

NELSON WA MATHS

for the **Australian Curriculum**

Developed especially for schools in Western Australia

Developed by innovative and experienced Maths teachers

New, interactive web-based digital versions free to schools using Nelson WA Maths as a core resource **nelsonnetbook**

Comprehensive coverage of the curriculum content descriptions and elaborations



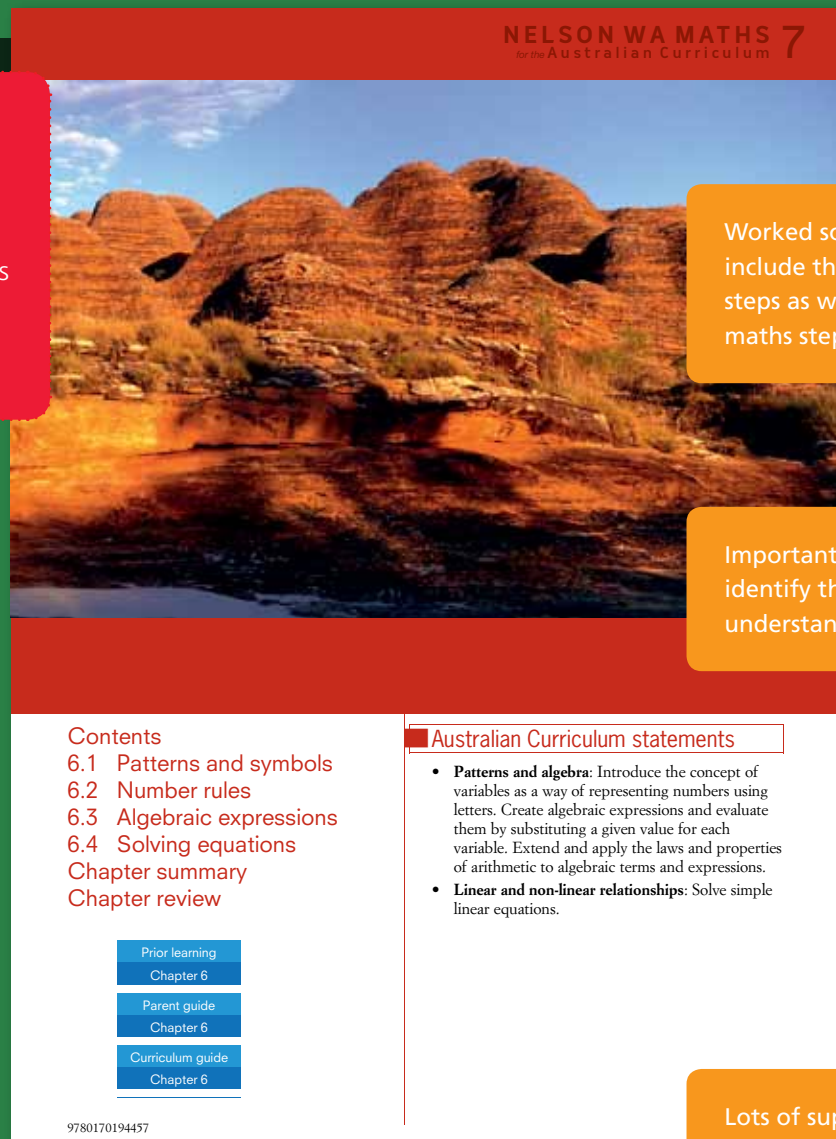
Stephen Corcoran | Ross Brodie | Stephen Swift | Sue Garner

NELSON WA MATHS

Nelson WA Maths for the Australian Curriculum 7 – 10 is a new series that has been developed to support teachers implementing the Australian Mathematics Curriculum for Years 7 – 10 students in Western Australia.

Key Features

- Explicit focus on the development of the four Australian Curriculum proficiencies – Understanding, Fluency, Problem solving and Reasoning
- Support for the general capabilities and cross-curriculum priorities
- Visually appealing, full-colour publications that reflect instructional design principles, and clearly distinguish exercises from theory and worked examples
- Numerous technology-related resources – spreadsheets, GeoGebra activities, scientific and CAS calculator examples and exercises
- Hands-on, practical real-world Maths investigations
- Clear thinking steps provided for worked examples
- Numerous 'drill and practice' exercises
- Graduated exercise sets referenced to colour-coded worked examples cater for mixed ability classrooms.



Chapter
Expression

Worked solutions include thinking steps as well as maths steps

Important boxes identify the key understandings

Contents

- 6.1 Patterns and symbols
- 6.2 Number rules
- 6.3 Algebraic expressions
- 6.4 Solving equations
- Chapter summary
- Chapter review

Prior learning
Chapter 6
Parent guide
Chapter 6
Curriculum guide
Chapter 6

9780170194457

Australian Curriculum statements

- **Patterns and algebra:** Introduce the concept of variables as a way of representing numbers using letters. Create algebraic expressions and evaluate them by substituting a given value for each variable. Extend and apply the laws and properties of arithmetic to algebraic terms and expressions.
- **Linear and non-linear relationships:** Solve simple linear equations.

Worksheet
Writing algebraic
expression
WKMN0700

Lots of supporting worksheets linked to chapters

100% Australian Curriculum Guaranteed

Student books for Years 7 and 8 have been written to address the Australian Curriculum as released by ACARA in December 2010. Revised editions will be available in 2012 if required.

The Nelson Swap Program

Schools that purchase class sets to the Nelson WA Maths Years 7 and 8 student books for use in 2012 can exchange the resources for the updated versions through their local bookseller. This option will be available ONLY if updated versions of the student books are published in late 2012 as a consequence of any revisions made to the Australian Curriculum by ACARA (and/or by State Curriculum Authorities) for implementation in 2013.

for the **Australian Curriculum**

Chapter 12 3 4 5 6 7 8 9 10
Expressions and equations

NELSON WA MATHS 7
for the Australian Curriculum

Example 15

How many terms are there in each of the following expressions?

- a $g + 8$ b $8 - m + 3pq$ c $2(v - 2p)$ d $6m + 3(m + 2)$

Solution

- a g and 8 are separated by $+$. **There are 2 terms.**
b The $-$ and $+$ separate the parts. **There are 3 terms.**
c The ' $v - 2p$ ' is not separated from the 2 . **There is 1 term.**
d $3(m + 2)$ is one term. **There are 2 terms.**

The English language has many words that mean the same thing, so you need to be able to translate all the words that describe arithmetic operations.

Important!

Key words for operations

The symbol n is used for a number in the table below. It doesn't make any difference if a different symbol is used for the variable.

Word	Example	Meaning
Sum	The sum of a number and 6.	$n + 6$
Quotient	The quotient of 20 and a number.	$20 \div n$ or $\frac{20}{n}$
Product	The product of a number and negative 8.	$-8n$ or $-8n$
Difference	The difference between 30 and a number.	$30 - n$
Double	A number doubled.	$2n$
Quarter	A quarter of a number.	$n \div 4$ or $\frac{n}{4}$
Increase	A number is increased by 5.	$n + 5$
Less	8 less than a number.	$n - 8$
Decrease	11 is decreased by a number.	$11 - n$

Example 16

Write each of the following as an algebraic expression, using p and q as variables.

- a The difference between a number and 18.
b 21 more than triple a number.
c The product of 8 and the sum of two numbers.
d Substitute the values $p = 3$ and $q = 4$ to evaluate the expression in part c.

Solution

- a Difference means subtract. $p - 18$
b Triple means 3 times.

Graduated examples to cater for mixed ability classrooms – green = easier, orange = moderate and blue = harder

- c The total is multiplied by 8.
d Write the expression.
Substitute values.
Work out the brackets.
Multiply.
Enter as: $8(3 + 4)$ **EXE** $\rightarrow$ $8(3+4)$ **56**

$$\begin{aligned} &8(p + q) \\ &8(p + q) \\ &= 8(3 + 4) \\ &= 8 \times 7 \\ &= 56 \end{aligned}$$

You could substitute $m = 3$ in the formula $c = 100m$ to work out the number of centimetres in 3 metres.

One reason for writing algebraic expressions is to make it clear when they can be simplified. The distributive law means that if you have $5p + 8p$ then you can add the 5 and 8 before multiplying by the number.

Important!

Collecting like terms

If an algebraic expression contains terms with exactly the same variables, we call these **like terms**. Like terms can be added or subtracted to **simplify** the expression.

Example 17

Simplify each of the following by collecting like terms.

- a $7m + 8m$
b $9p - 3p$

Solution

- a The terms are alike, so you can add them.
 $7 + 8 = 15$
b The terms are alike, so you can take one away from the other.
 $9 - 3 = 6$

$$7m + 8m$$

Chapter 12 3 4 5 6 7 8 9 10
Expressions and equations

Puzzle sheet
Grouping like terms
PSMNA070005

Example 18

Simplify each of the following by collecting like terms.

- a $5x + 3y - 7x + 6y$
b $g^2 - 3g^2 + 2g^2$

Solution

- a $5x + 3y - 7x + 6y$
 $= (5x - 7x) + (3y + 6y)$
 $= -2x + 9y$
b $g^2 - 3g^2 + 2g^2$
 $= (1 - 3 + 2)g^2$
 $= 0g^2$
 $= 0$

Emphasis on mathematical literacy throughout the books

Links to an online illustrated mathematical dictionary

Practical, real-world investigations to engage students

Weblink
Algebra masterclass

Algebra is like a written language and it is used to understand mathematics, you need to learn to read and write in primary school. Learning algebra is like learning the alphabet. When you work out the area of a rectangle, you are already using algebra. The formula $A = l \times w$ is an algebraic expression.

Mathematical literacy

The mathematical words below have special meanings. It is important that you learn to spell them and understand their meanings. You may find the glossary or online mathematical dictionary helpful. You may also find the glossary or online mathematical dictionary helpful.

associative	flow chart
coefficient	input
commutative	inverse
constant	law
distributive	left-hand side
equation	like terms
evaluate	linear
expression	output

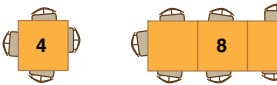
Maths dictionary

6.1 Patterns and sequences

Teacher notes
Restaurant tables

Investigate: Restaurant tables

Many restaurants use square tables that can seat more than four people, they put tables together. Examples are shown below. Your teacher may use these examples to investigate. Work in small groups.



- How many tables do you need to put together to seat 12 people?
- How many people can sit at 6 tables put together?
- How many tables will need to be put together to seat 20 people?
- Write a rule for the number of people that can sit at n tables.

You can see that for 1, 2, 3, 4, ... tables, the number of people that can sit at the tables is 4, 6, 8, 10, ... If you join 4 tables together, the 4 is called the **first term**, the 6 is the **second term**, the 8 is the **third term**, the 10 is the **fourth term**. The number in the pattern is called a **term** and the pattern is called a **sequence**.



Introducing the NelsonNetBook

The **NelsonNetBook** is a web-based eBook for Secondary schools, friendly to Interactive Whiteboards, computers and iPads, with optional Web 2.0 functionality for class groups and individual functionality to add highlights, annotations, audio clips and weblinks. Visit the NelsonNet portal at www.nelsonnet.com.au to find out more, to register or to log in if already registered.



Online Student Resources include:

- extra sets of questions
- worksheets
- homework sheets
- puzzle sheets
- video tutorials
- selected worked solutions
- CAS and scientific calculator resources
- quizzes
- spreadsheet activities
- geometry activities using GeoGebra.

Plus the interactive, customisable NelsonNetBook.

Online Teacher Resources include:

- a detailed teaching plan
- curriculum coverage grids
- curriculum teaching guides
- slideshow presentations
- secure topic tests and answers
- an ExamView question bank.

Plus a full colour printed Teacher's Edition of the student book with page-by-page wraparound information on implementing the curriculum.

Chapter 1 2 3 4 5 6 7 8 9 10
 Expressions and equations

You can model the expansion of $-3(x-2)$ by making 3 models of $(x-2)$ and turning them over to change from 3 times to -3 times. What do you get as the answer? Now use your models to work out $-2(5-2p)$, $-(2m-3p+x)$ and $-4(4-3p+2m-x)$. Write down your results and discuss them in groups of 3 people.

Exercise 6.2 Number rules

Understanding

Extra questions
Exercise 6.2
EQMNA070002
See Examples 8, 9

Fluency
See Examples 10, 11
Worked solutions
Exercise 6.2
WSMNA070002
See Example 12
See Example 13
Worked solutions
Exercise 6.2
WSMNA070002

Problem solving
Worked solutions
Exercise 6.2
WSMNA070002

Reasoning

1 Work out each of the following in your head and explain how you did it. Your teacher may ask you to explain it to your neighbour.

a $20 \times 154 \times 500$	b $80 \times 136 \times 12.5$
c $75 \times 234 \times 40$	d $68 + 90 + 13 + 43 + 73 + 7 + 37$
e $88 + 52 + 25 + 59 + 24 + 46 + 64$	f $3 + 27 + 74 + 86 + 50 + 92 + 22$
g $79 + 32 + 61 + 22 + 38 + 28 + 20 + 67$	h $88 + 83 + 16 + 77 + 17 + 84 + 20 + 34$
i $72 + 45 + 68 + 11 + 40 + 45 + 67 + 35$	

2 Use the distributive law to find shortcuts for working out each of the following.

a 101×143	b 152×99	c 327×102
d 999×68	e 302×35	f 49×247
g 19×28	h 21×422	i 99×1002

3 Expand the brackets and simplify each of the following.

a $3(a+2)$	b $2(b+2)$	c $2(m+3)$	d $4(x+6)$
e $4(x-2)$	f $3(m-7)$	g $8(k-3)$	h $5(y-5)$

4 Expand the brackets and simplify each of the following.

a $-3(m-5)$	b $-7(n+6)$	c $-12(2p+5)$	d $-5(w+2)$
e $6(3x+4)$	f $12(2m+n)$	g $10(4p+2q)$	h $3(2a+4b)$

5 Peter was paid \$12 an hour to pack. He worked 3 hours on Monday, 5 hours on Tuesday, 4 hours on Wednesday and 3 hours on Friday. Explain how to use a mathematical law to work out how much he should be paid.

6 Expand the brackets and simplify each of the following.

a $-3(x+2)$	b $-7(p+1)$	c $-2(m-3)$	d $-5(k-4)$
e $-4(6-y)$	f $-9(a+4)$	g $-(k+3)$	h $-(m-2)$
i $-(6-2x)$	j $-3(4m+5)$	k $-5(3y-6)$	l $-(4-7x)$

7 Write down shortcuts using the distributive law to work out each of the following. Your teacher may ask you to explain it to your neighbour.

a 103×49	b 999×104	c 205×51
d 1002×458	e 11×734	f 111×75

8 Show how to expand the brackets in each of the following, explaining every step.

a $2(m-p)$	b $7(3f-2g)$	c $4(3m-5)$	d $5(3m-3)$
e $6(3x-4)$	f $3(1-k)$	g $6(2-3p)$	h $10(2-2m)$

Questions classified according to proficiencies

Additional worked solutions provided

Questions colour-coded to show level of difficulty

Table of Contents

WA Maths Year 7

1 Statistics

- 1.1 Data and surveys
- 1.2 Tabulating data
- 1.3 Graphing data
- 1.4 Analysing data

2 Whole numbers

- 2.1 Using whole numbers
- 2.2 Order of operations
- 2.3 Index notation
- 2.4 Integers on the number line
- 2.5 Operating with integers
- 2.6 Special numbers

3 Flat shapes

- 3.1 Points, lines and angles
- 3.2 Angle relationships
- 3.3 Naming flat shapes
- 3.4 Sketching and constructing flat shapes
- 3.5 Similarity, congruency and transformations

4 Decimals

- 4.1 Naming and comparing decimals
- 4.2 Decimals, fractions and rounding
- 4.3 Adding and subtracting decimals
- 4.4 Multiplying and dividing decimals
- 4.5 Applying decimals

5 Time

- 5.1 12-hour and 24-hour time
- 5.2 Using timelines
- 5.3 Converting units of time
- 5.4 Time calculations and timetables

6 Expressions and equations

- 6.1 Patterns and symbols
- 6.2 Number rules
- 6.3 Algebraic expressions
- 6.4 Solving equations

7 Fractions and ratios

- 7.1 Naming and comparing common fractions
- 7.2 Ordering fractions
- 7.3 Adding and subtracting fractions
- 7.4 Multiplying fractions
- 7.5 Dividing fractions
- 7.6 Rates and ratios

8 Length and area

- 8.1 The metric system
- 8.2 Calculating perimeter
- 8.3 Area and its measurement
- 8.4 Calculating area

9 Probability

- 9.1 Describing probability
- 9.2 Experimental probability
- 9.3 Theoretical probability

10 Money and percentages

- 10.1 Money transactions
- 10.2 Percentages, fractions and decimals
- 10.3 Money and percentages

11 Solid shapes and measures

- 11.1 Solids, nets and surface area
- 11.2 Naming and classifying solids
- 11.3 Drawing solids
- 11.4 Volume and capacity
- 11.5 Mass

12 Number patterns

- 12.1 Graphs of number patterns
- 12.2 Number rules and functions
- 12.3 Functions and graphs

WA Maths Year 8

1 Statistics

- 1.1 Statistical measures
- 1.2 Organising data
- 1.3 Comparing samples and populations

2 Properties of shapes

- 2.1 Geometric shapes
- 2.2 Classifying triangles and quadrilaterals
- 2.3 Transformations
- 2.4 Similarity, congruence and symmetry

3 Numbers and indices

- 3.1 Positive and negative numbers
- 3.2 Indices
- 3.3 Scientific notation

4 Functions and graphs

- 4.1 Plotting points and lines
- 4.2 Linear graphs
- 4.3 Connecting algebra and geometry

5 Fractions and decimals

- 5.1 Comparing rational and irrational numbers
- 5.2 Adding and subtracting rational numbers
- 5.3 Multiplying and dividing rational numbers
- 5.4 Applications of fractions and decimals

6 Shapes and angles

- 6.1 Using angle relationships
- 6.2 Calculating angles on parallel lines
- 6.3 Calculating angles in triangles
- 6.4 Congruent triangles
- 6.5 Calculating angles in polygons

7 Applying ratios and rates

- 7.1 Rates
- 7.2 Ratios
- 7.3 Practical ratios and rates

8 Probability

- 8.1 Basic probability
- 8.2 Two-way tables and complementary events
- 8.3 Two-step probabilities

9 Algebraic expressions

- 9.1 Algebraic modelling
- 9.2 Expanding and simplifying
- 9.3 Factorising

10 Measuring shapes and time

- 10.1 Areas of triangles, rectangles and circles
- 10.2 Areas of other shapes
- 10.3 Surface area
- 10.4 Volumes of prisms and cylinders
- 10.5 Measuring triangles
- 10.6 Measuring time intervals

11 Personal business calculations

- 11.1 Accounts and budgets
- 11.2 Percentages
- 11.3 Personal business
- 11.4 Borrowing and investing money

12 Solving equations

- 12.1 Creating equations
- 12.2 Equation solution methods
- 12.3 Applying linear equations

About the Authors

Stephen Corcoran is an experienced teacher who has been Head of Mathematics in four schools. He is very familiar with current trends in mathematics education. He has received a National Excellence in Teaching award for inspiring students and encouraging their abilities through innovative mathematics programs.

Ross Brodie has worked as a classroom teacher and Mathematics Head of Department at a number of regional and metropolitan secondary schools. He has taught Mathematics at Years 8 to 12. Ross brings a wide range of

experience from education and other sectors to the writing of mathematics student books.

Stephen Swift started teaching Mathematics, Science and Computing in 1973 and taught at all levels from Years 7 to 12 in several states, in urban and country schools until retiring in 2010 from the role of Mathematics Head of Department at Wellington Point State High School in Brisbane.

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