Mathematics for Australia Year 7 2nd edition

Chapter summaries

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CHAPTER 1: WHOLE NUMBERS

- **A** Place value
- **B** Rounding numbers
- **C** Operations
- **D** Index notation

Keywords:

- add
- base
- counting number
- difference
- digit
- divide
- dividend
- divisor
- expanded form
- exponent
- Hindu-Arabic number system
- index
- index notation
- infinite
- multiply
- natural number
- number system
- numeral
- numeral form
- place value
- place value chart
- power
- product
- quotient
- round
- significant figures
- subtract
- sum
- undefined
- whole number

This chapter effectively covers Sections A, C, E, and F of Chapter 1 in the previous edition. The remaining sections are covered in a new Chapter 4: Number strategies and order of operations. We feel this gives a better flow of ideas, so that students are introduced to the structure of numbers before being asked to perform more complex operations.

In Section A, we have incorporated more questions involving millions, billions, and trillions that were introduced in Year 6.

In Section B, we use the same rule for rounding to a place value and rounding to significant figures. Students should be encouraged to think of significant figures as just another type of rounding to a place value. For example, to round 4696 to 2 significant figures, students should recognise that the 2nd significant figure is hundreds, so we are really rounding to the nearest 100.

In the Discussion at the end of Section B, students should find that zeros at the end of a number can be "significant" figures, depending on the rounding being performed. For example, when 6999 is rounded to 2 significant figures to 7000, the first zero after the 7 is a significant figure, and the last zeros are only there as place holders.

Section C provides students with words associated with the basic operations, and gives students enough practice to perform operations needed for the work in the next chapter involving factors and multiples. In Chapter 4, students will use particular strategies to perform operations involving larger numbers.

CHAPTER 2: NUMBER PROPERTIES

- **A** Square numbers
- **B** Cubic numbers
- **C** Divisibility

D Even and odd numbers
E Divisibility tests
F Factors
G Prime and composite numbers
H Highest common factor
I Multiples
J Lowest common multiple

Keywords:

- composite number
- cubic number
- divisible
- even number
- factor
- factor pair
- factor tree
- highest common factor
- lowest common multiple
- multiple
- odd number
- perfect cube
- perfect square
- prime factored form
- prime factorisation
- prime number
- repeated division
- square number
- square root

Square numbers has been moved to this chapter, and is presented along with square roots which was previously in this chapter. Cubic numbers has been added to this chapter, as they are useful numbers for students to be familiar with.

The divisibility tests section in the previous edition has been split into three sections: Divisibility, Even and odd numbers, and Divisibility tests. We feel it is important that students first become comfortable with the idea of divisibility in simple cases by performing the division first, before using tests to determine divisibility for larger numbers.

In the final question of the Delectable Numbers Activity in Section E, students are asked to find the only 9 digit delectable number which uses the digits 1 to 9 once each. Whilst this will be very challenging for students to find the number using only their knowledge of divisibility, students should be encouraged to think about which digits can be placed easily. For example, it should be easy for students to recognise that the 5 must be placed in the 5th position. Students should also see that the even numbers must be placed in the even numbered positions. Students should see the goal here as not necessarily to find the number, but to use logic and their knowledge of divisibility to cut down the possibilities as much as possible.

Since this is the first year students are introduced to lowest common multiples, it is found simply by listing multiples of each number, identifying the common multiples, and hence stating the lowest of these. Finding the lowest common multiple using the prime factorisations of each number will be presented in Year 8.

In the Discussion at the end of Section J, students should see that the lowest common multiple of 12 and 5 is 60.

CHAPTER 3: LINES AND ANGLES

A Lines
B Angles
C Parallel and perpendicular lines
D Angle properties
E Vertically opposite angles
F Angle pairs
G Angle pairs on parallel lines
H Tests for parallelism
I Geometric construction

Keywords:

- acute angle
- allied angles
- alternate angles
- angle
- angle bisector
- arc
- arm
- co-interior angles
- collinear points
- complementary angles
- concurrent lines
- corresponding angles
- degrees
- intersecting lines
- line

- line segment
- obtuse angle
- parallel lines
- perpendicular bisector
- perpendicular lines
- point
- point of intersection
- protractor
- ray
- reflex angle
- revolution
- right angle
- straight angle
- supplementary angles
- three point notation
- transversal
- vertex
- vertically opposite angles

The opening section is primarily about lines rather than points, so we have moved the material about points before Section A, and Section A is now named "Lines" rather than "Points and lines".

Section C has been added, and its primary purpose is to introduce students to the notation surrounding parallel and perpendicular lines. This saves us from having to introduce this notation in the Polygons chapter, where it distracts from the focus of the chapter.

In the Discussion in Section D, students should find that the sizes of angle ABC and reflex angle ABC should sum to $360°$.

Students are asked to find unknown angles in Section D. They have not yet studied solving equations, and for this reason we have only included the more simple problems in this edition, which can be solved intuitively. More involved problems have been moved to Chapter 10, where students can use their skills in solving equations to find the unknown angle.

Vertically opposite angles are given their own section, as they are conceptually very different to the other types of angle pairs, which have special properties when two parallel lines are cut by a transversal.

Constructing a perpendicular bisector has been added to the Geometric construction section.

CHAPTER 4: NUMBER STRATEGIES AND ORDER OF OPERATIONS

- **A** Addition strategies
- **B** Subtraction strategies
- **C** Multiplication strategies
- **D** Division strategies
- **E** Estimation
- **F** Order of operations
- **G** Problem solving

Keywords:

- BEDMAS
- dividend
- divisor
- estimate
- mathematical expression
- one figure approximation
- order of operations
- quotient

This is a new chpater, which covers the remaining material from Chapter 1 in the previous edition. Number strategies for each operation are presented in separate sections. We have also provided some insights into the nature of each operation to motivate the strategies. For example, the fact that it is easier to multiply a number by a power of 10 motivates the strategy of writing the products as a factor pair where one number is a power of 10. We hope that this helps students understand the strategies, and makes it easier for students to recognise which strategy to apply.

In the Discussion in Section B, students should notice that strategies 1 and 2 for subtraction are essentially equivalent to the strategies 1 and 2 for addition. Students should realise that strategy 3 for addition does not have an equivalent in subtraction, because we cannot change the order of numbers in a subtraction.

In Section F, we have emphasised that the BEDMAS rule does *not* mean division should be performed before multiplication, or that addition should be performed before subtraction. This should be made clear to the students.

The contextual order of operation problems have been moved to their own Section G, as they are not just about order of operations, but about being able to interpret a worded problem and decide which operations are required. In this sense they bring all aspects of this chapter together.

CHAPTER 5: POSITIVE AND NEGATIVE NUMBERS

- **A** The number line
- **B** Words indicating positive and negative
- **C** Addition and subtraction with negative numbers
- **D** Adding and subtracting negative numbers
- **E** Multiplying negative numbers
- **F** Dividing negative numbers
- **G** Order of operations
- **H** Calculator use

Keywords:

- integer
- negative number
- negative sign
- number line
- opposite
- positive number
- positive sign

This chapter has been significantly restructured from the previous edition.

We have introduced the number line from the start of the chapter, as we feel that this will help students understand the relationship between positve and negative numbers.

We have also made clearer the distinction between talking about *position* (for example, representing 3 levels below ground level as -3), and *movements* (for example, representing going down 3 levels as "subtract 3"). In the contextual problems, students should understand that we start from a position on a number line, described by a positive or negative number, interpreted by the context. Then, there is a series of movements, corresponding to operations (addition or subtraction) involving positive quantities. We then end up at our final position, which may be positive or negative, to be interpreted in context. Understanding of all of this is set up by the Activity which distinguishes between positions and directions.

Since multiplication of negative numbers is now introduced in Year 6 using a number line, it is explained here by thinking of 3×-2 as "3 lots of -2", which can be found by addition. Multiplying two negative numbers together is explained using patterns of products, for example $3 \times -2,\ 2 \times -2,\ 1 \times -2,\ 0 \times -2,$ and recognising that the product is increasing by two each time, motivating $-1 \times -2 = 2$.

CHAPTER 6: FRACTIONS

- **A** Fractions
- **B** Fractions as division
- **C** Proper and improper fractions
- **D** Fractions on a number line
- **E** Equal fractions
- **F** Lowest terms
- **G** Cancelling common factors
- **H** One quantity as a fraction of another
- **I** Comparing fractions
- **J** Adding and subtracting fractions
- **K** Multiplying a fraction by a whole number
- **L** Multiplying fractions
- **M** Reciprocals
- **N** Dividing fractions

Keywords:

- denominator
- equal fractions
- fraction
- improper fraction
- lowest common denominator
- lowest terms
- mixed number
- numerator
- proper fraction
- reciprocal
- simplest form

We have tried to avoid the term "simplest form" as much as possible in this new series, as it can be quite ambiguous. The simplest form to work with quite often depends on the context, and what you are trying to do. So, we have predominantly used "lowest terms" to describe fractions. However, we have kept the simplest form usage occasionally, as we understand this is in common use.

We have added Section G (Cancelling common factors), as it is a common method to write a fraction in lowest terms, and we feel that students should get explicit practice at performing this process.

We have added Section K (Multiplying a fraction by a whole number). We think this is a useful intermediate step towards multiplying two fractions, and it provides a method for students to find fractions of whole number quantities, without having to write the whole number as a fraction.

The Section about evaluating fractions using a calculator has been removed, and replaced with an Activity. It is recommended that students use a scientific calculator for this Activity.

The contextual problems have been presented in their relevant sections, rather than all being presented at the end in a "Problem solving" section.

CHAPTER 7: DECIMALS

- **A** Decimal numbers
- **B** Decimal numbers on a number line
- **C** Ordering decimal numbers
- **D** Rounding decimal numbers
- **E** Converting decimals to fractions
- **F** Converting fractions to decimals
- **G** Adding and subtracting decimal numbers
- **H** Multiplying by powers of 10
- **I** Dividing by powers of 10
- **J** Multiplying decimal numbers
- **K** Dividing decimal numbers

Keywords:

- decimal number
- decimal place
- decimal point
- expanded form
- hundredths
- place value table
- rounding
- significant figure
- tenths
- thousandths

In this edition, we have moved number lines, ordering decimal numbers, and rounding decimal numbers earlier in the chapter, as these concepts have more to do with the place value structure of decimal numbers discussed in Section A.

In Section D, students round decimal numbers to a number of significant figures, as well as a number of decimal places.

We have included a section for converting fractions to decimals. This is done by first writing the fraction so that the denominator is a power of 10. We consider both positive and negative fractions and decimals.

When multiplying and dividing decimal numbers by powers of 10, students should understand that each digit moves a particular number of places in the place value chart. This has the *effect* of moving the decimal point.

We perform multiplication of decimal numbers by converting them to fractions with a denominator which is a power of 10. We can then multiply the whole number numerators using column multiplication, and divide by the appropriate power of 10.

CHAPTER 8: ALGEBRA

- **A** Building expressions
- **B** Product notation
- **C** Index notation
- **D** Reading expressions
- **E** Terms and coefficients
- **F** Equal expressions

G Collecting like terms
H Algebraic substitution
I Formulae

Keywords:

- algebra
- algebraic expression
- coefficient
- constant
- evaluate
- expanded form
- formula
- index notation
- like terms
- product
- product notation
- quotient
- subject
- substitute
- sum
- term
- total
- variable

This chapter has been significantly restructured to give a more logical progression of ideas. Conventions for writing algebraic expressions (such as omitting the $\times$ symbol between variables, and writing numbers before variables in products) are addressed early in the chapter.

Section D has been added to help students read algebraic expressions in words. This is an important skill because it allows students to communicate mathmatically with others.

Section F introduces students to the idea that two algebraic expressions can be equal, even if they take different forms. This leads on to collecting like terms in the next section, in which an expression is simplified to an equal expression containing fewer terms.

CHAPTER 9: PERCENTAGE

A Percentage
B Converting percentages into decimals and fractions
C Converting decimals and fractions into percentages
D Expressing one quantity as a percentage of another
E Finding a percentage of a quantity
F Percentage increase or decrease

Keywords:

- decimal
- fraction
- percent
- percentage
- percentage decrease
- percentage increase

In Section A, we only write fractions with denominator 100 as percentages, such as $\frac{47}{100} = 47\%,$ as this is essentially the definition of a percentage. More involved conversions are left to Section C.

In the Discussion at the end of Section A, students should be encouraged to think of percentages beyond merely describing parts of a whole. They should think of situations where 100% does not represent the maximum amount attainable, but rather it might represent a desired amount, or a limit imposed for safety reasons. For example, a company might make sales worth 110% of their target, or a hospital might be operating at 140% of its intended capacity.

Section F (Percentage increase and decrease) has been added in this edition. This is a more general treatment of the work done involving percentage discount in Year 6.

CHAPTER 10: EQUATIONS

A Equations
B Solving by inspection
C Maintaining balance
D Inverse operations
E Algebraic flowcharts
F Solving equations
G Equations with a repeated variable
H Geometry problems

I Writing equations
J Word problems

Keywords:

- algebraic equation
- algebraic flowchart
- balancing equations
- build up
- equal sign
- equation
- inspection
- inverse operations
- left hand side
- right hand side
- solution
- undo
- unknown

In this edition, we have removed the questions asking students to solve by guess, check, and improve, as we feel this is not very helpful for students. It is instead presented as an Activity. The focus at the start of the chapter surrounds the idea of a solution to an equation. Students are asked to identify whether particular values of x are solutions to an equation, and to identify the solution for a list of numbers.

We have cut back a lot of the balancing scales work in this edition, as we feel it can lead to unhelpful conclusions if not done carefully. For example, when asked to write a set of symbols on the right to balance the left, students may just copy the symbols on the left. Also, there may be ambiguity in the operations performed. For example, moving from 4 blocks to 2 blocks could indicate subtracting two blocks, or it could indicate dividing by two. Some of the more interesting work involving scales has been moved to a Discussion at the end of Section C.

We have added algebraic flowcharts to our worked examples in Section F. We hope this will help students link the flowchart work done in Section E with solving equations in Section F.

Section H contains geometry problems, some of which were previously in the Angles and Lines chapter. Having now studied more formal methods to find unknowns, students should now be able to solve these problems more efficiently.

The Discussion at the end of the chapter invites students to consider whether an equation can have zero, two, or even infinitely many solutions. When considering equation **b**, students should be reminded of their work with negative numbers in Chapter 5. More able students could be challenged with whether "true for infinitely many values of x" is the same as "true for all values of x". A useful equation to distinguish these cases is $\frac{x}{x} = 1,$ which is true for infinitely many values of x, but is not true for $x = 0$.

CHAPTER 11: POLYGONS

A Polygons
B Triangles
C Angle sum of a triangle
D Exterior angles of a triangle
E Isosceles triangles
F Quadrilaterals
G Angle sum of a quadrilateral

Keywords:

- acute angled triangle
- apex
- base
- base angles
- convex polygon
- diagonal
- equilateral triangle
- exterior angle
- interior angle
- isosceles triangle
- kite
- obtuse angled triangle
- parallelogram
- plane figure
- polygon
- quadrilateral
- rectangle
- regular polygon
- rhombus
- right angled triangle
- scalene triangle
- square
- trapezium
- triangle
- vertex
- vertical angle
- vertices

In this edition, angle sum of a triangle and exterior angles of a triangle have been presented in separate Sections.

In the Activity at the end of Section A, students should find that, given a set of vertices, it is always possible to construct a polygon. However, if there is only one polygon which can be drawn with a given set of vertices, the polygon must be convex. If more than one polygon can be drawn, the polygons must be non-convex.

In Section E, we have added an Investigation which more carefully guides students through the process of constructing an isosceles triangle by folding a sheet of paper. The properties of the triangle which arise from this construction give motivation for the properties of isosceles triangles in general.

Section F provides an opportunity to ask students the difference between a *definition* and a *property*. For example, a parallelogram has opposite sides parallel by *definition*, but the fact the opposite sides are equal in length is a *property* of parallelograms.

In the Investigation at the end of the chapter, students should find that $V + R - 2 = E$. Students should be reminded to include the region outside the figure as a region.

CHAPTER 12: MEASUREMENT: LENGTH AND AREA

- **A** Length
- **B** Perimeter
- **C** Area
- **D** The area of a rectangle
- **E** The area of a triangle
- **F** The area of a parallelogram
- **G** The area of a trapezium

Keywords:

- area
- centimetre
- hectare
- kilometre
- length
- metre
- Metric System
- millimetre
- perimeter
- square centimetre
- square kilometre
- square metre
- square millimetre
- units

Since we are adding capacity and mass to Year 7 in this edition, it became sensible to split measurement into two chapters.

In Section B, we have removed the explicit formulae for perimeters of simple polygons, as we feel that it is better for students to understand what the perimeter measures, at which point the formulae are not required. Students are asked to write a formula for a square and a rectangle in the Exercise, but it is more intended as an exercise in generalisation, rather than for the purpose of using the formula in future problems.

As with Year 6 measurement, we have tried to minimise the use of "square units" in this edition, in favour of asking students to work with square centimetres and square metres.

The area of a trapezium has been added to Year 7, so that there is a more steady incline of new material as students progress through the years.

CHAPTER 13: SOLIDS

- **A** Solids
- **B** Nets of solids
- **C** Oblique and isometric projections
- **D** Views of solids

Keywords:

- apex
- cone
- cross-section
- cylinder
- edge
- face
- isometric projection
- net
- oblique projection
- prism
- pyramid
- solid

- solid of uniform cross-section
- sphere
- surface
- vertex

Moving this chapter between the two measurement chapters allows us to introduce 3-dimensional solids to students, so that we can talk sensibly about them in the context of volume and capacity in the following chapter.

In the Discussion at the end of Section A, students should find that each statement provided is an appropriate definition of a sphere. This is a chance to talk about the difference between a *definition* of an object and a *property* of an object, as students may feel that the second statement is a more appropriate definition, whereas the first statement is a property of a sphere.

When considering the views of block solids in Section D, students may find it interesting to consider the relationship between particular views. For example, the front and back views are reflections of each other, as are the left and right views.

CHAPTER 14: MEASUREMENT: VOLUME, CAPACITY, AND MASS

- **A** Volume
- **B** The volume of a prism
- **C** Capacity
- **D** Connecting volume and capacity
- **E** Mass
- **F** The relationship between units

Keywords:

- capacity
- cubic centimetre
- cubic metre
- cubic millimetre
- gram
- kilogram
- kilolitre
- litre
- mass
- megalitre
- milligram
- millilitre
- prism
- tonne
- volume

Capacity and mass have been added to Year 7 in this addition, so this chapter can be thought of as a study of 3-dimensional measurement.

As with Chapter 12, the focus in volume is on the metric units of cubic centimetres and cubic metres, rather than "cubic units".

Given that volumes of rectangular prisms is covered in Year 6, we have extended this to consider volumes of other types of prisms in Year 7.

The material about mass, and the relationship between units, has been moved from Year 8 back to Year 7, since we felt it was better to deal with these more simple concepts in Year 7. This leaves more time to deal with more complex measurement concepts in Year 8.

CHAPTER 15: COORDINATE GEOMETRY

- **A** Grid references
- **B** Coordinates
- **C** Positive and negative coordinates
- **D** Plotting points from a table of values
- **E** The equation of a line

Keywords:

- axes
- Cartesian plane
- coordinates
- equation
- grid reference
- number plane
- ordered pair
- origin
- quadrant
- straight line
- x-axis
- x-coordinate

- y-axis
- y-coordinate

As with Year 6, we have removed the idea of "movement from the origin" in order to plot points. Students should instead be encouraged to think of the axes as number lines, and to plot points on the number plane in the same way they would plot numbers on a number line. This is especially helpful when dealing with negative coordinates in Section C, as it removes the need to think about an x-coordinate of -2 as "moving 2 units to the left".

We have introduced the equation of a line in this edition, to give students somewhere to go beyond simply plotting points as they did in Year 6. We feel that students should have a more advanced understanding of points lying on a line, rather than simply observing a collection of randomly plotted points.

In the Discussion at the end of Section E, students should find that the equations contain a term involving x, as well as a constant term. They should conclude that the coefficient of x controls the steepness of the line, the sign of the coefficient of x controls whether the graph slopes upwards or downwards, and the constant term controls where the graph cuts the y-axis.

CHAPTER 16: RATIO AND RATES

- **A** Ratio
- **B** Ratio and fractions
- **C** Equal ratios
- **D** Lowest terms
- **E** Proportions
- **F** Using ratios to divide quantities
- **G** Rates
- **H** Unit cost

Keywords:

- equal ratios
- lowest terms
- proportion
- rate
- ratio
- simplest form
- speed
- unit cost

In this edition, Section B has been expanded to consider finding the ratio given a fraction.

What was Section C (Equal ratios) in the first edition has been split into 3 sections: Equal ratios, Lowest terms, and Proportions. This should give a clearer path through the material, as what was in the previous Section C was almost exclusively about writing ratios in lowest terms.

In the Equal ratios section, students can determine whether two ratios are equal by multiplying or dividing parts by whole numbers. In Section D, the pairs of ratios (such as $49 : 35$ and $21 : 15$) cannot as easily be compared by multiplying and dividing parts by whole numbers. This gives motivation to write the ratios in lowest terms, as two ratios are equal if they can be written in the same lowest terms.

In the Discussion at the end of Section G, students should conclude that we do not need units for ratios because we are comparing quantities of the same kind. For example, if we are combining liquids in the ratio $1 : 4$, this could be 1 mL to 4 mL, or 1 L to 4 L. However, units are needed for rates because we are comparing quantities of different kinds. When we describe a speed, for example, we need to be clear as to whether we are talking about metres per second, or kilometres per hour. When converting between units of rates, students need to pay attention to whether they are converting the units for the first quantity, the second quantity, or both.

In the Discussion at the end of Section H, students should consider things like the quality of the product, but also the inconvenience associated with purchasing a larger package size, as well as the possibility that the product may be past its use-by date before it is all used.

CHAPTER 17: LINE GRAPHS

- **A** Line graphs
- **B** Travel graphs

Keywords:

- decreasing
- dependent variable
- increasing
- independent variable
- line graph
- travel graph

In this edition, we have combined what was previously Sections A and B (Properties of line graphs, and Estimating from line graphs) into the one Section. This allows us to present all the theory about line graphs at once, and then ask students to either interpret a given line graph, or construct their own line graph from data. We have omitted reference to point graphs as an intermediate step as we feel it is not helpful for students.

In the Discussion in Section A, students should think about the advantages and disadvantages of using straight line segments or curves between the known points. It would be useful to consider situations where we are confident of how the quantities behave between the known data points, or where it is clear from the given data that the quantities do not change in a linear manner. In these situations, it may be preferable to use a curve to more accurately describe what is happening between the given data points. However, if we are not sure what would happen between the given data points, using straight line segments is likely to give us a good estimate of what is happening.

We have also added some questions asking students to construct their own travel graph from data in Section B. For straight line travel graphs, students should be able to determine the speed of the object. The Discussion at the start of Section B should prompt students to realise that a straight line travel graph indicates constant speed, and that a steeper graph indicates greater speed. This will lay the foundation for interpreting the gradient of a travel graph as the speed of the object in later years.

CHAPTER 18: PROBABILITY

- **A** Describing probability
- **B** Using numbers to describe probabilities
- **C** Sample space
- **D** Theoretical probability
- **E** Experimental probability
- **F** The accuracy of experimental probabilities

Keywords:

- certain
- complementary event
- equally likely
- event
- experimental probability
- frequency
- impossible
- outcome
- probability
- relative frequency
- sample space
- theoretical probability

In this edition, complementary events have been added. This was introduced in Year 6, and is now presented as part of Section B. It is then returned to throughout the chapter where appropriate.

In Section D, we have given less emphasis to the particular equipment used in probabilities (such as coins, dice) in favour of a more general description of theoretical probabilities, with the emphasis on the necessity that all outcomes must be equally likely. This is the focus of the Discussion at the start of Section D.

In the Discussion at the end of Section D, students should be careful to recognise that, although there are 36 possible outcomes for the dice rolls, the possible outcomes for the *sum* are 2 through to 12. Students should also realise that some of these outcomes are more likely than others. They can be led to this by considering the number of ways a sum of 2 can be obtained, compared to a sum of 7.

The final two sections have been moved here from Year 8 in this edition. This has been done to provide a more steady progression of new concepts.

The Investigation at the start of Section F involves a simple coin tossing experiment in which the theoretical probability is known. This is done to better demonstrate that the experimental probability approaches the theoretical probability as the number of trials increases.

CHAPTER 19: STATISTICS

- **A** Data collection
- **B** Categorical data

C Displaying categorical data
D Numerical data
E Stem-and-leaf plots
F Measuring the centre
G Measuring the spread

Keywords:

- average
- categorical data
- census
- data
- dot plot
- frequency
- horizontal bar chart
- mean
- median
- mode
- numerical data
- outlier
- pie chart
- population
- range
- sample
- scale
- statistics
- stem-and-leaf plot
- tally
- tally and frequency table
- vertical column graph

The content of this chapter has not changed significantly since the first edition, however its structure has been adjusted for better pacing.

The Categorical data section has been split into two sections: Categorical data and Displaying categorical data. These sections should mostly be revision of concepts encountered in Year 6.

The Numerical data section has been split into two sections: Numerical data and Stem-and-leaf plots. While most of the Numerical data section should be familiar from Year 6, outliers are introduced for the first time so care should be taken when introducing them. The Discussion at the start of Section D in particular emphasises that both frequency *and* location should be considered when identifying outliers. Stem-and-leaf plots are new for Year 7, so we have written out the steps of constructing stem-and-leaf plots in more explicit detail.

The Measuring the centre and spread section has been split into two sections: Measuring the centre and Measuring the spread. There is no substantial change in the content of these sections. This was mostly done to be consistent with future years where more measures of spread are introduced, and necessitate their own section.

CHAPTER 20: TRANSFORMATIONS

A Translations
B Reflections
C Line symmetry
D Rotations
E Rotational symmetry
F Enlargements and reductions
G Combinations of transformations

Keywords:

- centre of rotation
- centre of rotational symmetry
- enlargement
- image
- line of symmetry
- line symmetry
- mirror line
- object
- order of rotational symmetry
- reduction
- reflection
- rotation
- rotational symmetry
- scale factor
- transformation
- translation

In this edition, line symmetry and rotational symmetry have been presented in their own Sections.

In the Investigation at the end of Section C, if students are having trouble, they should be encouraged to think about why, given (say) 10 small circles, they can always create a shape with 10 lines of symmetry (form a regular decagon from the circles). Then students should consider all the factors of 10 (for example, can you form a shape with 5 lines of symmetry

by forming 2 lots of regular pentagons?). Students could then consider why you should be able to create a shape with 9 lines of symmetry (form a regular nonagon with 9 circles, plus a circle in the centre of the nonagon), as well as its factors (can you form a shape with 3 lines of symmetry by forming 3 equilateral triangles, plus a circle in the centre?). Ideally, students should arrive at the general rule that, given n small circles, the numbers of lines of symmetry you can form are n and all its factors, and $(n-1)$ and all its factors (although they may not have the algebra to express it in exactly this way).

Enlargements and reductions have been added in this edition. We have included them here because otherwise students will have seen them in Year 5, then not again until Year 9.

It would be useful for students to think about the subtle difference between enlargements and the other transformations presented in this chapter. For example, enlargements change the size of the object, whereas the size of the object remains unchanged for the other transformations. This type of thinking will be useful in future years, when considering congruence and similarity. It is also worth making students aware that the enlargement transformation does not specify a position for the image; the image does not need to be in a particular position relative to the object. This is why there are virtually no enlargements or reductions in Section G, as it would not make sense to combine enlargements (where position is not important) with the other transformations (where position is important). The only question about enlargements involves the effect of performing an enlargement followed by a reduction.