KESTEVEN AND SLEAFORD HIGH SCHOOL

Mathematics Scheme of Learning
Year 8 – Term 2/Straight Line Graphs/Proportion/Fractions/Averages

Intent – Rationale

Students last term practised substituting into formulae and will use this knowledge to create a table of values to recap sketching linear graphs before progressing on to drawing quadratic curves. The understanding they gain from straight line graphs is used to recognise directly proportional relationships shown graphically. Fraction calculations are used across varying topics so a recap and use with mixed numbers is studied. Finally, this term students extend finding averages from raw data to find averages when collated in a frequency table.

Sequencing – what prior learning does this topic build upon?	Sequencing – what subsequent learning does this topic feed into?
• Year 7 Term 2 fraction calculations • Year 7 Term 4 coordinates • Year 7 Term 5 ratio and proportion • Year 7 Term 5 averages • Year 8 Term 1 expressions • Year 8 Term 1 graphs	• Year 8 Term 3 interpreting statistical graphs (fractions of amounts) • Year 9 Term 1 make links to quadratic graph when factorising and solving quadratics • Year 9 Term 4 straight line graphs • Year 9 Term 4 averages from grouped frequency table • Year 9 Term 6 proportion
What are the links with other subjects in the curriculum?	**What are the links to SMSC, British Values and Careers?**
• Art and Design and Technology Proportion – scale of objects/measurements Unit value and placement	• C2 - Equivalence of fractions, decimals and percentages and the validity of comparisons between them. Link to Food nutrition labelling and healthy eating.

• Geography Coordinates Collecting, representing and interpreting data • History Handling, representing and interpreting data • ICT Graph plotting • Music Equivalent fractions • PE Performance data Mean, mode, median and range • RE Interpreting data • Science Continuous and discrete data	• GB4e - Solving real life problems, a chance to put new skills in to context and reflect on how mathematics is relevant to everyday life • GB4e - Use of statistics as a way of measuring and making sense of the world around us. • GB4e - Comparing data sets, using statistical data to make judgements

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Types of graph FDP Manipulation of algebraic expressions	
What are the opportunities for developing literacy skills and developing learner confidence and enjoyment in reading?	**What are the opportunities for developing mathematical skills?**
The Number Devil by Hans Magnus Enzensberger *Age 11+* The quirky and unusual story of a young boy who hates maths at school, but who discovers a new side to the subject when he meets an unusual mathematician in a dream. This book takes you on an adventure through creative mathematical thinking, with great illustrations along the way.	• Technique for drawing curved graphs, no feathering etc • Inverse proportion with real life problems e.g. more people less work each • Explore misconception that multiplying always makes bigger / makes smaller with fractions less than 1 • When calculating the mean from a frequency table, ensure we divide by frequency total not the number of categories in table

Mathematics Scheme of Learning
Year 8 – Term 1

Intent – Concepts

What knowledge will students gain and what skills will they develop as a consequence of this topic?

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National Curriculum Reference

Drawing Straight line graphs. Find the equation of a straight line. Draw curved graphs. Use graphs in a real-life context.

Perform 4 operations applied to fractions (8.3) and to improper fractions and mixed numbers (8.4). Interpreting worded questions in order to determine which operation should be carried out. Finding fractions of amounts.

Know

Draw linear and quadratic graphs using a table of values. Draw a linear graph using the y intercept and gradient.

Calculate values in direct and inverse proportional relationships

Convert between any fraction, decimal and percentage. Add/Subtract fractions and mixed numbers with different denominators. Multiply fractions and mixed numbers using cancelling first. Divide an integer by fraction and two fractions.

State the median mode and range for raw data, calculate the mean. Collect data in an ungrouped frequency table. Find the mode, median mean and range from the table.

Apply

Draw and interpret real life graphs such as depth over time and conversion graphs

Recognise direct and inversely proportional relationships shown graphically

Fraction worded problems – recognising the operation required

Compare sets of data

Extend

Draw linear graphs with negative gradients. Find the equation of a straight line with fractional gradients. Draw quadratic graphs with positive and negative coefficients of x^2 for BIDMAS recap.

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Add/Subtract/Multiply/Divide simple algebraic fractions (single term)	
What subject specific language will be used and developed in this topic?	**What opportunities are available for assessing the progress of students?**
• Linear equation, variable, constant, gradient, y-intercept, quadratic, average speed, distance-time graph, quadratic, cubic, table of values. • Direct proportion, proportional, formula, graph, inverse proportion • Reciprocal, unit fraction, divisor, equivalent, integer. • Mean, median, mode, range, consistency, measure of spread, averages, frequency, grouped, ungrouped, raw data, discrete, continuous.	• Mid-term target questions • End of half term assessment • **Common Misconceptions:** • Students may view graphical and algebraic representations as unlinked • Viewing equations such as • $y=2x+1 y=2x+1$ • as a procedure to be followed rather than a relationship between coordinates • Misconceptions around the use of algebraic notation • Confusing the equations of horizontal and vertical lines, again due to failure to view them as a relationship

	• Thinking that coordinates (for points on lines, and more broadly) can only take integer values • Being unable to identify, read or draw suitable scales for axes • Viewing proportion as unconnected to other areas of maths such as fractions • Having a less well developed understanding of multiplication causing difficulties with reasoning proportionally • Being unable to identify whether information relates to a whole or a part a given ratio • Assumption that fraction denominator is the percentage when converted eg 1/20 = 20%=0.2 • Insufficient knowledge of calculations with fractions • A lack of understanding of the concept of a fraction and its size leading to just adding or subtracting numerators and/or denominators • A lack of understanding of equivalent fractions leading to inefficient methods such as *always* 'cross-multiplying' • Confusing the procedures for using different operations with fractions • A lack of understanding of mixed number notation leading to difficulties with e.g. $3\frac{4}{5}+5\frac{2}{3}$ and $6\frac{1}{9}-3\frac{4}{7}$ • Confusing different measures of average • Thinking that the range is an average • Lack of conceptual understanding of averages and what they do and don't show, possibly due to lack of exposure to large sets of data • Not knowing what 'frequency' is

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Linear Graphs	R	A	G
Draw a linear graph using a table of values			
Identify the gradient and y intercept from the equation and graph			
Draw a straight-line graph from the equation			
Draw and interpret real life graphs/conversion graphs			
Draw quadratic graphs using a table of values			

Proportion	R	A	G
Calculate values in a directly proportional relationship			
Calculate values in an inversely proportional relationship			
Recognise a direct or inversely proportional relationship shown graphically			

Fractions	R	A	G
Convert between any fraction, decimal and percentage			
Be able to find Equivalent fractions			
Be able to add and subtract fractions (different denominators)			
Be able to multiply fractions and find fractions of an amount			

Be able to divide fractions and divide an integer by a fraction			

Averages	R	A	G
Calculating the mean, median, mode and range of a set of numbers			
Comparing sets of data			
Finding averages from a frequency table			