

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
Susan Timperley

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.

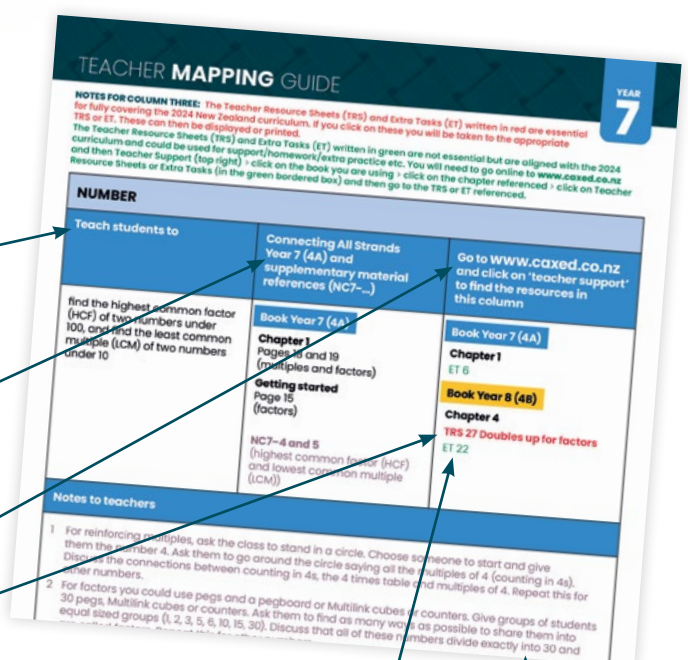
Column two gives you the page references from our existing Year 7 (4A) student book and from our supplementary student book (numbered NC7–...).

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. If you click on these you will be taken to the appropriate TRS or ET. These can then be displayed or printed.

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 7 (4A) and supplementary material references (NC7-...)	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 using powers of 10 (e.g., $10,000 = 10^4$)	NC6-1, 2 and 3 (writing and ordering numbers using powers of ten)	
Notes to teachers		
- Students may need to be reminded that 10×10 is written as 10^2 and $10 \times 10 \times 10$ is written as 10^3 etc. - Remind students that on a place value chart that each place to the right on the chart is ten times smaller and each place to the left on the chart is ten times larger. - When comparing numbers that are written with $\times 10^x$ it is best to write them all without the $\times 10^x$ first. - You could use place value expanders with powers of 10 on them to help.		

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NUMBER NUMBER STRUCTURE		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
find the highest common factor (HCF) of two numbers under 100, and find the least common multiple (LCM) of two numbers under 10	Book Year 7 (4A) Chapter 1 Pages 18 and 19 (multiples and factors) Getting started Page 15 (factors) NC7-4 and 5 (highest common factor (HCF) and lowest common multiple (LCM))	Book Year 7 (4A) Chapter 1 ET 6 Factor Investigation Book Year 8 (4B) Chapter 4 TRS 27 Double up for factors ET 22 Squares within squares
Notes to teachers		
- For reinforcing multiples, ask the class to stand in a circle. Choose someone to start and give them the number 4. Ask them to go around the circle saying all the multiples of 4 (counting in 4s). Discuss the connections between counting in 4s, the 4 times table and multiples of 4. Repeat this for other numbers. - For factors you could use pegs and a pegboard or Multilink cubes or counters. Give groups of students 30 pegs, Multilink cubes or counters. Ask them to find as many ways as possible to share them into equal sized groups (1, 2, 3, 5, 6, 10, 15, 30). Discuss that all of these numbers divide exactly into 30 and are called factors. Repeat this for other numbers. - When finding factors students often forget about 1 and the number itself. - Connect HCFs to simplifying fractions, and LCMs to renaming fractions when adding and subtracting fractions with different denominators. - Factor trees are covered in Year 8.		

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NUMBER NUMBER STRUCTURE		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
use exponents to represent repeated multiplication, and identify square roots of square numbers up to at least 100	NC7-6 to 10 (squares and square roots) NC 7-11 (exponents and patterns)	Book Year 8 (4B) Chapter 4 TRS 25 Find the area of these squares
Notes to teachers		
1 It is important to make the connection between squaring numbers and finding the area of a square. 2 Point out that squaring and finding the square root undo each other (are inverse operations like multiplying and dividing). 3 Check that the students' calculators have a square root button. Students can solve problems without the square root button, but it is helpful for checking answers. 4 Students should recognise the first 10 or 12 square numbers. 5 Students should know that prime numbers only have two factors, themselves and 1, and that composite numbers have more than two factors. Square numbers all have an odd number of factors because two of the factors are the same. For example the factors of 16 are 16 and 1, 2 and 8 and 4. If you have our stage books then you could use this for extra practice. Stage 7 book 1 pages 144 to 147		

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NUMBER OPERATIONS		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
- use rounding and estimation to predict and to check the reasonableness of calculations - round whole numbers to any specified multiple of power of 10, and round decimals to the nearest tenth, hundredth, or whole number	NC7-12 and 13 (rounding to powers of 10) NC7-14 to 16 (rounding decimals to tenths, whole numbers and hundredths) NC7-17 (estimating answers) Book Year 7 (4A) Chapter 1 Page 22 (estimating using basic facts) NC7-18 to 22 (checking answers using estimation and inverse operations)	Book Year 7 (4A) Chapter 1 TRS 2 Estimate this TRS 3 Estimate this (division) ET 3 Estimation game Book Year 8 (4B) Chapter 1 TRS 7 Number line rounding – to the nearest hundredth as well as the others TRS 6 Word clues
Notes to teachers		
- Use the material in the order in which it is given in column two. It is sensible to teach rounding first before the estimating because rounding is needed to be able to estimate. - Using a number line is a good way to show how to round to the nearest ten, hundred, thousand or whole number. NOTE: There are a variety of number lines included in our generic printable master online at this link. Scroll to the bottom for the generic printable masters. - 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. - Thinking about rounding to a whole number of dollars helps students to focus on rounding to whole numbers. - 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. - Ask your students to write families of facts. - Encourage students to find an efficient method to check answers such as - working backwards to check answers - looking for numbers that can be grouped to make 10, 100 or 1000 when adding - rounding to a benchmark such as a multiple of 10 or $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ etc - using inverse operations so for example using $5 \times 56 = 280$ to check that $280 \div 5 = 56$		

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NUMBER OPERATIONS		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	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 identify and describe the divisibility tests for 2, 3, 5, 9 and 10	NC7-23 and 24 (divisibility tests)	
Notes to teachers		
1 Frequent practice at recalling multiplication facts to at least 10×10 is required so that facts can be moved from short-term memory to long-term memory. Daily practice, games, guide tests etc aid this process. 2 Divisibility tests are useful to work out whether one number is divisible by another number. This could be useful for finding prime numbers for example. 3 In real life, the tests are useful when sharing amounts or measurements. 4 Students should know the divisibility tests for 2, 3, 5, 9 and 10. 5 You could investigate patterns in 100s boards or multiplication charts.		

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NUMBER OPERATIONS		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
multiply whole numbers	Book Year 7 (4A) Getting started Page 15 Find my number Chapter 1 Pages 20 to 28 (revision of multiplication horizontal strategies) Rich tasks Digit reversal and True or false NC7-25 to 27 (multiplying) NC7-28 (multiplying by a 2-digit number – more practice)	Book Year 7 (4A) Chapter 1 ET 1 Find my number ET 4 Puzzle ET 5 Multiplication tricks Book Year 8 (4B) Chapter 3 TRS 22 Written method multiplication – revision

Notes to teachers

- Cover the material in the order in which it is given in column two.
- 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. Games are a good way of doing this or quick fire questions.
- The multiplication in **Chapter 1** is easier than that of the objective but this can be used as an introduction and revision of multiplication. Pick and choose from **Chapter 1** for practice but don't necessarily use the strategies separately.
- When showing multiplication using vertical methods it is helpful to compare this to a horizontal method such as partitioning and/or use place value materials alongside the example.
- Students may need revision on how to multiply by a tens number such as 40. 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, 100 and 1000" which is listed later.
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.
- Remind students to always estimate the answers first. Connect this with place value and known facts. It is important that students get the correct order of magnitude when estimating.
- Connect multiplication with perimeter, area and volume and with scaling quantities.
- Ask students to discuss and justify which method, horizontal, vertical or digital is the best method to find an answer.

Link to Chapter 1 teacher notes and TRS

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NUMBER OPERATIONS		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
divide whole numbers by one- or two-digit divisors (e. g., $327 \div 5 = 65.44$ or $65 \frac{2}{5}$)	Book Year 7 (4A) Chapter 1 Pages 29 to 34 (basic practice) Book Year 7 (4A) Chapter 1 Pages 35 to 42 (multiplication and division and all four operations basic practice) NC7-29 to 32 (dividing by a one-digit number with fractional or decimal remainders and dividing by a two-digit number with no remainders)	Book Year 7 (4A) Chapter 1 TRS 5 Which strategy? Book Year 8 (4B) Chapter 3 TRS 23 Written method division
Notes to teachers are on the next page		

Notes to teachers

- 1 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.
- 2 Students may need practice at partitioning numbers.
- 3 When working through the first worked example on sheet **NC 7–29** it is useful to use materials alongside the worked example so that students understand the idea that 100 cannot be divided by 8 to get groups of 100 so 100 must be renamed as ten 10s.
- 4 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.
- 5 Remind students to always estimate the answer first. Students often have trouble estimating the answers to divisions because they round one or both numbers to the nearest 10 or 100 rather than looking for multiples of the divisor (“nice numbers”). For example, $358 \div 7$ is better rounded to $350 \div 7$ than $360 \div 7$ or $360 \div 10$.
- 6 Remind students to check their division answers using multiplication.
- 7 In a later objective, “use proportional reasoning to explore relationships between quantities”, the connection will be made between proportional reasoning and multiplication and division.

Link to Chapter 1 teacher notes and TRS

If you have our stage books then you could use this for extra practice.
Stage 7/1 page 110 to 113

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NUMBER OPERATIONS		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
use the order of operations rule	NC7-33 to 35 (order of operations)	Book Year 8 (4B) Chapter 3 ET 14 Puzzles
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 2 Remind students to work from left to right with each operation. 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 The identity that some students have difficult with is multiplying by zero. Remind them that 0×4 means 0 groups of 4 so that is 0. 4 It is important that students set out their work step by step with just one equals sign per line.		

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NUMBER OPERATIONS		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
order, compare, and locate integers on a number line and explore adding and subtracting integers	Book Year 7 (4A) Chapter 2 Pages 43 to 46 NC7-36 (Integers) Chapter 2 Pages 47 to 56	Book Year 7 (4A) Chapter 2 Getting started sheet 2 TRS 7 Underground railway TRS 8 Ladders TRS 9 Back to 0°C ET 1 Where did negative numbers begin?
Notes to teachers		
- In Year 7 (4A) page 47 point out in the example at the top that every positive number has an opposite negative number. For example, point out the balance of the number line to students. This is further reinforced on sheet NC 7-36. Generalise that a positive number has an opposite negative number, and that when they are added, the answer is zero (e.g., $5 + -5 = 0$). - Negative numbers are used in everyday life in temperatures, heights below sea level, mines, and financial situations such as, profit and loss, debit and credit and negative equity. It is useful to relate negative numbers to these situations. - Some students have difficulty understanding that -20 is smaller than -10 for example. Keep referring back to temperatures and pointing out that -20°C is a lower temperature than -10°C or if you lost \$20 you would have less money than if you lost \$10. - Using a number line when adding and subtracting integers is useful. This the link to the Chapter 2 teacher notes and TRS		

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NUMBER RATIONAL NUMBERS		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	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 three places), and percentages compare, order, and convert between fractions, decimals (to three places), and percentages	Book Year 7 (4A) Chapter 4 Pages 75 to 87 (decimal place value and ordering decimals) Chapter 3 Pages 69 to 71 (ordering fractions) Chapter 5 Pages 98 to 108 (percentages, fractions and decimals) NC 7-37 (ordering fractions, decimals and percentages)	Book Year 7 (4A) Chapter 3 TRS 12 Number lines ET 1 Puzzle Chapter 4 TRS 13 Matching tenths Chapter 5 TRS 16 Percentage dominoes
Notes to teachers are on the next page		

Notes to teachers

- 1 Cover the material in the order in which it is listed in column two.
- 2 Connect decimal place value with our decimal measurement system.
- 3 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.
- 4 Explain and demonstrate converting a fraction to a decimal or percentage by explaining that fractions are quotients (divisions) (e.g., $\frac{7}{10} = 7 \div 10$).
- 5 Encourage understanding of this topic rather than rote learning of rules for how to convert between decimals and fractions.
- 6 Ask students to think why percentages are useful in everyday life such as describing how full or empty something is or discounts. Encourage them to think of them as an amount out of 100 as this is easier to visualise.

Link to Teacher notes and TRS for

Chapter 3 (comparing and ordering fractions using number lines and benchmarks)

Chapter 4 (up to but not including adding and subtracting decimals)

Chapter 5 (up to but not including Finding percentages of)

For NC7–37

- 1 Explain and represent ordering fractions, decimal and percentages using triple or double number lines. You could also use 100s squares to compare percentages and fractions.
- 2 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.
- 3 Connect fractions, decimals and percentages to known benchmarks when comparing and converting. For example, $\frac{7}{12}$ is a little more than $\frac{6}{12}$, which is a half or 50%.
- 4 There are empty number lines you could use for whole numbers, tenths and hundredths in our **generic printable masters**. **Scroll to the bottom of the page.**

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Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
multiply and divide numbers by 10, 100 and 1000	NC7-38 and 39 (multiplying and dividing by 10, 100 and 1000)	
Notes to teachers		
1 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 tens times larger. 2 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. 3 Connect this to measurement i.e when multiplying or dividing measurements or converting between measurements, amounts often have to be multiplied or divided by 10 or 100. For example, 18.6cm = 18.6 × 10 mm = 186 mm. 4 You could use a place value expander or chart to help.		

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Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
find equivalent fractions, simplify fractions, and convert between improper fractions and mixed numbers	Book Year 7 (4A) Chapter 3 Pages 57 to 66 (fractions)	Book Year 7 (4A) Chapter 3 TRS 10 Fruit for today TRS 11 Fraction wall ET 2 Three digits
Notes to teachers Equivalent fractions - Use fractions walls or fraction circles or tiles to help students understand equivalent fractions. TRS 11 shows a fraction wall that you can display. This link is to Chapter 3 and TRS 11. - A common error is for students to add rather than multiply to find equivalent fractions. You could show using an example that this doesn't work. - Another common error is for students to only multiply or divide either the numerator or denominator, but not both. - Encourage understanding of why multiplying or dividing both the numerator and denominator by the SAME number gives an equivalent fraction. Use diagrams or paper folding to illustrate. Simplifying fractions - To simplify a fraction, find the HCF of the numerator and denominator and divide both by this number. HCF is linked to simplifying fractions and is covered on sheet NC7-4. Mixed numbers and improper fractions - 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. - The use of area models, for example, fraction circles and number lines are particularly helpful tools to develop the understanding that a fraction can lie anywhere on a number line and not just between 0 and 1. - 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. Link to teacher notes and TRS for Chapter 3 (up to Adding and subtracting fractions)		

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Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
multiply fractions and decimals by whole numbers	Book Year 7 (4A) Chapter 3 Pages 72 to 74 (fraction of a whole number) NC7-40 and 41 (multiplying decimals by whole numbers)	Book Year 7 (4A) Chapter 5 TRS 17 Spider diagram
Notes to teachers		
Link to teacher notes and TRS for Chapter 3 (Fraction of a whole number) NC7-40 and 41 - Point out that multiplying a decimal by a whole number is the same process as multiplying whole numbers. - It is important that students estimate first before calculating to get the correct order of magnitude for the answer. - To place the decimal point in the answer, have students estimate the answer first. Benchmarks such as the decimal equivalent for $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ etc can be useful when making estimates. - Point out that when multiplying by a decimal less than one that the answer will be less than the number being multiplied. Example: 0.4×56 will have an answer a bit less than half of 56 because 0.4 is a bit less than a half.		

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Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
find a percentage of a whole number and find a whole amount, given a simple fraction or percentage (e.g., 25% is \$100, what is the original amount?)	Book Year 7 (4A) Chapter 5 Getting started Page 98 Pages 109 to 112 (percentages of whole numbers) Rich tasks Page 99 (Food labels and Coaches do the maths) NC7-42 (Finding percentages of – more practice) NC7-43 and 44 (finding the whole amount given a fraction or percentage) Book Year 7 (4A) Chapter 3 Page 74 Puzzle	
Notes to teachers		
- Point out to students that the easiest percentages to find are 10% and 1% and all other percentages can be found using these. For example, 5% is half of 10% and 3% is $3 \times 1\%$ and 35% is $3 \times 10\%$ plus 5%. - Sometimes subtraction may be needed, for example, to find 29%, find 30% ($3 \times 10\%$) then subtract 1%. - Percentages can be converted to decimals and then multiplied. For example, to find 53% of 270 you could multiply 0.53×270. NC7-43 and 44 (Finding the whole given the fraction or percentage) - Bar models are the best way to show how to find the whole, given the fraction. Students are familiar with pizza 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 bar models. - A bar like the ones in the example at the top of sheet NC7-43 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 20% is 52. Then you know that there are four more lots of 20% to make up the 100%. Link to teacher notes and TRS for Chapter 5 (Finding percentages of quantities)		

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NUMBER RATIONAL NUMBERS		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
add and subtract fractions with different denominators up to a tenth, using equivalent fractions (e.g., $\frac{3}{4} + \frac{1}{3}$)	Book Year 7 (4A) Chapter 3 Pages 67 and 68 (adding and subtracting fractions) NC7-45 and 46 (adding and subtracting fractions with different denominators)	Book Year 8 (4B) Chapter 5 TRS 33 Chop it up
Notes to teachers		
- Using LCM to find the common denominator is covered in sheet NC7-5. - Using HCF to simplify fractions is covered in sheet NC7-4. - Students sometimes don't understand why the numerators are added but not the denominators when adding fractions with the same denominators. It is best to show why using diagrams. The denominator gives the name of the parts, for example, tenths or eighths or fifths, 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 different denominators it is important to stress that you can't add say quarters and halves by adding the numerators because the parts have different names and therefore are different sizes. It would be like trying to add apples and oranges together. One of the fractions must be changed so the name(size) of the parts is the same as the other fraction. For example, for $\frac{1}{4} + \frac{3}{8}$ the $\frac{1}{4}$ must become $\frac{2}{8}$ before adding. Use equivalent fractions and LCM to find a common denominator and THEN, once the denominators are the same the numerators can be added. - You could use fractions strips which are in our generic printable master. Link to teacher notes and TRS for Chapter 3 (Adding and subtracting fractions)		

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NUMBER RATIONAL NUMBERS		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
add and subtract decimals to three decimal places, with an emphasis on estimating before calculating	Book Year 7 (4A) Chapter 4 Pages 88 to 97 (adding and subtracting decimals using horizontal methods) NC7-47 and 48 (adding and subtracting decimals using a vertical method)	Book Year 7 (4A) Chapter 4 TRS 15 Which strategy?
Notes to teachers		
1 Relate adding and subtracting decimals vertically to adding and subtracting whole numbers vertically. 2 It is important that that students understand why the decimal points have to line up when adding and subtracting decimals – 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 ones etc. 3 You may need to revise renaming numbers so that students understand how to rename ones as tenths, tenths as hundredths. For example, when adding 7 tenths and 5 tenths they get 12 tenths, and this can be renamed as 1 one and 2 tenths. The 1 is put in the ones column and the 2 in the tenths column. 4 Encourage students to always estimate first. 5 When decoding word problems, ask students to write an equation first. 6 Expose students to situations where decimals are compared and the differences between them found (e.g., sporting event times and distances). Link to teacher notes and TRS for Chapter 4 (Adding and subtracting decimals)		

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NUMBER RATIONAL NUMBERS		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
use proportional reasoning to explore relationships between quantities (e.g., 'If there are 3 red for every 7 blue balls, how many balls are there altogether when there are 18 red balls?')	Book Year 7 (4A) Chapter 6 Pages 113 to 122 (whole chapter) (introducing ratios – proportional reasoning)	Book Year 7 (4A) Chapter 6 TRS 19 Necklaces ET 1 Real life ratio
Notes to teachers		
1 Connect this objective to multiplication and division. 2 The ratios in book Year 7 (4A) Chapter 6 require multiplicative thinking as in scaling quantities. 3 The example given in the objective could be expressed as a ratio. If there are 3 red for every 7 blue balls then this means the ratio of red to blue balls is 3:7. This can also be expressed as "for every 10 balls, 3 are red or $\frac{3}{10}$ are red and 7 are blue or $\frac{7}{10}$ are blue. 4 Proportional reasoning is often used when needing to change recipes, mix paint or drinks or share something or for working out real life distances on maps. 5 Equivalent ratios are simplified in a similar way to equivalent fractions. Link to teacher notes and TRS for Chapter 6 (Introducing ratios)		

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NUMBER FINANCIAL MATHEMATICS		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
- calculate total cost and change for any amount of money - calculate the percentage discounts of whole dollar amounts	NC7-49 and 50 (money)	
Notes to teachers		
- Look for opportunities to cover this topic by using situations relevant to your students such as the ones given on sheet NC 7-49. There may be other situations that are more relevant such as: - budget for the school fair - budget or cost of a hāngī - costs/budget for a school trip or outing - cost/budget for a school fundraiser - best buys for family food - budgets or presents or prizes for school raffles etc - Connect this topic to rounding and estimating, addition subtraction, multiplication and division and percentages and fractions - You could use digital tools, such as spreadsheets, to aid this topic. This enables "what if.." questions to be asked. - Investigate situations where there are financial percentage losses or gains (e.g., calculating discounts or profits, statistics in the media about growth or decline). Connect the ideas of loss and debt with integers.		

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ALGEBRA EQUATIONS AND RELATIONSHIPS		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
form and solve 1-step linear equations (e.g., $t + 7 = 12$; $2s = 14$)	Book Year 7 (4A) Chapter 7 Page 123 and pages 133 to 136 (equations)	Book Year 7 (4A) Chapter 8 TRS 22 What's my number?
Notes to teachers		
1 Book Year 7 (4A) Chapter 7 covers this and the next two objectives in a different order to how the objectives are listed here. You may choose to work through Chapter 7 in the order in which it is written to cover this, and the next two objectives, along with sheets NC7-51 to 55. 2 The section from book Year 7 (4A) referenced (pages 133 to 136) introduces students to the idea of using inverses to solve equations. This is explored in much more depth in Year 8. 3 Encourage students to check answers by substituting the answer back into the original equation formed. 4 Throughout the number section students are given a lot of practice at writing an equation for a word problem. Link to teacher notes and TRS for Chapter 7 (Expressions, formulae and equations)		

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ALGEBRA EQUATIONS AND RELATIONSHIPS		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
find the value of an expression or formula given the values of variables (e.g., calculate $w + 12$ when $w = 4$)	Book Year 7 (4A) Chapter 7 Pages 129 to 132 (formulae) Rich Task Page 125 (Shoes on feet) NC7-51 and 52 (finding the value of an expression)	Book Year 7 (4A) Chapter 7 ET 1 Spreadsheet practice
Notes to teachers		
- Book Year 7 (4A) Chapter 7 covers this, the previous and the next objective in a different order to how the objectives are listed here. You may choose to work through Chapter 7 in the order in which it is written to cover this and the other two objectives together with sheets NC7-51 to 55. - It is important that students understand that in algebra a letter stands for a number. The rules of number apply to algebra as well. Link to teacher notes and TRS for Chapter 7 (Expressions, formulae and equations)		

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ALGEBRA EQUATIONS AND RELATIONSHIPS		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
describe and use the commutative, distributive, and associative properties of operations	Book Year 7 (4A) Chapter 7 Pages 126 to 128 NC7-53 to 55	Book Year 7 (4A) Chapter 7 TRS 20 Writing expressions TRS 21 Creative formulae Book Year 8 (4B) Chapter 8 TRS 47 Practice it
Notes to teachers		
- Book Year 7 (4A) Chapter 7 covers this and the previous two objectives in a different order to how the objectives are listed here. You may choose to work through Chapter 7 in the order in which it is written to cover this and the previous two objectives along with sheets NC7-51 to 55. - Using algebra tiles is a good way to introduce students to algebra. The tiles are 1, x and x^2. You can use 3 of the x tiles and 4 of the 1 tiles to show $3x + 4$. These tiles will be further explored in Year 8 where they are very useful for explaining "collecting like terms" and "expanding brackets". - Although the objective mentions the commutative, associative and distributive properties by name, you may choose not to use these terms when teaching this topic as it could be confusing to some students. - The commutative property is used to explain why $3 \times a$ or $a \times 3$ is written as $3a$. For example, it does not matter in which order you multiply. - The associative property applies to algebraic expressions as well. For example $(a + b) + c = a + (b + c)$ - The distributive property is used when writing 3 lots of $x + 2$ as $3(x + 2)$ and is used more when expanding brackets at Year 8. The 3 outside the bracket multiplies both terms inside the bracket.		
Link to teacher notes and TRS for Chapter 7 (Expressions, formulae and equations)		

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ALGEBRA EQUATIONS AND RELATIONSHIPS		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
identify the constant rate of increase or decrease in a linear pattern, use variables and algebraic notation to represent the rule in a equation and use the rule to make conjectures	Book Year 7 (4A) Chapter 8 Pages 137 to 155 (whole chapter) (relationships and patterns)	Book Year 7 (4A) Chapter 8 ET 1 Number squares
Notes to teachers		
- Students must have a good grasp of place value partitioning, rounding and compensating and other number properties before being able to generalize the rules for patterns. - After doing question 2 on page 149, you could investigate more tukutuku patterns if this is appropriate for your class. Link to teacher notes and TRS for Chapter 8 (Relationships and patterns) If you have our stage books you could use Stage 6 page 178 for tukutuku patterns.		

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ALGEBRA ALGORITHMIC THINKING		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
create, test, and revise algorithms involving a sequence of steps and decisions	NC7-56 and 57 (algorithms)	
Notes to teachers		
- Once students understand how to put together one of these algorithms 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. - You could explore flowcharts written for divisibility of a number, sorting shapes, converting between measurements or the use of transformations in a shape pattern. - You could use a digital tool to create flowcharts and algorithms. - You could use the formula function of a spreadsheet and explore the effect changing the value of a variable has on the answer to a formula.		

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MEASUREMENT MEASURING		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
- estimate and then measure length, area, volume, capacity, mass (weight), temperature, data storage, time, and angle, using appropriate metric units - select and use an appropriate base measure (e.g., metre, gram, litre) within the metric system, along with a prefix (e.g., kilo, centi) to show the size of units	Book Year 7 (4A) Chapter 10 Pages 170 to 184 (using measures) Chapter 14 Pages 225 to 234 (angles) NC7-58 (data storage conversions)	Book Year 7 (4A) Chapter 10 TRS 24 Divided up into? ET 1 History of the metric system ET 2 How long will it take? ET 3 Tom's holiday Chapter 11 ET 1 Coin trail ET 2 Disco fun Chapter 14 TRS 27 Angles in real life TRS 28 Angle jigsaw

Notes to teachers

- 1 Connect this objective to benchmarks when making estimations such as, one large step is about 1 metre, a tall man is about 2 m tall, a cup holds about 250 ml, a pack of butter is about 500g.
- 2 Have students practise the accurate use of instruments that involve reading scales such as rulers, timers, thermometers, protractors, measuring jugs, weighing scales etc.
- 3 Make sure students put units with all readings and calculations.
- 4 Give students practice at choosing units and tools that are appropriate for a given situation and justify their choices.

Measuring angles

- 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 realize that a protractor has a clockwise and anticlockwise scale. Encourage students to estimate the size of the angle first. 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.

Link to teacher notes and TRS for

Chapter 10 (Using measures)

Chapter 14 (Angles)

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MEASUREMENT MEASURING		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
convert between metric units of length, mass (weight), and capacity, using whole numbers and decimals to express parts of a unit (e.g., 724g = 0.724kg)	Book Year 7 (4A) Chapter 11 Pages 185 to 197 (converting between units)	Book Year 7 (4A) Chapter 11 TRS 25 Follow me
Notes to teachers		
1 Remind students that our measurement system is based on our decimal number system and that each time you multiply by ten, the digits move one place to the left on a place value chart and each time you divide by ten the digits move one place to the right. This is helpful when converting between measurements. Use a place value table to aid this understanding. 2 Remind students of how to multiply and divide by powers of 10. You could use sheets NC7-38 and 39 for practice. 3 Using Chapter 11 TRS 25 is a good way to link multiplying and dividing by 10, 100 and 1000 to metric conversions. It is a "follow me" game and the cards need to be printed off. Link to teacher notes and TRS for Chapter 11 (Converting between units)		

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MEASUREMENT MEASURING		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
find speed given distance and time	NC7-59 and 60 (speed, distance and time)	
Notes to teachers		
- Using bar models is a good way to introduce this topic but once students are proficient with this, move to using the formula. - Make sure students put units with their answers. - Students are sometimes only familiar with km/h as a measure of speed. Point out that often wind speeds and very fast speeds are given in m/s. m/s is also the standard unit for speed used in scientific worlds.		

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MEASUREMENT MEASURING		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
- read, interpret, and use timetables and charts that present information about duration - convert between units of time and solve duration problems that involve fractions of time	Book Year 7 (4A) Chapter 9 Paged 156 to 169 (whole chapter) (time, timetables and charts)	Book Year 7 (4A) Chapter 9 TRS 23 In the sun ET 1 Time to think Book Year 8 (4B) Chapter 10 TRS 55 Between birthdays
Notes to teachers		
- Use timetables and charts from your local area or ones that are relevant to your class. Explain how to plan journeys. You could use digital tools. - Remind students to look carefully whether times are given in am/pm time or 24-hour time. - Encourage students to use the straight edge of a ruler to help read timetables and charts if they do not have division lines between the rows of times. - When converting between units of time for calculations, a number line can be useful. It is important that students know the main conversions between seconds and minutes and minutes and hours. Some simple questions about these conversions might be needed before starting time calculations. - 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. Link to teacher notes and TRS for Chapter 9 (Time, timetables and time)		

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MEASUREMENT PERIMETER, AREA AND VOLUME		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
calculate the perimeter and area of compound shapes composed of triangles and rectangles	Book Year 7 (4A) Chapter 12 Pages 198 to 216 (whole chapter) (Perimeter and area) NC7-61 to 63 (area of triangles and shapes made from triangles and rectangles) Chapter 13 Pages 217 to 224 (whole chapter) (volume)	Book Year 7 (4A) Chapter 12 ET 1 Sports dimensions Chapter 13 TRS 26 Contain it ET 1 Estimating volume is challenging Book Year 8 (4B) Chapter 12 TRS 61 Area of triangles TRS 63 Shape up TRS 64 Missing lengths
Notes to teachers are on the next page		

Notes to teachers

- 1 Use the material in the order in which it is listed in column two.
- 2 Point out the link to multiplication when calculating areas as a number of rows $\times$ number of squares in each roll and remind students that they can multiply in any order (commutative property).
- 3 Point out the link between area and multiplication arrays.
- 4 Show the link between the formula for area of a rectangle (length $\times$ width) and the counting squares method (rows $\times$ columns).

Link to teacher notes and TRS for Chapter 12 (Perimeter and area)**For sheets NC6–61 to 63**

- 1 These sheets use the formula for area of a triangle to find the area. Relate the formula back to counting squares and why the formula works. You could draw a triangle on squared paper and show how it is half of a rectangle with a width that is the same height as the triangle and a length that has the same base as the triangle.
- 2 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.
- 3 Connect calculations with factors, multiples, and the commutative and associative properties. For example:
 - When given the area and asked to find the lengths of sides, students can use factors to help.
 - When finding areas and volumes students can use multiples especially where side lengths are repeated.
- 4 The commutative and associative properties can be used to make calculations efficient by changing the order of numbers.

Volume

- 1 Students often confuse the units for area and volume. Point out that volume is three measurements multiplied together so the units will have the superscript 3.
- 2 It is important that students grasp that the concepts of volume and capacity are linked and discover that $1 \text{ ml} = 1 \text{ cm}^3$ and that $1000 \text{ L} = 1 \text{ m}^3$.

Link to teacher notes and TRS for Chapter 13 (Volume)

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GEOMETRY SHAPES		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
classify and name shapes based on their attributes (e.g., triangles, pyramids)	Book Year 7 (4A) Chapter 16 Pages 260 to 276 (whole chapter) (shape) NC7-64 to 66 (sorting 2D and 3D shapes using Venn diagrams and flowcharts)	Book Year 7 (4A) Chapter 16 TRS 35 What sort? TRS 37 That's my card TRS 38 Where do I belong? ET 1 Regular hexagons ET 2 Two circles
Notes to teachers		
1 Use the material in the order in which it is listed in column two. Link to teacher notes and TRS for Chapter 16 (Shape) For sheets NC7-64 to 66 1 For students to be able to classify shapes it is helpful if students have copies of the shapes so that they can fold them, turn them and measure them. 2 When filling in Venn diagrams it is best to fill in each of the ovals with the shapes that belong in them and then look for common shapes to put in the overlap. When a shape is put in the overlap, remove it from the other part of the oval. 3 You could ask students to write flowcharts for sorting triangles or quadrilaterals.		

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GEOMETRY SHAPES		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
identify and describe angles at a point, angles on a straight line, and vertically opposite angles	Book Year 7 (4A) Chapter 14 Pages 236 to 238 NC7-67 and 68 (finding missing angles on a straight line, at a point and vertically opposite angles)	Book Year 7 (4A) Chapter 14 ET 1 Parallel line angles
Notes to teachers		
- It is important that students understand each of these angle rules rather than just learn them. - Angles at a point make up a full turn so add to 360 °. - Angles on a straight line add to a half turn which is 180 °. - Vertically opposite angle are two angles made by lines which cross at the same angle so are equal. - You could use digital tools to show the rules. - Encourage students to write an equation. Link to teacher notes and TRS for Chapter 14 (the section called Angle problems)		

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GEOMETRY SPATIAL REASONING		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
visualise, construct, and draw plan views for front, back, left, right, and top views of 3D shapes,	Book Year 7 (4A) Chapter 17 Pages 284 to 290 (isometric drawing and views) (Rich tasks page 279 Container shops and Eight cubes) NC7-69 to 71 (draw and visualise views of 3-D models)	Book Year 7 (4A) Chapter 17 TRS 42 How many cubes? ET 2 Beach shelters Book Year 8 (4B) Chapter 16 TRS 78 How many cubes am I made from? ET 57 Puzzle
Notes to teachers		
- Cover the material in the order in which it is listed in column two. - Expose students to plan views and nets, using sketches on grid paper, digital tools, and physical models (e.g., blocks, cardboard nets). - Connect this objective to measurement. Link to teacher notes and TRS for Chapter 17 (the sections called Isometric drawing and Views) NC7-69 to 71 - Isometric paper <i>must</i> be orientated the correct way. Encourage students to find a way of remembering which way is correct. Some of these ideas could be shared. - It is important for students to understand that some cubes may not be able to be seen on an isometric drawing, which means that there could be several different 3-D models that have the same isometric drawing. - Some students have difficulty with isometric drawings and they may need plenty of practice. Isometric drawing skills lead on to being able to make perspective drawings so it is important that students grasp them well. - Make students aware of the fact that isometric drawings can be made without isometric paper. They could practise doing this. The angles made with the horizontal must be 30°. - Encourage students to think of themselves as having been shrunk by a magic potion when they look at the front, top or side views. This encourages them to draw only those faces directly in front of the view. - Students might need the models in front of them when drawing the views.		

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GEOMETRY SPATIAL REASONING		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
transform 2D shapes, including composite shapes, by resizing by a whole number or unit fraction of less than one	Book Year 7 (4A) Chapter 15 Pages 239 to 259 (whole chapter) (symmetry and transformations) NC7-72 and 73 (enlargements with fractional scale factors)	Book Year 7 (4A) Chapter 15 TRS 33 Art transformations TRS 30 What time is that? TRS 31 Rotating shapes TRS 34 Tessellation patterns ET 1 Investigate Islamic art ET 2 Can you make it symmetrical? ET 3 Symmetry is all around us ET 4 Computer transformations Book Year 8 (4B) Chapter 14 TRS 70 Bigger or smaller? ET 50 Enlarging
Notes to teachers		
- Use the material in the order in which it is listed in column two. - You could use a computer to draw enlargements by using a programme such as Microsoft Word with the grid lines turned on. If you increase the transparency of the shape, the grid lines will show through. - Ensure that students understand that fractional scale factors produce smaller, rather than larger images, and that they understand why. - Point out the link to maps and making models. - Point out the link to proportional reasoning – every length on the image is either multiplied or divided by the same number to get the corresponding length on the original and this number is the scale factor. Link to teacher notes and TRS for Chapter 15		

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GEOMETRY PATHWAYS		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
interpret and communicate the location of positions and pathways using coordinates, angle measures, and the 8 main and halfway compass points (e.g., 45° E from N is NE)	Book Year 7 (4A) Chapter 18 Pages 291 to 310 (whole chapter) (location) NC7-74 (relating angles to compass directions)	Book Year 7 (4A) Chapter 18 TRS 43 What's my place? TRS 44 Make up a question TRS 45 Puzzle time ET 1 Draw my picture
Notes to teachers		
1 Connect compass points and directional language with turns and angles, and simple scales with proportional reasoning. 2 Four figure grid references book Year 7 (4A) page 295, can be difficult for some students after becoming used to two figure grid references. Students often forget that the numbers give the bottom left hand corner of the square. Again challenge them to come up with a novel way of remembering this. 3 Students need exposure to all of the different ways scales can be presented on a map or plan. This is best explored using maps that interest the students such as maps of their local area or maps the students find themselves. 4 Reading maps and plans integrates many measurement topics such as converting between measures, estimating, compass directions, angles, grid references and scales. 5 Students seem to have most difficulty using scales given as This is because there are two different units given and they may have to measure the scale to see what length on the map represents 500 m and 1 km. It is important that students are well practised in converting between measures so that they can give answers using appropriate measures. 6 Students might need to estimate distances that fall between given markers. 7 To measure distances that are not straight students could use a piece of string to follow a given route and then straighten it out along the scale. 8 Explain pathways using directional language, including te reo Māori: whakamua/forwards whakamuri/backwards whakamaui/to the left whakamatau/to the right raki/north tonga/south rāwhiti/east uru/west		
Link to teacher notes and TRS for Chapter 18		

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STATISTICS PROBLEM, PLAN, DATA, ANALYSIS AND CONCLUSIONS		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
- investigate, use multivariate datasets, summary, comparison, time-series, and relationship situations for paired categorical data by: - posing investigative questions about local community matters - making predictions or assertions about expected findings - plan how to collect or source data to answer investigative questions, including - determining or identifying the variables needed - planning how to collect data for each variable (e.g., how to measure them when collecting) or finding out how provided data was collected - identifying the group of interest or who the data was collected from - building awareness of ethical practices by strategic questioning of data collection methods - collect primary data or information about variables in sourced data, create a simple informal data dictionary, and check for errors	Book Year 7 (4A) Chapter 21 Pages 342 to 348 (data) Pages 355 to 359 (statistical investigation – working through a survey from start to finish) NC7-75 (data dictionaries)	Book Year 7 (4A) Chapter 19 TRS 52 What is it called? TRS 53 Which graph? TRS 54 Time to see ET 1 Data in the media
Notes to teachers are on the next page		

Notes to teachers

- 1 You can choose to cover this material in one of two ways.

Either

Follow the sequence of **Chapters 19 to 21** where students learn to analyse data (**Chapter 19**) and draw data visualisations (**Chapter 20**) first and then go on and do their own statistical investigation using the enquiry cycle (PPDAC) (**Chapter 21**).

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 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 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.
- 3 Discuss with students how survey and data collection questions can be misinterpreted, leading to unreliable data. Who to, what, how and when a question is asked can make the data unreliable. For example, if a question is worded as “Everyone loves cola don’t they?”, or a student only asks their survey question to their friends/family, or if a question about animal welfare is asked at the SPCA etc.
- 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.
- 5 Discuss with students how to identify errors in data, and how to explain why they are errors. For example, If a survey is finding out the lengths of people’s arms and one data point is 20 cm longer than the next longest then it is very possible that there is a measurement error.
- 6 When collecting data for a survey, ask students to make an information data dictionary (refer to sheet **NC 7–75**)

For NC7–75

- 1 A data dictionary describes in full all of the properties of the data being collected. It is useful for anyone who uses a survey. For example the data dictionary could give the data names, properties, format, where collected who the data was collected from, when the data was collected etc

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STATISTICS ANALYSIS		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
- create data visualisations for the investigation - make statements about the data including its features and context, in descriptions of distributions	Book Year 7 (4A) Chapter 20 Pages 329 to 341 (whole chapter) (displaying data)	
Notes to teachers		
- You could use spreadsheets for collecting, displaying and analysing data. - Explain how different data visualisations have different features. Ask students to justify why they chose a particular data visualisation to display their data		
Link to teacher notes and TRS for Chapter 20		

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STATISTICS CONCLUSIONS		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
communicate findings in context to answer an investigative question, using evidence from analysis and comparing findings to initial predictions or assertions and existing knowledge of the world	Book Year 7 (4A) Chapter 19 pages 311 to 313 and pages 322 to 328 (making conclusions)	
Notes to teachers		
- When writing conclusions encourage students to use fractions proportions and percentages to describe their results. - Discuss with students how to: - choose descriptive statements that answer an investigative question - prepare and present succinct clear conclusions that relate back to the question or assertion - decide if what was found makes sense given what is known about the situation.		
Link to teacher notes and TRS for Chapter 19		

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STATISTICS STATISTICAL LITERACY		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
evaluate findings of others to check if their claims or statements are supported by the data visualisations they use	NC7-76 (Misleading data)	Book Year 7 (4A) Chapter 20 TRS 51 What is wrong
Notes to teachers		
1 There are plenty of examples of misleading data visualisations on the internet and it is best to use up-to-date examples. 2 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: This can distort the relative sizes of the data represented.		

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PROBABILITY PROBABILITY INVESTIGATIONS AND CRITICAL THINKING IN PROBABILITY		
Teach students to	Connecting All Strands Year 7 (4A) and supplementary material references (NC7-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
plan and conduct probability experiments for chance-based situations, including undertaking a large number of trials using digital tools, by: – posing investigative questions – anticipating what outcomes are possible and which of them are more or less likely to occur – identifying and systematically listing possible answers to the investigative question – collecting and recording data – creating data visualisations for the distribution of observed outcomes and (Year 8) for all – describing what these visualisations show – finding the probability estimates for the different outcomes – answering the investigative question – identifying similarities and differences between their findings and those of others – reflecting on anticipated outcomes – comparing findings from the probability experiment and associated theoretical probabilities, as appropriate identify, explain and check other's statements about chance based investigations, referring to evidence	Book Year 7 (4A) Chapter 22 Pages 360 to 374 (whole chapter) (probability investigations) NC7-77 (probability investigations)	Book Year 7 (4A) Chapter 22 TRS 58 Grand national day ET 1 Fair or unfair ET 2 Spinners Book Year 5 (3A) Chapter 21 TRS 75 Games
Notes to teachers are on the next page		

Notes to teachers

- 1 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.
- 2 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.
- 3 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 buy something at the school canteen who will buy a filled roll. This cannot be calculated theoretically. Data would need to be collected on what the first student to buy something at the canteen each day bought.
- 4 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 an experiment is carried out (the greater the number of trials) the closer experimental probability will be to the theoretical probability.
- 5 You could use digital tools that simulate tossing a die many times, spinning a spinner or tossing a coin.
- 6 Connect probabilities with proportional reasoning, fractions, and percentages, and with relative frequencies from data investigations.
- 7 These simulators:

roll dice

have adjustable spinners



tosses coins.

This site has several simulators

- 8 If you wanted to extend students' understanding of how theoretical and experimental probability compare, you could ask students to predict what the results of tossing one or two coins or spinner an adjustable spinner and then use one of the simulators given in point 7 above to show the experimental results.
- 9 On **page 369 question 4** of book **Year 7 (4A)** students are asked to make a biased die. You could show the comparison to a fair die tossed say 1000 times with this simulator.