocabulary and notation.
- c. Finding areas for collaboration between subjects.
- d. Assisting the transfer of pupils' knowledge, skills and understanding between subjects.
- e. Ensuring that all teachers are teachers of numeracy.

Teachers will use every relevant subject to develop pupils' mathematical fluency. Confidence in numeracy and other mathematical skills is a precondition of success across the national curriculum.

3. Key roles and responsibilities (also see Appendix 1)

- a. The Headteacher, with assistance and advice from the Assistant Principal for Teaching and Learning and the Numeracy coordinator/Head of Mathematics, has overall responsibility for the vision and implementation of the Numeracy policy.
- b. The Headteacher has responsibility for handling complaints regarding this policy as outlined in the school's Complaints Policy.
- c. The Assistant Principal for Teaching and Learning, with assistance and advice from the Numeracy coordinator/Head of Mathematics, has responsibility for the implementation, monitoring and management of the Numeracy policy.
- d. The Numeracy coordinator/Head of Mathematics working with the Headteacher and Assistant Principal for Teaching and Learning has responsibility for the implementation of the Numeracy Policy and procedures of Ashton on Mersey School.

- e. The Mathematics Department has responsibility for the implementation of the Numeracy Policy and procedures of Ashton on Mersey School.
- f. The Numeracy coordinator/Head of Mathematics will be responsible for the day-to-day implementation and management of the Numeracy Policy and procedures of Ashton on Mersey School.
- g. The Numeracy coordinator/Head of Mathematics, in conjunction with the Key Stage coordinators, will be responsible for liaising with teachers across all of the departments to facilitate the delivery of cross-curricular numeracy skills.
- h. The Mathematics department will be responsible for teaching basic maths skills.
- i. Teachers in all departments across the curriculum will be responsible for developing numeracy skills across their subjects.
- j. Parents will encourage and support their children in completing Maths homework and in revising for end of half term and end of year Maths assessments.
- k. The Governing Body has overall responsibility for ensuring that the Numeracy Policy, as written, does not discriminate on any grounds, including but not limited to ethnicity/national origin, culture, religion, gender, disability or sexual orientation.
- l. The Governing Body has overall responsibility for reviewing the Numeracy Policy on a regular basis.

4. Key skills

- a. Numeracy is the capacity to take mathematics and apply knowledge, skills and strategies to deal with everyday life in a variety of situations.
- b. Numerate pupils are able to:
 - Understand the size of a number and where it fits into the number system.
 - Read numbers correctly from a range of equipment.
 - Know and recall basic number facts and use mental arithmetic.
 - Use calculators and other equipment to solve mathematical problems.
 - Work confidently with the four operations (+, -, \times and \div).
 - Know when answers are reasonable and give accurate results.
 - Manipulate algebraic expressions and simple formulae.
 - Understand and use correct mathematical notation and terminology.
 - Explain methods, reasoning and conclusions.
 - Use units of measurement of length, angle, mass, capacity and time.
 - Suggest suitable units for measuring.
 - Make sensible estimates of measurements and measure accurately using a range of apparatus.
 - Understand and use compound measures and rates.
 - Use simple formulae and substitute numbers in them.

- Measure and estimate measurements, choosing suitable units, and calculate simple perimeters, areas and volumes.
 - Understand the concept of scale in geometrical drawings and maps.
 - Understand the difference between the mean, median and mode, and the purpose for which each is used.
 - Collect data, draw, interpret and predict from graphs, diagrams, charts and tables.
 - Understand probability and risk.
- c. Numerate pupils are able to deal with numbers in real life situations, such as:
- Calculating change when shopping.
 - Creating a household budget.
 - Calculating compound interest on a loan.
 - Calculating interest on savings.
 - Deciding which gas / electricity supplier to use.
 - Understanding interest rates when opening a bank account.
 - Recovering from debt.

5. Numeracy in the curriculum

- The Numeracy coordinator/Head of Mathematics, in conjunction with the Key Stage Coordinators, will work with the Heads of Department across the school to complete a [subject specific numeracy audit](#) (exemplar Appendix 2).
- Based on the subject specific numeracy audit, the Mathematics Department will complete a [whole school numeracy audit](#) to ensure that numeracy skills are covered for each year group across the curriculum.

5.1 Key stage 3

Pupils at key stage 3 will be taught the following numeracy skills across the curriculum:

- Place value, ordering and rounding.
- Calculations with whole numbers and decimals.
- Fractions, decimals, percentages, ratios and proportions.
- Calculator methods.
- Reasoning and generalising.
- Measures.
- Construction.
- Coordinates.
- Transformations.
- Handling data.
- Applying mathematics.
- Checking results.

In mathematics, pupils at key stage 3 will be taught to develop fluency in maths by:

- Learning to consolidate numerical and mathematical skills learned at primary school and developing further understanding of the number system and place value to include decimals, fractions, powers and roots.
- Developing an ability to use appropriate calculation methods to solve increasingly difficult problems.
- Using algebra to generalise the structure of arithmetic.
- Substituting values in expressions, rearranging and simplifying expressions, and solving equations.
- Moving freely between different numerical, algebraic, graphical and diagrammatic representations.
- Developing algebraic and graphical fluency, including understanding linear and simple quadratic functions.
- Using mathematical language.

Reason mathematically by:

- Increasing their understanding of the number system.
- Make connections between number relationships and their algebraic and graphical representations.
- Developing their knowledge of ratio and proportion, in working with measures and geometry, and in formulating proportional relations algebraically.
- Identifying variables and expressing relations between variables algebraically and graphically.
- Making and testing estimations about patterns and relationships and looking for proofs or counter-examples.
- Learning deductive reasoning.
- Interpreting when the structure of a numerical problem requires additive, multiplicative or proportional reasoning.
- Exploring what can and cannot be inferred in statistical and probabilistic settings, and beginning to express their arguments formally.

Solve problems by:

- Developing their mathematical knowledge through problem solving and evaluating the outcomes.
- Developing their use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics.
- Beginning to model situations mathematically and learning to express the results using a range of formal mathematical representations.
- Selecting appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems.

5.2 Key stage 4

Pupils will be taught to use correct mathematical representation by:

- Identifying the mathematical aspects of the situation or problem.
- Comparing and evaluating representations of a situation before making a choice.

- Simplifying the situation or problem in order to represent it mathematically using appropriate variables, symbols, diagrams and models.
- Selecting mathematical information, methods, tools and models to use.

Analyse mathematically by:

- Making connections within mathematics.
- Using knowledge of related problems.
- Visualising and working with dynamic images.
- Identifying and classifying patterns.
- Making and justifying conjectures and generalisations, considering special cases and counter-examples.
- Exploring the effects of varying values and looking for invariance and covariance.
- Taking account of feedback and learning from mistakes.
- Working logically towards results and solutions, recognising the impact of constraints and assumptions.
- Identifying a range of techniques that could be used to tackle a problem, appreciating that more than one approach may be necessary.
- Reasoning inductively, deducing and proving.

Use appropriate mathematical procedures by:

- Making accurate mathematical diagrams, graphs and constructions on paper and on screen.
- Calculating accurately, using mental methods or calculating devices as appropriate.
- Manipulating numbers, algebraic expressions and equations and applying routine algorithms.
- Using accurate notation, including correct syntax when using ICT to record methods, solutions and conclusions.
- Estimating, approximating and checking working.

Interpreting and evaluating data by:

- Creating convincing arguments to justify findings and general statements.
- Considering the assumptions made and the appropriateness and accuracy of results and conclusions.
- Appreciating the strength of empirical evidence and distinguishing between evidence and proof.
- Finding patterns and exceptions in data.
- Relating their findings to the original question or conjecture, and indicating reliability.
- Making sense of someone else's findings and judging their value in the light of the evidence they present.
- Critically examining strategies adopted.

Communicating and reflecting on data by:

- Using a range of formats to communicate findings to different audiences.
- Engaging in mathematical discussion.
- Considering the elegance and efficiency of alternative solutions.
- Looking for equivalence in relation to both the different approaches to the problem and different problems with similar structures.
- Giving examples of similar contexts they have previously encountered and identifying how these contexts differed from, or were similar to, the current situation and how and why the same, or different, strategies were used.

5.3 Key stage 5

Mathematics is not taught as a separate subject at KS5. However, specific booster and catch-up lessons are delivered to pupils in the Sixth Form who are retaking a GCSE in Mathematics as part of their KS5 studies. Please see KS4 list above in section 5.2 for key skills to be covered in catch up sessions.

6. Assessment and Intervention

a. Pupils will be assessed by:

- Each half term pupils will be assessed based on Mathematical skills they have been taught for that half term, combined with a proportion of synoptic skill assessment on Mathematics topics covered throughout the year. All pupils will be given the opportunity to review their areas of strength and weakness and be given the opportunity to identify target areas based on their performance
- At the end of each academic year all pupils will be assessed on all Mathematical skills that have been taught in that academic year. All pupils will be given the opportunity to review their areas of strength and weakness and be given the opportunity to identify target areas based on their performance.

b. The Key Stage 3 and Key Stage 4 coordinator will:

- Create assessments for each year group which allow consistent assessment of pupils across each year group.
- Analyse assessment data at the end of each half term and share the results of the analysis with the Mathematics Department.
- Pupils requiring additional support in numeracy will be identified and appropriate intervention put in place.
- Intervention could include: one to one or small group intervention with a designated member of staff, inclusion in the breakfast club or involvement in lunchtime and after school booster sessions.

7. Engagement and Enjoyment in Mathematics

The school will strive to provide numeracy experiences that will enthuse and inspire pupils. We will provide activities and events throughout the year that enable pupils to engage with Mathematics in a context outside the classroom to enable them to make links between subjects and relate their learning to the World around them.

8. Update and review

Regular reviews with the Headteacher, Assistant Principal and Curriculum Managers will inform updates to these key skills (Please see Appendix 3 – Update sheet).

Updated: November 2017

Review date: November 2021

Appendix 1: Numeracy responsibilities

School Leadership will	Numeracy Coordinator will	Curriculum Leaders will
<ul style="list-style-type: none"> • lead and give Numeracy a high profile • provide opportunities for staff training on Numeracy • monitor and evaluate departments' implementation of the Numeracy Policy • monitor exam and assessment outcomes to ensure that no one group is disadvantaged • put Numeracy at the heart of learning and teaching in lessons and pastoral time 	<ul style="list-style-type: none"> • Work constructively and collaboratively with SEND or leaders, other middle leaders and teachers of core subjects to maximise pupil attainment and progress in pupils' Numeracy skills across all subjects. • Assist SLT with monitoring and evaluation of Numeracy across the curriculum • Keep up-to-date with current initiatives and recommend best practice • Coordinate cross curricular Numeracy initiatives • Work in partnership with Maths and subject leaders to identify and share initiatives 	<ul style="list-style-type: none"> • ensure that 'subject specific' Numeracy is identified • integrate Numeracy marking into the department's marking policy • ensure that all reading material is accessible to all students through use of available data • ensure all department members are aware of Numeracy demands
All staff will		
<ul style="list-style-type: none"> • Encourage pupils to shape ideas through structured discussion • Encourage pupils to develop their Mathematics experience through group, individual, paired and whole class strategies. • Encourage pupils to reflect on their number skills. • Ensure they are familiar with the demands of Numeracy in their department/area. • Embed Numeracy skills in learning. • Use school agreed pedagogical strategies for the teaching of Numeracy. • Use SEND information to ensure resources are appropriate. • Celebrate Numeracy with school rewards systems. • Commit to promoting Numeracy as a high priority. 		

Appendix 2: Cross curricular examples

<p>English</p> <ul style="list-style-type: none"> • Frequency of words using bar charts and pie charts. • Surveys for descriptive writing using line graphs. • Mathematical vocabulary. 		<p>Science</p> <ul style="list-style-type: none"> • Various arithmetical calculations on decimals and fractions including ratio, use of formulae and percentages. • Graphs and charts of all kinds. • Shapes in 2D and 3D. • Golden ratio /Fibonacci sequence in biology. • Use of units. 	<p>Religious Education</p> <ul style="list-style-type: none"> • Shape in religious iconography. • Calendar years and years of other faiths. 	<p>Design and Technology</p> <ul style="list-style-type: none"> • Various arithmetical calculations on decimals and fractions including ratio, use of formulae and percentages. • Graphs and charts of all kinds. • Construction and measure of 2D and 3D shapes. • Development costings.
<p>Geography</p> <ul style="list-style-type: none"> • Graphs and charts of various kinds. • Fractions, percentages and ratios. • Population growth. • Four-figure grid references. • Study of maps, angles and position. 		<p>History</p> <ul style="list-style-type: none"> • Graphs and charts of various kinds. • Percentages, ideas of large numbers and wealth. • Measures of weight, length and time. 	<p>Computing</p> <ul style="list-style-type: none"> • Spreadsheets, databases, algebra and flowcharts. • Collecting and classifying data. • Measurement of distance and angle in control systems. • Production of graphs and charts. 	<p>Languages</p> <ul style="list-style-type: none"> • Measures of length / distance, time and weight. • Counting. • Tables. • Exchange rates. • Money / costs. • Speeds and distance.

<p>Music</p> <ul style="list-style-type: none"> • Pythagorean intervals. • Fractions and square roots. • Doubling of frequencies. • Aleatoric music. • Golden section. 		<p>Physical Education</p> <ul style="list-style-type: none"> • Speed, distance, time, units and weight. • Graphs and charts. • Percentages. • Power / weight ratios. • Calculations of energy expended. • Symmetry movement and direction. 	<p>Art and Design</p> <ul style="list-style-type: none"> • Islamic art and design. • 2D and 3D shapes. • Ratios. • Perspective. • Golden ratio/Fibonacci sequence. • Escher tessellations. • The art of Wassily Kandinsky. 	<p>Citizenship</p> <ul style="list-style-type: none"> • Developing financial fluency through numeracy. • Looking after and saving money. • Spending and saving (bank accounts, loans, credit cards etc.). • Voting and elections – Ratios, graphs and charts of various kinds.
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Appendix 3: Numeracy developments and update sheet

Date	Update

Year 11	
Design and Technology	Task/Activity
Mathematical Skill	Topic
Sort and classify objects by more than one criterion.	
Record results in simple lists, tables and block graphs.	
Interpret simple tables and lists.	
Interpret pictograms.	
Draw pictograms.	
Interpret bar graphs.	
Draw bar graphs.	
Collect data and record them using frequency tables.	
Understand and use the mode, the median and the range of a set of data.	
Group collected data into equal class intervals.	
Draw frequency diagrams using grouped data.	
Interpret line graphs.	
Select and use appropriate scales for axes.	
Draw line graphs.	
Use the vocabulary of probability.	

Design and Technology	Year 11	
Mathematical Skill	Topic	Task/Activity
Understand and use the mean of a set of data.		
Use averages and ranges to compare two sets of data.		
Interpret pie charts.		
Understand and use the probability scale from 0 to 1.		
Find probabilities using equally likely outcomes or experiments.		
Create frequency tables with equal class intervals to record continuous data.		
Interpret frequency diagrams.		
Draw frequency diagrams.		
Draw pie charts.		
Draw scatter-diagrams.		
Understand simple correlation.		
Use two-way tables to record all the possible outcomes of two events.		
Use the fact that the total probability of all mutually exclusive outcomes of an experiment is 1.		
Specify and test hypotheses using appropriate methods and taking account of variability and bias.		
Find modal class of grouped data.		

Design and Technology	Year 11	
Mathematical Skill	Topic	Task/Activity
Estimate the mean, median and range of grouped data.		
Use averages, ranges and frequency polygons to compare two sets of data.		
Draw a line of best fit on a scatter diagram.		
Use relative frequency to estimate probability.		
Interpret cumulative frequency tables and diagrams.		
Construct cumulative frequency tables and diagrams.		
Estimate the median, quartiles and inter-quartile range from a cumulative frequency diagram.		
Interpret histograms with unequal class intervals.		
Understand and use sampling.		
Draw histograms with unequal class intervals.		

Whole school numeracy audit

Mathematical Skill	Year 7	Year 8	Year 9	Year 10	Year 11
	Subjects				
Sort and classify objects by more than one criterion.					
Record results in simple lists, tables and block graphs.					
Interpret simple tables and lists.					
Interpret pictograms.					
Draw pictograms.					
Interpret bar graphs.					
Draw bar graphs.					
Collect data and record them using frequency tables.					
Understand and use the mode, the median and the range of a set of data.					
Group collected data into equal class intervals.					
Draw frequency diagrams using grouped data.					
Interpret line graphs.					
Select and use appropriate scales for axes.					
Draw line graphs.					
Use the vocabulary of probability.					
Understand and use the mean of a set of data.					
Use averages and ranges to compare two sets of data.					
Interpret pie charts.					

Mathematical Skill	Year 7	Year 8	Year 9	Year 10	Year 11
Understand and use the probability scale from 0 to 1.					
Find probabilities using equally likely outcomes or experiment.					
Create frequency tables with equal class intervals to record continuous data.					
Interpret frequency diagrams.					
Draw frequency diagrams.					
Draw pie charts.					
Draw scatter-diagrams.					
Understand simple correlation.					
Use two-way tables to record all the possible outcomes of two events.					
Use the fact that the total probability of all mutually exclusive outcomes of an experiment is 1.					
Specify and test hypotheses using appropriate methods and taking account of variability and bias.					
Find modal class of grouped data.					
Estimate the mean, median and range of grouped data.					
Use averages and ranges and frequency polygons to compare two sets of data.					
Draw a line of best fit on a scatter diagram.					
Use relative frequency to estimate probability.					
Interpret cumulative frequency tables and diagrams.					



Mathematical Skill	Year 7	Year 8	Year 9	Year 10	Year 11
Construct cumulative frequency tables and diagrams.					
Estimate the median, quartiles and inter-quartile range from a cumulative frequency diagram.					
Interpret histograms with unequal class intervals.					
Understand and use sampling.					
Draw histograms with unequal class intervals.					