# Year 8 - Maths

## Areas of Learning

- **Working Mathematically:** Develop fluency through varied and frequent practice using increasingly complex problems. Develop mathematical reasoning and solve problems, applying maths skills to routine and non-routine problems of increasing sophistication, breaking down problems into simpler steps.

- **Number:** Confidently use the four operations with integer numbers. Build on math vocabulary of year-7 [highest common factors, lowest common multiples] and prime factors. Utilise prime factorisation to solve problems. Apply the four operations to proper and improper fractions, and mixed numbers. Use conventional notation for the priority of operations, including brackets and powers, roots and reciprocals. Recognise and use relationships between operations including inverse operations. Multiply and divide whole numbers and decimals by any number. Convert terminating and non-terminating decimals to fractions.

- **Algebra**: Use algebra to generalise the structure of arithmetic, including to formulate mathematical linear relationships for more complex problems than previously seen. Substitute values in linear expressions, rearrange and simplify linear expressions and solve linear equations. Derive rules for linear integer sequences. Appreciate that other sequences than arithmetic linear sequences exist. Recognise straight-line graphs parallel to the x-axis and y-axis. Generate coordinate pairs that satisfy linear equations. Introduction to quadratic relationships, graphs and series.

- **Ratio, Proportion and Rates of Change:** Use ration notation, simplify ratios and divide a quantity into more than two parts. Solve more complex problems involving ratio and direct proportion. Draw and interpret graphs in real-life context involving more than one stage [travel graphs].

- **Geometry and Measures:** Derive and apply formulae to calculate and solve problems involving: perimeter and area of triangles, parallelograms, trapezia, volume of cuboids (including cubes) and other prisms (including cylinders). Solve more complex geometrical problems by using side and angle properties to identify equal lengths or calculate unknown angles and explain reasoning. Recognise the angular connections between parallel lines, perpendicular lines and transversals. Use a ruler, set square and protractor to construct midpoint and perpendicular bisectors and angle bisectors; to construct circles and arcs, triangles and make simple scale drawings. Transform 2-D points and shapes by reflection in a given line, rotation about a given point and translation. Know and use similarity properties of triangles.

- **Probability:** Use the language of probability to describe and interpret results involving likelihood and chance. Understand and use the probability scale. Find probabilities based on equally likely outcomes in more complex contexts. Identify all the possible mutually exclusive outcomes of a single event. Use experimental data to estimate probabilities. Compare experimental and theoretical probabilities in simple contexts.

- **Statistics:** Determine the mode (or modal class), median, mean and range of data presented in lists, in frequency tables for discrete and continuous variables. Draw and interpret pictograms, bar-line graphs and bar charts, frequency diagrams for grouped discrete data and simple pie charts. Appreciate the use of two-way tables. Determine relevant data to collect when designing a simple survey. Design the data collection sheet, organise the data and plot it using the relevant technique.

## Approaches to learning

- Problems are attempted and pupils write their answers on the whiteboards that they then show to the teacher.
- For more challenging problems, pupils given thinking time and are then chosen or volunteer to describe their solution on the whiteboard, whilst the teacher encourages them to use the correct mathematical vocabulary.
- Pupils work in groups to solve problems.
- Quizzes used to promote a moderate amount of competition and encourage engagement.
- Online activities to build mastery on topics.
- Pupils work on puzzling problems that they must interpret and determine a strategy to develop their solution.
- Pupils undertake a survey which is then used as the basis of further analysis.
- Pupils investigate the probability of events occurring and consider how these probabilities relate to the experiment they conducted.
- Pupils undertake cross-curricular projects, such as with Computing, to show they can think mathematically and can develop analyses that will allow them to derive certain conclusions.

## Examples of learning

- Pupils undertake a survey of the student body in order to collect data regarding the amount of money pupils spent on food and drink outside of their homes over one week.
- Pupils undertake a survey of their own habits of spending time studying and spending time being entertained, such as watching the television. The data is grouped together anonymously and analysed. This form of survey could be attempted again for a wider set of the student body, split by year group. This could be extended to an analysis of their body fat index and estimates for the amount of time they spend watching TV and/or amount of regular exercise per week.
- Pupils undertake exercises that expose them to relatively complex probability problems that require visualisation of total probability. This may lead them on to investigate the use of sample space diagrams.

## References

- UK Department of Education, (2013), National Curriculum Documents available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/239058/SECONDARY_national_curriculum_-_Mathematics.pdf , web-document published on 11 September 2013.