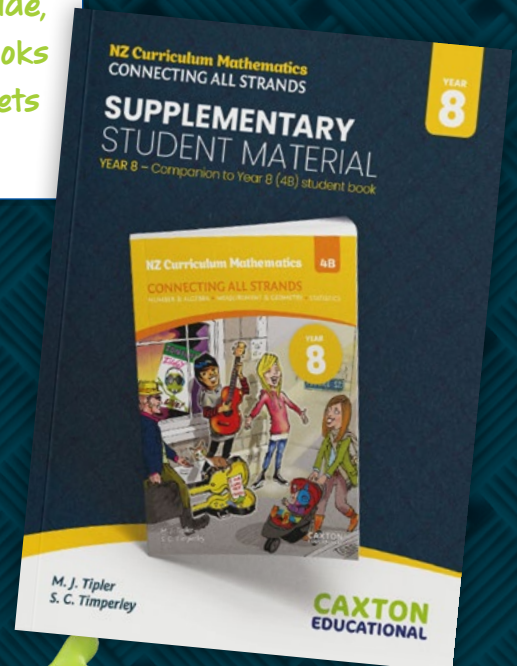


We've got the NEW 2024 Mathematics + Statistics curriculum covered!

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.



Maryanne Tipler
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 8 (4B) student book and from our supplementary student book (numbered NC8-...).

Column two 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.

TEACHER MAPPING GUIDE		
NOTES FOR COLUMN THREE: 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. 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 (top right) > click on the book you are using > click on the chapter referenced > click on Teacher Resource Sheets or Extra Tasks (in the green bordered box) and then go to the TRS or ET referenced.		
MEASUREMENT		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	Go to WWW.CAXED.CO.NZ and click on 'Teacher support' to find the resources in this column
calculate the volume of triangular prisms and shapes composed of rectangular prisms	Book Year 8 (4B) Chapter 12 Pages 210 to 224 (perimeter, area and volume) (whole chapter) NC8-60 to 62 (Volume of prisms)	Book Year 8 (4B) Chapter 12 TRS 65 I like my icing thick ET 43 How much air is in your room? ET 44 Hay bales ET 46 Find the volume of the school pool
Notes to teachers		
1 Use the material in the order in which it is listed in column three. 2 Point out the link to multiplication when calculating areas and remind students that they can multiply in any order (commutative property). 3 Point out the link between area and multiplication arrays. Link to teacher notes and TRS for Chapter 12 (all sections)		

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NUMBER NUMBER STRUCTURE		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	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 and decimals using powers of 10 (e.g., $0.01 = 1/100 = 10^{-2}$)	NC8-1 and 2 (powers of 10) NC8-3 (ordering whole numbers using powers of 10)	Book Year 8 (4B) Chapter 1 TRS 1 Moving human digits ET 6 Other number systems
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. - Students may have difficulty understanding negative indices. It is helpful to write out the indices for any number like this. $5^{-2} = \frac{1}{5 \times 5} = \frac{1}{25} \xleftarrow{\div 5}$ $5^{-1} = \frac{1}{5} \xleftarrow{\div 5}$ $5^0 = 1 \xleftarrow{\div 5}$ $5^1 = 5 \xleftarrow{\div 5}$ $5^2 = 5 \times 5$ If you work backwards from 5^2 and show students that each time you go back one line the answer is obtained by dividing by 5 and connect that to the exponents getting one less, then the pattern makes it more understandable than, for example, $5^{-2} = \frac{1}{5 \times 5} = \frac{1}{25}$ etc		

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NUMBER NUMBER STRUCTURE		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
- identify and describe the properties of prime and composite numbers up to at least 100 and cube numbers up to at least 125 - use prime factorisation to represent a number and to find the HCF of two numbers	Book Year 8 (4B) Chapter 4 Pages 82 and 83 (up to Factorials) (prime numbers) NC8-4 (composite numbers) Chapter 4 Pages 83 (from "Finding the prime factor of a number) to 86 (prime factorisation) Chapter 4 Page 73 (Rich Tasks 1 and 2) NC8-5 and 6 (prime factorisation and finding HCF) Book Year 8 (4B) Chapter 4 Page 86 Investigation (finding the HCF and LCM) Chapter 4 Pages 79 to 81 (cubes and cube roots)	Book Year 8 (4B) Chapter 4 TRS 27 Double up for factors TRS 28 Double up for multiples
Notes to teachers are on the next page		

Notes to teachers

- 1 It is best to cover prime numbers before doing this topic. Although they are not mentioned in the objective, **Year 8 (4B) Chapter 4 pages 82 and 83** are included because these pages cover this.
- 2 Remind students that 1 is not a prime number because it only has one factor, itself.
- 3 2 is a special number because it is the only even prime number. All other even numbers have the factor 2 plus themselves and 1 and so are not prime.
- 4 No multiples of numbers are prime numbers because a multiple must have at least three factors – itself, 1 and the number of which it is a multiple.
- 5 Make sure students know that the difference between prime and composite numbers is that prime numbers only have two factors, themselves and 1 and composite numbers have more than 2 factors.
- 6 When finding factors students often forget about 1 and the number itself.
- 7 Connect HCFs to simplifying fractions, and LCMs to renaming fractions when adding and subtracting fractions with different denominators, i.e. finding the common denominator.
- 8 Encourage students to have a systematic method for recording the factors of numbers to ensure that they do not miss any. For example, 1 times the number, then try 2 times something, then try 3 times something etc.
- 9 If you want to revise squares and square roots you could use **Year 8 (4B Chapter 4)** pages 74 to 78 (top). This work has been covered in Year 7.
- 10 Point out that cubing and finding the cube root are inverse operations.
- 11 Students should know the first 5 cube numbers.
- 12 Relate cubing to finding the volume of a cube and cube rooting to finding the side length of cube given its volume.

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NUMBER OPERATIONS		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
- use rounding, estimation and benchmarks to predict results and to check the reasonableness of calculations - Round whole numbers to any specified power of 10, and round decimals to the nearest tenth, hundredths, thousandth, or whole number	NC8-7 and 8 (Rounding to powers of 10) Book Year 8 (4B) Chapter 1 Pages 25 to 30 (rounding decimals and estimating to predict the reasonableness) Chapter 3 Getting started Page 47 (estimation) NC8-9 to 12 (estimating and checking answers)	Book Year 8 (4B) Chapter 1 TRS 6 What should I tell them TRS 7 Number line rounding TRS 8 Estimate this
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 to teach the rounding first before the estimating because rounding is needed in order to be able to estimate
- 2 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 master.**
- 3 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.
- 4 Thinking about rounding to a whole number of dollars helps students to focus on rounding to whole numbers.
- 5 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.
- 6 Point out that in the case of 5, as the last digit, which is halfway between, it is the convention to round up.
- 7 Rounding and estimating sensibly are dependent on strong place value understanding. 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 1.687976 m as no one measures to this accuracy.
- 8 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 was no longer than 5.04 m.
- 9 Encourage students to find an efficient method to check answers such as
 - using inverse operations to check answers (writing families of facts can help)
 - 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 $280 \div 5 = 56$

If you have our Stage books you could use this for more practice.
Stage 7 Book 1 pages 155 to 158

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NUMBER OPERATIONS		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
identify and describe the divisibility rules for 2-11	NC8-13 (divisibility tests) Book Year 8 (4B) Chapter 3 Pages 50 and 51 (divisibility tests)	Book Year 8 (4B) Chapter 3 TRS 15 Shade it ET 16 More divisibility tests
Notes to teachers		
1 It is useful to do a recap of factors before starting this objective. 2 Divisibility tests are useful to know if you want to know if a number is divisible by another number without actually doing the division.		

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NUMBER OPERATIONS		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
divide whole numbers (e. g., $327 \div 15 = 21.8$ or $21\frac{4}{5}$)	Book Year 8 (4B) Chapter 3 Pages 47 to 49 and 59 to 62 and 66 to 70 (revising division) Chapter 3 Page 49 Rich task Dicey games (revising multiplication) NC8-14 and 15 (dividing with no remainders) NC8-16 to 18 (dividing with fractional or decimal remainders)	Book Year 8 (4B) Chapter 3 TRS 23 Written method division ET 18 Doctor Doctor
Notes to teachers are on the next page		

Notes to teachers**NC8–14 and 15**

- 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 should understand that the vertical method is a short-hand way of writing the place value partitioning (horizontal) method. It is not helpful if students learn this as an algorithm.
- 3 Students may need to know how to partition and rename numbers.
- 4 When working through the first worked example on sheet **NC8–14** it is useful to use materials alongside the worked example so that students understand the idea that 3000 cannot be divided by 7 to get groups of 1000 so 3000 must be renamed as 30 hundreds so then 32 hundreds can be divided by 7 to get 4 groups of 7 hundreds with 4 hundreds left over.

NC8–16 to 18

- 1 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.
- 2 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 $360 \div 10$.
- 3 Remind students to check their division answers using multiplication.
- 4 In a later objective, "use proportional reasoning to share with unequal proportions", the connection will be made between proportional reasoning and multiplication and division.

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NUMBER OPERATIONS		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
use the order of operations rule	Book Year 8 (4B) Chapter 3 Pages 52 and 53	Book Year 8 (4B) Chapter 3 TRS 16 Operation fill in TRS 17 Tile sentences ET 17 Order of operation practice
Notes to teachers		
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 - 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. - 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. - 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 8 (4B) and supplementary material references (NC8-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
order, compare, add, and subtract integers	NC8-19 and 20 (ordering integers) Book Year 8 (4B) Chapter 1 Pages 23 and 24 (ordering decimals and integers) Chapter 5 Pages 90 to 93 (adding and subtracting integers)	Book Year 8 (4B) Chapter 1 TRS 4 Decimals and integers on the number line TRS 5 Guess my number game ET 7 Mt Everest game Chapter 5 TRS 29 What is the temperature now? TRS 30 Find the balance
Notes to teachers		
- 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 related 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. - Explain the direction of movement on a number line when adding and subtracting integers, and generalise that: - adding a negative number makes the original number smaller (e.g., $4 + -3 = 1$) - subtracting a negative number makes the original number larger (e.g., $-7 - (-3) = -4$). - It is important that students understand the difference between the use of $-$ and $+$ as operations and to indicate whether a number is negative or positive (its value).		

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NUMBER RATIONAL NUMBERS		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	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, and percentages - compare, order, and convert between fractions, decimals, and percentages	Book Year 8 (4B) Chapter 7 Pages 134 to 136 (putting fractions in order) Chapter 2 Pages 31 to 46 (whole chapter) (fractions, decimals and percentages) Chapter 6 Page 109 Rich task A greedy pig (ordering fractions)	Book Year 8 (4B) Chapter 7 TRS 43 Best way Chapter 2 TRS 9 Fractions to decimals TRS 10 Decimals make great fractions ET 9 Match Up ET 10 Pathways ET 12 Fractions, decimals and percentages – more practice
Notes to teachers		
- Students need to be able to find equivalent fractions and convert between improper fractions and mixed numbers with ease. - Connect decimal place value with our decimal measurement system. - 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. - Explain and demonstrate converting a fraction to a decimal or percentage by explain that fractions are quotients (e.g., $\frac{7}{10} = 7 \div 10$). - Encourage understanding of this topic rather than rote learning of rules for how to convert between decimals and fractions. - 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 or Chapter 2		

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NUMBER RATIONAL NUMBERS		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
multiply and divide numbers by powers of 10	Book Year 8 (4B) Chapter 1 Pages 18 to 20 (multiplying and dividing by powers of 10)	Book Year 8 (4B) Chapter 1 TRS 2 Find the views
Notes to teachers		
- Emphasise that it is the digits that move and discourage any rule which suggests adding or subtracting zeros as this does not work with decimals. - Encourage students to look at their answer to see if it is sensible. It is helpful to look at patterns such as $0.7 \times 10 = 7$ $0.7 \times 100 = 70$ $0.7 \times 1000 = 700$ $6 \times 10 = 60$ $6 \times 1 = 6$ $6 \times 0.1 = 0.6$ $6 \times 0.01 = 0.06$ $6 \div 10 = 0.6$ $6 \div 0.1 = 60$ $6 \div 0.01 = 600$ $1.4 \div 10 = 0.14$ $1.4 \div 100 = 0.014$ $1.4 \div 1000 = 0.0014$ - Our number system uses base 10 and the understanding of "nested place value" is central to applying operations on both whole numbers and decimal fractions.		

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NUMBER RATIONAL NUMBERS		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	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	NC8-21 and 22 (equivalent fractions) NC8-23 (simplifying fractions) NC8-24 to 26 (mixed numbers and improper fractions)	Book Year 8 (4B) Chapter 2 TRS 11 Denominator 10, 100 and 1000 – cancelling TRS 12 Making the denominator 10, 100 and 1000 TRS 13 Odd one out TRS 14 Dominoes ET 9 Match up ET 11 Fraction practice ET 12 More practice at changing between fractions, decimals and percentages
Notes to teachers are on the next page		

Notes to teachers**NC8–21 and 22****Equivalent fractions**

- 1 Use fractions walls or fraction circles or tiles to help students understand equivalent fractions. This link shows a **fraction wall**.
- 2 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.
- 3 Another common error is for students only to multiply or divide either the numerator or denominator, but not both.
- 4 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.

NC8–23**Simplifying fractions**

- 1 To simplify a fraction, find the HCF of the numerator and denominator and divide both by this number. HCF linked to simplifying fractions is covered on sheet **NC8–5 and 6**.

NC8–24 to 26**Mixed numbers and improper fractions**

- 1 It is useful for students to see the conversion between mixed numbers and improper fractions visually using fraction tiles or fraction diagrams.
- 2 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.
- 3 It is important that students know that a fraction can lie anywhere on a number line and not only between zero and one. The use of area models, for example, fraction circles and number lines are particularly helpful tools to develop this understanding.

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Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	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 8 (4B) Chapter 6 Pages 107 to 112 (fraction of a whole number) Chapter 6 Pages 115 and 116 (multiplying decimals) NC8-27 (multiplying decimals by whole numbers) Chapter 6 Page 128 (mixed fraction, decimal and percentage)	Book Year 8 (4B) Chapter 6 TRS 34 Multiplying with fractions TRS 35 Six the same TRS 38 Multiplying 0? Chapter 7 TRS 46 Which has more
Notes to teachers Fraction of - Emphasise that "of" can be replaced with multiply, $\times$. - Students sometimes multiply both the numerator and the denominator of the fraction by the whole number. Using materials or diagrams initially is helpful to student understanding. - Diagrams and working with fraction pieces are good ways of helping with understanding fractions of fractions Multiplying decimals by whole numbers (Chapter 6 pages 115 to 116 and NC8-27) - Point out that the process for multiplying a decimal by a whole number uses the same process as multiplying whole numbers. - It is important that students estimate first before calculating, in order to get the correct order of magnitude of 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. Link to teacher notes and TRS for Chapter 6 (Fraction of and Decimal multiplication sections)		

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NUMBER RATIONAL NUMBERS		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	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., "75% is \$45, what is the original amount?")	Book Year 8 (4B) Chapter 6 Pages 124 to 127 (percentage of) Pages 129 and 130 (find the whole amount for percentages) NC8-28 and 29 (finding the whole)	Book Year 8 (4B) Chapter 6 TRS 42 Weta walk ET Extra practice – percentage of
Notes to teachers		
- Students will need to be proficient at finding fractions of amounts and also know the fraction/decimal equivalents for percentages such as 10%, 50%, 25%, $33\frac{1}{3}\%$, $12\frac{1}{2}\%$ etc. - 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% ($3 \times 10\%$) and subtract 1%. - Percentages can be converted to decimals and then multiplied. For example, to find 53% of 270 you could multiply 0.53×270. - Encourage students to estimate their answers. - Remind students to put units with their answers. - GST and tax are a good example of the use of percentages. Remind students that GST is added to the cost of an item and tax is taken off someone's income. Book Year 8 (4B) pages 129 to 130 and NC8-28 and 29 (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 examples at the top of sheet NC8-28 show what students know already about the whole and what the missing parts are. Draw the bar and divide it into the parts known, for example that $\frac{5}{8}$ is 450. Then $\frac{1}{8}$ can be worked out and then $\frac{8}{8}$ or the whole. - Encourage students to find what a unit fraction is. If they are told what $\frac{3}{5}$ is they first must find what $\frac{1}{5}$ is and then $\frac{5}{5}$ (one whole). If they are told what a percentage is that is not a factor of 100 they must first find a percentage that is a factor of 100. If they are told what 60% is then they must first find what 10% is and then 100% (one whole). Link to teacher notes and TRS for Chapter 6 (Percentage of and Find the missing number sections)		

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NUMBER RATIONAL NUMBERS		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	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, using equivalent fractions	NC8-30 to 32 (adding and subtracting fractions)	
Notes to teachers		
- Using HCF to simplify fractions is covered in sheet NC8-5 and 6. - 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 masters.		

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NUMBER RATIONAL NUMBERS		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
add, subtract, and multiply decimals, with an emphasis on estimating before calculating	Book Year 8 (4B) Chapter 1 Pages 21 and 22 (adding and subtracting decimals using nested place value) Chapter 5 Pages 94 to 101 (addition and subtraction of decimals) Chapter 6 Page 117 (decimal multiplication) NC8-33 and 34 (Decimal multiplication)	Book Year 8 (4B) Chapter 1 TRS 3 Nesting Chapter 5 ET 23 Decimal diamond
Notes to teachers are on the next page		

Notes to teachers**Adding and subtracting decimals**

- 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).

Multiplying decimals

- 1 Point out that multiplying decimals is the same process as multiplying whole numbers.
- 2 It is important that students estimate first before calculating to get the correct order of magnitude of the answer.
- 3 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.
- 4 Point out that when multiplying by a decimal less than one that the answer will be less than the number being multiplied. Example 0.4×10.8 will have an answer a bit less than half of 10.8 because 0.4 is a bit less than a half.

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NUMBER RATIONAL NUMBERS		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
use proportional reasoning to share with unequal proportions (e.g., "We have 100 stickers to share. for every 1 sticker I get, you get 3 stickers. How many do we each get?")	Book Year 8 (4B) Chapter 7 Pages 136 to 143 NC8-35 (proportional reasoning)	Book Year 8 (4B) Chapter 7 TRS 45 Colour codes ET 25 Fractions, rates and ratios – extra practice
Notes to teachers		
1 Connect this objective to multiplication and division and equivalent fractions. 2 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. 3 Number lines and bar models are good tools to use to help students understand proportional reasoning. It is helpful if students write down what they know first. In the example in NC8-35 it is known that of the 40 chocolates in total, 2 out of 5 or $\frac{2}{5}$ of the total are dark 3 out of 5 or $\frac{3}{5}$ of the total are milk Then the bar model shown can be drawn. 4 Equivalent fractions could be used to find answers. For example in NC8-35, $\frac{2}{5}$ could be made into an equivalent fraction with denominator 40, i.e. $\frac{16}{40}$ to get the answer that 16 chocolates are dark.		

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NUMBER FINANCIAL MATHEMATICS		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
create and compare weekly, monthly, and yearly finance plans (e.g., saving plans, phone plans, budgets, and 'buy now, pay later' services)	NC8 36 to 38 (Finance) Book Year 8 (4B) Chapter 6 Page 109 Rich task Banking on interest (percentage interest)	Book Year 8 (4B) Chapter 1 ET 8 Practical Chapter 10 ET 38 I want to buy a phone ET 41 Phone plans
Notes to teachers		
- Students need to understand and be competent at rounding and addition and subtraction to 2 decimal places before starting this objective. - Look for opportunities to cover this topic by using situations relevant to your students such as the ones given on sheet NC8 -38. - Investigate relevant "best buys" using advertisements or the internet. - 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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NUMBER FINANCIAL MATHEMATICS		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
apply percentage discounts	NC8-39 and 40 (working with percentages)	
Notes to teachers		
- Investigating best deals is a really good way to work with percentages and discounts. - Percentage discounts can be worked out in different ways: - By converting the percentage to a decimal for example 45% is 0.45. The amount can then be multiplied by the decimal to find the discount. - By finding percentages that are easy to calculate such as 10%, 50% ($\frac{1}{2}$), 25% ($\frac{1}{4}$), 1%. Percentages can then be added or subtracted to find the percentage required. For example, to find 27% it could be found by adding $2 \times 10\% + (7 \times 1\%)$ or $3 \times 10\% - (3 \times 1\%)$ or $25\% + (2 \times 1\%)$ or by finding 0.27 of the amount. - Point out to students that if they want to find the final amount rather than just the discount this can be found by finding $100\% - (\text{percentage discount})$ of the amount. For example the final cost of something with a discount of 45% will be 55% of the cost because $100\% - 45\% = 55\%$. This is shorter than finding 45% and then subtracting it.		

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ALGEBRA EQUATIONS AND RELATIONSHIPS		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
form and solve one- or two-step linear equations (e.g., $5s + 3 = 18$)	Book Year 8 (4B) Chapter 8 Pages 147 to 161 (up to substituting into equations and formulae)	Book Year 8 (4B) Chapter 8 TRS 48 Flow charts ET 29 Writing and solving equations – more practice ET 30 Arithmagons
Notes to teachers		
- Students sometimes find this topic difficult. Keep reminding them that equations follow the same rules as numbers and that letters are just missing numbers in a number sentence. So $3n + 2 = 12$ could be written as $3 \times ? + 2 = 12$. - The section from Year 8 (4B) page 155 shows students how to use inverses to solve equations. It continues (page 156 onwards) to show how to balance an equation to solve it. Point out to students that these are linked. Doing the inverse is just the same as doing the same to both sides. - It is very important that students know how an equation has been built. They will then know what is happening when either inverse operations or balancing both sides is used to solve the equation. Using either of these methods, the order in which the equation has been built is undone (in reverse order) to solve the unknown amount. - You may need to recap inverse operations and give a bit of practice in recognising that adding 5 is the inverse of subtracting 5, and so on. This is a crucial step for students in understanding how to solve an equation. - Emphasise the importance of writing down the answer after each step of the flow chart. - Encourage students to check their answers by substituting them into the original equation or putting them through the flow chart. - Emphasise that both sides of an equation will remain equal as long as both sides are operated on in the same way. Doing the same thing to the values on both sides of the equations in the discussion on Year 8 (4B) page 156 will help illustrate this. - It is important that all terms on both sides of an equals sign are operated on. Example – for the equation $3x + 3 = 15$, some students when dividing both sides by 3 will only divide the 3 or the $3x$ by 3 but not both. - Throughout the number section students are given a lot of practice at writing an equation for a word problem. Year 8 (4B) pages 150 and 152 give further practice at this.		

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ALGEBRA EQUATIONS AND RELATIONSHIPS		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	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	Book Year 8 (4B) Chapter 8 Pages 161 to 162 (from "Substituting into equations and formulae" onwards) Chapter 8 Page 149 Rich task Temperature trouble and How tall was he or she? (substituting into a formula) NC8-41 and 42 (more substituting into formulae)	Book Year 8 (4B) Chapter 3 ET 13 What do these letters stand for? Chapter 8 TRS 49 Substitute me
Notes to teachers		
- It is important that students understand that in algebra a letter stands for a number. The rules of number apply to algebra as well. - Some students may find this section difficult and need to be reminded about how to solve an equation, for example by using a balance or flow chart and doing inverse operations.		

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ALGEBRA EQUATIONS AND RELATIONSHIPS		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
simplify algebraic expressions involving sums, products, differences, and single brackets expressions using the distributive property (e.g., $2(x + 3) + 1 = 2x + 6 + 1 = 2x + 7$)	NC8-43 to 48 (understanding algebra, collecting like terms) NC8-49 and 50 (brackets) NC8-51 (simplifying expressions)	
Notes to teachers		
- 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 $3x + 4$. The tiles are very useful for explaining "collecting like terms" and "expanding brackets". - The commutative property is used to explain why $3 \times a$ or $a \times 3$ is written as $3a$, i.e. 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 then expanding the brackets. The 3 outside the bracket multiplies both terms inside the bracket. So $3(x + 2) = (3 \times x) + (3 \times 2) = 3x + 6$. - When expanding brackets with negatives, multiplying negative numbers is not required but students will understand this if algebra tiles are used initially to explain this. - When collecting like terms, it is useful to write the like terms together first.		

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ALGEBRA EQUATIONS AND RELATIONSHIPS		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
determine if a pattern is linear and, if it is, write the equation for the pattern and use the equation to make conjectures	Book Year 8 (4B) Chapter 9 Pages 163 to 174 (relationships and patterns) Chapter 9 Getting started Page 163 (Fibonacci sequence) Page 165 Rich task Magic squares (substituting into a formula)	Book Year 8 (4B) Chapter 9 TRS 50 Growing patterns ET 31 Fibonacci's rabbits ET 32 More Fibonacci sequence investigations ET 34 Where will the 33rd dot be? ET 35 Pascal's triangle ET 36 There are a lot more than you think
Notes to teachers		
- Students must have a good grasp of place value partitioning and other number properties before being able to generalize the rules for patterns. - If the rate of change i.e the difference between terms is constant (the same) then a pattern is linear. You could use the terminology "rate of change" with students to help them understand this concept. - You could investigate tukutuku patterns if this is appropriate for your class. - You may need to recap how to write expressions and remind students that a multiplication sign is not written between a number and a letter. - Encourage students to look at both the patterns and the numbers in the table to help work out the expression. - Emphasise that the order of the operations is important and that $\times 3 + 2$ is different from $+ 2 \times 3$. - The relationship between two variables can be represented by a table, a rule or a graph. A linear relationship is characterised by a straight line on a graph or a regular amount added on or taken off between terms on a table.		

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ALGEBRA ALGORITHMIC THINKING		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
create, test, revise, and use algorithms to identify, interpret, and explain patterns	NC8-52 to 54 (algorithms)	Book Year 8 (4B) Chapter 3 TRS 19 Meet the target ET 15 Number chains Chapter 9 ET 33 Challenge
Notes to teachers		
- Once students understand how to put together 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, sorting multivariate data, divisibility of numbers, etc. - 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 8 (4B) and supplementary material references (NC8-...)	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 units - select and use an appropriate base measure within the metric system along with a prefix to show the size of units	Book Year 8 (4B) Chapter 13 Pages 225 to 229 and pages 235 and 236 NC8-55 (Estimating and measuring area) Rich task Chapter 1 Page 17 World's largest and smallest Book Year 8 (4B) Chapter 1	Book Year 8 (4B) Chapter 11 TRS 57 New Zealand's forests ET 42 Measure it Chapter 13 TRS 66 Count the spaces TRS 68 Match my estimate ET 47 Estimating practice TRS 49 How do you measure it? Book Year 7 (4A) Chapter 12 ET 1 Sports dimensions
Notes to teachers		
- When reading scales remind students to count the gaps between two named dashes to enable them to work out what each gap represents. It is a good idea to check using skip counting along the dashes. - Connect 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. - Have students practise the accurate use of instruments that involve reading scales such as rulers, timers, thermometers, protractors, measuring jugs, weighing scales etc. - Make sure students put units with all readings and calculations. - Give students practice at choosing units and tools that are appropriate for a given situation and justify their choices. Link to teacher notes and TRS for Chapter 13 (Using measures section) Measuring area NC8-54 - Encourage students to estimate lengths and then areas first before measuring accurately. It is important to choose a suitable unit for estimating and measuring area. - Give students practice at estimating and measuring areas around the school and home environment so that they can improve their ability to make more accurate estimations. Encourage students to use a benchmark such as 1 m² to help them estimate.		

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MEASUREMENT MEASURING		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
convert between metric measurement units, including square units	Book Year 8 (4B) Chapter 11 Page 195 (whole chapter)	Book Year 8 (4B) Chapter 11 TRS 59 Metric conversions TRS 60 Convert this
Notes to teachers		
- 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. - Remind students of how to multiply and divide by powers of 10. You could use Year 8 (4B) Chapter 1 pages 18 to 20 for practice. Link to teacher notes and TRS for Chapter 11 (all sections)		

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MEASUREMENT MEASURING		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
find distance, given speed and time; or time given distance and speed	NC8-56 and 57 (speed, distance and time)	Book Year 8 (4B) Chapter 7 TRS 44 Compare it
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 8 (4B) and supplementary material references (NC8-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
- read, interpret, and use timetables, charts, and results that present information about duration - Convert times to a common unit, such as seconds or minutes, and use decimal units of time (milliseconds)	Book Year 8 (4B) Chapter 10 Pages 179 to 194 (whole chapter) NC8-58 (time conversions) NC8-59 (decimal time)	Book Year 8 (4B) Chapter 10 TRS 54 Time conversions TRS 56 Reading timetables and charts ET 39 Going on holiday ET 40 Big win!
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 10 (all sections) NC8-59 - Decimal time is used extensively in sports, such as at the Olympics for track and swimming events. - It is important that students understand the decimal time conventions. For example, a time given as 1:54.78 minutes means 1 minute and 54.78 seconds. A colon is used between the minutes and the seconds because it is not a decimal number but a decimal point is used between the seconds and hundredths of a second because this is a decimal number.		

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MEASUREMENT PERIMETER, AREA AND VOLUME		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
calculate the volume of triangular prisms and shapes composed of rectangular prisms	Book Year 8 (4B) Chapter 12 Pages 210 to 224 (perimeter, area and volume) (whole chapter) NC8-60 to 62 (volume of prisms)	Book Year 8 (4B) Chapter 12 TRS 65 I like my icing thick ET 43 How much air is in your room? ET 44 Hay bales ET 46 Find the volume of the school pool
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 and remind students that they can multiply in any order (commutative property). 3 Point out the link between area and multiplication arrays. Link to teacher notes and TRS for Chapter 12 (all sections)		

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GEOMETRY SHAPES		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
describe triangles, quadrilaterals, and other polygons in relation to their sides, diagonals, and angles	Book Year 8 (4B) Chapter 15 Pages 255 and 266 (sorting shapes) NC8-63 (diagonals of 2D shapes) NC8-64 (more sorting shapes)	Book Year 8 (4B) Chapter 15 TRS 73 True or false? TRS 74 Shapes and table for check up TRS 75 Describe me
Notes to teachers		
1 There is a shape sorting algorithm on NC8-53. Link to teacher notes and TRS for Chapter 15 (all sections apart from Constructing triangles) NC8-63 1 When drawing diagonals on shapes it is a good idea to draw each diagonal in a different colour so that double ups do not occur.		

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GEOMETRY SHAPES		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
reason about unknown angles in situations involving angles at a point, angles on a straight line, vertically opposite angles, interior angles of triangles, and polygons	NC8-65 and 66 (angles) NC8-67 and 68 (angles in triangles) Book Year 8 (4B) Chapter 14 Pages 250 and 251 (interior angles in a polygon) NC8-69 and 70 (interior angles of a polygon) NC8-71 and 72 (more angles practice)	Book Year 8 (4B) Chapter 15 TRS 73 True or false? TRS 74 Shapes and table for check up TRS 75 Describe me
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 up to 360°. - Angles on a straight line add to a half turn which is 180°. Angles on a straight line are called supplementary angles. - Vertically opposite angle are two angles made by lines which cross at the same angle so are equal. Note Angles that add to 90° are called complementary angles. - You could use digital tools to show the rules. - Encourage students to write an equation. NC8-67 and 68 - It is important that students understand that the interior angles of ALL triangles add to 180°. - Encourage students to write an equation for the triangle before trying to work out the missing angle. NC8-68 and 69 - Even although Year 8 (4B) Chapter 14 pages 250 and 251 are about Tessellations, they are a good introduction to the interior angles of a polygon because the practical shows how polygons can be broken up into triangles and then the sum of the interior angles worked out. - Once students understand how to break up a polygon into triangles and work out the sum of the interior angles that way, they can use the formula. It is important that they understand the formula, i.e that all polygons can be broken up into (n - 2) triangles where n is the number of sides. It is important to show students several examples of this so that they are convinced it works.		

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GEOMETRY SPATIAL REASONING		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
visualise and draw nets for prisms with a fixed cross section	NC 73 to 76 (nets) Book Year 8 (4B) Chapter 16 Page 269 Getting started (Mission Impossible) Pages 272 to 275 (nets) Pages 280 to 284 (views) Chapter 15 Page 255 Getting started Euler's rule (relationship between vertices, edges and faces of 3D shapes) (This Getting Started content could be used for revision or extension- it is not strictly included in the Year 8 curriculum)	Book Year 7 (4A) Chapter 17 TRS 40 Will it or won't it? ET 1 Making a box ET 3 Making a die Book Year 8 (4B) Chapter 16 TRS 77 Sketch a net TRS 79 Draw it ET 58 Tennis for anyone? ET 59 Dice dilemmas
Notes to teachers		
- Students often find nets difficult. They may need to cut the net out and fold it for themselves. The nets for some of the questions are given in the online Teacher Support: Printable Master–Chapter 16 Activity 1 Question 2 Printable Master– Chapter 16 Activity 1 Question 3 - Encourage students as they fold nets to look at which edges join with which and then close their eyes and imagine it without looking. - Before folding a net, encourage students to put the same mark on edges that they think will join up when the net is folded. Then they can check if they are correct when they fold the net. - Encourage students to count the faces that the solid will have when the net is folded and the shape of the faces. This will help students decide which solid the net will fold to. - When checking whether a net will fold to make a solid shape at all, encourage students to check the number of faces and that the edges that will join are the same length. - This link gives you the templates for some nets to print off if you would like to use them.		

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GEOMETRY SPATIAL REASONING		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
recognise the invariant properties of 2D and 3D shapes under different transformations	Book Year 8 (4B) Chapter 14 Pages 244 to 249 (invariant properties) Chapter 14 Page 237 Getting started (transforming shapes)	Book Year 8 (4B) Chapter 14 TRS 71 Guess if I change
Notes to teachers		
- Generalise the properties that do not change i.e - For reflection, angles, length of sides and area do not change - For rotation angles and lengths of sides and area do not change - For translation angles, length of sides, area and orientation do not change - For enlargement angles and orientation do not change. - Students can have difficulty visualising rotation. One way to help remedy this is to use the rotate button on the computer to give practice. Ask students to sketch how simple shapes will look when rotated and then rotate the shapes on the computer to check. - It is important that students are able to identify the invariant properties for each transformation because knowing this will help them when drawing images and tessellating. - Point out that architects, graphic designers, engineers and crafts people all use transformations when working.		

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MEASUREMENT PATHWAYS		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
use map scales, compass points, distance, and turn to interpret and communicate positions and pathways in coordinate systems and grid reference systems	Book Year 8 (4B) Chapter 17 Pages 287 to 308 (whole chapter)	Book Year 8 (4B) Chapter 17 TRS 80 Mapping TRS 81 Bearings know how
Notes to teachers - While latitude and longitude in Year 8 (4B) on pages 300 to 303 are not specifically mentioned in the objective, it is an example of a grid reference and angles. Based on student interest you may or may not choose to teach this. - A topographical map such as the ones in book Year 8 (4B) pages 292 to 294 have large scale maps that show 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. - Investigate the navigating techniques of Māori and Pacific voyagers for locating position and finding the direction of travel. Link to teacher notes and TRS for Chapter 17 (all sections).		

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STATISTICS PROBLEM, PLAN, DATA, ANALYSIS AND CONCLUSION		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	Go to www.caxed.co.nz and click on 'teacher support' to find the resources in this column
- investigate, using multivariate datasets, summary, comparison, time-series, and relationship situations by: - posing an investigative question about a local community matter - making conjectures or assertions about expected findings - plan how to collect or source data to answer the investigative question, including - determining or identifying the variables needed - planning how to collect data for each variable (e.g., how to measure it 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 or source data, including: - Checking for errors and following up and correcting them when possible - Creating an informal data dictionary with information that will help others know about the context - create data visualisations for the investigation, using multiple visualisations to provide different views of the data - Make statements about the data including its features and context, in descriptions of distributions - communicate findings in context to answer the investigative question, using evidence from analysis, considering possible explanations for findings, and comparing findings to initial conjectures or assertions and existing knowledge of the world	Book Year 8 (4A) Chapter 18 Pages 309 to 311 (surveys) Pages 316 to 340 (displaying data and surveys) Book Year 8 (4B) Chapter 9 Page 165 Rich task Steady as you go (drawing a time series graph)	Book Year 8 (4B) Chapter 18 TRS 84 Scatter it TRS 85 What is the relationship? TRS 86 Horsing around (spreadsheet) TRS 90 Which graph? ET 63 I want to influence you ET 64 Walk bus or bike? ET 67 Practice at displaying data
Notes to teachers are on the next page		

Notes to teachers**Link to teacher notes and TRS for Chapter 18 (all sections except Displaying data)**

- 1 The section in **Year 8 (4B) pages 312 to 315** on drawing pie charts is excluded because this is not required in Year 8.
- 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 of. 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 You could use spreadsheets for collecting, displaying and analysing data.
- 6 When writing conclusions encourage students to use fractions proportions and percentages to describe their results.
- 7 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.
- 8 Explain how different data visualisations have different features. Ask students to justify why they chose a particular data visualisation to display their data.
- 9 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 discovered makes sense given what is known about the situation.

Data dictionary

- 1 When collecting data for a survey, ask students to make an information data dictionary (refer to sheet **NC 7–75**).

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 STATISTICAL LITERACY		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	Go to WWW.CAXED.CO.NZ and click on 'teacher support' to find the resources in this column
evaluate the data-collection methods, data visualisations, and findings of others' statistical investigations to see if their claims are reasonable	Book Year 8 (4B) Chapter 20 Pages 361 to 376 (whole chapter) (statistical literacy) NC8-77 (Analysing secondary data or other people's data)	Book Year 8 (4B) Chapter 20 TRS 95 What's wrong with that?
Notes to teachers Link to teacher notes and TRS for Chapter 20 (all sections) 1 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 PROBABILITY INVESTIGATIONS AND CRITICAL THINKING IN PROBABILITY		
Teach students to	Connecting All Strands Year 8 (4B) and supplementary material references (NC8-...)	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 technology, by: – posing an investigative question – anticipating what outcomes are possible and which of them are more 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 for all possible outcomes for theoretical probability models, where they exist – describing what these visualisations show – finding the probability estimates for the different outcomes – proposing possible theoretical outcomes and associated probabilities, for situations where no theoretical model exists – identifying similarities and differences between their findings and those of others – reflecting on anticipated outcomes – identifying similarities and differences between findings from probability experiments and associated theoretical probabilities, as appropriate identify, explain, and check other's statements about investigations referring to evidence	Book Year 8 (4B) Chapter 19 Pages 341 to 360 (whole chapter) NC8-78 (comparing theoretical and experimental probability) NC8-79 and 80 (probability experiments – with and without replacement)	Book Year 8 (4B) Chapter 19 TRS 91 Is it always possible to calculate a probability? TRS 93 How much area? ET 68 Spin it right ET 70 Space dice ET 71 Just for fun
Notes to teachers are on the next page		

Notes to teachers**Link to teacher notes and TRS for Chapter 19 (all sections)**

- 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 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.
- 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 Connect probabilities with proportional reasoning, fractions, and percentages, and with relative frequencies from data investigations.
- 6 You could use digital tools that simulate tossing a die many times, spinning a spinner or tossing a coin. These simulators

roll dice

have adjustable spinners

**have a coin tosser**

This site has **several simulators**

- 7 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 spin an adjustable spinner and then use one of the simulators given in point 7 above to show the experimental results.

NC8-78

- 1 Each group of students could roll the dice 200 times and then if there are 5 groups, the results could be combined to make 1000 rolls.

NC8-79 and 80

- 1 It is important that students understand that the probability of the second, third and fourth draw of the cards is different if the card is not replaced each time. If it is replaced, then the probability at each draw is the same because each time there is a 1 in 4 chance on getting each card. If it is not replaced, then there are only 3 cards, then 2 cards, then 1 card to choose from, so the probability is different each time.