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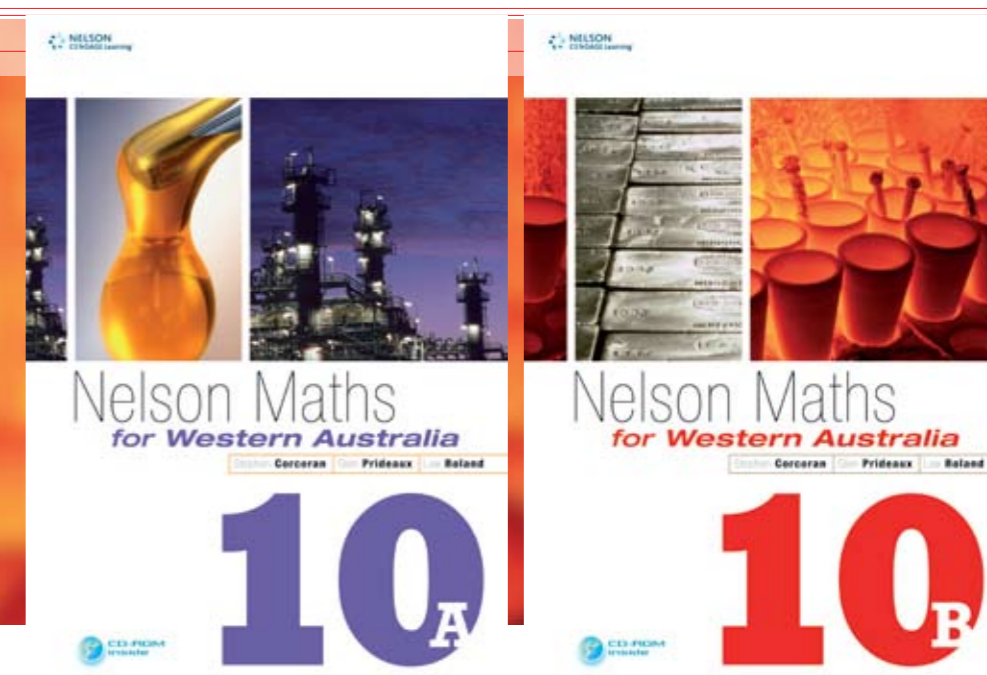
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ABN 14058280149 Printed 07/08 SEC7154

# Nelson Maths for Western Australia





# Nelson Maths

for Western Australia

## Features

Each Nelson Maths for Western Australia text comes with a CD-ROM containing the "live" version of the complete text linking to progress checks, alternative methods, interactive tutorials, technology activities, teacher notes, and glossary. The exercise and additional exercise questions link directly to their answers for easy self correction.

Other important series features include:

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- **Interactive quizzes** for use on interactive whiteboards or personal computers
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**Teacher Resource Packs** are also available, containing:

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- BLMs of progress checks, additional worksheets, and end-of-term review quizzes (with answers)
- CD-ROMs with network licences available to schools that adopt the student textbook.

### CHAPTER OPENER

**Fractions and ratios**

**5**

**Contents**

5.1 Naming and comparing common fractions and decimals  
 5.2 Addition and subtraction of common fractions  
 5.3 Multiplication and division of common fractions  
 5.4 Ratios and rates  
 5.5 Direct proportion

**Statement of learning: Number (N)**  
 Students use numbers and operations and the relationships between them efficiently and flexibly.

- Understand numbers
- Understand whole numbers and decimals
- Understand fractions
- Understand operations
- Calculate

**Progress check**

**Statement of Learning** summarises content featured in chapter

**Progress check** to assess student ability (also available on student CD-ROM and TRP)

**Statement of Learning** summarises content featured in chapter

Comprehensive Teaching Plans available to those schools that adopt class sets of the student textbook

### INTRODUCING CONCEPTS

Ever since people could count, they have needed to be able to measure and compare distances, areas and other quantities. We now have instruments to measure these quantities but this has not always been the case.

The human body has been used as a measurement device from early times. The body is a very convenient measuring device, but not a very accurate one. Can you imagine the different results if we asked five people from your class to pace out 1 kilometre?

The use of the body led to the development of a collection of units of measurement based on parts of the body. Some body units are still used today. For instance, the height of horses is still measured in hands, but this unit has been standardised to 4 inches (10.16 cm).

**4.1 Measuring length**

The metric system of units has been used in Australia since the early 1970s. Some common metric units are shown in the following table.

Quantity	Metric unit	Large metric unit	Smaller metric unit
Length	metre (m)	kilometre (km)	centimetre (cm)
Mass	gram (g)	kilogram (kg)	milligram (mg)
Capacity	litre (L)	kilolitre (kL)	millilitre (mL)

The metric system also uses the units of **seconds (s)**, **minutes (min)** and **hours (hr)** to measure time and the unit **degrees Celsius (°C)** to measure temperature.

**Investigation: Body parts as measuring instruments**

You will need a ruler or tape measure, pencil and paper for this investigation. Work in a group of four or five classmates.

1 Measure parts of your body to complete the following table.

Body unit	Metric measurement
Finger width	
Foot length	
Neck circumference	
Waist circumference	
Hand span	
Arm length	
Head circumference	
Pace length	
Body height	

Compare your measurements with those of others in your group.

**Key terms** are easily identified in **bold**

**Investigation** boxes contain ideas for classroom activities

Introductory paragraphs relate concepts to real-life situations

Key terms are easily identified in bold

Investigation boxes contain ideas for classroom activities

### CONSOLIDATION

**Project: Using a compass**

Your teacher will supply the compass that you need to use for this project. To use a compass, you need to know the directions: north, south, east and west. There are many kinds of compasses. The one we will use is called an **adjustable dial compass**. This type of compass is also called a **baseplate compass** or **orienting compass**. An adjustable dial compass looks like this.

It has a compass housing that can be rotated and is transparent so that maps can be read through it. The compass also has a **direction-of-travel arrow** drawn on the baseplate, and a **red-and-black compass needle** that floats in a liquid-filled enclosure. When the compass needle is free to move, it will always settle so that the red part of the needle points towards the Earth's magnetic North Pole.

As well as having N, S, E and W indicated, the compass housing or dial shows numbers of degrees to indicate direction. As you saw earlier in the chapter, this means that north is 0° (or 360°), east is 90°, south is 180° and west is 270°.

**Task 1: Travelling north**

- Hold the compass horizontally so that the needle moves freely. The compass needle will eventually settle into a north-south position. The red part of the needle will point north.
- To travel north, just follow the direction of the red end of the compass needle.

**Task 2: Travelling in a different direction**

If you want to travel in a different direction, you need to use the movable compass dial. Say you want to travel in a direction halfway between south and east, known as south-east.

**Selected end-of-chapter projects** to consolidate learning with various **Task** choices

**Teacher notes** on the CD-ROM contain additional information for teachers

Selected end-of-chapter projects to consolidate learning with various Task choices

Teacher notes on the CD-ROM contain additional information for teachers

**\*NEW\***  
10A and 10B books feature **Casio ClassPad 330** instructions

### INTERACTIVE LEARNING OBJECTS

**Fraction fiddle: reach the target**

Welcome!

Can you help my plane hit the target? Each time you make two fractions that add up to the number on the target, my plane will hit the bull's-eye!

Have you helped me before?

Yes No

The Learning Federation\* codes throughout the text link to interactive learning objects on the student CD-ROM. These learning objects give students access to colourful, appealing activities, where they can explore maths concepts in a fun and engaging way.

Interactive tutorials for further practice

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### SOLUTIONS & EXTENSION

To change an improper fraction to a mixed fraction, we divide to find the number of whole numbers. The remainder becomes the numerator. For the diagrams on page 159, this is given by  $11 \div 4 = 2 \text{ R } 3$ , so  $\frac{11}{4} = 2\frac{3}{4}$ .

From the above paragraph it is clear that we could rewrite an improper fraction as a division problem, so  $\frac{11}{4} = 11 \div 4$ . This means that it doesn't matter whether we regard  $\frac{11}{4}$  as a division problem or as an improper fraction.

**Example 2**

a Change  $\frac{17}{5}$  to a mixed fraction.  
 b Change  $4\frac{2}{3}$  to an improper fraction.

**Solution**

a Do the division.  
 Write the answer.  $17 \div 5 = 3 \text{ R } 2$   
 $\frac{17}{5} = 3\frac{2}{5}$

b Do the multiplication and addition.  
 Write the answer.  $4 \times 3 + 2 = 12 + 2 = 14$   
 $4\frac{2}{3} = \frac{14}{3}$

The ambiguity of naming fractions also arises with mixed numbers. Thus the written and spoken forms of  $\frac{107}{100}$ ,  $\frac{107}{100}$ ,  $100\frac{7}{100}$  and the 142 000th place are easily confused. If you need to use fractions like these, make sure your meaning is clearly understood.

There is more than one way to show the same number. For example, a quarter of a cake will be the same amount of cake as two-eighths of the same cake.

We say that  $\frac{1}{4} = \frac{2}{8}$  and that the fractions are equivalent.

**Equivalent fractions**  
 Different fractions that represent the same amount are called equivalent fractions.

The simplest form of a fraction is the equivalent fraction (or mixed number) with the lowest possible denominator. Improper fractions are not considered to be in simplest form.

**Simplest form =**  $\frac{1}{2}$

**Example 11**

Use a calculator to work out approximate answers to the following.

a  $\frac{5}{14} - \frac{3}{28}$     b  $\frac{21}{40} + \frac{27}{56}$     c  $5\frac{11}{20} + 4\frac{3}{10}$

**Solution**

a Enter as  $\frac{5}{14} - \frac{3}{28}$  → 0.20857142857  
 To change to a decimal  
 Press **SND** →  
 Write the answer.  $\frac{5}{14} - \frac{3}{28} = 0.2129$

b Enter as  $\frac{21}{40} + \frac{27}{56}$  → 1.02857142857  
 To change to a decimal  
 Press **SND** →  
 Write the answer.  $\frac{21}{40} + \frac{27}{56} = 1.043$

c Enter as  $5\frac{11}{20} + 4\frac{3}{10}$  → 10.3  
 To change to a decimal  
 Press **SND** →  
 Write the answer.  $5\frac{11}{20} + 4\frac{3}{10} = 10.31$

**Exercise 5.2**

1 Work out each of the following in your head.  
 a  $\frac{1}{2} + \frac{1}{3}$     b  $\frac{1}{4} + \frac{1}{5}$     c  $\frac{1}{6} + \frac{1}{7}$     d  $\frac{1}{8} + \frac{1}{9}$     e  $\frac{1}{10} + \frac{1}{11}$     f  $\frac{1}{12} + \frac{1}{13}$   
 g  $\frac{1}{14} + \frac{1}{15}$     h  $\frac{1}{16} + \frac{1}{17}$     i  $\frac{1}{18} + \frac{1}{19}$     j  $\frac{1}{20} + \frac{1}{21}$     k  $\frac{1}{22} + \frac{1}{23}$     l  $\frac{1}{24} + \frac{1}{25}$

2 Use a calculator with a fraction key to work out each of the following.  
 a  $\frac{1}{2} + \frac{1}{3}$     b  $\frac{1}{4} + \frac{1}{5}$     c  $\frac{1}{6} + \frac{1}{7}$     d  $\frac{1}{8} + \frac{1}{9}$   
 e  $\frac{1}{10} + \frac{1}{11}$     f  $\frac{1}{12} + \frac{1}{13}$     g  $\frac{1}{14} + \frac{1}{15}$     h  $\frac{1}{16} + \frac{1}{17}$   
 i  $\frac{1}{18} + \frac{1}{19}$     j  $\frac{1}{20} + \frac{1}{21}$     k  $\frac{1}{22} + \frac{1}{23}$     l  $\frac{1}{24} + \frac{1}{25}$

3 Use a calculator to work out an approximate answer to each of the following, correct to 3 decimal places. If your calculator has a fraction key, don't use it.  
 a  $\frac{1}{2} + \frac{1}{3}$     b  $\frac{1}{4} + \frac{1}{5}$     c  $\frac{1}{6} + \frac{1}{7}$     d  $\frac{1}{8} + \frac{1}{9}$   
 e  $\frac{1}{10} + \frac{1}{11}$     f  $\frac{1}{12} + \frac{1}{13}$     g  $\frac{1}{14} + \frac{1}{15}$     h  $\frac{1}{16} + \frac{1}{17}$

**Examples with worked solutions**

**Definitions and explanations of key terms**

**Additional exercises** for further extension

**Exercises with graded questions** including an **Application and Problem solving** section to develop concepts