CONTENTS TEACHER'S HANDBOOK

The Teacher's Handbook contains:
- **Detailed answers** for all activities in the Student's text. Note, at times, the author has provided answers to reflect industry practice, rather than a more traditional mathematical response.
- Suggested teaching and **learning strategies**
- Up to date **information on the contexts**
- Sundry **information to build interest** in the contexts
- **References to other resources** to reinforce learning.

Consider using the student text and teacher's handbook for:

- Teaching mathematics, and numeracy subjects, and delivering competencies from national Training Packages
- Test preparation, such as the Queensland Cores Skills Test
- Assessing students' numeracy abilities, for reporting purposes
- Determining students' ability to meet the Standards in the National Reporting System. Details are in the students' textbook. The author has attempted to provide activities for Levels 3 and 4 of the NRS.

INTRODUCTION

NOTES TO TEACHERS

The *Maths at Work Teacher's* Handbook and the student textbook have been designed to assist young adults about to enter the workforce, particularly those students who seek to improve their maths and numeracy skills. The author believes maths and numeracy skills are best developed through practising basic mathematics computations, and developing an understanding of the contexts within which the skills are applied. Students should develop a sense of confidence as they achieve competencies in familiar situations.

The student activities range from simple calculations to the solving of problems using more complex and varied steps.   Syllabus documents for trade, business and workplace mathematics have been accessed so that hopefully, the needs of teachers and students are met both from curriculum and life skills perspectives.

Students should be encouraged to store their responses to the activities in a folder so that evidence of achieved competencies can be produced if required.

The Teacher's Handbook contains suggestions for engaging students in the learning process. The Handbook is designed for teachers who may need assistance with understanding pedagogy in mathematical contexts. Answers are provided to assist teachers with preparation, and to act as models when demonstrating to students.

A number of contexts have been used to set the scene. These contexts should be familiar to most students. Learning in familiar contexts provides students with a more confident start to problem solving and helps teachers engage students in meaningful experiences. Alternatively the context can add a challenge thereby adding depth to what might have been simple calculations, in isolation.

When designing the activities, the authors considered the essential skills for living. Students should be able to reinforce their numeracy skills through:
- participating in day to day activities involving mathematical calculations
- reading journals, newspapers and other sources to develop an understanding of the meaning behind the calculations
- viewing audio-visual media to appreciate the importance of numeracy skills when making decisions
- communicating with others to use technical language
- presenting information in a variety of forms including statistical, tabular, written, oral, pictorial, graphical
- using information communication technology to support effective use of numeracy skills
- work experience to practise numeracy and other skills.

SUGGESTED STRATEGIES WHEN TEACHING MATHEMATICAL AND NUMERACY SKILLS - AN OVERVIEW

Setting the scene when teaching a particular skill

- Identify who in the group has used the particular skill in a workplace or community context
- Encourage these users to share examples of
  - the types of equipment or materials used when calculations were made
  - whether mental computation was necessary
  - whether or not a supervisor checked the accuracy of calculations
  - whether skills in dealing with customers were required while calculations were completed
  - problems that had to be solved
  - complications which had to be overcome
  - consequences of miscalculating.

Determine known mathematical knowledge and skill already acquired

- Provide students with a pre-test, and inform students results will be confidential and used to assess individual and class needs
- Analyse results and determine the level of prior knowledge and skills.

Check for understanding of language and context

- Before providing mathematical problems, investigate the context through discussion, stimulus material, Internet searches, guest speaker visits.
- Provide opportunities for students to check understanding of terminology and language by either working alone, or in pairs.
- Draw on students' experiences of working or interacting in the context being examined.

Determine the mathematical concepts that underpin the specific skill to be learned.

- Do students know the order of operations?
- Are they confident in using different numbers?
- Can they estimate?

Introduce the skill and Review the skill

The *Maths at Work* Teacher's Handbook, on CD, provides strategies when teaching mathematics skills.

Combine a number of skills and test for understanding

Use the problems in the *Maths at Work* student text to solve problems, and understand job and life skills contexts.

MATCHING SKILLS TO ACTIVITIES IN STUDENT'S TEXT

LINKING ACTIVITIES TO SKILLS

Students might work the activities in the order presented in this text, thereby focusing on context. Alternatively, activities might be grouped according to the mathematical skills. The following table provides one example of linking the activities to the skills.

Number	Finance
Activities: 1, 2, 3, 7, 8, 19, 24, 26, 27, 37, 38, 46, 48, 50, 51, 52, 56, 61, 62, 66, 67, 77, 78, 114, 121, 123, 134, 139	Activities: 5, 6, 9, 10, 11, 12, 13, 16, 18, 20, 25, 29, 30, 31, 34, 35, 36, 49, 59, 60, 63, 85, 86, 87, 88, 89, 90, 91, 94, 95, 96, 97, 99, 100, 101, 102, 103, 106, 113, 115, 116, 117, 118, 119, 120, 128, 138, 140, 143, 144, 146,147, 149
Measurement	**Time and Location**
Activities: 21, 28, 39, 40, 41, 42, 43, 44, 45, 54, 58, 65, 68, 70, 71, 82, 129, 132, 142	Activities: 53, 72, 73, 74, 75, 76, 79, 80, 81, 84, 122, 126, 127
Data	
Activities: 4, 14, 15, 17, 19, 22, 23, 32, 33, 47, 55, 57, 64, 69, 83, 92, 93, 98, 104, 105, 107, 108, 109, 110, 111, 112, 124, 125, 130, 131, 133, 135, 136, 137, 141, 145, 148, 150	

NATIONAL TRAINING PACKAGES

Teachers and trainers might also link activities to Learning Outcomes in national Training Packages. Following are some examples.

ICA99 Information Technology
ICAITAD139A   Design a database
ICAITAD147A   Determine that database functionality and scalability suits business
ICAITAD151A   Gather data to identify business requirements
ICAITB060B   Identify physical database requirements
ICAITB170A   Build a database

BSB01 Business Services
BSBCMN107A   Operate a personal computer
BSBCMN207A   Prepare and process financial /business documents
BSBCMN214A   Create and use simple spreadsheets
BSBEBUS301A Search and assess online business information

BCG03 General Construction
BCGCM1005B   Carry out measurements and calculations
BCGCM2001B   Read and interpret plans and specifications

THH02 Hospitality
THHGCSO6B   Plan and implement sales activities

SECTION 1 – COMMON CALCULATIONS

The answers in this Teacher's Handbook are detailed so that
- inexperienced mathematics teachers have support material
- busy teachers have quick access to ideas and response
- teachers who are not familiar with particular contexts have background information
- the answers can be used as models
- the answers may be provided to students working at individual rates.
- Experienced mathematics teachers may not need the detail provided and may even suggest alternative strategies and explanations.

Numbers have been written with commas separating hundreds and thousands to assist students who sometimes find mathematics difficult. Diagrams are hand drawn to reflect industry practice in informal settings. Teachers should update answers when these are based on information current at the time of writing this Handbook, for example, changed income tax rates, or superannuation rates.

Administration, Trade and Commerce

Terms in this section

Terms	Meaning
retailer	Person or organisation selling to the public
wholesaler	Person or organisation buying from a producer or manufacturer and selling to the retailer
manufacturer	Person or organisation making goods and selling to wholesalers or retailers
producer	Person or organisation growing or preparing goods or services for sale
cost price	The price it costs to make or produce the goods or services
sale price	The price at which goods or services are provided
income	Earnings through the sale of goods or services
expense	Costs in producing and distributing the goods or services
mark-up	The amount added to the cost price so that expenses are covered and, hopefully, a profit is made
break-even point	The income to be received to cover costs in producing or making the goods. Income after this point will mean a profit if made
transactions	Events in a business such as selling goods to a customer
cash register	Equipment used to record receipts from the sale of goods, and sometimes the quantity of stock used
stock/Inventory	The items available for sale, as opposed to other assets the business might, have such as motor vehicles
discount	A reduction in the selling price, sometimes for fast payment, for sale items, for regular customers or for

	large orders
goods and services tax (GST)	A tax collected when goods or services are exchanged – many people involved in business transactions are therefore playing the role of 'tax collector' for the government
Business Activity Statement	The statement summarising GST collected when goods are sold and GST paid when supplies are ordered
purchase order	A document used to order goods or services
invoice	A document summarising goods or services provided and the amount owing
statement of account	A document summarising amounts owing for a particular period of time
credit note	A document describing a reduction in a debt when goods or services are returned or unacceptable
debtor	A person who has a debt – people or organisations owing money to someone else
creditor	A person to whom money is owed
direct deposit	Payments made directly into a bank account by a debtor
credit card transaction	Purchase and sale when payment is made at a later date
sales voucher	Documentation describing the credit sale
EFTPOS	Electronic funds transfer at point of sale
merchant fees	Charges made by financial organisations for providing credit facilities to business organisations
profit	The selling price of goods or services is higher than the cost price
loss	The selling price of goods or services is less than the cost price
gross profit or loss	The profit or loss when comparing cost price and selling price
net profit or loss	The profit or less when comparing cost price, selling price and all other related expenses and income
petty cash system	A method of recording payment for small items so that the cash control system is kept intact
interest	An amount added when money is borrowed or invested. There are different ways of calculating interest
stocktaking	The process of determining the quantity of stock available for sale so that orders can be placed, errors detected and financial reports prepared
budget	A document with calculations predicting future receipts, payments and funds available
bank statement	A document from the bank listing deposits, withdrawals, balances, charges and interest
bank reconciliation statement	The statement prepared by a business to prove that the business records of cash received and paid match the bank's record

Dr	An abbreviation for Debit – accounting information is coded Dr or Cr to record changes in account values. For example, a Dr may mean an increase in amount owing to a business
Cr	An abbreviation for Credit – indicates a change, for example, increase in amount owed by a business

SOME STRATEGIES WHEN TEACHING NUMBER
ADDITION, SUBTRACTION, MULTIPLICATION AND DIVISION

STRATEGY 1
Pre-test students to determine their ability to add, subtract, divide, and multiply using mental, manual and electronic calculations. For some calculations ask students to estimate and check against their answers.

STRATEGY 2
Gain from students the strategies they have already been taught, when adding, subtracting, multiplying and dividing. Ask students to identify which methods they are most familiar with. Discuss the rules they are familiar with.

STRATEGY 3
Divide students into small groups. Provide students with butcher's paper.   Ask each group to list the types of jobs they know of, where mathematical skills are needed. List the jobs and types of mathematical calculations. For example, some might list:

Working in a fast food outlet
Select products from a screen and note total amount owing. Advise the customer. Take money. Record amount received and note on the screen the total change to be given.
Working as an apprentice in construction
Read plans, especially draft on site sketches; measure timber; cut to specific lengths; sketch what has to be done marking lengths and angels, understand the use of a scale in drawings.

Decide the most commonly used calculations and methods for performing them.
Debate whether or not people still need mental arithmetic.

STRATEGY 4
Review how to use a calculator for commonly used calculations.

ACTIVITY 1

Use this activity to determine students' prior knowledge. Students may need to review examples and rules in the Number section of the *Overview – Mathematics Skills* in Part B of the *Maths at Work* Student's text.

Addition a. 18 b. 107 c. 11,916 d. 45 e. 236

Subtraction a. 111 b. 116 c. 3 d. 201 e. 819

Multiplication a. 20 b. 195 c. 6,307 d. 36 e. 504

f.	29	g.	138	h.	35	i.	89	j.	425
	16		149		18		28		348
	174		1,242		280		712		3,400
	290		5,520		350		1780		17,000
	464		13,800		630		2,492		127,500
			20,562						147,900

Division a. 4 b. 49 1/3 c. 26,142 d. 5 e. 226

In the next group of activities, remind students that there can be many different steps taken when solving problems. Just as we, on a computer, have at least three ways to underline, so to in mathematics there are shortcuts or different ways to determine an answer.

Percentages, decimals and fractions

a. $23.50 Move decimal one place to the left OR divide by 10 OR multiply $235 by 0.10.

b. 25/100 x $1,654
= ¼ x $1,654
= $413.50

c. 5/100 x $624
= 1/20 x $624
= $31.20 OR multiply $624 by 0.05

Order of operations

a. 1.623 + .091 + .64 = 2.354

b. 4 + (6 x 25) – 16   c. 13 + 8 – (4 x 3) + 9   d. (18 x 2) – 6 + 9
= 4 + 150 – 16   = 13 + 8 – 12 + 9   = 36 – 6 + 9
= 154 – 16   = 21 – 12 + 9   = 39
= 138   = 18

Remind students of the importance of working from left to right.

ACTIVITY 2

The purpose of this activity is to demonstrate how mathematics when spoken and calculated mentally can bring different challenges. Students need to develop active listening skills, ask for information to be repeated if necessary, and develop confidence.

Teachers may need to review order of operations, that is, multiplication and division before addition and subtraction.

Spoken response might be:

1. *That will be 23 cans*.

2. *That will be 31 burgers.*

3. *Yes. You have enough. You have ordered 22 and you need 20. Would you like to reduce one type of chocolate by 2? Or take 1 from 2 different types?*

Teachers might provide visual reinforcement. Brackets are used to separate groups rather than denote order of operation.

$(12 – 2) + 4 + 6$ OR
$(12-1) + (4 – 1) + 6$

4. *You will need to divide 50 by 9. Each child will receive 5 each with 5 left over.*

5. *There are 22 people now going on the excursion. We will need 11 double seats.*

Teachers might use brackets to review order of operations. $(25-3) / 2$.   Show how the incorrect answer might be obtained if writing $25 – 3 / 2$.

6. *You will need five pieces of cutlery for each person. As there are 4 people, you will need 20 pieces.*

    $4 x (2 + 2 + 1)$

ACTIVITY 3

This activity is designed to test active listening when performing simple calculations.

1.
   a. Sally buys 5 ice blocks.
   b. Judy buys 11 tubs of yoghurt
   c. Kathy buys 13 chocolate bars.
   d. Leah buys 8 ice blocks.

2.
   a. Adam owes $2.95
   b. Sarah owes $4.15
   c. Jane owes $1
   d. Heather owes 3 times $2, or $6.
   e. Mike owes 4 times $1.20 or $4.80
   f. Alex owes 10 times 0.65 cents or $6.50
   g. Vaino owes 2 times 0.50 cents and 0 .95 cents or $1.95

3.
   a. Sally owes 5 times .65 cents or $3.25. Students need to locate the cost of one ice block and revisit Sally's purchase details. This often happens in a small business situation – remembering or accessing prices or customer details quickly.
   b. Judy owes 11 times 0 .50 cents or $5.50
   c. Kathy owes 13 times 0.75 cents or $9.75
   d. Leah owes 8 times 0.65 cents or $5.20

4.