

We've got the NEW 2024 Mathematics + Statistics curriculum covered!

COMPREHENSIVE TEACHER MAPPING GUIDE



All you need is this **mapping guide**,
the **Connecting All Strands** books
with the **Supplementary** booklets
to fully cover the curriculum.



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and
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CAXTON
EDUCATIONAL

TEACHER MAPPING GUIDE

A full detailed guide connecting **every** objective in the **2024 New Zealand Curriculum for Mathematics and Statistics for Years 3–8**. It covers both the Caxton Educational New Zealand Mathematics **Connecting All Strands** student books Years 3–8 (2A, 2B, 3A, 3B, 4A and 4B) and each companion Supplementary Student Books (Years 3–8).

HOW TO USE OUR GUIDE

Column one lists the objectives from the 2024 Mathematics and Statistics curriculum.

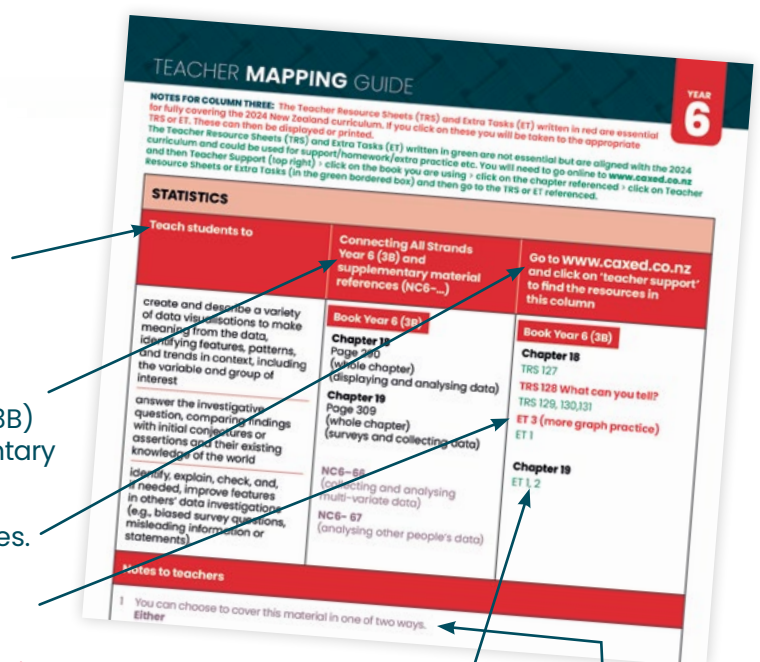
Column two gives you the page references from our existing Year 6 (3B) student book and from our supplementary student book (numbered NC6–...).

Column three lists our online resources.

Red text: The Teacher Resource Sheets (TRS) and Extra Tasks (ET) written in red are essential for fully covering the 2024 New Zealand curriculum. If you click on these you will be taken to the appropriate TRS or ET. These can then be displayed or printed.

Green text: The Teacher Resource Sheets (TRS) and Extra Tasks (ET) written in green are not essential but are aligned with the 2024 curriculum and could be used for support/homework/extra practice etc. You will need to go online to www.caxed.co.nz and then “**Teacher Support and Mapping Guides**” (top right) > click on the book you are using > click on the chapter referenced > click on Teacher Resource Sheets or Extra Tasks (in the bordered boxes at the top of the page > Go to the resource sheet or extra task referenced.

Notes to teachers (purple text) are under the three columns and give notes and also links (in red) to our existing online teacher notes, where applicable.



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NUMBER NUMBER STRUCTURE		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
identify, read, write, compare, and order whole numbers up to 1,000,000 and represent them using base 10 structure	NC6-1 and 2 (place value to 1 000 000) Book Year 6 (3B) NK 1 Page 15 (place value) NK 2 Page 18 (nested place value) NC6-3 to 5 (ordering whole numbers up to 1 000 000)	Book Year 6 (3B) NK 1 TRS 139

Notes to teachers

- 1 Use the material in the order in which it is listed in column two.
- 2 Decimal place is included in the material in book Year 6 (3B). This is required for a later objective so you could choose to include it here.
- 3 The place value system underpins our number system, particularly our system of measurement. It is important to point out this link wherever relevant.
- 4 Continued practise at saying, reading, and writing given numbers, including large numbers, using PV houses helps students consolidate their understanding of numbers.
- 5 Use PV houses to **generalise** that multiplying by 10 moves each digit in a number one place to the left, and dividing by 10 moves each digit one place to the right.
- 6 Nested place value is very useful when students need to rename numbers when subtracting or dividing. For example knowing that 4 hundreds is 40 tens or 6 tens is 60 ones etc

Link to online teacher notes for NK 1

NC6-3 to 5

- 1 Use marked number lines to order and compare numbers and place-value (PV) houses.

If you have our stage books you could use this as extra practice.
 Stage 6 pages 208 and 209 – reading and writing whole numbers
 Stage 6 page 219 and 220 – ordering whole numbers

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NUMBER NUMBER STRUCTURE		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
identify square numbers and factors of numbers up to 125	NC6-6 (factors) Book Year 6 (3B) Chapter 10 Page 193 (investigation) NC6-7 (square numbers)	Book Year 7 (4A) Chapter 1 ET 6
Notes to teachers - Cover the material in the order in which it is listed in column two. - When finding factors students often forget about 1 and the number itself. - Being able to find factors of numbers is useful for division, simplifying fractions and making equivalent fractions. - Make the connection between square numbers and squares. Square numbers are useful when finding the area of a square and other more complex shapes where squares are part of the shape.		

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NUMBER OPERATIONS		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
- use rounding, estimation and inverse operations to predict and to check the reasonableness of calculations - round whole numbers to a specified power of 10, and round tenths and hundredths to the nearest whole number or one decimal place	Book Year 6 (3B) NK 4 Page 43 (rounding to the nearest 10, 100 and 1000) NK 7 Page 76 (rounding decimals) NC6- 8 (rounding to 1 decimal place) Chapter 2 Pages 45 to 50 (whole chapter) (checking answers by estimating) Chapter 4 Pages 88 and 89 (estimating answers to decimal addition and subtraction) NC6-9 and 10 (estimating the answers to multiplication and division problems and using benchmarks)	Book Year 6 (3B) NK 4 TRS 141, 142 NK 7 TRS 144 Chapter 2 TRS 7, 8, 9 TRS 10 What number might I have been? TRS 11 Which estimate is best? ET 1, 2, 3, 4 Chapter 4 TRS 21 Rounding practice with decimals ET 4
Notes to teachers are on the next page		

Notes to teachers

- 1 Use the material in the order in which it is given in column two. It is sensible cover the rounding first before estimating material because rounding is needed in order to estimate.
- 2 Understanding rounding and estimating sensibly is dependent on a strong understanding of place value. You may need to revise this.
- 3 A good way to illustrate rounding is using a number line. It is a visual way of showing that a number is closer to one end of the line than the other. Encourage students to draw the number lines themselves when rounding. NOTE There are a variety of **number lines** included in our generic printable masters online at this link. **Scroll to the bottom for the generic printable masters.**
- 4 Point out that in the case of numbers that end with 5, halfway between, it is the convention to round up.
- 5 Connect rounding with:
 - known benchmarks (e.g., doubles, halves, multiples of 10), to make estimations and check calculations.
 - rounding to an appropriate unit in measurement situations.
- 6 Explain how to use families of facts to 'work backwards' (e.g., $7 \times 8 = 56$, so $56 \div 8 = 7$).
- 7 When rounding to the nearest whole number It is important that students see examples of decimals above 1 as well as between 0 and 1.
- 8 Thinking about rounding to a whole number of dollars helps students to focus on rounding to whole numbers.
- 9 Encourage students to round sensibly by thinking about the context and the accuracy to which the answer would normally be given. For example, you can't have 2.3 humans as that is not sensible. It would also not be sensible to say that the width of a desk, when calculated, was 1.6874 m as no one measures to this accuracy.
- 10 When numbers that have been rounded to the nearest tenth, for example, end up with no tenths, it is important to put 0 in the tenths place so that everyone knows the number has been rounded to the nearest tenth and not to the nearest whole number. For example, 5.03 to the nearest tenth is 5.0 not 5. This is important in many practical situations. Imagine if a 5 m van could fit in a space but it would not fit if it was 5.1 m. Anyone being told the van was 5 metres long might assume that it *could* be anything **up to** 4.99999... m, if it had been rounded to the nearest metre, but if the length was written as 5.0 m then it would be known that it could be no longer than 5.04 m
- 11 When smaller decimals are involved sometimes rounding to the nearest whole number to estimate is not very helpful when checking answers. It is sometimes better to round to one decimal place.
- 12 **ET 3 from Chapter 2 links estimation and statistics.**
- 13 **ET 4 from Chapter 2 links estimation to perimeter.**

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NUMBER OPERATIONS		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
add and subtract any whole numbers	Book Year 6 (3B) NK 3 Page 20 (addition and subtraction basic facts) Chapter 1 Pages 27 to 42 (whole chapter) (using horizontal methods) Chapter 3 Pages 51 to 66 (whole chapter) (using vertical methods)	Book Year 6 (3B) NK 3 TRS 140 ET 4 Chapter 1 TRS 2, 5 ET 1, 2, 3, 4 Chapter 3 TRS 13 TRS 14 Step by step short-hand addition TRS 16 TRS 17 Step by step short-hand subtraction TRS 12, 13, 15, 16, 18, 19 ET 2 More addition and subtraction practice ET 1, 4
Notes to teachers are on the next page		

Notes to teachers

- 1 Before students can calculate with larger numbers using horizontal and vertical methods, they need to be able to quickly recall the basic addition and subtraction facts to 20.
- 2 Encourage students to practise basic facts often at home. Games are an engaging way of doing this.
- 3 For the game in **Year 6 (3B) NK 3 page 21** you could have a grid between two students and get them to race to colour the most numbers with their coloured highlighter. They could check each other's answers.
- 4 You may want to pick and choose questions from **Chapter 1** rather than teach specific strategies and then practice them.
- 5 Explain and represent addition and subtraction using materials such as PV materials and number lines.
- 6 Explain and connect:
 - the horizontal method and the vertical-column method when teaching addition or subtraction
 - making estimates or mental calculations using place value partitioning, and known facts.For example to estimate the answer to $456 + 810$ you could round 456 to 460 and then partition to get $400 + 800 + 60 + 10 = 1200 + 70 = 1270$.
- 7 **TRS 13 to 17** online give you displayable resources that take students through adding and subtracting using vertical methods step by step. The links for 14 and 17 are in column three and again below.

TRS 14 Step by step short-hand addition

TRS 17 Step by step short hand subtraction

Link to online teacher notes for Chapter 3 (all sections)

If you have our stage series you could use these for further practice.
Stage 6 page 82 and 86 to 89 (standard written form)

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NUMBER OPERATIONS		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
recall multiplication facts to at least 10×10 and corresponding division fact	Book Year 6 (3B) NK 10 Pages 101 to 106 (multiplication and division basic facts) Chapter 10 Page 192 (patterns in multiples) NC6-11 (Generalising number patterns)	Book Year 6 (3B) NK 10 TRS 147 (Face down game)
Notes to teachers		
- Using NK 10 to ascertain what students do and do not know is a good idea but it is not enough in itself to practice these basic facts. NK 10 may have been done in a previous objective. - It is important to practise these facts frequently so that they can move from short-term memory into long-term memory. - Students may have played the games in NK 10 in Year 5 (supplementary material Year 5) but they are still appropriate for practising basic facts at Year 6. - Committing to recall, multiplication and corresponding division facts needs to be practised regularly. Online games or tables practice are available at this link. NC6-11 - This sheet investigates patterns in the multiples of times tables and helps students to generalise multiplication problems beyond recalled facts by looking for patterns.		

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NUMBER OPERATIONS		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
multiply multi-digit whole numbers (e.g., 54×112)	Book Year 6 (3B) Chapter 5 Pages 107 to 114 (easier multiplication practice – 2-digit by 1-digit) NC6-12 to 14 (multiplying multi-digit whole numbers)	Book Year 6 (3B) Chapter 5 TRS 35

Notes to teachers

- Students need to know their basic facts for multiplication and division. Frequent/daily practice is the best way to ensure that these facts move from short-term memory to long-term memory. You could use flash cards or games.
- The multiplication in **Year 6 (3B) Chapter 5** is easier than that of the objective but can be used as an introduction and revision of multiplication.
- Explain and demonstrate:
 - the vertical-column method for division and multiplication, ensuring students understand and practise the procedure and connect with place value, known facts, and estimation
 - making estimates or mental calculations by connecting to place value, partitioning, and known facts.
- Remind students to always estimate the answers first.
- When teaching the multiplication on **NC6-12 to 14** it is helpful to relate this to place value partitioning. In the example on **NC6-12**, 76 is partitioned into $70 + 6$.
- Multiplying a 3-digit number by 70 could be challenging for some students so in the example on **NC6-12**, 423 could also be partitioned into $400 + 20 + 3$ and then each of these multiplied by 70.
- Students may need revision on how to multiply by a tens number such as 70. This goes hand in hand with an understanding of place value. It is important for students to understand that when a number is multiplied by 10, each digit moves one place to the left on the place value chart because each place to the left on a place value chart is ten times larger. You could teach the objective “*multiply and divide numbers by 10 and 100 to make decimals and whole numbers*” which is listed later and use **NK 9** on **page 81 of Year 6 (3B)**. It is important not to teach students to ‘add a zero’ when multiplying by 10 because this doesn’t work with decimal numbers and doesn’t promote understanding of multiplying by 10 etc.
- Connect multiplication with perimeter, area and volume.
- When using the area method this is using the distributive property. It is up to you whether you use this terminology with students.

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NUMBER OPERATIONS		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
divide up to four-digit whole numbers by a 1-digit divisor, with a remainder (e.g., $198 \div 7$; $4154 \div 8$)	Book Year 6 (3B) NK 10 Pages 101 to 106 (multiplication and division basic facts) Chapter 5 Pages 115 to 117 (area model) Pages 118 to 122 (mixed practice of easier multiplication and division) NC6–15 to 17 (dividing by a 1-digit number with remainders) Book Year 6 (3B) Chapter 8 Pages 162 to 164 (division with fractional remainders) Chapter 6 Page 123 (whole chapter) (solving problems using all four operations)	Book Year 6 (3B) Chapter 5 TRS 44 Chairs TRS 43 Remainders TRS 38, 39, 41, 43, 47 ET 1 Interpreting remainders ET 4 Cross number puzzle ET 2, 3 Chapter 6 TRS 48, 49, 50, 51
Notes to teachers are on the next page		

Notes to teachers

- 1 Cover the material in the order in which it is listed in the column two.
- 2 Students need to know their basic facts for multiplication and division. Frequent/daily practice is the best way to ensure that these facts move from short-term memory to long-term memory. You could use games or flash cards etc
- 3 There are some problems where students are asked to divide by a two-digit number. It is expected that strategies other than vertical strategies will be used to answer these.
- 4 Students may need practice at partitioning numbers.
- 5 When working through the worked example on sheet **NC6–16** it is useful to use materials alongside the worked example so that students understand the idea of renaming, for example 1 hundred as 10 tens and 4 tens as 40 ones.
- 6 **Year 6 (3B) Chapter 8 pages 162 to 164** gives teaching and practice at showing remainders as a fraction. It is important to show students that remainders can be shown as a whole number remainder, as a fraction or as a decimal. The choice of how to give a remainder depends on the context. For example, if the remainder is about how many students are left over then giving it as a whole number is most useful. If it is a measurement then it is more useful to give the remainder as a fraction or decimal.
- 7 Remind students to always estimate the answer first.
- 8 **Year 6 (3B) Chapter 6** gives practice at solving problems using all four operations. Students should have a good understanding of, and practised all four operations. This chapter provides a useful check that students can choose the correct operation, or operations, to solve a problem.
- 9 Remind students to check their division answers using multiplication.
- 10 In a later objective, “Use known multiplication and division facts to scale a quantity”, the connection will be made between proportional reasoning and multiplication and division.
- 11 You could show this website before doing **Activity 2 question 1 on page 129 of Year 6 (3B)**.
<https://www.wakaama.co.nz/>

If you have the stage series you could use these for further practice
Stage 7/1, pages 110 to 113

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NUMBER OPERATIONS		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
use the order of operations rule with grouping, addition, subtraction, multiplication, and division	NC6-18 to 20 (order of operations) NC6-21 and 22 (properties of addition, subtraction, multiplication and division)	Book Year 6 (3B) Chapter 9 ET 5
Notes to teachers		
1 GEMA is a different acronym for BEDMAS or BEMDAS. GEMA stands for G = grouping E = exponents M = multiplication and/or division A = addition and/or subtraction NOTE Tell students to ignore the E for exponents this year but this will be explained in a later year. 2 Remind students to work from left to right with each operation. So for example when working with the M which stands for multiplication and division, work from left to right doing the multiplication and division in the order in which they occur. 3 Use worked examples to demonstrate a step-by-step layout with one equal sign per line. See NC6-18. 4 You might like to refer to NC6-46 for the algorithm for order of operations For NC6-21 to 23 1 Some students have difficulty with multiplying by zero. Remind them that 0×4 means 0 groups of 4 so that is 0. 2 Knowing the principles of the commutative, associative and distributive properties underpins solving and forming equations and writing expressions as well as other algebraic manipulation in later years. Students are not required to remember the names of these properties but be able to use them. 3 It is important that students know that the commutative and associative properties only work for addition and multiplication.		

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NUMBER RATIONAL NUMBERS		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
identify, read, write, and represent fractions, decimals (to two places), and related percentages	Book Year 6 (3B) NK 12 Page 137 (fractions revision) NK 5 Pages 67 to 71 (fractions and decimals) NK 6 Pages 72 to 75 (nested place value with decimals) NC6 23 and 24 (percentages)	Book Year 6 (3B) NK 5 TRS 143

Notes to teachers

- 1 Use the material in the order in which it is listed in column two.
- 2 Have students practise saying, reading, and writing decimals using decimal PV houses.
- 3 Connect fractions and decimals with the measurement system. The rationale numbers section provides numerous opportunities to point out the connection between decimal place value and measurement. Investigate situations where decimals are used (e.g., in measurements at a sports day).
- 4 Decimal place value was covered in a previous objective in **NK 1 pages 15 to 17** of the **Year 6 (3B)** book.
- 5 Understanding how decimals and fractions with denominators of 10, 100, 1000 etc relate to each other is key to understanding decimals. Illustrating this with a variety of materials such as place value blocks, tens and hundreds frames, deci-pipes etc will help.

For NK 6

- 1 Nested place value underpins much of working with numbers. It is important that students understand nested place value so that they can rename numbers when adding, subtracting, multiplying and dividing large numbers, or those with decimals.
- 2 Working with materials that have been clearly explained is a very good way to help students understand this concept. Encourage students to continue using materials until they are confident with nested place value.

Link to online teacher notes for NK 12

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NUMBER RATIONAL NUMBERS		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
compare and order fractions, decimals (to two places), and percentages and convert decimals, and percentages to fractions	Book Year 6 (3B) NK 8 Pages 79 and 80 (ordering decimals) Chapter 7 Pages 138 to 144 (converting between fractions, decimals and percentages) NC6–25 and 26 (Converting decimals and percentages to fractions) NC6–27 (Ordering fractions, decimals and percentages on number lines)	Book Year 6 (3B) NK 8 TRS 145 Chapter 7 TRS 55, 58,
Notes to teachers		
1 Use the material in the order in which it is listed in column two. 2 Students must understand decimals and what they mean before attempting to compare them. If necessary revise decimal place value. 3 Working with materials, such as deci-mats or deci-pipes, and diagrams, such as number lines, helps with understanding of decimal comparisons. 4 Showing decimals, fractions and percentages on triple number lines as in NC6–27 helps students see the comparison between them. It is important to point out that percentages relate to fractions and decimals between 0 and 1, and that $100\% = 100/100 = 1$ 5 Before converting between decimal, fractions and percentages, students need to understand each fully and understand how they relate to each other. Decimals arise from fractions with denominators of 10 and 100 as shown using place value houses, and percentages are fractions with denominators of 100. 6 Encourage understanding of this topic rather than rote learning of rules for how to convert between decimals and fractions. 7 Ask students to think why percentages are useful in everyday life, such as describing how full or empty something is, or as discounts. Encourage them to think of them as an amount out of 100 as this is easier to visualise. Hundreds decimats are useful for this.		

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NUMBER RATIONAL NUMBERS		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
multiply and divide numbers by 10 and 100 to make decimals and whole numbers (e.g. $1.3 \times 10 = 13$)	Book Year 6 (3B) NK 9 Pages 81 to 84	Book Year 6 (3B) NK 9 TRS 146 Multiplying and dividing by 10, 100 and 1000.
Notes to teachers		
- It is important for students to understand that when a number is multiplied by 10, each digit moves one place to the left on the place value chart (Increasing the place value of the digit) because each place to the left on a place value chart is ten times larger. Similarly dividing by 10 moves each digit one place to the right on a place value chart (decreasing the value of the digit). - It is important not to teach students to ‘add a zero’ when multiplying by 10 because this does not work with decimal numbers and does not promote understanding of multiplying by 10 etc. - Connect this objective to measurement. When multiplying or dividing measurements, or converting between measurements, amounts often must be multiplied or divided by 10 or 100. Example $5.1 \text{ cm} = 5.1 \times 10 \text{ mm} = 51 \text{ mm}.$		

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NUMBER RATIONAL NUMBERS		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
for fractions with denominators of 2, 3, 4, 5, 6, 8, 10, 12, or 100: – compare and order the fractions – identify when two fractions are equivalent – represent the fractions in their simplest form	Book Year 6 (3B) Chapter 8 Pages 152 to 154 (equivalent fractions) NC6-28 to 30 (comparing and ordering fractions using benchmarks and number lines) NC6-31 (simplifying fractions)	Book Year 6 (3B) Chapter 8 TRS 61 What Benny ate TRS 60 ET 1, 2, 3
Notes to teachers		
1 Use the material in the order in which it is listed in column two. 2 It is important that students understand that the equals sign means that the two fractions, one on either side of it, have the same value i.e. represent the same fractional amount. 3 Using diagrams and materials is a good way of ensuring students understand the concept of equivalent fractions and therefore understand why multiplying or dividing both numerator and denominator by the same number gives an equivalent fraction. For example $\frac{2}{4} = \frac{1}{2}$. The numerator AND denominator in $\frac{2}{4}$ are both twice as large as the numerator and denominator in $\frac{1}{2}$. NOTE You may want to give students a copy of the fraction wall. 4 Use a fraction wall or diagrams to illustrate simplifying fractions. Simplifying fractions means finding an equivalent fraction where the numerator and denominator can no longer be divided by the same number, except 1.		

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NUMBER RATIONAL NUMBERS		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
convert between improper fractions and mixed number	Book Year 6 (3B) NK 11 Pages 135 and 136 (skip counting in fractions) Chapter 8 Pages 157 to 160 (converting between improper fractions and mixed numbers)	Book Year 6 (3B) Chapter 8 TRS 65 The change TRS 67
Notes to teachers		
- It is useful for students to see the conversion between mixed numbers and improper fractions visually using fraction tiles or fraction diagrams. - Students need to know that when any fraction has the same numerator and denominator it equals one whole. This makes it easier to appreciate that when the numerator is larger than the denominator the fraction will be larger than 1. - Represent improper fractions using words and materials, and place them on a number line. - Explain conversions from an improper fraction to a mixed number as a division with a remainder (e.g., $\frac{15}{6}$ is 15 divided by 6 = 2 with 3 remainder = $2\frac{3}{6} = 2\frac{1}{2}$, in it's simplest form. To convert from mixed numbers to improper fractions use a multiplication plus a remainder (e.g., $3\frac{2}{5}$ is = $\frac{(5 \times 3 + 2)}{5} = \frac{17}{5}$) - At this point, students often become aware for the first time that a fraction can lie anywhere on a number line and not only between zero and one. The use of area models (fraction diagrams), fraction circles and number lines are particularly helpful tools to develop this understanding. - It is helpful if students skip count in fractions, for example, one quarter, two quarters, three quarters, four quarters, five quarters, six quarters and so on so that they realize that once		
Link to online teacher notes for Chapter 8 (“Mixed fractions and improper fractions” page 157)		

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NUMBER RATIONAL NUMBERS		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
- find a fraction or percentage of a whole number where the answer is a whole number (e.g., $\frac{3}{8}$ of 48; 30% of \$150) - identify, from a fractional part of a set, the whole set	Book Year 6 (3B) Chapter 7 Pages 145 to 148 (finding a fraction or percentage of a whole number) Chapter 8 Rich Task Page 151 (find the whole given the part) NC6-32 (finding fractions and percentages of, using benchmarks and known facts) NC6-33 and 34 (finding the whole given the part)	Book Year 6 (3B) Chapter 7 TRS 57 TRS 59 ET 1 Percentage smorgasbord ET 2 Shop smart ET 3

Notes to teachers

- Use the material in the order in which it is listed in column two.
- It is important that students understand the meaning of percentages. i.e that per cent means out of 100 and that for example 20% means 20 out of 100 or $\frac{20}{100}$. All percentages, 100% or less, represent an amount between 0 and 1.
- Students often find percentages difficult because they don’t understand that they are fractions with a denominator of 100 and therefore they behave the same way as fractions.
- Connect percentages to benchmarks such as 25% is $\frac{1}{4}$ so to find 25% divide by 4 and to find 50% divide by 2 etc.
- Point out that percentages can be greater than 100% just as fractions can be greater than 1. For example, 120% means $\frac{120}{100}$ or 1.2. So if you had 120% of an amount the answer would be greater than the amount.
- Finding a percentage of an amount is used in a lot of calculations involving money for example discounts, profit and loss etc. Point this out to students. This is expanded upon in a later objective.

For NC6-33 and 34

- Diagrams such as bar models are the best way to show how to find the whole given the fraction. Students are familiar with pizza for example and so if they know what $\frac{1}{4}$ of a pizza looks like they would be able to find what the whole pizza looks like. Similarly with fraction strips.
- A bar like the ones in the example on **NC6-33** show what you know already about the whole and what the missing parts are. Draw the bar and divide it into the parts you know for example that $\frac{1}{3}$ are girls. Then you know that 18 are boys so this must represent the other $\frac{2}{3}$. The missing bits can then be filled in.

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NUMBER RATIONAL NUMBERS		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
add and subtract fractions with the same or related denominators (e.g., $\frac{1}{4} + \frac{1}{8}$)	Book Year 6 (3B) Chapter 8 Page 161 (adding and subtracting fractions with the same denominator) NC6-35 and 36 (adding and subtracting fractions with related denominators)	Book Year 6 (3B) Chapter 8 TRS 69, 70
Notes to teachers - Students often don’t understand why the numerators are added (or subtracted) but not the denominators when adding (or subtracting) fractions with the same denominators. It is best to show why, using diagrams such as fraction walls. The denominator gives the name of the parts, for example tenths or eighths or fifths etc., and the numerator gives the number of parts. You add together the number of parts but the name of the parts stays the same. - When adding and subtracting fractions with related denominators it is important to stress that you can’t add or subtract say quarters and halves by adding the numerators because the parts have different names. It would be like trying to add apples and oranges together. One of the fractions must be renamed by changing it into an equivalent fraction so the name of the parts is the same as the other fraction. So for example $\frac{1}{4}$ becomes $\frac{2}{8}$. Use a fraction wall to show this equivalence. THEN, once the denominators are the same the numerators can be added. Link to online teacher notes for Chapter 8 (adding and subtracting fractions with the same denominator – page 161)		

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NUMBER RATIONAL NUMBERS		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
add and subtract whole numbers and decimals to two decimal places (e.g. $250.11 + 135.29 = 385.4$)	Book Year 6 (3B) Chapter 4 Pages 90 to 100 (adding and subtracting decimals to 1 d.p.) NC6-37 to 39 (adding and subtracting decimals to 2 d.p.)	Book Year 6 (3B) Chapter 4 TRS 23, 24, 25, 26, 27, 28, 29, 33 ET 1, 2, 5
Notes to teachers		
1 Relate adding and subtracting decimals vertically to adding and subtracting whole numbers vertically. 2 It is important that students understand why the decimal points must line up i.e. so that digits with the same place value are underneath one another. Remind students that hundredths must be added to hundredths and tenths to tenths and ones to one etc. 3 You may need to revise renaming numbers so that students understand that when, for example, they add 6 tenths and 5 tenths and get 11 tenths that this is 1 one and 1 tenth so the 1 one is put in the ones column and the 1 tenth in the tenths column. 4 Relate adding and subtracting decimals to measurement.		
Link to online teacher notes for Chapter 8 (adding and subtracting decimals to 1 d.p. – all of the sections about adding and subtracting decimals – from pages 90 to 98)		

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NUMBER RATIONAL NUMBERS		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
use known multiplication and division facts to scale a quantity	Book Year 6 (3B) Chapter 8 Getting started Page 138 Boxing Day sale (percentage discounts) Pages 165 and 166 (equivalent ratios (scaling)) NC6-40 and 41 (scaling quantities)	Book Year 6 (3B) Chapter 13 ET 9
Notes to teachers		
1 Use the material in the order in which it is listed in column two. 2 Connect this objective to multiplication and division, 3 The equivalent ratios in book Year 6 (3B) Chapter 8 pages 165 and 166 require similar multiplicative thinking as in scaling quantities and are good practice at this. • Encourage students to see the patterns in the tables used to solve these problems. • Point out or draw out the multiplicative thinking needed to solve the problems using double number lines. 4 Scaling is often used when needing to change recipes for a different number of people or for working out real life distances on maps. 5 Point out the multiplicative relationship in scaling, i.e. when you scale a quantity you need to use multiplication or division to do so.		

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NUMBER FINANCIAL MATHEMATICS		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
- solve problems involving purchases (e.g., ensuring they have enough money) - create simple financial plans (e.g., shopping lists, a family budget)	NC6-42 (money)	
Notes to teachers		
- Look for opportunities to cover this topic by using situations relevant to your students such as the ones given on NC6-42. There may be other situations that are more relevant such as: - A budget for the school fair - A budget or cost of a hāngī - Costs/budget for a school trip or outing - Cost/budget for a school fundraiser - Connect this topic to rounding and estimating, addition subtraction, multiplication and division and percentages and fractions. - Connect this topic to finding percentages and fractions of quantities as these are used when working out discounts, budgets and profit and loss etc - Have students practise grouping denominations and making amounts using play money, connecting with place value, skip counting, and multiplication. - Investigate authentic financial situations and represent findings using equations, spreadsheets, and tables.		

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ALGEBRA EQUATIONS AND RELATIONSHIPS		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
form and solve true or false number sentences and open number sentences involving all four operations, using equality or inequality (e.g., $8 \times 7 < 8 \times 5 + 8$ (T or F?))	Book Year 6 (3B) Chapter 9 Pages 167 to 178 (whole chapter) (equations and relationships) NC6-43 (greater than and less than)	Book Year 4 (2B) Chapter 9 ET 3 Book Year 6 (3B) Chapter 5 TRS 36 Pick the false ones
Notes to teachers		
1 Use the material in the order in which it is listed in column two. 2 Once students understand the equals sign, it is a fairly small step for them to understand what the equality signs, $<$ and $>$, mean. Remind them that the smaller end points to the smaller amount, for example $3 < 6$ and $6 > 3$. 3 Explain the difference between an expression (e.g., 3×6), an equation (e.g., $3 \times 6 = 18$), and an inequality (e.g., $3 \times 6 < 4 \times 6$). Have students practise the use of equal and inequality symbols. 4 In the expression $3n + 2$, the n is called a variable and the 2 is called a constant.		
Link to online teacher notes for Chapter 9		

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ALGEBRA EQUATIONS AND RELATIONSHIPS		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
use tables, XY graphs, and diagrams to recognise relationships in a linear pattern, develop a rule for the pattern in words (i.e. that there is a constant amount of change between consecutive elements or terms) and make conjectures about further elements in the pattern	NC6-44 (language of patterns) Book Year 6 (3B) Chapter 10 Pages 182 to 191 (rules for growing patterns) Page 193 (starting at number patterns) Page 194 (rules for number patterns)	Book Year 6 (3B) Chapter 10 TRS 86 Patterns in graphs
Notes to teachers		
NC6-44 has been put before the work in the chapter from book Year 6 (3B) because it introduces students to the language of patterns and you may want to use this language when working through Chapter 10. - You could go online and search for Tīvaevae patterns. These are treasured quilts made by women in the Cook Islands. Tīvaevae are made from brightly coloured fabrics, and designs can include geometric shapes, flower and animal designs. Ask students to describe how these patterns have been made. - XY graphs are graphs that have a horizontal axis (the X-axis) and a vertical axis (Y- axis) such as the graph in the example on page 294 of Year 6 (3B). This is an XY graph. Link to online teacher notes for Chapter 10 (sections “finding the rule for a growing pattern” page 182 and “using graphs and table to describe a growing pattern” page 188)		

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ALGEBRA ALGORITHMIC THINKING		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
create and use algorithms for making decisions that involve clear choices	NC6-45 and 46 (algorithms)	
Notes to teachers		
1 Once students understand how to put together an algorithm you could get them to choose an activity relevant to themselves and create an algorithm for it. They could then share this with the rest of their group or class and see if everyone agrees that all the steps and decisions have been included. Ideas for algorithms are: • Giving directions or finding the most efficient path to somewhere • Finding the way through a maze • Sorting shapes using multiple characteristics • Adding or subtracting two numbers • Multiplying or dividing two numbers • Making a pattern • Deciding which transformation was used to make a pattern • Finding factors or multiples 2 Ask students to explain and justify how their chosen procedure was broken into steps, the order of the steps, whether there were any errors or omissions, and, if so, how they were corrected.		

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MEASUREMENT MEASURING		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
- estimate and then accurately measure length, mass (weight), capacity, temperature, and duration, using appropriate metric units or a combination of units - select and use the appropriate unit and tool for the task and the attribute being measured - convert between common metric units for length, mass (weight), and capacity; and use decimals to express parts of wholes in measurements - visualise, measure, and draw (to the nearest degree), the amount of turn in angles up to 360 degrees	Book Year 6 (3B) Chapter 13 Pages 224 to 238 (whole chapter) (measures) NC6-47 (reading a scale to the nearest ...) NC6-48 (temperature) NC6-49 to 51 (measuring and drawing angles)	Book Year 6 (3B) Chapter 13 TRS, 95, 99, 100 ET 1, 3, 4, 5
Notes to teachers are on the next page		

Notes to teachers**Link to online teacher notes for Chapter 13**

- 1 Allow for plenty of practise at practical measuring situations where students have multiple opportunities for the accurate use and reading of rulers, scales, timers, thermometers, and measuring jugs.
- 2 Students should know the units centimetres, metres, millimetres, grams, kilograms, litres, millilitres, and degrees Celsius.
- 3 Discuss the meaning of measurements in context. Explain the use of benchmarks in measurement and prompt students to develop them (e.g., “A big step is about a metre, so roughly how long is our classroom?”)
- 4 It is important that students get practice at, and can justify, the use of appropriate metric units or tools for measuring a given attribute with the precision necessary for the problem, noting that using smaller units provides more accuracy.
- 5 It is useful for students to understand prefixes (e.g., milli-, centi-), how they connect metric units, and how they are based on powers of ten and relate to place value.
- 6 Students should know how measures can be partitioned and combined like other numbers, and how smaller units are created by equally partitioning larger units.

Notes for specific supplementary pages:**NC6–47**

Connect “Reading a scale to the nearest ...” with rounding.

NC6–48

If you do not want water and ice in the classroom, you could ask students to do **questions 2 and 3** on this page at home or you could do it outside. You could use the school pool, a puddle or water from a tap to estimate and then measure the temperature.

NC6–49 to 51

- 1 When the arm of an angle is not long enough to reach the scale on the protractor, put a ruler along the edge of the arm and read the scale where the ruler crosses it.
- 2 It is important that students realise that a protractor has a clockwise and anticlockwise scale. Encourage students to estimate the size of the angle first, for example is it less than or more than a right angle. If they choose the wrong scale it will be immediately evident that their reading is not close to their estimate.
- 3 Students sometimes put the protractor in the wrong place. Encourage them to check that the centre of the protractor is at the vertex (where the two arms meet) of the angle and that the bottom line of the protractor is along one arm.
- 4 Show students different angles using physical and digital tools and angles in the environment, comparing and classifying them as acute, right, reflex, or obtuse.
- 5 Make connections between angles, fractions of a circle, and turns.

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MEASUREMENT MEASURING		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
convert between units of time and solve duration-of-time problems, in both 12- and 24-hour time systems	Book Year 6 (3B) Chapter 11 Pages 195 to 208 (whole chapter) (time problems and timetables) NC6-52 (converting between units of time) NC6-53 to 55 (24- hour time)	Book Year 6 (3B) Chapter 11 TRS 88 Units of time TRS 89 ET 2, 3
Notes to teachers 1 Use the material in the order in which it is listed in column two. 2 The units of time do not follow base 10 rules in that instead of working in tens, it works in 60s and 12s etc. It is helpful when multiplying or dividing by 60 to know multiplying and dividing by 10. 3 Students should know the relationships between the units of time (e.g., 60 seconds to the minute, 60 minutes to the hour, 24 hours in a day, 365 days in a year), and use them to convert between units of time. See TRS 88 Units of time to remind students of this. 4 A number line is helpful for working out the duration between times. Students need to know the relationships between the units of time to be able to correctly use a number line. 5 Knowing 24-hour time is useful for timetables (especially overseas). Often digital clocks show 24-hour time. Make sure students understand that it is just another way of depicting am/pm time. 6 You could ask students to Investigate using calendars, timetables, schedules, and number lines to work out the time between two events or the duration of an event. Explore solar calendars (e.g., Roman, Gregorian) and lunar calendars (e.g., maramataka Māori, Chinese). Link to online teacher notes for Chapter 11		

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MEASUREMENT PERIMETER, AREA AND VOLUME		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
visualise, estimate, and calculate the area of rectangles and right-angled triangles (in cm^2 and m^2) and the volume of rectangular prisms, by applying multiplication	Book Year 6 (3B) Chapter 12 Page 209 (whole chapter) (perimeter, area, volume) NC6–56 to 58 (areas of rectangle and squares and right-angled triangles using the formula and multiplication)	Book Year 6 (3B) Chapter 12 TRS 91, 92, 93 ET1, 2, 5, 6 ET 7 More perimeter area and volume problems
Notes to teachers		
- Use the material in the order in which it is listed in column two. - Point out the link to multiplication when calculating areas as a number of rows of squares and remind students that they can multiply in any order (commutative property). - Give students lots of practical measuring situations and connect: - finding area with multiplication arrays - finding area and volume with the commutative property of multiplication - how part-units can be combined using number concepts, when finding the area of a shape - Encourage students to have clear laid out working when calculating perimeter, area and volume. This particularly important when calculating for complex shapes to ensure that they include all required parts of the shapes. Link to online teacher notes for Chapter 12 For sheets NC6–56 to 58 - Connect the area of a right-angled triangle with half the area of a square or rectangle. - These pages use the formulae for area of a rectangle, square and right-angle triangle to find the area. Relate the formula back to counting squares and why the formula works. The practical on NC6–57 can be used to show this. It is important that students understand where the formula comes from rather than just learn it by rote. - Remind students to always put units with their answer. Sometimes students don’t put the exponent on the units so for example m instead of m^2. The units are squared because two lengths are being multiplied together and so the units are also multiplied together.		

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GEOMETRY SHAPES		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
classify, identify, and explain similarities and differences between: – 2D shapes, including types of triangle – prisms and pyramids	Book Year 6 (3B) Chapter 14 Pages 239 to 249 (2D shape) Chapter 15 Pages 251 to 253 (3D shapes) Pages 255 to 257 (begin at properties of 3D shapes) NC6–59 and 61 (similarities and differences between shapes)	Book Year 6 (3B) Chapter 14 TRS 107 (shapes and properties) TRS 108, 109 ET 1 Draw and describe ET 2, 3, 4, 5
Notes to teachers		
1 Use the material in the order in which it is listed in column two. 2 Use a range of 2D and 3D shapes, including tactile shapes, diagrams, student-made constructions, and digital shapes when looking for similarities and differences between shapes based on their attributes Link to online teacher notes for Chapter 14 Chapter 11 (3-D shapes page 254) For sheet NC6–59 and 61 1 For students to be able to classify shapes according to their properties an understanding of angles, line and rotational symmetry is needed. It is helpful if students have copies of the shapes so that they can fold them and turn them and measure them. 2 Connect sorting and classifying shapes to algorithms. Students could refer to NC6–46.		

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GEOMETRY SHAPES		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
identify and describe the interior angles of triangles and quadrilaterals	Book Year 6 (3B) Chapter 14 Page 250 (angles in a triangle) NC6 –62 (interior angles of shapes)	
Notes to teachers		
- Cover the material in the order in which it is listed in column two. Year 6 (3B) page 250 introduces students to the fact that the three angles of a triangle add to 180° which is the same as the angles on a straight angle. - Knowing the interior angles of shapes is helpful when building or designing. - Students can sometimes get the names of angles confused. It is useful to refer to angles by their names such as obtuse, reflex, acute and right as part of everyday language. NC6–62 and 63 - Have students Investigate interior angles using digital tools and paper shapes to generalise that the interior angles of a triangle add to 180° and those of a quadrilateral add to 360°. - Connect what they have discovered to ideas about right angles, straight lines, and full turns.		

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GEOMETRY SPATIAL REASONING		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
visualise and draw nets for rectangular prisms	Book Year 6 (3B) Chapter 15 Pages 258 to 260 (nets)	Book Year 6 (3B) Chapter 15 TRS 112 The net result NOTE this gives you the templates for the nets to print.
Notes to teachers		
1 If you go online to book Year 7 (3B) Chapter 15, TRS 112 gives you the templates for the nets to print off and you can ask students to identify the edges, vertices and faces.		
Link to online teacher notes for Chapter 15 (Nets page 258)		

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GEOMETRY SPATIAL REASONING		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
visualise, create, and describe 2D geometric patterns and tessellations using rotation, reflection, and translation, and identifying the properties of shapes that do not change	Book Year 6 (3B) Chapter 17 Pages 275 to 277 Pages 281 to 289 (transformations) NC6-63 and 64 (properties that do not change with each transformation)	Book Year 6 (3B) Chapter 17 TRS 124 Patterns of the pacific TRS 125 How was I made? TRS 126 Pretty patterns
Notes to teachers		
1 Use the material in the order in which it is listed in column two. 2 From Year 6 (3B) pages 285 and 286 ask students to identify which properties change such angle size, shape, lengths, orientation. 3 The material on pages 278 to 280 on enlargement have been used in the supplementary material for Year 5. If required you could use some of it to revise enlargement. Link to online teacher notes for Chapter 17 (whole chapter) For NC63 and 64 1 These pages help generalise the properties that do not change under certain transformations: • For reflection, angles, area and lengths of sides do not change. • For rotation, angles, area and lengths of sides do not change. • For translation, angles, area, lengths of sides and orientation do not change. • For enlargement, angles and orientation do not change. 2 Students often say that angles do change with an enlargement so you could ask them to measure the angles to check and confirm that they are correct. 3 Connect quarter and half turns to 90° and 180° and full turns to 360°.		

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GEOMETRY PATHWAYS		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
- interpret and create grid references and simple scales on maps - use directional language, including the four main compass points, turn (in degrees), and distance (in m, km), to locate and describe positions and pathways	Book Year 6 (3B) Chapter 16 Pages 265 to 274 (whole chapter) (maps and scales)	Book Year 6 (3B) Chapter 16 TRS 115 TRS 116 Riccarton TRS 117 ET 1, 2 (extension), 3, 6, 7
Notes to teachers		
- Remind students that a quarter turn is 90 degrees, a half turn is 180 degrees and a full turn is 360 degrees. - Connect compass points and directional language with turns and angles, and simple scales with proportional reasoning. - Explain pathways using directional language, including te reo Māori (e.g., whakamua/forwards, whakamuri/backwards, whakamaui/to the left, whakamatau/to the right, raki/north, tonga/south, rāwhiti/east, uru/west). - A topographical map is a large scale map that shows natural and cultural features. The natural features could include lakes and rivers (blue), mountains and valleys (shown using orange contour lines connecting points of the same height), and forests (green). The closer together the contour lines the steeper the slope of the land. Cultural features include roads (red and orange lines), residential areas (grey), railways (black lines), and significant named features. Places can be located using grid references and distances calculated using the scale of the map. You could show this map of NZ and zoom in on various areas to demonstrate these features. Also, you could use the map to locate features in your local area. www.topomap.co.nz This objective is covered in more detail at Year 8.		
Link to online teacher notes for Chapter 16		

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STATISTICS PROBLEM, PLAN, DATA, ANALYSIS AND CONCLUSIONS AND STATISTICAL LITERACY		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
- use multivariate data to investigate summary, comparison, and time-series situations, by: – posing an investigative question – that can be answered with data – making conjectures or assertions about expected findings - plan how to collect primary data or how to use provided data, including identifying the variables of interest and, for provided data: – identifying who the data was collected from – identifying the original investigator’s purpose for collecting the data – deciding if the source is reliable (e.g by checking if survey questions appear to be biased towards a particular point of view) - collect primary data and check for errors and provide information about variables in secondary data (e.g. how data was collected for them and possible outcomes for them) - create and describe a variety of data visualisations to make meaning from the data, identifying features, patterns, and trends in context, including the variable and group of interest - answer the investigative question, comparing findings with initial conjectures or assertions and their existing knowledge of the world - identify, explain, check, and, if needed, improve features in others’ data investigations (e.g., biased survey questions, misleading information or statements).	Book Year 6 (3B) Chapter 18 Pages 290 to 308 (whole chapter) (displaying and analysing data) Chapter 19 Pages 309 to 322 (whole chapter) (surveys and collecting data) NC6-65 (collecting and analysing multi-variate data) NC6-66 (analysing other people’s data)	Book Year 6 (3B) Chapter 18 TRS 127 TRS 128 What can you tell? TRS 129, 130,131 ET 3 (more graph practice) ET 1 Chapter 19 ET 1, 2
Notes to teachers are on the following page		

Notes to teachers

- 1 You can choose to cover this material in one of two ways.
Either Follow the sequence of **chapters 18 and 19** where students learn to display and analyse data (chapter 18) first and then go on and do their own statistical investigation using the enquiry cycle (PPDAC)(chapter 19)
Or You could follow the order of objectives given in the curriculum where students work through the enquiry cycle step by step with their own investigations. This way you may need to stop and teach data visualisations and analysis as you go through the cycle.
- 2 The enquiry cycle is the same as **PPDAC** which stands for **P**ose, **P**lan, **G**ather **D**ata, **A**nalysed **D**ata and form **C**onclusions. There is a printable master of this in our generic printable master online in the Teacher support
- 3 It is more engaging if students ask questions that are of interest to them. Check that the questions students ask are sensitive to cultural, gender and any sensitive topics that might offend others. You could ask “do you think everyone in the class/school/group being asked would be happy to answer that question?” to make students consider this.
- 4 Make sure students choose suitable measures for their variables (what they are asking about). For example, if it is a measurement then ask what unit is most suitable and because students haven’t been introduced to group data, any measures would need to be to the nearest ... and also have a small enough range that each individual data point (each cm or m) can be put onto a table without having to be grouped.
- 5 Make sure students understand that the way data is collected or who from can affect the results. For example, if they only ask their friends this is not likely to represent the whole class or if they only ask their class it will not represent the school. Results can be skewed depending on who they ask.
- 6 Introduce students to how different data visualisations have different features and how some graphs are more suitable than others for particular variables. Students can learn this by trial and error as well by drawing several graphs for the same set of results and then discussing with others which representation is best.
- 7 It is really important that the whole process is analysed for possible errors, that data points that don’t seem to fit are investigated, and that the way data is collected and displayed does not lead to wrong conclusions.
- 8 Encourage students to check their data, graphs and analysis for errors and if necessary recollect the data or redraw the graph etc.
- 9 Make sure students can relate their conclusions to the original question or assertion or comparison.
- 10 When students look at their results, encourage them to decide if they answer the question, or agree/disagree with the assertion, or make the required comparison, or do they need to ask more questions or change the question.
- 11 When analysing frequency tables, you could point out that the result with highest frequency is the modal result. i.e the most frequently occurring result.

Link to online teacher notes for

Chapter 18 (all sections)

Chapter 19 (all sections)

Notes to teachers are continued on the next page

Notes to teachers continued**Misleading data and NC6–68**

There are plenty of example of misleading data visualisations on the internet and it is best to use up-to-date examples.

Graphs can be misleading in a number of ways, including:

- **Cherry-picking:** Selecting data points that support a certain view point, while excluding or intentionally omitting other data points. For example, a graph that shows cherry production in New Zealand, but only includes data from after a large spike in production at the start of the millennium.
- **Graphs not drawn to scale:** When the scale on the vertical axis doesn't increase by equal amounts, or doesn't show a scale at all.
- **Cropped graphs:** When a small scale is used on the vertical axis to make differences between groups appear larger. Often these scales do not start at 0.
- **Misleading pictograms:** When pictograms are used to make statistics more exciting, but don't accurately reflect the data. Larger pictures might be used to show one set of data than another for example.
- **Graphs with broken axes:** When the scale doesn't start at zero or has a gap in it, making it difficult to see small differences between bars.
- Using three-dimensional images to display data which distorts the relative sizes of the data represented.

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PROBABILITY INVESTIGATIONS AND CRITICAL THINKING IN PROBABILITY		
Teach students to	Connecting All Strands Year 6 (3B) and supplementary material references (NC6-...)	Go to www.caxed.co.nz and click on ‘teacher support’ to find the resources in this column
- engage in chance-based investigations, with equally likely outcomes, by: – posing investigative questions – anticipating and then identifying possible outcomes for the investigative question – generating all possible ways to get each outcome (a theoretical approach) or undertaking a probability experiment and recording the occurrences of each outcome – creating data visualisations for possible outcomes – describing what these visualisations show – finding probabilities as fractions – answering investigative questions – reflecting on anticipated outcomes – comparing findings from probability experiments and associated theoretical probabilities, if the theoretical model exists - identify, explain and check others’ statements about chance based investigations, referring to evidence	Book Year 6 (3B) Chapter 20 Pages 323 to 336 (whole chapter)	Book Year 6 (3B) Chapter 20 TRS 136 TRS 137 Can you work it out or do you have to collect some data? TRS 138 What are my chances? ET 1
Notes to teachers are on the next page		

Notes to teachers

- 1 Putting probabilities in order on **pages 326 to 328 of Year 6 (3B)** is not strictly indicated in the objective but you may choose to still use it because it does aid the understanding of probability.
- 2 The material referenced concentrates mainly on finding probabilities as fractions. Encourage students to convert these to a decimal or percentage if this is more sensible for the situation.
- 3 Encourage students to collect the results from their probability experiments in a table. This way fractions etc can clearly be worked out. If an experiment is carried out 100 times, then it is easier to work out the decimal or percentages for each outcome.
- 4 It is important for students to understand that some probabilities can be calculated theoretically, such as when tossing a die or coin, because the outcomes are all equally likely and clearly identifiable. Other probabilities can only be calculated by doing an experiment or collecting data, for example, the probability that the first student to arrive at school tomorrow will have come by car. This cannot be calculated theoretically. Data would need to be collected on how the first student to arrive at school each day got there.
- 5 It is also important to know that if a probability can be calculated and then an experiment is carried out for the same event, the experimental results won't necessarily match the calculated probability unless the experiment is carried out a great number of times. For example, if you roll a die six times you won't necessarily get a 1, a 2, a 3, a 4, a 5, and a 6 but if you rolled a die many times, you will get each number about $\frac{1}{6}$ of the time. The more times it is rolled the closer the number of times each number is rolled will be to $\frac{1}{6}$.
- 6 You could use digital tools that simulate tossing a die many times, spinning a spinner or tossing a coin
 - This simulator **rolls dice**.
 - These simulators have adjustable spinners



- This simulator has a **coin tosser**.

Link to online teacher notes on Chapter 20 (all sections)