

3-year scheme of work

The following scheme of work provides a suggestion for how Pupil Book 2.3 can be taught over the course of one year, as part of a 3-year Key Stage 3 course.

Please note that you can recombine the test questions provided on Collins Connect to create new tests if your frequency of assessment differs from that below, or if you wish to combine content from different chapters in your own half-term tests.

This scheme of work is provided in editable Word and Excel format on the CD-ROM accompanying this Teacher Pack.

Chapter	Lesson	No. of hours	Learning objective	Comments/ suggestions
Half-term / Term 1				
1 Working with numbers	1.1 Multiplying and dividing negative numbers	1	<ul style="list-style-type: none"> To carry out multiplications and divisions involving negative numbers 	One of the main misconceptions pupils have when multiplying two negative numbers is giving a negative answer. Reinforce the fact that when multiplying two negative numbers, the answer will always be positive. And, when multiplying two numbers, pupils often think that the sign of the answer is determined by the sign of the largest number. Make sure that pupils do not rush through their work, as they need to have a clear understanding of the rules.
	1.2 Factors and highest common factor (HCF)	1	<ul style="list-style-type: none"> To understand and use highest common factors 	Pupils sometimes confuse factors and multiples. Say that multiples come from multiplying. Pupils should understand that the multiples of a number are the times table for that number.
	1.3 Multiples and lowest common multiple (LCM)	1	<ul style="list-style-type: none"> To understand and use lowest common multiples 	
	1.4 Powers and roots	2	<ul style="list-style-type: none"> To understand and use powers and roots 	Reinforce the fact that the square root of a number can be both positive and negative. Pupils often think that n^2 is $n \times 2$ or that n^3 is $n \times 3$. Explain clearly that this is not the case.
	1.5 Prime factors	1	<ul style="list-style-type: none"> To find the prime numbers of an integer 	Make sure that less able pupils are familiar with Venn diagrams before they start Exercise 1E in the Pupil Book.
	Challenge – Blackpool Tower	1		This challenge encourages pupils to think about a tourist attraction with different facilities and what is involved in running them. The topic could lead to class discussion about environmental issues such as electricity and water usage.
2 Geometry	2.1 Parallel lines	1	<ul style="list-style-type: none"> To calculate angles in parallel lines 	Pupils often assume that because something looks right, it is right. However, pupils need to understand the importance of correct mathematical notation, for example, to identify parallel lines, and the need for rigorous mathematical proof.
	2.2 The geometric properties of quadrilaterals	1	<ul style="list-style-type: none"> To know the geometric properties of quadrilaterals 	
	2.3 Translations	1	<ul style="list-style-type: none"> To understand how to translate a shape 	A sound understanding of coordinates in all four quadrants will help pupils to understand translations. Physical demonstrations will also help the pupils who may struggle with this.
	2.4 Enlargements	1	<ul style="list-style-type: none"> To enlarge a 2D shape by a scale factor 	Pupils often fail to consider whether their enlargement will fit on the sheet of paper they are using. Encourage pupils to ask themselves this question before starting any enlargement.

	2.5 Constructions	1	<ul style="list-style-type: none"> To construct the mid-point and the perpendicular bisector of a line To construct an angle bisector To construct a perpendicular to a line from or at a given point To construct a right-angled triangle 	Pupils are often not precise enough when doing constructions in mathematics. Give them the opportunity to assess the errors in exemplars and explain how they can avoid these errors. Use dynamic geometry software to support pupils (for example: www.geogebra.org). Make sure pupils understand each step, or they will fail to apply the steps in complex or less familiar contexts.
	Challenge – More constructions	1		This challenge gives pupils the opportunity to extend their learning to more complex constructions. They need to be able to reproduce a set of instructions that extend what they have already done in the classroom.
Chapters 1–2 assessment on Collins Connect				
3 Probability	3.1 Mutually exclusive outcomes and exhaustive outcomes	1	<ul style="list-style-type: none"> To recognise mutually exclusive and exhaustive events To use a probability scale to represent a chance 	Make sure that pupils understand the fact that mutually exclusive events cannot happen at the same time. This knowledge will help pupils to avoid confusion in later years with independent events. Pupils may also be confused by sentences with the words 'or' and 'and'. Explain the meanings carefully.
	3.2 Using a sample space to calculate probabilities	1	<ul style="list-style-type: none"> To use sample spaces to calculate probabilities 	Remind pupils that they will need to be very methodical when recording outcomes, otherwise pupils might miss some of the outcomes.
	3.3 Estimates of probability	1	<ul style="list-style-type: none"> To use relative frequency to estimate probabilities 	Pupils often struggle to relate experimental data results to probabilities. Make sure pupils understand that experimental probabilities will be closer to the theoretical probability values if they increase the number of times they perform the experiment.
	Financial skills – Fun in the fairground	1		Pupils extend their understanding of probability to a common real-life application that may be new to them. Pupils also make a real-life link between probability and financial skills.
Half-term				
Half-term / Term 2				
4 Percentages	4.1 Calculating percentages	1	<ul style="list-style-type: none"> To write one quantity as a percentage of another 	Rather than simply learning a rule to calculate percentages of a quantity, pupils need to understand what they are doing and why. Pupils often confuse fractions and percentages, for example, by calculating 27% as one-twenty-seventh instead of 27 of 100. Make links to fractions and percentages so that pupils grasp the connection. Make sure pupils know what a percentage is and how to find a percentage of a quantity in a range of contexts.
	4.2 Calculating percentage increases and decreases	2	<ul style="list-style-type: none"> To use a multiplier to calculate a percentage change 	Pupils are often confused when they come across percentages greater than 100. Using a real-life example here could help, starting with percentages with which they can work comfortably. Pupils need a good understanding of 100% as a whole before tackling percentage increase and decrease successfully.
	4.3 Calculating a percentage change	2	<ul style="list-style-type: none"> To work out a change in value as a percentage increase or decrease 	Pupils make the mistake of pairing an increase with an equivalent decrease. For example, they think that a 50% increase followed by a decrease of 50% will take them back to their starting value. This misconception stems from using additive instead of

				<p>multiplicative reasoning. Part 3 of this lesson tackles this misconception and pupils should draw on their work on inverse relationships during the lesson to explain their responses.</p>
	Challenge – Changes in population	1		<p>This activity is designed to give pupils the opportunity to demonstrate their understanding of percentage change in a real-life situation. All the information they need is provided but they will need to read the questions carefully to decide which information they need and what mathematical skills to use.</p>
5 Congruent shapes	5.1 Congruent shapes	1	<ul style="list-style-type: none"> To recognise congruent shapes 	<p>Pupils often do not realise that they can test for congruence by placing one shape on top of the other. Encourage the use of tracing paper to do this. Also reinforce the fact that shapes can have different orientations and still be congruent.</p>
	5.2 Congruent triangles	2	<ul style="list-style-type: none"> To know the conditions for recognising congruent triangles 	<p>The most common mistake pupils make when answering problems, and with proof, is to assume facts that are not actually given in the questions.</p>
	5.3 Using congruent triangles to solve problems	2	<ul style="list-style-type: none"> To solve geometrical problems using congruent triangles 	
	Problem solving – Using scale diagrams to work out distances	1		<p>Pupils will need to be familiar with scale diagrams and ruler compass constructions before starting the questions for this activity. You may need to model some examples.</p>
Chapters 3–5 assessment on Collins Connect				
6 Surface area and volume of prisms	6.1 Metric units for area and volume	1	<ul style="list-style-type: none"> To convert metric units for area and volume 	<p>Pupils often learn rules without really understanding them, so they may not be sure whether to multiply or divide when converting between units. Encourage pupils to use estimation and real-life contexts to help them understand which operations to use. Less able pupils would benefit from using concrete objects to help them visualise given conversions.</p>
	6.2 Surface area of prisms	1	<ul style="list-style-type: none"> To calculate the surface area of a prism 	<p>Not understanding rules can cause confusion. Pupils also make mistakes with units. Pupils need to grasp that area is two-dimensional and volume is three-dimensional, and the effect this has on the formulae and units they will use.</p>
	6.3 Volume of prisms	1	<ul style="list-style-type: none"> To calculate the volume of a prism 	
	Investigation – A cube investigation	2		<p>In this investigation, pupils apply their understanding of area to a more complex problem. Pupils need to work methodically and be able to explain their solutions. This is a good transferable skills objective to share with pupils when doing this investigation. Ask pupils to share not only their solutions but also <i>how</i> they approached working on the problem.</p>
Holidays				
Half-term / Term 3				
7 Graphs	7.1 Graphs from linear equations	1	<ul style="list-style-type: none"> To extend the range of graphs of linear equations 	<p>Pupils often struggle to recognise that letters represent variables and that the answer can vary depending on the situation. Provide lots of opportunity for pupils to see this in action in contexts with which they are familiar, for example, 'Think of a number' word problems. Pupils need to understand that letter symbols used in algebra stand for unknown numbers or variables and not labels. E.g. 5b cannot mean five bananas.</p>

	7.2 Gradient (steepness) of a straight line	1	<ul style="list-style-type: none"> To work out the gradient in a graph from a linear equation To work out an equation of the form $y = mx + c$ from its graph 	Pupils often ignore the scales on the axes and just count the squares when calculating the gradient or divide the change in x over the change in y by mistake. Pupils will also occasionally give the x -intercept instead of the y -intercept. Make sure that you address these points and that pupils have a clear understanding of how to do these questions correctly.
	7.3 Graphs from quadratic equations	2	<ul style="list-style-type: none"> To recognise and draw the graph from a quadratic equation To solve a quadratic equation from a graph 	Pupils often misread the scales when reading or drawing quadratic graphs. Another common problem relates to errors in calculations, which stem from an incorrect understanding of BIDMAS. Pupils sometimes draw the bottom of a quadratic graph flat if its minimum point lies between two plotted points.
	7.4 Real-life graphs	2	<ul style="list-style-type: none"> To draw graphs from real-life situations to illustrate the relationship between two variables 	Pupils can get confused by the different ways that times are written. For example, they may assume that 1.4 hours is the same as 1 hour and 40 minutes or that 1 hour and 50 minutes is 1.5 hours. Make these points to pupils during the lesson.
	Challenge – The M25	1		This challenge activity encourages pupils to think about the M25, one of Europe's busiest motorways.
8 Number	8.1 Powers of 10	1	<ul style="list-style-type: none"> How to multiply and divide by negative powers of 10 	As with all use of powers, pupils tend to confuse 10^n with $10 \times n$. Provide opportunities for pupils to compare the two and understand why they are different. Comparing the two using visual images and making links to area could also help to reinforce the difference.
	8.2 Significant figures	1	<ul style="list-style-type: none"> To round a specific number of significant figures 	Pupils sometimes confuse rounding to decimal places and significant figures. Provide opportunities for pupils to compare the two. Some pupils may struggle with the role of 0 and when this counts as a significant figure. Go over the text in the Pupil Book (at the beginning of the lesson) thoroughly.
	8.3 Standard form with large numbers	1.5	<ul style="list-style-type: none"> To write a large number in standard form 	Pupils need to be confident with the definition of standard form as being a number written as $A \times 10^n$. The most important thing is for pupils to appreciate that A is always between 1 and 10 no matter the size (large or small) of the number. Be careful how you explain this, as explanations involving moving the decimal point can be misleading and lead to misconceptions about place value in general. Give pupils plenty of practice in converting numbers.
	8.4 Multiplying with numbers in standard form	2	<ul style="list-style-type: none"> To multiply with numbers in standard form 	Introduce standard form as a powerful tool that is widely used in science. Pupils need to be confident with the ideas in the previous lessons before tackling this lesson. Encourage pupils to revisit these lessons if necessary.
	Challenge – Space – to see where no one has seen before	1.5		This activity is designed to combine the skills covered across this chapter to explore an interesting real-life problem set in a slightly less familiar context. The context is one of the best examples of the use of very large numbers.
<i>Chapters 6–8 assessment on Collins Connect</i>				
9 Interpreting data	9.1 Interpreting graphs and diagrams	1	<ul style="list-style-type: none"> To interpret different charts seen in the media 	Go through the key vocabulary that pupils will use when working with real-life graphs.

	9.2 Relative sized pie charts	1	<ul style="list-style-type: none"> To draw pie charts relative to data size 	Demonstrate the correct method of drawing pie charts to the class, with emphasis on starting the measurement of each angle at the end of the previous sector. The sum of the angles of the sectors of any pie chart must always be 360° , so pupils should check that the angles add up to 360 (approximation can make the sum of the angles one degree higher or lower).
	9.3 Scatter graphs and correlation	1	<ul style="list-style-type: none"> To read scatter graphs To understand correlation 	Explain that correlation does not imply causality, or interconnection, as this is a common problem area in the interpretation of correlation.
	9.4 Creating scatter graphs	2	<ul style="list-style-type: none"> To create scatter graphs and use a line of best fit 	Make sure pupils understand that scatter diagrams are different to line graphs (some pupils may try to join the plots).
	Challenge – Football attendances	2		In order to be able to do this challenge, pupils will need to be able to read and interpret the table, draw pie charts relative to the data in the table, and draw on their knowledge of averages, means and scatter diagrams. Pupils are given the opportunity to practise these skills in what is most likely a familiar context.
Half-term				
Half-term / Term 4				
10 Algebra	10.1 Algebraic notation	1	<ul style="list-style-type: none"> To simplify algebraic expressions involving the four basic operations 	Pupils may struggle to understand that letters represent variables, and so try to substitute particular values for the letters. Provide pupils with plenty of opportunity to reflect on the use of algebra as generalised number, and to make clear links to the rules they have learnt for number. Discuss the power of algebra or generalisation.
	10.2 Like terms	1	<ul style="list-style-type: none"> To simplify algebraic expressions by combining like terms 	Pupils often struggle to identify what constitutes 'like' in this context. Provide opportunities for pupils to compare and discuss what are and what are not like terms. Pupils often do not make the connection from Lesson 10.1 that when we write a letter with no number in front such as x , that there is in fact a 1 in front of the x and we have 'one x '. Say that this is just one of the conventions of writing mathematics that has developed over the years.
	10.3 Expanding brackets	1	<ul style="list-style-type: none"> To remove brackets from an expression 	Pupils often forget to multiply all the terms in brackets. Pupils also struggle to interpret negative signs in brackets accurately. Making links to grid multiplication may be useful to help pupils make links and visualise what is happening.
	10.4 Using algebraic expressions	2	<ul style="list-style-type: none"> To manipulate algebraic expressions To identify algebraic expressions 	Difficulties with substitution into formulae often come from a failure to grasp the fundamentals of BIDMAS and negative numbers, along with an inability to recognise that letters represent variables. When this is the case, pupils tend to want to substitute specific values. Provide lots of opportunity for pupils to see this in action in familiar contexts, before moving on to more complex or abstract examples.
	10.5 Using index notation	2	<ul style="list-style-type: none"> To write algebraic expressions involving powers 	Pupils struggle to identify what constitutes 'like' when powers are included. Provide plenty of opportunity for pupils to compare and

				discuss what are and what are not like terms.
	Mathematical reasoning – Writing in algebra	2		This activity develops pupils' confidence and fluency with algebraic notation. Pupils may struggle to decode everyday language into mathematics, so this activity also gives pupils the opportunity to practise this in a range of contexts.
11 Shape and ratio	11.1 Ratio of lengths, areas and volumes	1	<ul style="list-style-type: none"> To use ratio to compare lengths, areas and volumes of 2D and 3D shapes 	Pupils often make errors with units in questions involving ratio. Remind them that the units must be the same before they form a relationship involving ratio.
	11.2 Fractional enlargement	1	<ul style="list-style-type: none"> To enlarge a 2D shape by a scale factor 	Pupils often use an incorrect point as the centre of enlargement, or they just enlarge the shape without reference to the given point. Sometimes pupils do not enlarge all the lines, or they enlarge by an incorrect scale factor. Remind pupils that the shape produced after an enlargement will look similar to the original; it will just be a bigger or smaller version.
	11.3 Map scales	2	<ul style="list-style-type: none"> To understand how to use map scales 	Pupils occasionally mix units when working with map scales. Make sure pupils understand that units must be the same before writing a ratio.
	Activity – Map reading	2		This activity consolidates topics previously covered on extracting data, area and ratio.
<i>Chapters 9–11 assessment on Collins Connect</i>				
Holidays				
Half-term / Term 5				
12 Fractions and decimals	12.1 Adding and subtracting fractions	2	<ul style="list-style-type: none"> To add or subtract fractions and mixed numbers 	Pupils often get taught rules without fully understanding them. As a result, pupils may struggle to apply the rules in different contexts and often confuse the rules for adding and subtracting fractions with those for multiplying and dividing fractions. Another common problem is that pupils add or subtract the denominators as well as the numerators when adding and subtracting fractions.
	12.2 Multiplying fractions and integers	2	<ul style="list-style-type: none"> To multiply a fraction or a mixed number and an integer 	
	12.3 Dividing with integers and fractions	2	<ul style="list-style-type: none"> To divide a fraction or a mixed number by an integer To divide an integer or a mixed number by a fraction 	
	12.4 Multiplication with large and small numbers	1	<ul style="list-style-type: none"> To multiply with combinations of large and small numbers mentally 	Pupils often find decimal fractions difficult to understand, though without realising it, they may have encountered decimals when solving money problems. Working with decimals is an extension of pupils' understanding of place value. Most pupils have an understanding that each column to the left of another is 10 times greater. Build on this so that pupils are aware that each column to the right is 10 times smaller.
	12.5 Division with large and small numbers	1	<ul style="list-style-type: none"> To divide combinations of large or small numbers mentally 	
	Challenge – Guesstimates	1		This activity gives pupils the opportunity to practise their mental strategies in some real-life contexts. It also encourages pupils to make links to the use of estimation as well as the need to make assumptions when tackling real-life problems.
13 Proportion	13.1 Direct proportion	1	<ul style="list-style-type: none"> To understand the meaning of direct proportion To find missing values in problems involving proportion 	Pupils often mix up direct and inverse proportion, usually by using direct proportion to answer inverse proportion questions. Pupils sometimes use an incorrect multiplier.
	13.2 Graphs and direct proportion	1	<ul style="list-style-type: none"> To represent direct proportion graphically and algebraically 	Some pupils may struggle to draw correctly scaled axes for questions in this exercise. Draw the scales for these pupils and explain the reasoning behind the chosen values.

	13.3 Inverse proportion	1	<ul style="list-style-type: none"> To understand what inverse proportion is To use graphical and algebraic representations of inverse proportion 	Pupils often use direct proportion rather than inverse proportion. Make sure pupils can point out key words in a question that indicate inverse proportion. Also make sure that pupils write the variables the correct way around in their formula.
	13.4 Comparing direct proportion and inverse proportion	1	<ul style="list-style-type: none"> To recognise direct and inverse proportion and work out missing values 	Make sure that pupils are aware of the important words in a question, and the patterns of numbers in a table that indicate whether to use direct or inverse proportion.
	Challenge – Planning a trip	1		For this challenge pupils apply their understanding of proportion to a typical real-life context including speed, time and fuel consumption. The questions increase in complexity and pupils can use a range of graphical and algebraic skills to tackle them. They also need to be able to interpret some complex language.
Chapters 12–13 assessment on Collins Connect				
14 Circles	14.1 The circumference of a circle	1	<ul style="list-style-type: none"> To know the definition of a circle and the names of its parts To work out the relationship between the circumference and diameter of a circle 	Pupils often confuse radius and diameter. Give them plenty of opportunity to use both. Collective memory activities would be useful to help pupils remember which is which.
	14.2 Formula for the circumference of a circle	1	<ul style="list-style-type: none"> To calculate the circumference of a circle 	Pupils often do not make the link between the work they have done previously on perimeter and area, and the work on the circumference and area of a circle.
	14.3 Formula for the area of a circle	1	<ul style="list-style-type: none"> To calculate the area of a circle 	Pupils may confuse the definitions of the parts of circles. They may also confuse the formulae, particularly in terms of the use of radius and diameter. This is because pupils cannot visualise what they are doing. Use activities like the one in Part 2 of Lesson 14.1 to help pupils overcome both of these problems.
	Financial skills – Athletics stadium	2		This activity is designed to give pupils the opportunity to apply their knowledge to a multi-step real-life problem. The context is common, but is presented in a slightly more complex way than pupils are used to.
Half-term				
Half-term / Term 6				
15 Equations and formulae	15.1 Equations with brackets	1	<ul style="list-style-type: none"> To solve equations involving brackets To solve equations where the answers are fractions or negative numbers 	A common problem often seen when expanding a bracket is to multiply the first term by the number outside the bracket and just write down the second term. Pupils will sometimes get confused with adding or subtracting from each side when dealing with equations with unknowns on both sides.
	15.2 Equations with the variable on both sides	1	<ul style="list-style-type: none"> To solve equations with the variable on both sides 	Pupils are sometimes confused with adding or subtracting from each side when dealing with equations with unknowns on both sides. Make it clearer for less able pupils by explaining that to remove a negative value they must <i>add</i> to both sides; to remove a positive value they must <i>subtract</i> from both sides. Pupils who struggle may benefit from following these steps: <ol style="list-style-type: none"> Remove the smallest x value by adding or subtracting from both sides (explain, for example, that $-5x$ is smaller than $2x$). Remove the number on the same side as the remaining x value by

				<p>adding or subtracting from both sides.</p> <p>3. Finally, divide both sides by the number in front of the x to obtain your answer.</p>
	15.3 More complex equations	2	<ul style="list-style-type: none"> To solve equations with brackets and fractional coefficients To solve simple equations involving squares 	<p>A common problem that pupils have when expanding a bracket is to multiply the first term by the number outside the bracket and write down only the second term. Another problem is that sometimes pupils add instead of multiplying. When solving equations that contain fractions, pupils will sometimes remove the fraction by multiplying, but they leave the denominator next to the bracket.</p> <p>For example: $\frac{1}{4}(x + 2) = 5$ may be written <i>incorrectly</i> as: $4(x + 2) = 20$.</p>
	15.4 Rearranging formulae	1	<ul style="list-style-type: none"> To change the subject of a formula To change the subject of a formula involving squares 	<p>Pupils sometimes forget to apply BIDMAS correctly when rearranging formulae, so their answers are incorrect. Remind pupils that when rearranging a formula, they should follow the methods learned earlier in the chapter for solving equations. Pupils who struggle with rearranging formulae may find the input-output method easier to understand.</p>
	Mathematical reasoning – Using graphs to solve equations	1		<p>In this activity, pupils will use mathematical reasoning to make links between equations and formulae and their graphical representations. Comparing graphical and algebraic representations enables pupils to check their ability to solve equations. Tell pupils that the ability to use different representations to check their understanding is a valuable skill.</p>
16 Comparing data	16.1 Grouped frequency tables	1	<ul style="list-style-type: none"> To create a grouped frequency table from raw data 	<p>Pupils often struggle to identify appropriate groups. They want to follow a set of rules and often struggle with making links between the data and the question that is being asked. They often fail to appreciate how this should inform their decisions. Give them lots of real life examples to discuss. This will help them see there is not necessarily a correct answer but that some grouping is more efficient/informative than others.</p>
	16.2 Drawing frequency diagrams	1	<ul style="list-style-type: none"> To interpret frequency diagrams To draw a frequency diagram from a grouped frequency table 	<p>Pupils often do not associate drawing frequency diagrams with the analytical process of comparing outcomes or gathering evidence to support a hypothesis. Give pupils a range of examples, some good and some less good, from real-life contexts. Ask pupils to discuss how useful the representations are in terms of assessing the evidence and/or delivering a clear message.</p>
	16.3 Comparing sets of data	2	<ul style="list-style-type: none"> To be able to compare data from two sources 	<p>Pupils may struggle with interpreting data accurately. Provide many opportunities for pupils to compare different representations. Encourage pupils to generate their own questions about the data and to assess the advantages and disadvantages of different representations and statistical measures.</p>
	16.4 Misleading charts		<ul style="list-style-type: none"> To recognise when a statistical chart may be misleading 	<p>In real life, people often accept data without being critical of where it has come from or how it is being used. As part of this critical appraisal, pupils need to consider how the data is</p>

				being represented. In preparation for this lesson you could have a class discussion around some topical examples in the media.
	Problem solving – Why do we use so many devices to watch TV?	1		This activity is designed to combine all the lessons in this chapter by taking pupils through the steps of tabulating and displaying data for a familiar real-life problem. All the data is given, but pupils will need to read and think carefully about how they display the data so that they can make valid comparisons.
<i>Chapters 14–16 assessment on Collins Connect</i>				
<i>End of year assessment on Collins Connect</i>				

2-year scheme of work

The following scheme of work provides suggestions for teaching Pupil Book 2.3 as part of a 2-year Key Stage 3 course.

Please note that you can recombine the test questions provided on Collins Connect to create new tests if your frequency of assessment differs from that below, or if you wish to combine content from different chapters in your own half-term tests.

This scheme of work is provided in editable Word and Excel format on the CD-ROM accompanying this Teacher Pack.

Chapter	Lesson	No. of hours	Learning objective	Comments/ suggestions
Half-term / Term 1				
1 Working with numbers	1.1 Multiplying and dividing negative numbers	1	<ul style="list-style-type: none"> To carry out multiplications and divisions involving negative numbers 	Much of this material will be new to Year 8 pupils. Pupils can leave out questions 1 and 2 in Exercise 1A, which was covered in Year 7. If pupils are quick to grasp the concepts in this chapter they can move swiftly through the exercises, leaving out some of the questions.
	1.2 Factors and highest common factor (HCF)	1	<ul style="list-style-type: none"> To understand and use highest common factors 	
	1.3 Multiples and lowest common multiple (LCM)		<ul style="list-style-type: none"> To understand and use lowest common multiples 	
	1.4 Powers and roots	1	<ul style="list-style-type: none"> To understand and use powers and roots 	
	1.5 Prime factors	1	<ul style="list-style-type: none"> To find the prime numbers of an integer 	
	Challenge – Blackpool Tower	1		This challenge activity encourages pupils to think about a tourist attraction with different facilities and what is involved in running them. The topic could lead to class discussion about environmental issues such as electricity and water usage.
2 Geometry	2.1 Parallel lines	1	<ul style="list-style-type: none"> To calculate angles in parallel lines 	Much of the material in the first three lessons of this chapter will be familiar to pupils. Use the activities and challenges at the end of each exercise to check pupils' understanding. If you feel that pupils' understanding is secure, move straight on to Lesson 2.4 and Lesson 2.5.
	2.2 The geometric properties of quadrilaterals	1	<ul style="list-style-type: none"> To know the geometric properties of quadrilaterals 	
	2.3 Translations	1	<ul style="list-style-type: none"> To understand how to translate a shape 	
	2.4 Enlargements	1	<ul style="list-style-type: none"> To enlarge a 2D shape by a scale factor 	
	2.5 Constructions	1	<ul style="list-style-type: none"> To construct the mid-point and the perpendicular bisector of a line To construct an angle bisector To construct a perpendicular to a line from or at a given point To construct a right-angled triangle 	
	Challenge – More constructions	1		This challenge gives pupils the opportunity to extend their learning to more complex constructions. They need to be able to reproduce a set of instructions that extend what they have already done during Lesson 2.5 and in Exercise 2E of the Pupil Book.
Chapters 1–2 assessment on Collins Connect				
3 Probability	3.1 Mutually exclusive outcomes and exhaustive outcomes	1	<ul style="list-style-type: none"> To understand mutually exclusive and exhaustive outcomes 	Much of the material in this chapter will be new. If pupils are familiar with Lesson 3.1 from Year 7, they can move on to the activity question at the end of Exercise 3A.

	3.2 Using a sample space to calculate probabilities	1.5	<ul style="list-style-type: none"> To use sample spaces to calculate probabilities 	
	3.3 Estimates of probability	1.5	<ul style="list-style-type: none"> To use relative frequency to estimate probabilities 	
	Financial skills – Fun in the fairground	1		Pupils extend their understanding of probability to a common real-life application that may be new to them. Pupils also make a real-life link between probability and financial skills.
Half-term				
Half-term / Term 2				
4 Percentages	4.1 Calculating percentages	1	<ul style="list-style-type: none"> To write one quantity as a percentage of another 	Although pupils have met percentages before, there are some important and quite challenging concepts in this chapter. The idea of percentages as a multiplier and the use of multiplicative reasoning is very important to pupils' confidence and fluency with percentages. Therefore, you may be able to leave out some of the earlier questions in each lesson, providing that pupils demonstrate confidence and fluency with calculating percentages.
	4.2 Calculating percentage increases and decreases	1	<ul style="list-style-type: none"> To use a multiplier to calculate a percentage change 	
	4.3 Calculating a percentage change	1	<ul style="list-style-type: none"> To work out a change in value as a percentage increase or decrease 	
	Challenge – Changes in population	1		This activity is designed to give pupils the opportunity to demonstrate their understanding of percentage change in a real-life situation. All the information they need is provided but they will need to read the question carefully to decide which information they need and what mathematical skills to use.
5 Congruent shapes	5.1 Congruent shapes	1	<ul style="list-style-type: none"> To recognise congruent shapes 	Pupils will be unfamiliar with most of the concepts in this chapter. However if they can demonstrate that they are confident and fluent with these basic concepts, pupils can move on to the more challenging questions at the end of each exercise in the Pupil Book.
	5.2 Congruent triangles	1	<ul style="list-style-type: none"> To know the conditions for recognising congruent triangles 	
	5.3 Using congruent triangles to solve problems	1	<ul style="list-style-type: none"> To solve geometric problems using congruent triangles 	
	Problem solving – Using scale diagrams to work out distances	1		Pupils will need to be familiar with scale diagrams and ruler compass constructions before starting the questions for this activity. You may need to model some examples.
Chapters 3–5 assessment on Collins Connect				
6 Surface area and volume of prisms	6.1 Metric units for area and volume	1	<ul style="list-style-type: none"> To convert metric units for area and volume 	Pupils should be familiar with the concepts in Lesson 6.1. Check pupils' understanding with a couple of examples and if pupils are confident and fluent, move on to Lesson 6.2.
	6.2 Surface area of prisms	1	<ul style="list-style-type: none"> To calculate the surface area of a prism 	
	6.3 Volume of prisms	1	<ul style="list-style-type: none"> To calculate the volume of a prism 	
	Investigation – A cube investigation	2		In this investigation, pupils apply their understanding of area to a more complex problem. Pupils need to work methodically and be able to explain their solutions. This is a good transferable skills objective to share with pupils when doing this investigation. Ask pupils to share not only their solutions but also <i>how</i> they approached working on the problem.
7 Graphs	7.1 Graphs from linear equations	1	<ul style="list-style-type: none"> To extend the range of graphs of linear equations 	It is important to take time over the examples in this chapter. Sometimes, however, it is more worthwhile to work through one or two examples in-depth as a class, followed by picking out just one or two key examples for pupils.
	7.2 Gradient (steepness) of a straight line	1	<ul style="list-style-type: none"> To work out the gradient in a graph from a linear equation To work out an equation of the form $y = mx + c$ from the graph 	

	7.3 Graphs from quadratic equations	1	<ul style="list-style-type: none"> To recognise and draw the graph from a simple quadratic equation To solve a quadratic equation from a graph 	
	7.4 Real-life graphs	1	<ul style="list-style-type: none"> To draw graphs from real-life situations to illustrate the relationship between two variables 	
	Challenge – The M25	1		This challenge activity encourages pupils to think about the M25, one of Europe's busiest motorways.
Holidays				
Half-term / Term 3				
8 Number	8.1 Powers of 10	1	<ul style="list-style-type: none"> How to multiply and divide by negative powers of 10 	There are new ideas in all these lessons, which build on pupils' existing knowledge of rounding and the number system. Check pupils' understanding by doing some examples as a class; then ask pupils to focus on the PS and MR questions in the Pupil Book exercises, plus the investigations, activity and challenge at the end of the exercises
	8.2 Significant figures	1	<ul style="list-style-type: none"> To round a specific number of significant figures 	
	8.3 Standard form with large numbers	1.5	<ul style="list-style-type: none"> To write a large number in standard form 	
	8.4 Multiplying with numbers in standard form	1	<ul style="list-style-type: none"> To multiply with numbers in standard form 	
	Challenge – Space – to see where no one has seen before	1.5		This activity is designed to combine the skills covered across this chapter to explore an interesting real-life problem in a slightly more abstract context.
Chapters 6–8 assessment on Collins Connect				
9 Interpreting data	9.1 Interpreting graphs and diagrams 9.2 Relative sized pie charts	1	<ul style="list-style-type: none"> To interpret different charts seen in the media To draw pie charts relative to data size 	Much of the material in lessons of this chapter will be new to pupils. However, Lesson 9.3 and Lesson 9.4 could be combined. Make sure that pupils have a good grasp of correlation before moving on.
	9.3 Scatter graphs and correlation	1	<ul style="list-style-type: none"> To read scatter graphs To understand correlation 	
	9.4 Creating scatter graphs	1	<ul style="list-style-type: none"> To create scatter graphs and use a line of best fit 	
	Challenge – Football attendances	2		In order to be able to do this challenge activity, pupils will need to be able to read and interpret the table, draw pie charts relative to the data in the table, and draw on their knowledge of averages, means and scatter diagrams. Pupils are given the opportunity to practise these skills in what is most likely a familiar context.
10 Algebra	10.1 Algebraic notation 10.2 Like terms	1	<ul style="list-style-type: none"> To simplify algebraic expressions involving the four basic operations To simplify algebraic expressions by combining like terms 	Pupils should have met the concepts in Lesson 10.1 and Lesson 10.2 before. Work through some examples to check pupils' understanding, then move on to Lesson 10.3.
	10.3 Expanding brackets	1	<ul style="list-style-type: none"> To remove brackets from an expression 	
	10.4 Using algebraic expressions	1	<ul style="list-style-type: none"> To manipulate algebraic expressions To identify algebraic expressions 	
	10.5 Using index notation	1	<ul style="list-style-type: none"> To write algebraic expressions involving powers 	
	Mathematical reasoning – Writing in algebra	2		This activity develops confidence and fluency with algebraic notation. Pupils often struggle to decode everyday language into mathematics. This activity gives them the opportunity to practise this in a range of contexts.
11 Shape and ratio	11.1 Ratio of lengths, areas and volumes	1	<ul style="list-style-type: none"> To use ratio to compare lengths, areas and volumes of 2D and 3D shapes 	Pupils will have met some of the basic concepts in this chapter. If they can demonstrate that they are confident and fluent with these basic concepts, pupils can move on to the more challenging questions at the end of each exercise in the Pupil Book.
	11.2 Fractional enlargement	1.5	<ul style="list-style-type: none"> To enlarge a 2D shape by a fractional scale 	
	11.3 Map scales	1	<ul style="list-style-type: none"> To understand how to use map scales 	

	Activity – Map reading	2		This activity consolidates topics previously covered on extracting data, area and ratio.
<i>Chapters 9–11 assessment on Collins Connect</i>				
Half-term				
Half-term / Term 4				
12 Fractions and decimals	12.1 Adding and subtracting fractions	1	<ul style="list-style-type: none"> To add and subtract fractions and mixed numbers 	Pupils should be familiar with how to use all four operations with fractions. However, these operations are important concepts and pupils often get them confused. Check pupils' confidence while working through the examples in Lessons 12.1 to 12.3. If pupils are confident, concentrate on the challenge questions in these lessons. Then move on to Lesson 12.4 and Lesson 12.5.
	12.2 Multiplying fractions and integers	1	<ul style="list-style-type: none"> To multiply a fraction or a mixed number and an integer 	
	12.3 Dividing with integers and fractions	1	<ul style="list-style-type: none"> To divide a fraction or a mixed number by an integer To divide an integer or a mixed number by a fraction 	
	12.4 Multiplication with large and small numbers	1	<ul style="list-style-type: none"> To multiply with combinations of large and small numbers mentally 	
	12.5 Division with large and small numbers	1	<ul style="list-style-type: none"> To divide combinations of large or small numbers mentally 	
	Challenge – Guesstimates	1		This activity gives pupils the opportunity to practise their mental strategies in some real-life contexts. It also encourages pupils to make links to the use of estimation as well as the need to make assumptions when tackling real-life problems.
13 Proportion	13.1 Direct proportion	1	<ul style="list-style-type: none"> To understand the meaning of direct proportion To find missing values in problems involving proportion 	Much of this material in this chapter will be unfamiliar to pupils. Make sure that each concept is fully understood by all pupils before moving on to the MR and PS questions in the exercises.
	13.2 Graphs and direct proportion	1	<ul style="list-style-type: none"> To represent direct proportion graphically and algebraically 	
	13.3 Inverse proportion	1	<ul style="list-style-type: none"> To understand what inverse proportion is To use graphical and algebraic representations of inverse proportion 	
	13.4 Comparing direct proportion and inverse proportion	1	<ul style="list-style-type: none"> To recognise direct and inverse proportion and work out missing values 	
	Challenge – Planning a trip	1		For this challenge pupils are required to apply their understanding of proportion to a typical real-life context including speed, time and fuel consumption. The questions increase in complexity and pupils will need to use a range of graphical and algebraic skills to tackle the questions. Pupils also need to be able to interpret some quite complex language.
<i>Chapters 12–13 assessment on Collins Connect</i>				
14 Circles	14.1 The circumference of a circle	1	<ul style="list-style-type: none"> To know the definition of a circle and the names of its parts To work out a relationship between the circumference and diameter of a circle 	Pupils may be familiar with the contents of Lesson 14.1. Check understanding with a couple of examples, and if pupils are confident and fluent move straight on to Lesson 14.3 and Lesson 14.4.
	14.2 Formula for the circumference of a circle	1	<ul style="list-style-type: none"> To calculate the circumference of a circle 	
	14.3 Formula for the area of a circle	1	<ul style="list-style-type: none"> To calculate the area of a circle 	

	Financial skills – Athletics stadium	2		This activity is designed to give pupils the opportunity to apply their knowledge to a multi-step real-life problem. The context is common, but the activity is presented in a slightly more complex way than pupils may be used to.
15 Equations and formulae	15.1 Equations with brackets 15.2 Equations with the variable on both sides	1	<ul style="list-style-type: none"> To solve equations involving brackets To solve equations where the answers are fractions or negative numbers To solve equations with the variable on both sides 	Much of this chapter will be new material. However, pupils who are familiar with multiplying out brackets and solving simple equations can either complete Exercise 15A in the Pupil Book quickly, or move straight on to Exercise 15B.
	15.3 More complex equations	1	<ul style="list-style-type: none"> To solve equations with brackets and fractional coefficients To solve equations involving squares 	
	15.4 Rearranging formulae	1	<ul style="list-style-type: none"> To change the subject of a simple formula To change the subject of a formula involving squares 	
	Mathematical reasoning – Using graphs to solve equations	1		In this activity, pupils will use mathematical reasoning to make links between equations and formulae and their graphical representations. Comparing graphical and algebraic representations enables pupils to check their ability to solve equations. Tell pupils that the ability to use different representations to check their understanding is a valuable skill.
16 Comparing data	16.1 Grouped frequency tables 16.2 Drawing frequency diagrams	1	<ul style="list-style-type: none"> To create a grouped frequency table from raw data To interpret frequency diagrams To draw a frequency diagram from a grouped frequency table 	Use one or two examples to check pupils' understanding from Lesson 16.1 and Lesson 16.2. If pupils are fluent and confident with the concepts, move straight to Lessons 16.3 and 16.4.
	16.3 Comparing sets of data 16.4 Misleading charts	1	<ul style="list-style-type: none"> To be able to compare data from two sources To recognise when a statistical chart may be misleading 	
	Problem solving – Why do we use so many devices to watch TV?	1		This activity is designed to combine all the lessons in this chapter by taking pupils through the steps of tabulating and displaying data for a familiar real-life problem. All the data is given but pupils will need to read and think carefully about the way the data is displayed so that they can make valid comparisons.
<i>Chapters 14–16 assessment on Collins Connect</i>				
<i>End of year assessment on Collins Connect</i>				
Holidays				
Half-term / Term 5				
Work continues with Pupil Book 3.3				
Half-term				
Half-term / Term 6				
Work continues with Pupil Book 3.3				