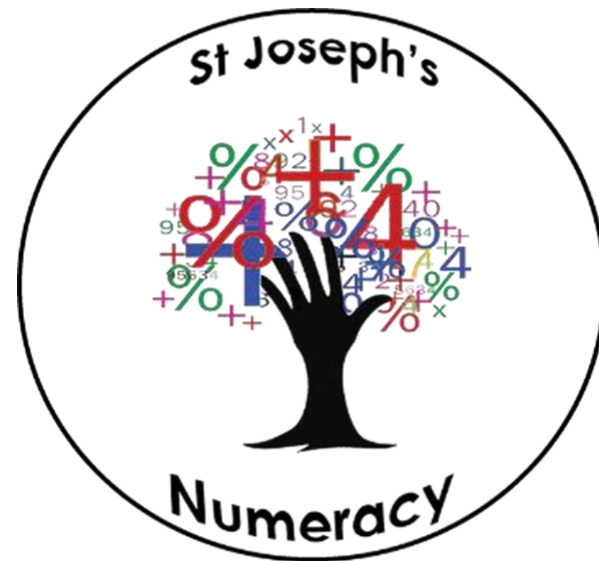


# Year 7

# Scheme of Work

# 2020-21



## **Vision:**

- **To develop passionate, resilient problem solvers through the medium of mathematics.**
- **Instilling the necessary building blocks to allow pupils to unlock solutions and connections within mathematics.**

## **Key Points**

- Year 7 will begin the year by doing a baseline test. This will inform particular set changes to take place in the first week of September as well as allow the department to reflect on the schemes of work and make any necessary adjustments to ensure the foundation of building blocks for KS3 Mathematics is secure.
- The Year 7 scheme of work comprises of an overview of topics covered during the year as well as a breakdown of the objectives covered within each unit. **For each unit the objectives are split into PAL (Prior attainment lower), PAM (Prior attainment middle) and PAH (Prior attainment higher), to reflect the differentiation between and within the class sets.** Numbers in brackets next to units suggest the number of lessons that could be used to cover that particular unit.
- The **Year 7 SOW Resources folder** comprises of lesson plan power points as well as resources that can be used for each unit. They are put in lesson order (e.g. L1 means lesson 1) to aid the usage of them in class.

The online Resources folder is by no means an exhaustive list but a useful starting point for lesson planning. There are also resources in the Maths office consisting of textbooks, board games and TARSIA (jigsaw) puzzles.

60% of the skills and knowledge will be new to Year 7. 40% will be embedding and deepening skills they would have acquired in Year 6. These will be required to be the necessary building blocks for KS3 material.

## Learning and Teaching

- **Blooms based learning objectives** are displayed during the lesson. This can be through 'one star, two star, three star' and inform the pupils how they will progress through the lesson and the skills they are using. These must acknowledge the target grades of all pupils within the class.
- **Mini White boards (MWBs)** – These can be used during Q&A sessions or for working out during games/main activities for pupils. It is a crucial tool to facilitating AfL in the class.
- **PIXL, MyMaths and Mathswatch** can be used to explain concepts in a manageable way, as well as to model examples.

## Subscriptions

- [www.mymaths.co.uk](http://www.mymaths.co.uk) – (School login and password: **stjos, angle**) There are online lesson plans as well as student accounts so work can be set for them to complete independently in class or at home.
- <http://www.mathsbox.org.uk/index1.php> - (**sjchs, edge 20**) There are online starters, worksheets and activities that can be used in class.
- <https://vle.mathswatch.co.uk/vle/> - online lesson videos as well as accompanying worksheets. This is particularly useful for setting cover work.
- PIXL MATHS-Username: SJ54, Password: #ESSENCE758SAT
- **PIXL MATHS APP** – Contains homework tasks and diagnostics tests.  
**(School ID: SJ54, Userid: STAFF, Password: WEST 142)**
- **Mathswatch-Username-firstinitial.surname@st-jospehs**

## **Useful Websites**

- <http://prethomework.weebly.com/> - Source of PRET homeworks
- <http://www.missbsresources.com/> - useful resources that can be used in lessons.
- <http://corbettmaths.com/> - contains topic based assessments and online videos.
- [www.mathedup.co.uk](http://www.mathedup.co.uk)
- [www.emaths.co.uk](http://www.emaths.co.uk)
  
- <http://nrich.maths.org/public/>
- <http://justmaths.co.uk/>
- [www.mathsbot.com](http://www.mathsbot.com)
- [www.resourceholic.com](http://www.resourceholic.com)
- [Mrcartermaths.com](http://Mrcartermaths.com)
- [Tes.com](http://Tes.com)
- [Maths4everyone.com](http://Maths4everyone.com)
- [Accessmaths.com](http://Accessmaths.com)
- [Piximaths.co.uk](http://Piximaths.co.uk)
- [Desmos](http://Desmos)
- [Mathsdrills](http://Mathsdrills)
- [Mathsaids](http://Mathsaids)

<b>Year 7 Recommended Reads</b>
<b>Fermat's Last Theorem – Simon Singh</b>
<b>Murderous Maths</b>

### Year 7 Curriculum Overview 20-21

Autumn Term 1	Spring Term 1	Summer Term 1
<b>Baseline Test (1)</b>	<b>8. Angles and Algebra (6)</b> Angles and parallel lines, forming and solving equations	<b>13. Percentages and FDP conversions (8)</b> Percentage of amount, % increase/decrease, fraction-decimal percentage conversions
<b>1. Types of Number (6)</b> Directed Number, BIDMAS, Primes, Squares, Cubes, HCF, LCM	<b>9. Sequences (6)</b> Term to term rule, nth term of linear sequence, types of sequences (e.g. Fibonacci)	<b>14. Ratio and Proportion (6)</b> Sharing an amount in a ratio, direct and inverse proportion
<b>2. Algebraic Thinking (6)</b> Notation, Collecting like terms, substitution, Expanding and Factorising	<b>10. Probability and Set Notation (6)</b> Theoretical probability, sample space diagrams, venn diagrams	
<b>3. Fractional Thinking (6)</b> Four operations with fractions, mixed numbers, equivalence		
Autumn Term 2	Spring Term 2	Summer Term 2
<b>4. Averages and Spread (6)</b> Analysing data sets, recording data into frequency tables and analysing through calculation of averages	<b>11. Perimeter, Area and Volume (6)</b> Area of 2D shapes, surface area of 3D shapes, Volume of prisms, circumference and area of circles (H)	<b>15. Transformations (6)</b> Translations, rotation, reflection, enlargement
<b>5. Forming and Solving Equations (6)</b> Linear equations, equations with brackets	<b>12. Applying Algebraic Thinking (6)</b> Expanding and Factorising, Algebraic geometry	<b>16. Presenting and Interpreting Data (6)</b> Pie charts, scatter graphs, frequency tables
<b>6. Rounding and Approximation (4)</b> Rounding to decimal places, significant figures, estimating calculations	<b>12. Pythagoras' Theorem (6)</b> Squares and roots, Perimeter of right angled triangles	<b>Wind Power Challenge Project (Oral Presentation) (4)</b>
<b>7. Written Calculations (Problem Solving) (2)</b>		

Christmas Holidays

Easter Holidays

Summer Holidays

**Year 7 Curriculum Context**

Autumn Term 1	Spring Term 1	Summer Term 1
<b>Baseline Test (1)</b>	<b>8. Angles and Algebra (6)</b> Embedding KS2 knowledge on angles and then applying this within equations – a key skill at KS3. Constructions is new content.	<b>13. Percentages and FDP conversions (8)</b> Embedding KS2 content however from feeder schools it was a key area of development
<b>1. Types of Number (6)</b> Embedding KS2 knowledge particularly directed number which is an area of development	<b>9. Sequences (6)</b> Embedding KS2 knowledge and then extending into the nth term. Enriching cultural capital through Fibonacci.	<b>14. Ratio and Proportion (6)</b> New to KS3 and allows pupils to see the connections between fractions and ratio.
<b>2. Algebraic Thinking (6)</b> New content building the foundations of algebraic thinking at KS3	<b>10. Probability and Set Notation (6)</b> New content to KS3 that allows pupils to see the real life significance of mathematics	
<b>3. Fractional Thinking (6)</b> Embedding KS2 knowledge		
Autumn Term 2	Spring Term 2	Summer Term 2
<b>4. Averages and Spread (6)</b> Embedding KS2 knowledge that is a key area of development at KS3 for pupils.	<b>11. Perimeter, Area and Volume (6)</b> Embedding KS2 content but extending PAH into circles	<b>15. Transformations (6)</b> Pupils have a very basic understanding – at KS3 advanced terminology and understanding will be acquired.
<b>5. Forming and Solving Equations (6)</b> New content that builds on Unit 2.	<b>12. Applying Algebraic Thinking (6)</b> Builds upon Unit 1 and 2 connecting them to Unit 8 and 11.	<b>16. Presenting and Interpreting Data (6)</b> This will allow pupils to see the key ways mathematics is utilised in careers as well as applying this knowledge to a sustainability project.
<b>6. Rounding and Approximation (4)</b> Embedding KS2 knowledge of rounding and extending into significant numbers	<b>12. Pythagoras' Theorem (6)</b> Key cultural capital as well as building upon skills attained in Unit 1 and extending their knowledge of perimeter.	<b>Wind Power Challenge Project (Oral Presentation) (4)</b>
<b>7. Written Calculations (Problem Solving) (2)</b> Opportunity to apply current skills in a problem solving context.		

Assessment Plan	Assessment Schedule 20-21	Years 7,8,9,10	Year 12	Years 11, 13
	Sept	Exam Assessment 1		PPE 1- Grade input (shortened version)
		<b>CWA 1 (12<sup>th</sup> Oct)</b>	<b>CWA 1 (3<sup>rd</sup> Nov)</b>	<b>CWA 1 (3<sup>rd</sup> Nov)</b>
Nov	Class Assignment 2 (Knowledge Recall)		Class Assignment 2 (Knowledge Recall)	Class Assignment 2 (Knowledge Recall)
Dec	Exam Assessment 2		Exam Assessment 2	Exam Assessment 2
		<b>CWA 2 (14<sup>th</sup> Dec)</b>	<b>School Deadline: 15<sup>th</sup> Dec</b>	<b>School Deadline: 15<sup>th</sup> Dec</b>
Jan	Class Assignment 3		PPE 2 – grade input	PPE 2 – grade input
Feb	Class Assignment 4			
		<b>School Deadline: 11<sup>th</sup> Feb</b>	<b>CWA 2 – 1<sup>st</sup> Feb</b>	<b>CWA 2 – 1<sup>st</sup> Feb</b>
March	Exam Assessment 3		Exam Assessment 3 (PPE Weaknesses)	Exam Assessment 3 (PPE Weaknesses)
		<b>CWA 3 (29<sup>th</sup> March)</b>	<b>CWA 3 (22<sup>nd</sup> March)</b>	<b>CWA 3 (22<sup>nd</sup> March)</b>
May	Class Assignment 5			
June	EOY Assessment		PPE 3 – Grade input	
		<b>CWA 4 (6<sup>th</sup> July)</b>	<b>CWA 4 (6<sup>th</sup> July)</b>	

- Exam assessments must be marked by the teacher. Class assignments may be self/peer assessed. Each class assignment and exam assessment will result in a percentage input on SIMS.

## Unit 1 – Types of Number

### Objectives – PAL

- **Directed Number:** To be proficient with numerical calculations regarding the four operations including sums involving negative numbers.
- To add and subtract numbers involving **interpreting** more complex rules (such as two negatives make a plus).
- To **understand** and apply BIDMAS to basic two step problems.
- To **recognise and derive** (with assistance) square numbers and cube numbers.
- **To employ calculators effectively to ascertain** squares, cubes and roots.

### Objectives – PAM

- **Directed Number:** To be proficient with numerical calculations regarding the four operations including sums involving negative numbers.
- To **employ established** rules regarding negative numbers on complex multiplication/division problems.
- To **understand** and apply BIDMAS to 2-3 step problems.
- To **categorise** numbers into various groups including squares, square roots, cubes and primes.
- **To employ calculators effectively to ascertain** squares, cubes and roots.

### Objectives – PAH

- **Directed Number:** To be proficient with numerical calculations regarding the four operations including negative numbers.
- To **employ BIDMAS** to complex numerical problems.
- To **categorise** numbers into various groups **distinguishing** between squares, square roots, cubes and primes.
- To **express** a number as a **product** of prime factors using index notation.
- **To understand and utilise** indices in simple scenarios.
- **To employ calculators effectively to ascertain** squares, cubes and roots.

### Support and Challenge:

- Ensure basic numeracy skills are reviewed regularly as starters.
- Encourage pupils to check solutions using the number line display.
- Link the rule of two negatives making a plus to English with the 'double negative' rule.
- Contrast BIDMAS with reading a book, "*In Mathematics we don't automatically read/solve from left to right, BIDMAS tells us the order in which we read/solve*"

### Cross – Curricular Skills

#### Key Vocabulary:

- Multiple, Product, Square, Cube, Square root, BIDMAS
- Analyse weather forecasts to see how they describe negative temperature changes in real life contexts.
  - Discuss negative numbers in the context of debt, overdraft, deposits and floor levels.

### Physical Resources

- TARSIA- indices
- Numbers 1-100 cards, to be used when identifying different types of number.
- Negative numbers and BIDMAS board games.

### Key Questions/Activities:

Design your own weather forecast.



## Unit 2 – Algebraic Thinking

Objectives – PAL	Objectives – PAM	Objectives – PAH	Support and Challenge
<ul style="list-style-type: none"> <li>• <b>Use and interpret algebraic notation including</b> <ul style="list-style-type: none"> <li>- <b>ab in place of a x b</b></li> <li>- <b>3y in place of y+y+y and 3 x y</b></li> </ul> </li> <li>• To <b>summarise</b> an expression through simplifying by collecting like terms.</li> <li>• To <b>multiply</b> algebraic terms together extending into squares.</li> <li>• To <b>simplify expressions by collecting like terms.</b>(including positive squares and cubes)</li> <li>• To <b>substitute</b> into basic expressions understanding the role of BIDMAS.</li> <li>• To <b>expand</b> a single bracket in algebraic expressions.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Model</b> situations or procedures by translating them into algebraic expressions.</li> <li>• To <b>simplify</b> expressions by collecting like terms extending into collecting squares and cubes.</li> <li>• To <b>simplify</b> algebraic expressions by multiplying terms <b>applying</b> index notation (squares)</li> <li>• To <b>simplify</b> algebraic expressions by dividing applying index notation. This can extend into <b>simplifying</b> algebraic fractions.</li> <li>• To <b>expand</b> single brackets and two sets of single brackets.</li> <li>• To <b>evaluate</b> expressions by substituting positive integers into algebraic expressions that involve up to three stages of working out.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Model</b> situations or procedures by translating them into algebraic expressions.</li> <li>• To collect like terms.</li> <li>• To multiply and divide terms <b>employing</b> relevant index laws. (<math>n^{\text{th}}</math> powers).</li> <li>• To <b>expand out</b> single brackets and two single brackets in an expression <b>recognising</b> when further simplifying would be required.</li> <li>• To <b>factorise</b> linear expressions <b>distinguishing</b> when there will a single and double term as the HCF.</li> <li>• To <b>evaluate</b> expressions by substituting positive and negative integers into expressions involving powers and employ a range of index and BIDMAS rules when required.</li> </ul>	<ul style="list-style-type: none"> <li>• When expanding employ multiplying arrows encouraging a systemic method, such as ‘smiley face’ or ‘fishy’ method for double brackets.</li> <li>• Ensure pupils are aware of expanding and factorising being opposites.</li> <li>• For extension activities/problem solving link multiplying in algebra to calculating areas.</li> <li>• Ensure BIDMAS is well understood before substitution.</li> </ul> <p><b>Cross – Curricular Skills</b></p> <p><b>Key Vocabulary:</b> Term, Expression, Equation, Formula, Function, Order, Operation, Algebra, Factorise, Brackets, Powers, substitution, Flow chart, Indices, Powers</p> <p><input type="checkbox"/> Cross reference substitution with football.</p> <p><b>Resources</b></p> <ul style="list-style-type: none"> <li>• TARSIA – factorising quadratics</li> <li>• TARSIA- substitution(L5)</li> <li>• TARSIA - indices</li> </ul>

### Key Questions/Activities

- Will outputs like  $a+3$  and  $3a$  always, sometimes or never be the same?
- What does the expression  $6a$  mean?
- When do we need to use brackets when substituting into expressions using a calculator?

### Unit 3 – Fractional Thinking

#### Objectives – PAL

- **Understand** fractions as division.
- Understand basic conversions between fractions, decimals and percentages.
- **Illustrate** parts of shapes using fractions.
- **Calculate** fractions of quantities.
- **Compare** simple fractions **understanding** their relative quantities visually as well as fractionally.
- **Add** fractions with the **same denominator**
- **Subtract** fractions with the same **denominator**
- **Multiply** singular fractions.

#### Objectives – PAM

- **Understand** fractions as division.
- **Recall and** understand basic conversions between fractions, decimals and percentages.
- **Simplify** fractions and **derive** equivalent fractions
- **Interpret** equivalent fractions to **compare** and order fractions
- **Determine** any fraction of a quantity
- **Convert** between mixed and improper fractions interchangeably, using their method to check either answers.
- **Add and subtract** fractions with **different** denominators, utilising method of making one or both denominators the same appropriately.
- To **multiply** singular fractions.
- To **divide singular fractions** recalling the appropriate steps accordingly.

#### Objectives – PAH

- **Understand** fractions as division.
- **Recall and** understand basic conversions between fractions, decimals and percentages.
- **To convert** between improper and mixed fractions.
- **To calculate** fractions of quantities.
- To **add** fractions with **different denominators** and **expressed as mixed numbers**
- **Multiply** a fraction by a whole number
- Multiply fractions extending into **multiplying mixed numbers**
- **Divide** a whole number by a fraction extending into **dividing mixed numbers**.

#### Support and Challenge

- Invest time into retraining pupils to utilise fractions or decimals instead of remainders when dividing a fraction.
- Ensure pupils gain an idea of estimating the size of parts of a whole.
- Encourage pupils to be aware of what methods they prefer. Encourage them to make a consistent choice, to reduce confusion during exams.
- For division 'KFC' method can be utilised to enhance retention of method.

#### Cross – Curricular Skills

- Use real life examples from food technology to compare fractional quantities.
- Key Vocabulary:**
- Fraction, mixed, improper, quantity, multiply, divide, add, subtract.

#### Resources

- TARSIA puzzle – equivalent fractions

#### Key Questions/Activities

- Why are we unable to write  $\frac{1}{8}$  in tenths?
- Can we write  $\frac{1}{8}$  in hundredths? Explain your answer?

## Unit 4 – Averages and Spread

Objectives – PAL	Objectives – PAM	Objectives – PAH	Support and Challenge
<ul style="list-style-type: none"> <li>• <b>Understand</b> the mode and range of a set of data</li> <li>• <b>Identify</b> the mode and range from bar graphs</li> <li>• <b>Identify</b> the median of a data set which has an odd number of pieces of data</li> <li>• <b>Understand and calculate</b> the mean of a data set.</li> <li>• <b>Identify</b> the <b>averages and range</b> of a data set which has an even number of pieces of data.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Identify</b> the <b>averages and range</b> of a data set which has an even number of pieces of data.</li> <li>• <b>Make comparisons by making distinctions</b> between the data pieces using the range and one other average.</li> <li>• <b>Explain</b> the difference between continuous and discrete data</li> <li>• <b>Know and comprehend</b> how to complete a frequency table for discrete data.</li> <li>• <b>Calculate</b> the mean, mode and range from a frequency table.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Calculate</b> the mean, mode and range from a frequency table.</li> <li>• <b>Explain</b> the difference between continuous and discrete data</li> <li>• <b>Know and comprehend</b> how to complete a frequency table for grouped data.</li> <li>• Identify the range, and modal class for grouped data, specifying their answer accurately.</li> <li>• <b>Estimate the mean of grouped data, justifying</b> why the proposed method would only give them an estimation.</li> <li>• <b>Carry out problems involving averages such as reverse mean.</b></li> </ul>	<ul style="list-style-type: none"> <li>• Ensure that pupils see the link between a dataset and the dataset in table form.</li> <li>• Explain the general rule of thumb that discrete data tends to be <i>human made</i> (e.g. shoe size) and continuous data tend to be <b>nature made</b> (e.g. length, time).</li> </ul> <p><b>Cross – Curricular Skills</b></p> <p>Mean, Mode, average, median, range, frequency table, grouped frequency, inequality, estimate, frequency polygon,</p> <ul style="list-style-type: none"> <li>• Linked to data trends explored in Business, Economics and Geography.</li> <li>• Linked to graph sketching and tabulating in Science</li> </ul> <p><b>Resources</b></p> <p>☐ Maths Taboo – Data words</p>

## Unit 5 – Forming and Solving Equations

<u>Objectives – PAL</u>	<u>Objectives – PAM</u>	<u>Objectives – PAH</u>	<u>Support and Challenge</u>
<ul style="list-style-type: none"> <li>• <b>Understand</b> what an equation is.</li> <li>• <b>Solve</b> simple equations by <b>trial and error</b>.</li> <li>• <b>Know</b> how to check answers using <b>substitution</b>.</li> <li>• <b>Solve</b> two step equations utilising inverse operations.</li> </ul>	<ul style="list-style-type: none"> <li>• Understand the difference between an equation and expression.</li> <li>• Model situations or procedures by translating them into equations.</li> <li>• <b>Solve</b> linear equations <b>with 2 operations utilising Inverse operations and/or balancing method</b></li> <li>• <b>Know</b> how to <b>check</b> answers using substitution</li> <li>• <b>Solve equations</b> involving <b>brackets</b>, understanding the need for expansion before solving.</li> <li>• <b>Solve</b> equations with unknowns on both sides.</li> <li>• <b>Construct and solve basic linear equations using an appropriate method.</b></li> </ul>	<ul style="list-style-type: none"> <li>• Understand the difference between an equation and expression.</li> <li>• Model situations or procedures by translating them into equations.</li> <li>• <b>Solve</b> linear equations <b>adopting</b> an appropriate method.</li> <li>• <b>Solve equations containing brackets.</b></li> <li>• <b>Solve</b> equations with unknowns on both sides understanding the need to eliminate an unknown on one side.</li> <li>• <b>Solve</b> equations with <b>brackets on both sides.</b></li> <li>• <b>Construct and solve linear equations using an appropriate method.</b></li> </ul>	<p>• Ensure pupils choose a consistent method when solving equations. Ensure they are proficient in at least one of them.</p> <p>• Encourage the value of checking answers via substitution.</p> <p>• Ensure inverse operations are carried out in the correct order.</p> <p>• As an extension link the term linear equation to its graphical representation.</p> <hr/> <p><b><u>Cross – Curricular Skills</u></b></p> <p><b>Key Vocabulary:</b> Equation, balancing, elimination, substitution, linear, brackets, expand</p> <ul style="list-style-type: none"> <li>• Link the use of linear equations to their graphical representation so that pupils can see their relevance in the real world.</li> <li>• Use graphs from science or geography.</li> </ul> <hr/> <p><b><u>Resources</u></b></p> <ul style="list-style-type: none"> <li>• Solving equations board game</li> <li>• Solving equations TARSIA jigsaw puzzle</li> <li>• Simplifying expressions TARSIA jigsaw puzzle</li> <li>• Indices TARSIA jigsaw puzzle</li> </ul>
<p><b><u>Key Questions/Activities:</u></b></p> <ul style="list-style-type: none"> <li>• Think of as many equations where the unknown is 12.</li> </ul>			

## Unit 6 – Rounding and Approximation

Objectives – PAL	Objectives – PAM	Objectives – PAH	Support and Challenge
<ul style="list-style-type: none"> <li>Reading time on analogue and digital clocks</li> <li><b>Use and apply</b> the 12 hour and 24 hour clock</li> <li>Round to the nearest whole number, 10, 100, 1000.</li> </ul>	<ul style="list-style-type: none"> <li><b>Use</b> a timetable and <b>determine</b> time lengths.</li> <li><b>Round</b> to the nearest whole number, 1 d.p, 2 d.p and 3d.p.</li> <li><b>Estimate</b> calculations by rounding to an appropriate degree (including 1 significant figure)</li> </ul>	<ul style="list-style-type: none"> <li><b>Round</b> to decimal places.</li> <li><b>Round</b> to the nearest significant figure <b>understanding</b> when this is used.</li> <li><b>Estimate</b> calculations by rounding to an appropriate degree.</li> </ul>	<p><input type="checkbox"/> Ensure pupils understand rounding is estimating.</p> <hr/> <p><b>Cross – Curricular Skills</b></p> <p>pm, am, Estimate</p> <p><input type="checkbox"/> Science and food technology</p> <hr/> <p><b>Resources</b></p> <p><input type="checkbox"/> Rounding treasure hunt</p>

### Key Questions/Activities:

- Why do we round numbers?
- When talking about the population of the UK, would you round to the nearest hundred, thousand or million? What about the population of Slough?
- To the nearest thousand 84,000 attended a concert. What is the least/greatest number of people attending? (introduction to bounds)

## Unit 7 – Written Calculations (Problem Solving)

### Objectives

- Be able to add, subtract, multiply and divide numbers of any size (including decimals).
- Extension: Solve problems involving missing digits within a multiplication/addition.

**Includes a group investigation on missing digit puzzles**

### Support and Challenge

- This is an opportunity to focus on number problems and ensure pupils are fluent with their division skills in particularly when representing remainders as decimals or mixed number format.
- Depending on the calibre of pupils this unit can be embedded as starters throughout the curriculum.

### Cross – Curricular Skills

#### **Key Vocabulary:**

Add, subtract, multiply, divide, decimal

### Resources

- Worksheets and PPTS located in staffarea under SOW resources.

# **Scheme of Work – Spring Term**

## Unit 8 – Angles and Algebra

<u>Objectives – PAL</u>	<u>Objectives – PAM</u>	<u>Objectives – PAH</u>	<u>Support and Challenge</u>
<ul style="list-style-type: none"> <li>Turning clockwise and anticlockwise</li> <li>Turning shapes a <math>\frac{1}{2}</math>, <math>\frac{1}{4}</math>, <math>\frac{3}{4}</math> turn</li> <li>Recognise that there are 360 degrees in a full turn and 180 degrees on a straight line</li> <li>Use a protractor correctly to measure and draw angles accurately up to 180 degrees.</li> <li>Know and recognise an acute, obtuse, reflex, and right angle.</li> <li>Calculate missing angles from a right angle and straight line.</li> <li>Identify and recognise different types of triangles.</li> <li>Know and use the fact that the angles in a triangle add up to 180o</li> </ul>	<ul style="list-style-type: none"> <li>Use a protractor correctly to measure and draw angles accurately including reflex angles</li> <li>Know and utilise the facts that the angles at a point add up to 360o, at a right angle add up to 90o and on a straight line add up to 180o</li> <li>Recognise vertically opposite angles are equal.</li> <li>Know and use the fact that the angles in a triangle add up to 180o</li> <li>Know and use the fact that angles in a quadrilateral add up to 360°</li> <li>Form and solve equations involving angles</li> <li>Understand and illustrate basic loci using a compass. (locus of a point and line)</li> </ul>	<ul style="list-style-type: none"> <li>Use angle facts to find missing angles in isosceles triangles and quadrilaterals.</li> <li>Understanding and utilising angle rules within parallel lines.</li> <li>Form and solve equations involving angles</li> <li>Be able to illustrate basic loci using a compass. (locus of a point and line)</li> </ul>	<ul style="list-style-type: none"> <li>Year 7 pupils may not be familiar with the physical skills required in geometry, since it is not emphasised in the Key Stage 2 curriculum. Therefore ensure they practise how to use protractors/compasses well during the unit.</li> <li>For PAL pupils use turns to check their understanding of telling time.</li> </ul> <hr/> <p><b><u>Cross –Curricular Skills</u></b></p> <p>Key Vocabulary:</p> <ul style="list-style-type: none"> <li>Turning, Rotation, Clockwise, Anti-clockwise, Symmetry, Acute, Obtuse, Reflex, Right-Angle, Perpendicular, Protractor, Estimate, Order of rotational symmetry, Angle, Degrees, Vertically Opposite, Isosceles, Equilateral, Scalene</li> <li>Angles and using mathematical equipment in Art and Design.</li> </ul> <hr/> <p><b><u>Resources</u></b></p> <ul style="list-style-type: none"> <li>Compasses and Protractors in each classroom.</li> <li>Worksheets and PPTS located in staffarea under SOW resources.</li> </ul>

### Key Questions/Activities

- Use the playground to illustrate different loci using the pupils as locus of points.
- Simon Says for turns.



## Unit 9 - Sequences

Objectives – PAL	Objectives – PAM	Objectives – PAH	<b>Support and Challenge</b>
<ul style="list-style-type: none"><li>Describe and continue a sequence diagrammatically.</li><li>Predict and check the next term(s) of a sequence.</li><li>To recognise basic sequences and derive the term to term rule of sequences</li></ul>	<ul style="list-style-type: none"><li>Recognise sequences and tabular and graphical forms</li><li>Recognise the difference between linear and non-linear sequences.</li><li>Can recognise basic sequences (square and triangular, fibonacci) and derive the term to term rule.</li><li>Can derive the nth term for a linear sequence and use this to find missing terms in a given sequence.</li></ul>	<ul style="list-style-type: none"><li>Can recognise various sequences (square and triangular, fibonacci) and derive the term to term rule.</li><li>Recognise sequences and tabular and graphical forms</li><li>Recognise the difference between linear and non-linear sequences.</li><li>Can interpret linear sequences</li><li>Can derive the nth term for a linear sequence and use this to find missing terms in a given sequence.</li></ul>	<ul style="list-style-type: none"><li>Prior knowledge check: Substitution for linear sequences.</li></ul> <p>• <b>Key Words</b> Term, sequence, Fibonacci, arithmetic, linear, non-linear, geometric</p> <p><b>Resources</b></p> <ul style="list-style-type: none"><li>TARSIA puzzle</li></ul>

### **Key Activities/Questions:**

How would you explain the difference between an arithmetic and geometric sequence?

How could you get from the first to the ....th term in this sequence?

## Unit 10 – Probability and Set Notation

<u>Objectives – PAL</u>	<u>Objectives – PAM</u>	<u>Objectives – PAH</u>	<u>Support and Challenge</u>
<ul style="list-style-type: none"> <li>• Use the words certain, impossible, likely and unlikely and give examples of such events from experience</li> <li>• Understand and give examples of events that have an even chance</li> <li>• Know and use the probability scale from 0 to 1</li> <li>• Calculate basic single event probabilities simplifying the fractional answers.</li> </ul>	<ul style="list-style-type: none"> <li>• Calculate single event probabilities with equally likely outcomes expressing their answers as fractions, decimals or percentages.</li> <li>• Calculate the probability of something not happening using the idea of probabilities adding up to 1.</li> <li>• Identify and list all the possible outcomes of an experiment</li> <li>• Calculate probabilities from combined events using sample space diagrams.</li> <li>• Understand how to create venn diagrams and recall basic set notation.</li> </ul>	<ul style="list-style-type: none"> <li>• Calculate single event probabilities with equally likely outcomes.</li> <li>• Calculate probabilities that involve listing outcomes utilising sample space diagrams when appropriate. (Single-event and combined events).</li> <li>• Understand how to create venn diagrams and recall basic set notation.</li> <li>• To calculate basic probabilities from a venn diagram.</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure they use the correct terminology when describing probabilities. Refrain from using '50-50'.</li> <li>• This is not in the KS2 curriculum at all.</li> <li>• Soft dice are available.</li> <li>• Use the horse race activity to show the usage of sample space diagrams in listing outcomes and calculating probabilities.</li> </ul> <p>□ <b>Key Words</b></p> <p>Certain, Possible, Impossible, Chance, Probability, Likely, Unlikely, Outcomes, Even chance, Experimental probability, data, Likelihood, venn diagram</p> <p><b>Resources</b></p> <ul style="list-style-type: none"> <li>• Horse Race – online staff area</li> <li>• Dice</li> <li>• Worksheets and PPTS located in staff area under SOW resources.</li> </ul>

### Key Questions/Activities

## Unit 11 – Perimeter, Area and Volume (8)

<u>Objectives – PAL</u>	<u>Objectives – PAM</u>	<u>Objectives – PAH</u>	<u>Support and Challenge</u>
<ul style="list-style-type: none"> <li>Identify and recognise basic 2D and 3D shapes</li> <li>Understand perimeter and use the correct units</li> <li>Understand area and use the correct units</li> <li>Determine areas of squares &amp; rectangles on square grids</li> <li>Know and utilise the formula for finding the area of a rectangle and squares.</li> <li>Know and utilise the formula for finding the area of triangles and parallelograms</li> <li>Understand volume and use the correct units</li> <li>Know and utilise the formula for finding the volume of cuboids.</li> </ul>	<ul style="list-style-type: none"> <li>Identify and recognise basic 2D and 3D shapes</li> <li>Calculate the perimeter of compound shapes made from rectangles.</li> <li>Calculate the area of compound shapes made from rectangles.</li> <li>Know and utilise the formula to find the area of a triangles and parallelograms and trapeziums.</li> <li>Create solutions to finding the area of compound plane shapes including shaded areas.</li> <li>Understand volume and use the correct units</li> <li>Know and utilise formulae for finding the volume of cuboids and triangular prisms.</li> </ul>	<ul style="list-style-type: none"> <li>Know and utilise the formula to find the area of a parallelograms, triangles and trapeziums.</li> <li>Create solutions to finding the area of compound plane shapes including shaded areas involving triangles and trapeziums.</li> <li>Know and utilise the formula for finding the volume of prisms.</li> <li>Recall different parts of a circle.</li> <li>Utilise and understand the formulae required for finding the circumferences and areas of circles.</li> <li>To calculate the volume of cylinders.</li> </ul>	<ul style="list-style-type: none"> <li>Mini whiteboards.</li> <li>Displays for learning</li> <li>Cm cubes to illustrate concept of volume being the number of cm cubes that can fit into a 3D shape.</li> <li>Emphasise the importance of units.</li> </ul> <p>□ <b>Key Words</b> Perimeter, area, Space, Volume, rectangle, Cuboids, Cube, Square, Formula, Compound Shapes, Triangle, Capacity, Surface Area</p> <p>Link use of area to PE and Art. Link volume and 3D shapes to Resistant Materials and Graphics.</p> <p><b>Resources</b></p> <ul style="list-style-type: none"> <li>Multi-link cubes</li> <li>Worksheets and PPTS located in staffarea under SOW resources.</li> </ul>

### Key Questions/Activities:

Area/Volume and Algebra problems

## Unit 12 – Applying Algebraic Thinking

### Objectives – PAL

- Review key objectives from Unit 2.
- To simplify expressions regarding area and perimeter
- To factorise basic linear expressions by identifying the HCF.

### Objectives – PAM

- Review key objectives from Unit 2
- To form and solve equations regarding perimeter/angles and area
- To expand double brackets creating a quadratic.

### Objectives – PAH

- Review key objectives from Unit 2
- To form and solve equations regarding perimeter/angles and area.
- To expand double brackets creating a quadratic.
- To **factorise** quadratic expressions in the form  $x^2 + bx + c$ .

### Support and Challenge

- Ensure pupils are aware of expanding and factorising being opposites.
- To stretch PAH pupils link a quadratic to its graphical representation.
- This topic is largely revision from Autumn 1, therefore ensure its focus is on the weaknesses that arose from their previous assessment.

### Cross – Curricular Skills

Key Vocabulary  
Term, Expression, Equation, Formula, Function, Order, Operation, Algebra, Factorise, Brackets, Powers, substitution, Flow chart, Indices, Powers

### Resources

- TARSIA – factorising quadratics
- TARSIA- substitution(L5)
- TARSIA - indices

### Key Questions/Activities

## Unit 13 – Pythagoras’ Theorem

<u>Objectives – PAL</u>	<u>Objectives – PAM</u>	<u>Objectives – PAH</u>	<u>Support and Challenge</u>
<ul style="list-style-type: none"> <li>To recall the square numbers and cube numbers up to 100.</li> <li>To utilise basic laws of indices to simplify powers.</li> </ul>	<ul style="list-style-type: none"> <li>To understand the purpose of Pythagoras’ theorem.</li> <li><b>To apply</b> Pythagoras’ theorem to calculate the hypotenuse of a right angled triangle.</li> </ul>	<ul style="list-style-type: none"> <li>To understand the purpose of Pythagoras’s theorem.</li> <li>To apply Pythagoras’ theorem to calculate different sides of a right angled triangle.</li> <li>To create models involving Pythagoras for worded problems.</li> </ul>	<ul style="list-style-type: none"> <li>For PAL/PAM pupils in particular, in order to enable pupils to access the theorem introduce it as adding and subtracting squares to get the square of the missing side rather than <math>a^2 + b^2 = c^2</math>.</li> <li>For PAH pupils ensure they understand the rearrangement of the formulae since this is a skill they will need to be proficient in long term.</li> </ul> <p>□ <b>Key Words</b>            BIDMAS, indices, power, standard form, index, hypotenuse, Pythagoras, right angles triangle            Formulae</p> <p><b>Resources</b></p> <ul style="list-style-type: none"> <li>Worksheets and PPTS located in staffarea under SOW resources.</li> </ul>

### Key Questions/Activities:

- Pythagorean triples investigation
- Introduce Fermat’s Last Theorem

# **Scheme of Work – Summer Term**

## Unit 14 – Percentages and FDP Conversions

### Objectives – PAL

- Understand percentages as one out of hundred.
- Understand 10%, 20%, 25%, 50% and 75%
- Write percentages as fractions
- Change a percentage to terminating decimal and vice versa.
- Find percentages of quantities – only 25%, 50%

### Objectives – PAM

- Understand percentages as one out of hundred.
- Express a quantity as a percentage of another.
- Convert between fractions, decimals and percentages (factors of 100)
- Find percentages of any amounts (inc. VAT) utilising a non calculator method.
- Find percentages of any amounts (inc. VAT) utilising a calculator method.
- Determine percentage increases and decreases adopting a non calculator method as well as a calculator method.

### Objectives – PAH

- Express a quantity as a percentage of another.
- Convert between fractions, decimals and percentages.
- Find percentages of any amounts (inc. VAT) utilising a non calculator and calculator method.  
Find percentages of any amounts (inc. VAT) utilising a calculator method.
- Determine percentage increases and decreases adopting a non calculator method as well as a calculator method.

### Support and Challenge

- Mini whiteboards.
- Displays for learning
- Emphasise percent means ‘out of 100.’
- Ensure key FDP conversions are known off by heart. Provide a revision sheet for them to refer to.
- Link percentage of amount rules to fraction of amount rules.
- For finding 17.5% introduce the three step process of, 10% and 5% and 2.5%.

#### Key Words

#### **Key Vocabulary:**

Percent, V.A.T, depression, inflation, reduce, decimal, fraction, equivalent

Percentages can be linked to sales- business studies and percentages used in data analysis (bar charts, pie charts)

#### Resources

- **Worksheets and PPTS located in staff area under SOW resources.**
- **%of amount boardgame**
- **%of amount brainstorm**
- **‘Create your own shop window’ activity**

### Key Questions/Activities:

Reverse Percentages

## Unit 15 – Ratio and Proportion

<u>Objectives – PAL</u>	<u>Objectives – PAM</u>	<u>Objectives – PAH</u>	<u>Support and Challenge</u>
<ul style="list-style-type: none"> <li>Understand the concept of proportion by applying the unitary method to basic problems</li> <li>Understand the concept of ratio linking it to fractions</li> <li>Describe scenarios using ratio</li> <li>Simplify ratio</li> </ul>	<ul style="list-style-type: none"> <li>Understand the concept of direct proportion by applying the unitary method to various problems.</li> <li>Understand the concept of ratio linking it to fractions</li> <li>Describe scenarios including fractional problems using ratio.</li> <li>Simplify ratio</li> <li>Divide a ratio into a given amount (with the amount equating to the total, one person's amount or the difference in amounts)</li> </ul>	<ul style="list-style-type: none"> <li>Understand the principles of direct and inverse proportion.</li> <li>Apply the unitary method to proportion problems.</li> <li>Understand and describe scenarios using ratio, understanding the link to fractions.</li> <li>Divide a ratio into a given amount (with the amount equating to the total, one person's amount or the difference in amounts)</li> <li>Solve complex ratio problems by deriving the value of one part in a given ratio problem.</li> </ul>	<ul style="list-style-type: none"> <li>Ensure pupils see the link between ratio and fractions.</li> <li>Discuss the idea of ratio being about sharing and fairness</li> <li>Visual boxes in the method may be a useful way for pupils to see how the two amounts are calculated during the division of an amount in a ratio.</li> </ul> <p>☐ <b>Key Words</b> Ratio, parts, sharing, proportion, unitary method, direct and inverse</p> <p>Link ratio to art through mixing paints and the golden ratio.</p> <p><b>Resources</b></p> <p>☐ <b>Worksheets and PPTS located in staffarea under SOW resources.</b></p>

### Key Questions/Activities

- Converting a fraction problem to a ratio problem.
- Convince me that the ratio 120mm:0.3m is equivalent to 2:5
- Always / Sometimes / Never: the smaller number comes first when writing a ratio



## Unit 16 – Transformations

### Objectives – PAL

- Recognise line symmetry in all regular polygons, triangles and quadrilaterals
- Reflect 2D shapes in given mirror lines
- Translating 2D shapes given the written instruction.
- Rotate 2-D shapes about a given point.
- Understand enlargement and enlarge shapes via a given scale factor (positive integers)

### Objectives – PAM

- Reflect 2D shapes in given mirror lines
- Recognise rotational symmetry in all polygons, triangles and quadrilaterals.
- Rotate 2-D shapes about a given point.
- Translate 2-D shapes given a vector.
- Reflect shapes in line equations that must be derived first.
- Enlarge shapes with a given scale factor (integer)

### Objectives – PAH

- Reflect shapes in line equations that must be derived first.
- Translate shapes from a given vector
- Rotate shapes from a given centre.
- Enlarge shapes given a scale factor using a centre of enlargement (positive integer and fraction).
- Understand and recognise how shapes have transformed through a combination of transformations.

### Support and Challenge

- Mini whiteboards.
- Displays for learning
- Ensure pupils are familiar with methods that involve tracing paper, to ensure the accuracy of their answers.
- Explore the use of transformations in historical buildings and art.

### Literacy/Cross-curricular Focus:

Linked to art and architecture

### Key Vocabulary:

Transformation, translation, rotation, symmetry, enlargement, tessellation

### Resources

- Vectors Snakes and Ladders
- **Worksheets and PPTS located in staffarea under SOW resources.**

## Unit 16 – Representing and Interpreting Data (6)

### Objectives – PAL

- Make and use a frequency table
- Tally data into groups and draw bars charts from grouped discrete data.
- To identify basic averages and the range from graphs and data sets.
- To draw scatter graphs and basically interpret them in terms of correlation
- To draw and interpret basic pie charts.

### Objectives – PAM

- Read data from tables
- Draw and interpret pie charts.
- To draw and interpret a scatter graphs.
- To identify what representation of data would be appropriate to display different data sets.

### Objectives – PAH

- Display data in grouped frequency tables.
- Calculate averages from frequency tables and grouped frequency tables.
- Draw and interpret pie charts.
- Draw and interpret scatter graphs by utilising it to make estimations (applying a line of best fit).
- To identify what representation of data would be appropriate to display and interpret different data sets.

### Support and Challenge

- Displays for learning
- Advantages and disadvantages of averages and different representations of data.
- **Scatter graphs do not imply causation.**

### Literacy/Cross-curricular Focus:

Linked to science and geography in terms of lines of best and tabulations

### **Key Vocabulary:**

Mean, mode, median, frequency, frequency density, histograms, correlation, line of best fit, scatter graphs.

### Resources

- Worksheets and PPTS located in staff area under SOW resources.

### **Key Questions/Activities:**

Sports Day Analysis

**Wind Energy Project – Oral Presentation**