

# Henry Sprays It Safe



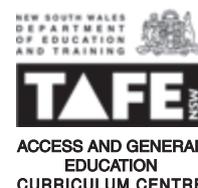
## Trainer guide

A CD-ROM resource to assist  
market gardeners with chemical spraying

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#### Disclaimer

At the time of development and printing, care has been taken to ensure the accuracy and currency of the information presented in the CD-ROM training resource *Henry sprays it safe*. No person should rely on the general information presented in this resource as a substitute for specific expert advice. All chemicals, pests and diseases used in scenarios and activities are fictitious.



# Henry sprays it safe

## TRAINER GUIDE

*Henry sprays it safe* is a CD-ROM resource to assist market gardeners with chemical spraying.

This resource supports the development of the language, literacy and numeracy skills related to selected units of competency common to the

- Conservation and Land Management Training Package (RTD02)
- Rural Production Training Package (RTE 03)
- Amenity Horticulture Training Package (RTF 03).



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# INTRODUCTION

*Henry Sprays It Safe* was funded under the Workplace English Language and Literacy Programme by the Commonwealth Department of Education Science and Training. It has been developed to assist market gardeners with chemical spraying. Many market gardeners are

- sole operators/single person enterprises
- from language backgrounds other than English.

Chemical use has been identified as a high risk activity, which can impact negatively on growers, consumers and the environment.

The resource consists of a CD-ROM and Trainer guide. The learning activities and tasks are drawn from an analysis of the industry units of competency, from site visits to market gardens, interviews with chemical trainers and market gardeners as well as consultations with bilingual support officers in the field.

The resource aims to support the development of the language, literacy and numeracy skills required for a number of key units of competency common to Conservation and Land Management Training Package (RTD02), the Rural Production Training Package (RTE 03) and the Amenity Horticulture Training Package (RTF 03).

These units relate to the safe handling, storage, preparation and application of chemicals at AQF levels I, II and III.

The selected units of competency are:

- RTC 1701A Follow basic chemical safety rules
- RTC 2706A Apply chemicals under supervision
- RTC 3704A Prepare and apply chemicals
- RTC 3705A Transport, handle and store chemicals

The learning sequences and activities have been based around the everyday work of a small enterprise market garden and involve three characters – Henry and Joe, both market gardeners, and Charlie, a chemical reseller.

The grid on pages 10-13 indicates how the activities relate to the underpinning knowledge and skills of particular units of competency.

# THE CD-ROM

There are 5 sections on the CD-ROM, which take the learner through a whole spraying sequence, from identifying the pest, discussing options with a chemical re-seller and reading important parts of the chemical label, transporting and storing chemicals, checking and calibrating equipment, mixing, spraying, cleaning up after spraying and keeping records.

In a nutshell, the learner follows Henry, a market gardener as he deals with the problem of 'Bluefly' on his lettuces. He gets help from Charlie, his reseller, in choosing an appropriate chemical and in transporting the chemical home. He then gets help from his neighbour, Joe, in calibrating his equipment for spraying. He then successfully sprays his lettuces.

Throughout this sequence of events, Henry seeks help from the learner with particular tasks related to his lettuces and other crops on his farm.

While the characters and activities are as authentic as possible, it should be noted that the chemicals, pests and diseases are not.

The learner can choose to work through the sections sequentially or in any order.

The largest and most in-depth section (Calibration) covers:

- finding information from the chemical label
- taking measurements
- calibrating equipment
- calculating the amount of chemical per tank
- calculating how much chemical is needed to spray an area.

Each part in the process has been broken into small chunks. This is to ensure that the learner has the opportunity to gain an understanding of the process and to develop the required skills in small manageable steps. There is a practice activity to reinforce the learning at every step. In the practice activities learners are given hints. If they make an incorrect response, they are given the opportunity to try again. On the third incorrect response they are given the correct answer, so they can continue through the activity.

The learner will also learn and practise beginner computer skills while undertaking the activities on the CD-ROM. Navigation has been kept very simple with only a few basic computer actions required. The *How to use the CD-ROM* explains these, and all learners should be directed to use this section before starting the program. However it is possible that some learners may require additional trainer guidance when first using the program.

## Other features

### Hints

Throughout the CD-ROM, hints are provided for additional information or tips about the topic. These can be accessed by clicking on a flashing red spot on the tool bar.

### Printable sheets

There are a number of printable sheets which can be accessed from the CD-ROM itself. These sheets are also available for photocopying from this Trainer guide. (See pages 25 to 53)

### **1. Sheets for recording information**

Key record sheets modeled on those currently used in the industry are provided for learners to use in the activities. These are also used by the characters in the CD-ROM.

They are:

- Calculation sheet (for learners to record measurements and calculations)
- Calibration record
- Spray application record
- Storage record

### **2. Information sheets**

Where there is a lot of information to be given, one-page summaries can be printed for further reference. These are:

- Ute it don't boot it (information about safe transporting of chemicals)
- Cleaning up after spraying
- Beaufort scale

### **3. Maths practice sheets**

Worksheets are provided to assist learners to develop and practise the maths skills required for the calculations in chemical spraying. These are:

- Changing centimetres to metres
- Changing litres to millilitres
- Changing millilitres to litres
- Changing square metres to hectares
- Working out 10%

### **4. Glossary - Words to know**

A glossary is provided for learners to refer to for the meanings of key terms. This glossary is also included in this trainer guide at page 54. It could be photocopied for learners if appropriate.

# TIPS FOR TRAINERS

*Henry Sprays It Safe* is not a complete training program. It can be used by a trainer in conjunction with other teaching, learning and assessment materials and activities. A range of additional material is summarised in the Useful Resources section pp 20-24 of this trainer guide.

It is suggested that the trainer work through the sections first, and choose appropriate parts for use within a training session. After each section, ask questions to check for understanding and allow time for discussion and review of the material covered.

The printable sheets on the CD-ROM are included in this trainer guide. These can be printed, copied and discussed prior to the learners using the CD-ROM.

Initially, learners can be encouraged to work through the sections in order. Later the user can return to sections where they want or need more practice or revision.

The simulated tasks performed on the CD-ROM need to be supported with real chemical labels and Material Safety Data Sheets using equipment appropriate to the crop and area to be covered, and focusing on the pests common to the crop and region.

As said earlier, while navigation has been kept simple, some learners may not have computer skills, and may need initial guidance on how to use the CD-ROM. For example, they may need help with clicking with a mouse, using enter and delete, moving the cursor and clicking in a box, printing worksheets, moving from screen to screen and using the online calculator.

Trainers need to be aware that many older workers may not be familiar with metric units or with using a calculator and may need to be shown how to enter numbers including decimals, and to perform operations.

## REFERRALS

If trainers identify learners in their group who require further assistance with English language, literacy or numeracy, they could encourage learners to seek further training.

There is a National Reading-Writing Hotline which provides advice on how to access classes throughout Australia. The hotline number is 1300 655 506.

Trainers can pass on this information discretely, or offer to make the call on the learner's behalf.

# SECTIONS ON THE CD-ROM

The table below outlines the content of the CD-ROM. The trainer can choose which sections are most suited to the purpose of different parts of their training.

SECTION	SUB-SECTION	WHAT'S THERE
<b>Introduction</b>		The purpose of the CD-ROM, the characters and the setting
<b>How to use the CD-ROM</b>		General navigation from the Home page and using the shovel and circles Toolbar icons: Speaker – volume Book - a glossary Question mark – hints and printable worksheets for extra help Sheet – Calculation Sheet to print
<b>1. Choosing chemicals</b>	1. At the farm	<i>Scenario using a fictitious insect and chemical: Henry finds Bluefly on his lettuces</i> Identification of a pest.
	2. At the resellers	Herbicides, pesticides, fungicides. <i>From sub-section 2 to 6 Henry and Charlie work out that Bugaway is the best chemical to use.</i>
	3. Broad Claims for Use	Chemical label – <i>Broad Claims for Use</i> section
	4. Mode of Action	Chemical label – <i>Mode of Action</i> section
	5. Signal Heading	Chemical label – <i>Signal Heading</i> section
	6. Withholding Period	Chemical label – <i>Withholding Period</i> section
	7. Overview	Revision of where on the label to find <i>Broad Claims for Use, Signal Heading, Withholding Period</i> and <i>Mode of Action</i> Asking for the MSDS
	8. Activity 1	Practice activity - Look at the <i>Broad Claims for Use</i> to choose the most suitable chemical
	9. Activity 2	Practice activity - Look at the <i>Signal Heading</i> to identify how poisonous a chemical is
	10. Activity 3	Practice activity - Look at the <i>Withholding Period</i> and find when the crop can be harvested
<b>2. Transport and store</b>	1. Safe transport	Transporting chemicals, Dangerous Goods signs.
	2. Safe storage	Storage shed, Labelled containers How chemicals can harm you Hazardous substances and the MSDS
	3. Storage Record	Keeping Storage Records – demonstration of how to fill in a Storage Record Sheet
	4. Activity	Practice activity - Print out and fill in a Storage Record Sheet

SECTION	SUB-SECTION	WHAT'S THERE
<b>3. Calibrating and measuring</b>	1. Introduction	The reason for calibrating The approach taken on this CD-ROM – 5 steps Getting ready to calibrate – what you need The Calculation Sheet
	2. Step 1 – Recording information	<i>Scenario using a fictitious insect and chemical: Joe wants to use his 200L tank to spray his cucumber crop for cucumber mite using Buzoff.</i> Joe records: Chemical Application Rate Water Application Rate Tank size Pump pressure Nozzle Size
	3. Step 1 - Activity	<i>Scenario using the same fictitious insect and chemical from section 1 – Henry wants to use his 15L knapsack sprayer to spray his lettuce crop for Bluefly using Bugaway.</i> Practice activity – Help Henry find and record: Chemical Application Rate Water Application Rate Tank size Pump pressure Nozzle Size
	4. Step 2 – Taking measurements	Joe measures: Nozzle output Spray width Walking speed
	5. Step 2 - Activity	Practice activity - Help Henry measure: Nozzle output Spray width Walking speed
	6. Step 3 – Calibrating equipment	Joe calculates the Sprayer Application Rate using a formula
	7. Step 3 - Activity	Practice activity - Help Henry calculate the Sprayer Application Rate using a formula
	8. Step 4 – Chemical per tank	Joe calculates how much chemical to put in a tank using a formula
	9. Step 4 - Activity	Practice activity - Help Henry calculate how much chemical to put in a tank using a formula
	10. Step 5 – Area, tanks and chemical	Joe calculates: Area to spray in square metres and hectares How many tanks are needed How much chemical is needed for the job
	11. Step 5 - Activity	Practice activity - Help Henry calculate: Area to spray in square metres and hectares How many tanks are needed How much chemical is needed for the job
	12. Overview	Keeping a record of calibration calculations using a Calibration Record Sheet Review of when to calibrate

SECTION	SUB-SECTION	WHAT'S THERE
<b>4. Calibrating – test yourself</b>	1. Introduction	<i>Scenario using a fictitious insect and chemical – Henry wants to use his 100L tank to spray his tomatoes for rust using Gonno</i> Print a Calculation Sheet
	2. Step 1	Practice activity - Help Henry find and record: Chemical Application Rate Water Application Rate Tank size Pump pressure Nozzle Size
	3. Step 2	Practice activity - Help Henry measure: Nozzle output Spray width Walking speed
	4. Step 3	Practice activity - Help Henry calculate the Sprayer Application Rate using a formula
	5. Step 4	Practice activity - Help Henry calculate how much chemical to put in a tank using a formula
	6. Step 5	Practice activity - Help Henry calculate: Area to spray in square metres and hectares How many tanks are needed How much chemical is needed for the job
	7. Recording	Practice activity - Copy calibration calculations onto a Calibration Record Sheet
<b>5. Spray and clean up</b>	1. Critical Comments	Critical Comments about spraying on the label
	2. Weather	Suitable weather for spraying: Wind speed and direction Temperature Humidity
	3. Critical Comments Activity	Check Critical Comments on the label
	4. Weather - Activity	Practice activity - Check suitable weather for spraying: Wind speed and direction Temperature Humidity
	5. PPE	Personal protective equipment – finding information Demonstration of PPE
	6. Mixing	Where to mix How to mix How much chemical
	7. Mixing - Activity	Practice activity - How much chemical to use.
	8. Spraying	Careful spraying – watch out for sensitive areas and no spray drift
	9. After spraying	Clean Up After Spraying printable sheet Check equipment Check Re-entry Period on the label Check Withholding Period on label Spray Application Record Form

# TRAINING PACKAGES

## Grid of learning activities

The grid below shows how the sections on the CD-ROM relate to the selected units of competency. These units are in a large number of qualifications. Trainers should check which units are required for the qualification they are delivering, so that learners can be directed to complete only those sections required for the particular qualification.

Unit of Competence	Element	Performance Criteria	Section
<b>RTC1701A</b> <b>Follow basic chemical safety rules</b>	1. Follow workplace requirements and instructions concerning chemicals.	1.2 Safety procedures involved in chemical handling and use are recognised and followed as required	Transport and store: Safe transport Spray and clean up: PPE, Spraying, After spraying
	2. Recognise risks associated with chemicals.	2.2 Chemical labels and symbols are recognized and hazards identified.	Choosing chemicals: Signal heading Transport and store: Safe transport, Safe storage
		2.3 Chemical storage locations are identified.	Transport and store: Safe storage
		2.4 Instructions for transport, handling and storage if chemicals are recognised and observed.	Transport and store: Safe transport, Safe storage
	3. Follow chemical handling and storage rules	3.3 Appropriate personal protective equipment is obtained and used when working in areas where chemicals are used or stored.	Spray and clean up: PPE

Unit of Competence	Element	Performance Criteria	Section and Sub-Section
<b>RTC2706A</b> <b>Apply chemicals under supervision</b>	1. Follow instructions to check and maintain application of personal protective equipment	1.1 Pre and post operational checks and maintenance on application equipment are carried out according to manufacturer's specifications and enterprise procedures.	Calibrating and measuring: Step 2 – Taking measurements
		1.2 Application and personal protective equipment are prepared and adjusted for use appropriate to the situation and in accordance with OHS requirements.	Spray and clean up: PPE
	2. Use application and personal protective equipment	2.1 Chemical label is interpreted	Choosing chemicals Spray and clean up: Critical Comments

<b>RTC2706A</b> <b>Apply chemicals under supervision</b>  .....continued		2.2 Application and personal protective equipment appropriate to the task are recognized and used, maintained and stored according to enterprise and OHS requirements.	Spray and clean up: PPE
		2.3 Measurement and decanting of substances comply with directions.	Spray and clean up: Mixing
		2.5 Procedures in the event of a chemical spill are identified and followed.	Spray and clean up: After spraying
	3. Apply chemicals	3.2 Requirements for application equipment to accurately and effectively apply the required dose of chemical to the target are followed.	Calibrating and measuring: Step 3 – Calibrating equipment
	4. Follow instructions to empty and clean equipment and containers according to directions	4.1 Instructions for clean-up are identified.	Spray and clean up: After spraying
		4.2 Equipment and clean-up methods using appropriate tools are followed.	Spray and clean up: After spraying
		4.3 Instructions for disposal of containers and unused chemical or biological agents are identified.	Spray and clean up: After spraying
	5. Complete chemical records	5.1 Chemical inventory is recorded as instructed and as required by regulations.	Transport and store: Storage record
		5.2 Chemical application details are reported and instructed as required by regulations.	Spray and clean up: After spraying
	6. Transport, handle and store chemicals according to instructions and legislative requirements	6.1 Transport, handling and storage requirements for chemicals are recognised and followed.	Transport and store
		6.2 Requirements for storage of chemicals at the workplace are recognised and followed.	Transport and store

Unit of Competence	Element	Performance Criteria	Section and Sub-Section on CD-ROM
<b>RTC3704A</b> <b>Prepare and apply chemicals</b>	1. Determine the need for chemical use	1.1 Nature and level of the pest, weed infestation or disease is identified.	Choosing chemicals: At the farm
		1.2 Need for action is assessed.	Choosing chemicals: At the reseller
		1.4 Hazard and risk analysis of different chemical options is undertaken.	Choosing chemicals: At the reseller
	2. Prepare appropriate chemical	2.1 Chemical label and Material Safety Data Sheets (MSDS) are read and understood.	Choosing chemicals: At the reseller Transport and store: MSDS

<b>RTC3704A</b> <b>Prepare and apply chemicals</b> <b>.... continued</b>		2.2 Labels are checked to ensure chemicals meet user requirements and specifications.	Choosing chemicals
	3. Prepare to use chemicals according to the label and MSDS	3.1 Personal protective equipment is selected and checked for use according to the label and MSDS.	Spray and clean up: PPE
		3.5 Mixing rates are defined and calculated.	Calibrating and measuring Spray and clean up: Mixing
		3.6 Directions, standards and legislative requirements for mixing chemicals are followed.	Spray and clean up: Mixing
	4. Apply chemicals	4.1 Meteorological conditions and forecasts are assessed prior to and during application.	Spray and clean up: Weather
		4.2 Hazards of particular chemicals are identified.	Choosing chemicals: Signal heading Transport and storage: Safe storage - MSDS
		4.3 Risks to others and the environment are assessed and controlled.	Choosing chemicals: Signal heading Spray and clean up
		4.4 Application equipment calibration procedures are followed.	Calibrating and measuring Calibrating – test yourself
		4.5 Procedures and precautions for the use of the chemicals are interpreted from labels and accreditation requirements.	Choosing chemicals: Signal heading Spraying and clean up Calibrating and measuring
		4.7 Chemicals are applied safely and effectively according to directions.	Spraying and clean up
		4.8 Chemicals spills or accident procedures are followed.	Spray and clean up: After spraying
		5. Clean up following chemical application	5.2 Requirements for cleaning equipment and sites are defined and followed according to directions and standards.
	6. Record application details	6.1 Application of chemicals is recorded according to organisation procedures, label directions and legislation.	Spray and clean up: After spraying
		6.2 Details of the specific compound concerned are recorded correctly in the chemical inventory according to regulations.	Spray and clean up: After spraying

Unit of Competence	Element	Performance Criteria	Section and Sub-Section
<b>RTC3705A</b> <b>Transport, handle and store chemicals</b>	1. Transport and handle chemicals and biological agents	1.1 Transport methods according to label and Material Safety Data Sheets (MSDSs) are identified and confirmed to safely transport the chemical.	Transport and store: Safe transport
		1.2 Risks involved in transport and handling are identified and recognised.	Transport and store: Safe transport
	2. Store chemicals in the workplace	2.3 Storage method selected is appropriate for chemical concerned.	Transport and store: Safe storage
	3. Record storage details	3.1 Chemical store inventory is maintained.	Transport and store: Storage record
		3.2 Storage of chemicals is recorded in accordance with OHS and enterprise requirements.	Transport and store: Storage record



# ASSESSMENT

Learners using *Henry Sprays It Safe* are working towards the selected industry units of competency. The learning sequences and activities do not comprise a complete training program, so formal assessment events have not been included. Learners can assess their progress in completing the activities on the CD-ROM, as feedback is provided for both correct and incorrect responses.

Trainers can undertake ongoing assessment of learners through demonstration of processes, oral questioning of knowledge and observation.

Trainers can sign and present learners with a *Learning Achievements Checklist*, which is available for copying on pages 16 - 19. The *Learning Achievements Checklist* is a summary of what learners have achieved by successfully completing the activities on the CD-ROM. The completed checklist, along with worksheets such as the *Calculation sheet* can be used as a piece of evidence/or can contribute towards the required evidence when learners are assessed against the relevant units of competence.

# LEARNING ACHIEVEMENTS CHECKLIST

The activities in the CD-ROM are based on the units of competency

RTC 1701A Follow basic chemical safety rules

RTC 2706A Apply chemicals under supervision

RTC 3704A Prepare and apply chemicals

RTC 3705A Transport, handle and store chemicals

## **RTC 1701A Follow basic chemical safety rules**

\_\_\_\_\_ (name)

By completing the relevant activities about chemical spraying on the CD-ROM, the learner has demonstrated that he/she can:

- recognise safety procedures involved in chemical handling and use
- recognise chemical labels and symbols
- identify suitable chemical storage conditions and locations
- recognise instructions for transport, handling and storage of chemicals
- locate specific information from chemical labels
- recognise workplace instructions and directions from the chemical label or MSDS
- identify the chemical re-seller as a source of information and clarification on use, transport, handling and storage of chemicals

Signed: \_\_\_\_\_ Date: \_\_\_\_\_  
(trainer)

# LEARNING ACHIEVEMENTS CHECKLIST

## RTC 2706A      Apply chemicals under supervision

\_\_\_\_\_ (name)

By completing the relevant activities about chemical spraying on the CD-ROM, the learner has demonstrated that he/she can:

- locate and interpret information from a chemical label eg mode of action, signal heading, broad claims for use, withholding period
- locate relevant information MSDS eg Hazardous Goods class, hazard information, what personal protective equipment (PPE) to wear
- identify procedures in the event of a chemical spill
- identify instructions for cleaning equipment and personal protective equipment (PPE)
- report storage information as required by regulations
- report chemical application details as required by regulations
- recognize requirements for transport, handling and storage of chemicals
- recognize requirements for storage of chemicals at the workplace
- measure metric quantities using simple measuring instruments in a simulated activity
- check settings of equipment eg nozzle size, pump pressure, in a simulated activity
- calculate time periods before work can continue in an area following spraying of chemicals
- use symbols and conventions relevant to the task. eg L/ha
- identify the chemical re-seller as a source of information and clarification on use, transport, handling and storage of chemicals

Signed: \_\_\_\_\_ Date: \_\_\_\_\_  
(trainer)

# LEARNING ACHIEVEMENTS CHECKLIST

## RTC 3704A Prepare and apply chemicals

\_\_\_\_\_ (name)

By completing the relevant activities about chemical spraying on the CD-ROM, the learner has demonstrated that he/she can:

- identify information on chemical labels and Material Safety Data Sheets (MSDSs) about hazards and risks of different chemical options
- locate specific information from Chemical labels and Material Safety Data Sheets (MSDS) eg mode of action, signal heading, broad claims for use, withholding period, Dangerous Goods class, what personal protective equipment (PPE) to wear
- interpret the information from chemical labels about whether the chemical meets their requirements and specifications eg suitability for crop, appropriate withholding period
- calculate metric quantities eg area, capacity, volume, length, and undertake conversions between metric units eg litres to millilitres, square metres to hectares
- measure nozzle output, spray width and walking speed
- calculate area, the amount of chemical required and mixing rate
- use formulas to undertake calculations for calibrating equipment and amount of chemical required for a job
- use a calculator to calculate sprayer application rate, amount of chemical per tank, number of tanks and amount of chemical required for the job
- consider meteorological conditions and forecasts prior to and during application
- consider risks to others and the environment eg consider spray drift, withholding period
- follow procedures for calibrating application equipment
- identify requirements for cleaning up after spraying and for dealing with spills
- record application of chemicals according to label directions and legislation
- identify contact numbers in case of emergency
- identify the chemical re-seller as a source of information and clarification on use, transport, handling and storage of chemicals

Signed: \_\_\_\_\_ Date: \_\_\_\_\_  
(trainer)

# LEARNING ACHIEVEMENTS CHECKLIST

## RTC 3705A      Transport, handle and store chemicals

\_\_\_\_\_ (name)

By completing the relevant activities about chemical spraying on the CD-ROM, the learner has demonstrated that he/she can:

- identify risks involved in transport and handling of chemicals
- identify suitable conditions and locations for storage of chemicals
- record storage of chemicals in accordance with legislative requirements
- locate relevant information MSDS involved in transport and handling of chemicals eg Hazardous Goods class, hazard information, what personal protective equipment to wear
- identify the chemical re-seller as a source of information and clarification on use, transport, handling and storage of chemicals
- identify requirements for cleaning up after spills

Signed: \_\_\_\_\_ Date: \_\_\_\_\_  
(trainer)

# USEFUL RESOURCES

## VIDEOS

<b>Title</b>	<b>Integrated Pest Management for Brassicas (41 mins)</b>
<b>Publisher</b>	Institute of Horticultural Development, Knoxfield, Victoria, 2002
<b>Summary</b>	Documents how growers Australia-wide are adopting IPM and improving their business, the environment and the health of their families

<b>Title</b>	<b>Safe Use of Pesticides</b>
<b>Publisher</b>	Originally published by Health Department of WA.
<b>Summary</b>	Available in a range of languages. Department of Primary Industries, Victoria re-published the video with voiceovers in a number of languages. NSW Department of Environment and Conservation will shortly re-publish it in several other languages.

<b>Title</b>	<b>Healthy Harvest</b>
<b>Publisher</b>	Swinburne TAFE, Vic
<b>Summary</b>	This video shows the importance of spraying correctly and the consequences if you don't. Available in a range of languages

<b>Title</b>	<b>Dealing with Chemical Safety</b>
<b>Publisher</b>	Safety Care Australia, c1989 Rowville, Vic
<b>Summary</b>	General chemical video about the hazards to health, the environment and fire (no market gardening)

<b>Title</b>	<b>How to get the most from your spray unit</b>
<b>Publisher</b>	Ag-Link, Toowoomba, Qld.
<b>Summary</b>	Covers topics such as the appropriate nozzle to use and the correct applicators.

<b>Title</b>	<b>Using farm chemicals</b>
<b>Publisher</b>	Produced for Brookway Park School of Horticulture, Gilles Plains College of TAFE by Educational Media Unit, Centre for Applied Learning Systems, Adelaide College of TAFE, Adelaide SA c1992.
<b>Summary</b>	14 videocassettes (VHS) Prog.1. Farm chemicals Prog.2. Selecting farm chemicals Prog.3. What's on the label Prog.4. Transportation and storage Prog.5. Location check Prog.6. Suitable conditions Prog.7. Personal safety & protective equipment Prog.8. Calibrating equipment Prog.9. Mixing safely Prog.10. Applying farm chemicals Prog.11. Washdown and decontamination Prog.12. Clean-up procedure Prog.13. Keeping records Prog.14. Integrated pest management (I.P.M.)

<b>Title</b>	<b>Spraying solutions</b>
<b>Publisher</b>	Kondinin Group, Cloverdale, W.A., 2001

<b>Title</b>	<b>Working with pesticides</b>
<b>Publisher</b>	Open Training and Education Network, Sydney 1992
<b>Summary</b>	An expert panel discuss four topics of pest control - masks & respirators, why they should be worn and how to fit them; mixing pesticides safely and efficiently; licenses and permits; pest collections, equipment needed and method to prepare a collection. Related to house fumigation but has good information on PPE and how to mix chemicals. Covers topics such as the appropriate nozzle to use and the correct applicators.

<b>Title</b>	<b>The easy guide to handling hazardous chemicals</b>
<b>Publisher</b>	Workplace Video Productions, Victoria c1992
<b>Summary</b>	This video highlights the importance of safety when working with hazardous chemicals in the workplace. It highlights areas such as the material safety data sheet, personal protective equipment, personal hygiene, housekeeping, hazard control and what to do in case of an emergency

<b>Title</b>	<b>Using chemicals safely</b>
<b>Publisher</b>	ChemCert Australia (Vic), Workplace Skills Access, Swinburne University of Technology TAFE with funds from Department of Education, Science and Training, for the WELL Programme.
<b>Summary</b>	The video provides comprehensive coverage of the standards RTC 1701A Follow basic chemical safety rules and RTC 2706A Apply chemicals under supervision. It supports the "Using chemicals safely" introductory program for people who work with chemicals under supervision. Included are sections on pest control, chemical labels, transport and storage, personal protective equipment, preparing equipment, and chemicals, applying chemicals, cleaning up and keeping records. It is accompanied by a training manual.

<b>Title</b>	<b>How to get the most from your spray unit</b>
<b>Publisher</b>	Ag-Link, Toowoomba, Qld.
<b>Summary</b>	Covers topics such as the appropriate nozzle to use and the correct applicators

## **BOOKS AND PUBLICATIONS**

<b>Title</b>	<b>Australian Vegetable Growing Handbook / [John Salvestrin, editor].</b>
<b>Publisher</b>	Irrigation Research & Extension Committee [and] NSW Agriculture, Griffith, NSW. 1991
<b>Summary</b>	Good information, tables and pictures on pest and weed control.

<b>Title</b>	<b>Integrated pest management in Greenhouse vegetables: Information Guide and Field Identification Guide</b>  <b>Integrated pest management in Lettuce : Information Guide and Field Identification Guide</b>
<b>Publisher</b>	NSW Agriculture, 2002 Available from Department of Primary Industries Bookshop Ph: 1800 028 374
<b>Summary</b>	Two small concise guides which can be carried around and used by farmers to check what sort of pest they have

<b>Title</b>	<b>Understanding farm chemical labels: support materials for the Farm Chemicals Users Course / Workplace Language Unit, Eastern TAFE, Melbourne for the WELL Program on behalf of the Department of Education, Employment, Training and Youth Affairs</b>
<b>Publisher</b>	Workplace Language Unit, Outer Eastern Institute of TAFE, Wantirna South, Vic. c1996
<b>Summary</b>	A resource which can be used as a student's workbook covering important aspects of reading and understanding chemical labels. It is suitable for users from non English speaking backgrounds in particular and has lots of activities and information.

<b>Title</b>	<b>Spray Sense – safe and effective use of farm chemicals</b>
<b>Publisher</b>	NSW Dept of Primary Industries, 2004.
<b>Summary</b>	The Spray Sense series was originally published as 12 individual leaflets between 1995 and 1996. The series was updated and expanded to 17 leaflets and is available from the Dept of Primary Industries website <a href="http://www.agric.nsw.gov.au">www.agric.nsw.gov.au</a> . The main purpose is to provide up-to-date information to users of agricultural chemicals

<b>Title</b>	<b>Chemical Spraying and Handling Learning and Assessment Guide</b>
<b>Publisher</b>	NSW Agriculture, 2004 Murrumbidgee College of Agriculture, Yanco NSW 2703 ph:1800 628 422
<b>Summary</b>	The Chemical Spraying and Handling Learning and Assessment Guide is a workbook to assist learners to gather the evidence required to achieve the unit of competency RTC 2706A Apply chemicals under supervision.

<b>Title</b>	<b>Safe Use of Hazardous Substances Learning and Assessment Guide</b>
<b>Publisher</b>	NSW Agriculture, 2004 Murrumbidgee College of Agriculture, Yanco NSW 2703 ph:1800 628 422
<b>Summary</b>	The Safe Use of Hazardous Substances Learning and Assessment Guide is a workbook to assist learners to gather the evidence required to achieve the unit of competency 2701A Follow OHS Procedures.

<b>Title</b>	<b>Chemical Application Assessment Guide</b>
<b>Publisher</b>	NSW Agriculture, 2004 Murrumbidgee College of Agriculture, Yanco NSW 2703 ph:1800 628 422
<b>Summary</b>	The Chemical Application Assessment Guide is a workbook to assist learners to gather the evidence required to achieve competency in chemical application at AQF III.

## TOOLBOXES

<b>Title</b>	<b>Horticulture (304)</b>
<b>Project manager</b>	Ms Jill Jamieson Challenger TAFE, Fremantle, WA Ph: (08) 92398207
<b>Website</b>	<a href="http://flexiblelearning.net.au/toolbox/series3/304.htm">http://flexiblelearning.net.au/toolbox/series3/304.htm</a>
<b>Summary</b>	This toolbox supports the Cert II in Horticulture The activities and resources in this Toolbox are located within a fictitious horticultural setting that includes a garden area, a nursery, a pergola, a machinery shed and a lunchroom. The competency unit related to chemical spraying is RUH HRT 227 Recognise plants, products and treatments

<b>Title</b>	<b>Amenity Horticulture (605)</b>
<b>Project manager</b>	Ms Anelieske Noteboom Challenger TAFE, Fremantle, WA Ph: (08) 92398524
<b>Website</b>	<a href="http://flexiblelearning.net.au/toolbox/series6/605.htm">http://flexiblelearning.net.au/toolbox/series6/605.htm</a>
<b>Summary</b>	This toolbox supports the Cert III and IV in Horticulture.

<b>Title</b>	<b>Horticulture for Indigenous Learners (422)</b>
<b>Project manager</b>	Challenger TAFE, Fremantle, WA
<b>Website</b>	<a href="http://flexiblelearning.net.au/toolbox/series4/422.htm">http://flexiblelearning.net.au/toolbox/series4/422.htm</a>
<b>Summary</b>	This toolbox supports the Cert II in Horticulture In particular, the nursery and parks and gardens sectors have been targeted, but some of the Units of Competency are valid for all seven industry sectors in Horticulture and for Production Agriculture. The activities and resources in this Toolbox are located within a fictitious horticultural setting that includes a garden area, a Meeting Place, a nursery, a machinery shed and a lunchroom. The competency unit related to chemical spraying is RUH HRT 227 Recognise plants, products and treatments

<b>Title</b>	<b>NurseryLive!</b>
<b>Project manager</b>	Gerard Marcus Holmesglen Training and Development, Holmesglen Institute of TAFE, ANTA Initiative, 2003
<b>Website</b>	<a href="http://flexiblelearning.net.au/toolbox/series6/605.htm">http://flexiblelearning.net.au/toolbox/series6/605.htm</a>
<b>Summary</b>	This toolbox supports the Cert III in Horticulture and covers the following competency standards. <ul style="list-style-type: none"> <li>• RUHHRT303A Maintain nursery plants</li> <li>• RUHHRT317A Control pests and diseases</li> <li>• RUHHRT353A Select chemicals and biological agents.</li> </ul> <p>NurseryLive! features a simulated nursery, in which the user interacts with a variety of plants in order to complete certain tasks. Plants must be watered, fertilised and monitored to ensure their health. Pests and disease must also be controlled.</p>

## CD-ROMS

<b>Title</b>	<b>Prime Notes – Version 8</b>
<b>Publisher</b>	DPI Publications, Dept of Primary Industries, Brisbane, 1999
<b>Summary</b>	Advisory information for Agriculture and Natural Resources provided by State Government Departments, Centres and Corporations Australia wide. To find an article you simply type in a keyword and a list of possible articles will appear. This CD should be updated every 6 months.

## WEBSITES

Chemlink – Health and safety for chemical users

[www.chemlink.com.au/health.htm](http://www.chemlink.com.au/health.htm)

NSW Environment Protection Authority's home page

[www.epa.nsw.gov.au/home.htm](http://www.epa.nsw.gov.au/home.htm)

NSW EPA information on record keeping laws

[www.epa.nsw.gov.au/envirom/recordkeeping.htm](http://www.epa.nsw.gov.au/envirom/recordkeeping.htm)

Australian Flexible Learning Framework - NurseryLive! This is an interactive 2D and 3D computer based simulation of a horticultural nursery.

[www.flexiblelearning.net.au/productsandservices/nursery.htm](http://www.flexiblelearning.net.au/productsandservices/nursery.htm)

Web Site of the National Association of Agricultural Educators

[www.naae.asn.au](http://www.naae.asn.au)

National Occupational Health and Safety Commission - a selection of farming safety resources from around Australia.

<http://www.nohsc.gov.au/OHSInformation/Agriculture/default.asp>

NSW Association of Agriculture Teachers inc. website

[www.nswaat.org.au](http://www.nswaat.org.au)

Spray Sense - a series of leaflets which focus on providing up-to-date information on a range of pesticide issues

[www.agric.nsw.gov.au/reader/spray-sense](http://www.agric.nsw.gov.au/reader/spray-sense)

[www.apvma.gov.au](http://www.apvma.gov.au)

This is the Australian Pesticides and Vet Medicines Authority website – very useful to find information about registered chemicals, permits etc

[www.goodbugs.org.au](http://www.goodbugs.org.au)

A lot of useful information including about The Good Bug Book

[www.virginiahc.com.au](http://www.virginiahc.com.au)

Go to the Resources then the Article Archive for information on a lot of resources

[www.aanro.net](http://www.aanro.net)

Australian agriculture and natural resources online

Useful links

[www.pestgenie.com.au](http://www.pestgenie.com.au)

Pest Genie is a database specializing in information about plant protection and animal health products.

[www.horticulture.com.au](http://www.horticulture.com.au)

The Horticulture Australia (HAL) website

Good information on current projects and general developments in horticulture

[www.horticulturefortomorrow.com.au](http://www.horticulturefortomorrow.com.au)

Interesting national project on quality assurance guidelines

# CALCULATION SHEET

## Step 1 Recording important information

- Write down these measurements:

Chemical application rate  litres per hectare (L/ha)

Water application rate  litres per hectare (L/ha)

Tank size  litres (L)

Pump pressure  kilopascals (kPa) or bars

Type and size of nozzle

Remember: you get this rate from the DIRECTIONS FOR USE on the label

Remember: you get this rate from the GENERAL INSTRUCTIONS on the label

Remember to write the amount in litres (L):  
 1000 mL = 1 L  
 500 mL = 0.5 L  
 100 mL = 0.1 L  
 150 mL = 0.15 L

## Step 2 Taking measurements

- Measure **nozzle output**:

Water sprayed into jug in one minute =  litres (L)

- Measure **spray width**:

Spray width =  metres (m)

- Measure **walking speed**:

Distance walked in one minute =  metres per minute (m/min)

Remember to write the width and distance in metres (m):  
 100 cm = 1 m  
 50 cm = 0.5 m  
 45 cm = 0.45

## Step 3 Calibrating equipment

- Use this formula to work out **your sprayer application rate**:

<b>Your sprayer application rate (L/ha)</b>	=	nozzle output (L/min)	x	10000	÷	spray width (m)	÷	walking speed (m/min)
---	---	-----------------------	---	-------	---	-----------------	---	-----------------------

<b>Your sprayer application rate (L/ha)</b>	=	<input type="text"/>	x	10000	÷	<input type="text"/>	÷	<input type="text"/>
	=	<input type="text"/>	L/ha					

- Check: Is your rate **within the range of the water application rate** on the label?  
 If not, change the nozzle, the pump pressure or your walking speed and work out the sprayer application rate again.

## Step 4 Calculating the amount of chemical per tank

- Use this formula to work out **how much chemical to put in your tank**:

<b>Amount of chemical per tank (L)</b>	=	chemical application rate (L/ha)	x	tank size (L)	÷	your sprayer application rate (L/ha)	=	[ ] L
<b>Amount of chemical per tank (L)</b>	=	[ ]	x	[ ]	÷	[ ]	=	[ ] L

- Now change the amount from litres (L) to millilitres (mL):

[ ] L = [ ] mL	—————	Remember: 1 litre (L) = 1000 millilitres (mL)
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## Step 5 Calculating the area, tanks and chemical for this job

- Use this formula to find the **area to be sprayed in square metres**:

<b>Area to be sprayed (m<sup>2</sup>)</b>	=	length (m)	x	width (m)	=	[ ] m <sup>2</sup>
<b>Area to be sprayed (m<sup>2</sup>)</b>	=	[ ]	x	[ ]	=	[ ] m <sup>2</sup>

Remember:  
10000 m<sup>2</sup> = 1 hectare

- Now change the area from square metres to hectares

<b>Area in hectares (ha)</b>	=	[ ] m <sup>2</sup> ÷ 10000	=	[ ] ha
------------------------------	---	----------------------------	---	--------

- Use this formula to work out the **number of tanks to use**

<b>Number of tanks</b>	=	size of area (ha)	x	your sprayer application rate (L/ha)	÷	your tank size (L)	=	[ ] tanks
<b>Number of tanks</b>	=	[ ]	x	[ ]	÷	[ ]	=	[ ] tanks

- Use this formula to work out the **total amount of chemical for this job**

<b>Total amount of chemical for this job (mL)</b>	=	number of tanks	x	amount of chemical per tank (mL)	=	[ ] mL
<b>Total amount of chemical for this job (mL)</b>	=	[ ]	x	[ ]	=	[ ] mL

Now **copy important information** onto another sheet called the **CALIBRATION RECORD** sheet. It may be useful when doing other calibrations.

# CALIBRATION RECORD

<b>General information</b>	
Name of chemical	
Crop	
Reason for spraying	
Date of calibration	

<b>Label and equipment information</b>	
Chemical application rate	L/ha
Water application rate	L/ha
Tank size	L
Pump pressure	
Type and size of nozzle	

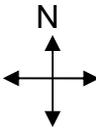
<b>My measurements</b>	
Nozzle output	L/min
Spray width	m
Walking speed	m/min

<b>Calculations</b>	
Sprayer application rate	L/ha
Amount of chemical per tank	mL
Area sprayed	ha
Number of tanks	
Total amount of chemical for this job	

# SPRAY APPLICATION RECORD

<b>Spraying information</b>	
Name of chemical	
Crop sprayed	
Pest / disease	
Size of area sprayed	
Equipment used	
Date of calibration	
Date of application	
Time started	
Time finished	
Application rate (from label)	
Amount of chemical used for this job	

Sketch map showing where on the property the chemical was applied



<b>Weather information</b>	
Wind speed	
Wind direction	
Temperature	
Humidity	
Did the weather change while spraying?	Yes / No    If yes, give details

<b>General information</b>	
Property Address	
<b>Owner, manager or occupier of the land:</b>	
Name	
Address	
Phone number	
<b>Person applying the chemical:</b>	
Name	
Address	
Phone number	

Signature of the person applying the chemical: \_\_\_\_\_

# STORAGE RECORD FORM

Name of chemical	
Location of chemical	
Date of purchase	
Current MSDS (5 years or less)	Yes / No
Hazardous substance	Yes / No
Dangerous Goods Class	
Expiry date or Date of Manufacture	
Batch number	
Comments	

Name of chemical	
Location of chemical	
Date of purchase	
Current MSDS (5 years or less)	Yes / No
Hazardous substance	Yes / No
Dangerous Goods Class	
Expiry date or Date of Manufacture	
Batch number	
Comments	

Name of chemical	
Location of chemical	
Date of purchase	
Current MSDS (5 years or less)	Yes / No
Hazardous substance	Yes / No
Dangerous Goods Class	
Expiry date or Date of Manufacture	
Batch number	
Comments	



## Henry sprays it safe

### Transport your chemical products safely

## Ute it. Don't boot it!

- Don't transport chemicals with people or animals.
- Don't transport chemicals with foods or drinks, plants and seeds, safety equipment or other clothing.
- Put chemicals inside a tray or box to stop liquids spilling.
- Check all containers for damage and leaks.
- Put lids and caps facing upwards.
- Make sure lids are on tightly.
- Put lighter items on top of heavy ones.
- Don't transport any pesticide, insecticide or fungicide with fertilizer.
- Tie down chemical containers. Make sure they can't slide around or fall off the truck.
- Make sure nothing in the truck can damage containers - for example, tools.
- Cover your load with plastic or a tarpaulin to protect from heat and water damage.
- Drive straight home if you can. If you have to stop on the way home, lock your vehicle.

## CLEANING UP AFTER SPRAYING

- Keep your PPE on to clean equipment.
- Read Cleaning Up instructions on the label and the MSDS.
- Flush your sprayer with water inside and out to get rid of all chemical. The water must not be able to run away and get into water supplies.
- While cleaning, check to see if there are any worn parts on your equipment. Make repairs and replace worn parts before your next spray job.
- Rinse empty chemical containers three times or pressure rinse and wash inside the cap and around the thread of the container. If the container has a drumMUSTER symbol, take it to a special collection site where you see the drumMUSTER sign – most tips have them.
- After cleaning equipment, take off your PPE. Soak overalls and washable hats overnight in clean water. Wash in hot water. Do not wash with your other laundry.
- Wash gloves, boots and goggles with warm soapy water. Check there are no leaks in your gloves.
- Check the valves on the respirator are opening and shutting correctly. Remove the respirator cartridges and store them in a sealed container. Wash the respirator body with a damp cloth.
- Store your PPE away from chemicals.



## CLEANING SPILLS

- Keep your PPE on.
- You should have a spill clean up kit in your shed. This may include a bin, a shovel, a broom, a bag of hydrated lime and absorbent material such as kitty litter.
- Follow the instructions on the label and MSDS.
- Clean up spills as soon as possible.
- Do not allow chemical to get into waterways or drains.
- If you need help to clean up the spill contact the Fire Brigade.

If you need advice about poisons ring the Poisons Information Centre on 131126



# Henry sprays it safe

## BEAUFORT WIND SCALE

BEAUFORT WIND SCALE			
#	Wind Speed	Seamans Terms	Common signs for reconition
0	0 kph	Calm	 Air is Calm; Smoke rises vertically
1	1-5 kph	Light Air	 Smoke drifts slowly Vanes do not move
2	6-11 kph	Light Breeze	 Wind felt on face; leaves rustle; vanes begin to move
3	12-19 kph	Moderate Breeze	 Leaves move constantly. Light flags extend
4	20-29 kph	Fresh Breeze	 Small trees begin to sway
5	30-39 kph	Strong Breeze	 Large branches of trees move.
6	40-50 kph	Moderate Gale	 Whole trees sway. Resistance in walking
7	51-61 kph	Fresh Gale	 Twigs & small branches break off trees
8	62-74 kph	Strong Gale	 Large branches break. Some Structural damage occurs
9	75-85 kph	Whole Gale	 Small trees uprooted. Structural damage occurs

between 3 and 15 kph





# Henry sprays it safe

## CHANGING CENTIMETRES TO METRES

Remember that Joe used a measuring tape to measure his spray width in centimetres. The spray width was 110 cm. He changed the centimetres to metres and said that his spray width was 1.1 metres.

This worksheet shows you how to change centimetres to metres.

Look at this measuring tape. It measures in centimetres (cm) and metres (m).



100 cm is the same as 1 m.

200 cm is the same as 2 m.

150 cm is the same as 1.5 m.

Remember

100 centimetres = 1 metre

### Changing centimetres to metres without a calculator

To change centimetres to metres you divide by ( $\div$ ) 100. One way to divide by 100 is to move the decimal point 2 places to the left. (If you don't see the decimal point, it's at the end of the number.)

Example 1, Change 400 cm to metres

$$400 \div 100$$

Move the decimal 2 places left

So, 400 cm = 4 m

$$400. \div 100 = 4.00 = 4$$

Example 2, Change 150 cm to metres

$$150 \div 100$$

Move the decimal 2 places left

So, 150 cm = 1.5 m

$$150. \div 100 = 1.50 = 1.5$$

Example 3, Change 95 cm to metres

$$95 \div 100$$

Move the decimal 2 places left

So, 95 cm = 0.95 m

$$95. \div 100 = 0.95$$

## Changing centimetres to metres with a calculator

Put the number of centimetres into your calculator and divide by 100.

Example, Change 105 cm to metres.

Put into your calculator:

1	0	5	÷	1	0	0	=
---	---	---	---	---	---	---	---

Answer on the calculator:

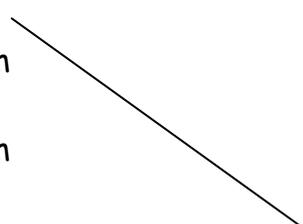
1.05
------

So, 105 cm = 1.05 m

## ACTIVITY

1. Draw a line from the measurement in centimetres to the same measurement in metres. The first one has been done for you.

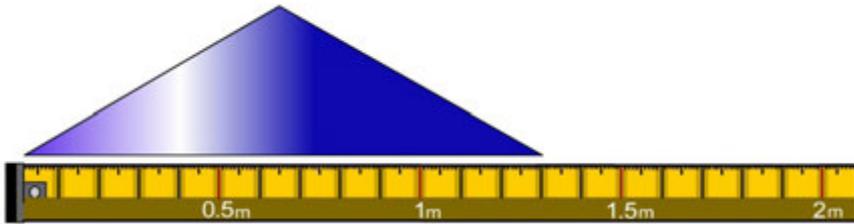
<u>Centimetres</u>	<u>Metres</u>
a) 50 cm	0.98 m
b) 125 cm	0.85 m
c) 98 cm	2 m
d) 140 cm	1.03 m
e) 85 cm	1.25 m
f) 170 cm	0.5 m
g) 200 cm	1.7 m
h) 103 cm	2.1 m
i) 88 cm	1.4 m
j) 210 cm	0.88 m



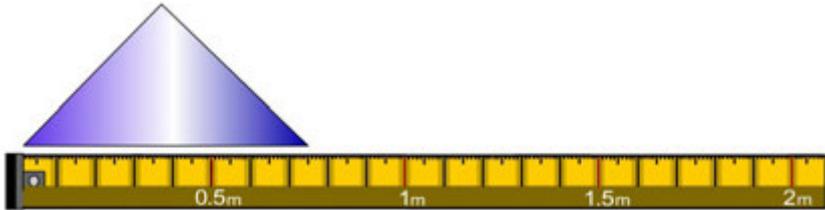
2. Write these measurements in metres. The first one has been done for you.

- |                     |                     |
|---------------------|---------------------|
| a) 150 cm = 1.5 m   | e) 100 cm = _____ m |
| b) 225 cm = _____ m | f) 117 cm = _____ m |
| c) 85 cm = _____ m  | g) 105 cm = _____ m |
| d) 78 cm = _____ m  | h) 139 cm = _____ m |

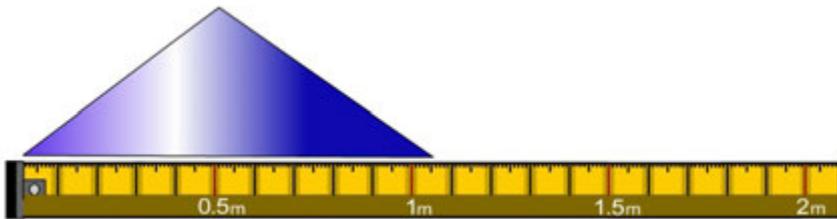
3. Measure these spray widths in centimetres and metres. The first one has been done for you.



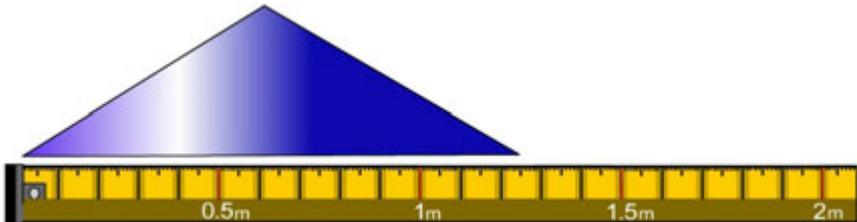
130 cm  
or  
1.3 m



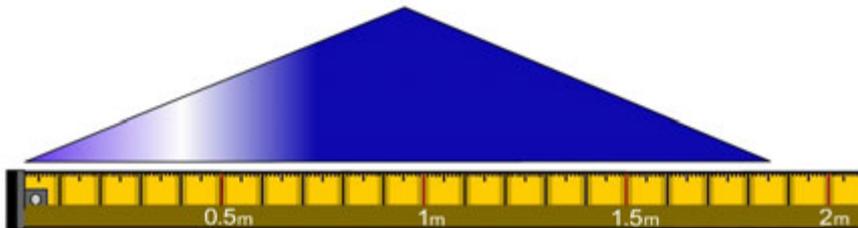
\_\_\_ cm  
or  
\_\_\_ m



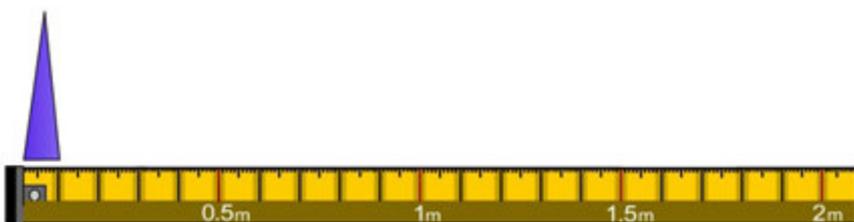
\_\_\_ cm  
or  
\_\_\_ m



\_\_\_ cm  
or  
\_\_\_ m



\_\_\_ cm  
or  
\_\_\_ m



\_\_\_ cm  
or  
\_\_\_ m

# ANSWERS

1.

<u>Centimetres</u>	<u>Metres</u>
a) 50 cm	= 0.5 m
b) 125 cm	= 1.25 m
c) 98 cm	= 0.98 m
d) 140 cm	= 1.4 m
e) 85 cm	= 0.85 m
f) 170 cm	= 1.7 m
g) 200 cm	= 2 m
h) 103 cm	= 1.03 m
i) 88 cm	= 0.88 m
j) 210 cm	= 2.1 m

2.

<u>Centimetres</u>	<u>Metres</u>
a) 150 cm	= 1.5 m
b) 225 cm	= 2.25 m
c) 85 cm	= 0.85 m
d) 78 cm	= 0.78 m
e) 100cm	= 1 m
f) 117 cm	= 1.17 m
g) 105 cm	= 1.05 m
h) 139 cm	= 1.39 m

3.

<u>Centimetres</u>	<u>Metres</u>
a) 130 cm	= 1.3 m
b) 75 cm	= 0.75 m
c) 105 cm	= 1.05 m
d) 125 cm	= 1.25 m
e) 185cm	= 1.85 m
f) 10 cm	= 0.1 m



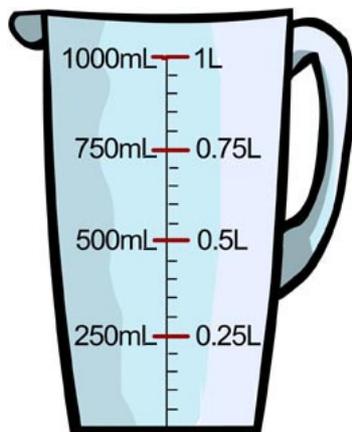
# Henry sprays it safe

## CHANGING LITRES TO MILLILITRES

Remember that when Joe calculated how much chemical to put into the tank he used a formula. He got the answer 0.373 litres. He needed to measure the chemical using a measuring jug which measures in millilitres so he changed 0.373 litres to 373 millilitres.

This worksheet shows you how to change litres into millilitres.

Measuring jugs measure in millilitres and litres.



When the jug is full, it holds 1 litre or 1 000 mL.

When the jug is half ( $\frac{1}{2}$ ) full, it holds 0.5 L or 500 mL.

When the jug is a quarter ( $\frac{1}{4}$ ) full, it holds 0.25 L or 250 mL.

When the jug is three quarters ( $\frac{3}{4}$ ) full, it holds 750 mL or 0.75 L.

Remember

1 litre = 1 000 millilitres

### Changing millilitres to litres without a calculator

To change litres to millilitres you multiply by (x) 1 000. One way to multiply by 1 000 is to move the decimal point 3 places to the right.

Sometimes there are only one or two digits after the decimal point. In this case, you just add zeros so that you have 3 digits after the decimal point. The number will stay the same.

This means,  $0.25 = 0.250$   
 $0.7 = 0.700$   
 $0.01 = 0.010$

Example 1, Change 0.186 litres to millilitres

$$0.186 \times 1\,000$$

Move the decimal 3 places right

$$0.\overset{\wedge}{1}\overset{\wedge}{8}\overset{\wedge}{6} \times 1\,000 = 186.$$

So, 0.186 L = 186 mL

Example 2, Change 0.35 litres to millilitres

$$0.35 \times 1\,000$$

First write 0.35 as 0.350

Now move the decimal 3 places right  $0.\overset{\wedge}{\underset{\wedge}{\underset{\wedge}{350}}} \times 1\,000 = 350.$

So, 0.35 L = 350 mL

Example 3, Change 0.2 litres to millilitres

$$0.2 \times 1\,000$$

First write 0.2 as 0.200

Now move the decimal 3 places right  $0.\overset{\wedge}{\underset{\wedge}{\underset{\wedge}{200}}} \times 1\,000 = 200.$

So, 0.2 L = 200 mL

### Changing litres to millilitres with a calculator

Put the number of litres into your calculator and multiply by 1 000.

Example, Change 0.325 litres to millilitres.

Put into your calculator:

0	.	3	2	5	x	1	0	0	0	=
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Answer on the calculator:

325
-----

So, 0.325 L = 325 mL

## ACTIVITY

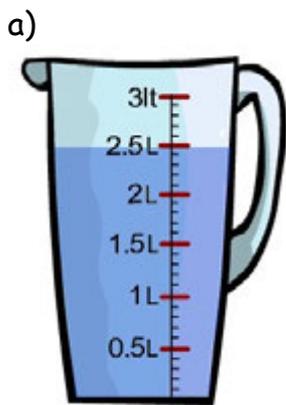
1. Draw a line from the measurement in litres to the same measurement in millilitres. The first one has been done for you.

<u>Litres</u>	<u>Millilitres</u>
a) 5 L	1 200 mL
b) 2.5 L	2 500 mL
c) 0.375 L	485 mL
d) 0.25 L	50 mL
e) 1.2 L	375 mL
f) 0.485 L	17 mL
g) 0.05 L	3 100 mL
h) 1.01 L	5 000 mL
i) 3.1 L	1 010 mL
j) 0.017 L	250 mL

2. Write these measurements in millilitres. The first one has been done for you.

- |                     |                       |
|---------------------|-----------------------|
| a) 0.245 L = 245 mL | d) 0.05 L = _____ mL  |
| b) 1.3 L = _____ mL | e) 0.915 L = _____ mL |
| c) 0.6 L = _____ mL | f) 1.07 L = _____ mL  |

3. Look at how many litres of water is in each jug. Change millilitres to litres. The first one has been done for you.



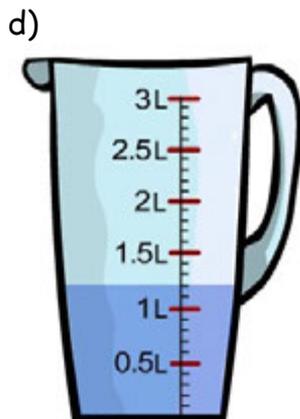
2.5 L  
2 500 mL



\_\_\_\_\_ L  
\_\_\_\_\_ mL



\_\_\_\_\_ L  
\_\_\_\_\_ mL



\_\_\_\_\_ L  
\_\_\_\_\_ mL



\_\_\_\_\_ L  
\_\_\_\_\_ mL



\_\_\_\_\_ L  
\_\_\_\_\_ mL

# ANSWERS

1.

<u>Litres</u>	<u>Millilitres</u>
a) 5 L	= 5000 mL
b) 2.5 L	= 2500 mL
c) 0.375 L	= 375 mL
d) 0.25 L	= 250 mL
e) 1.2 L	= 1200 mL
f) 0.485 L	= 485 mL
g) 0.05 L	= 50 mL
h) 1.01 L	= 1010 mL
i) 3.1 L	= 3100 mL
j) 0.017 L	= 17 mL

2.

<u>Litres</u>	<u>Millilitres</u>
a) 0.245 L	= 2450 mL
b) 1.3 L	= 1300 mL
c) 0.6 L	= 600 mL
d) 0.05 L	= 50 mL
e) 0.915 L	= 915 mL
f) 1.07 L	= 1070 mL

3.

<u>Litres</u>	<u>Millilitres</u>
a) 2.5 L	= 2500 mL
b) 1.8 L	= 1800 mL
c) 0.4 L	= 400 mL
d) 1.2 L	= 1200 mL
e) 2.4 L	= 2400 mL
f) 0.7 L	= 700 mL



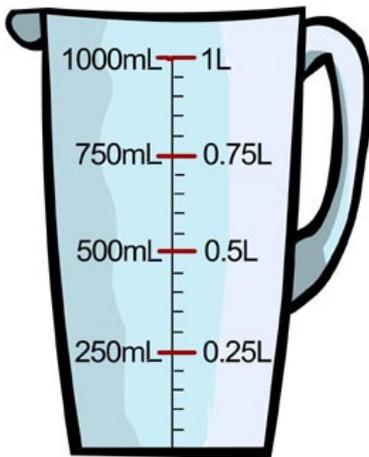
# Henry sprays it safe

## CHANGING MILLILITRES TO LITRES

Remember that when Joe measured his nozzle output he sprayed water into a measuring jug for one minute. He looked at the scale on the jug and saw that he had 3 litres and 300 millilitres of water in the jug. He changed the millilitres to litres and said that his nozzle output was 3.3 litres per minute (3.3 L/min)

This worksheet shows you how to change millilitres to litres.

Look at this measuring jug. It measures in millilitres (mL) and litres (L).



When the jug is full, it holds 1000 mL or 1 litre.

When the jug is half ( $\frac{1}{2}$ ) full, it holds 500 mL or 0.5L

When the jug is a quarter ( $\frac{1}{4}$ ) full, it holds 250 mL or 0.25 L.

When the jug is three quarters ( $\frac{3}{4}$ ) full, it holds 750 mL or 0.75 L.

Remember

$$1\ 000\ \text{mL} = 1\ \text{litre}$$

### Changing millilitres to litres without a calculator

To change millilitres to litres you divide by ( $\div$ ) 1 000. One way to divide by 1000 is to move the decimal point 3 places to the left. (If you don't see the decimal point, it's at the end of the number.)

Example 1, Change 3 000 mL to litres

$$3\ 000 \div 1\ 000$$

Move the decimal 3 places left

$$\text{So, } 3000\ \text{mL} = 3\ \text{L}$$

$$3\ 000. \div 1000 = 3.000 = 3$$

Example 2, Change 4 500 mL to litres

$$4\ 500 \div 1\ 000$$

Move the decimal 3 places left

$$\text{So, } 4\ 500\ \text{mL} = 4.5\ \text{L}$$

$$4\ 500. \div 1000 = 4.500 = 4.5$$

Example 3, Change 650 mL to litres

$$650 \div 1\,000$$

Move the decimal 3 places left

$$\text{So, } 650 \text{ mL} = 0.65 \text{ L}$$

AAA

$$650. \div 1\,000 = 0.650 = 0.65$$

### Changing millilitres to litres with a calculator

Put the number of millilitres into your calculator and divide by 1 000.

Example, Change 1 900 mL to litres.

Put into your calculator:

1	9	0	0	÷	1	0	0	0	=
---	---	---	---	---	---	---	---	---	---

Answer on the calculator:

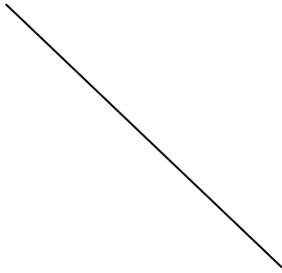
1.9
-----

$$\text{So, } 1900 \text{ mL} = 1.9 \text{ L}$$

## ACTIVITY

1. Draw a line from the measurement in millilitres to the same measurement in litres. The first one has been done for you.

<u>Millilitres</u>	<u>Litres</u>
a) 5 000 mL	2.25 L
b) 2 250 mL	3.4 L
c) 650 mL	1.05 L
d) 3 400 mL	4.55 L
e) 1 050 mL	0.65 L
f) 500 mL	0.5 L
g) 4 550 mL	5 L
h) 975 mL	2.95 L
i) 1 200 mL	1.2 L
j) 2 950 mL	0.975 L



2. Write these measurements in litres. The first one has been done for you.

a) 1 L 500 mL = 1.5 L

c) 2 L 750 mL = \_\_\_\_\_ L

e) 3 L 500 mL = \_\_\_\_\_ L

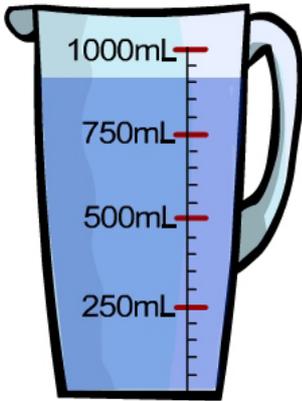
b) 250 mL \_\_\_\_\_ L

d) 4 L 200 mL \_\_\_\_\_ L

f) 950 mL \_\_\_\_\_ L

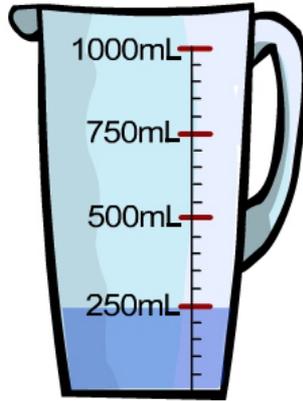
3. Look at how many millilitres of water is in each jug. Change millilitres to litres. The first one has been done for you.

a)



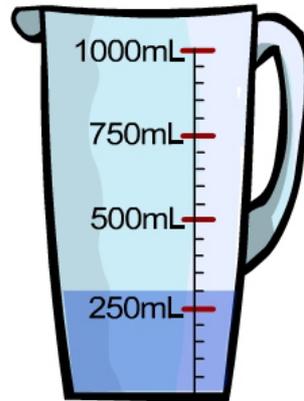
900 mL  
0.9 L

b)



\_\_\_\_\_ mL  
\_\_\_\_\_ L

c)



\_\_\_\_\_ mL  
\_\_\_\_\_ L

d)



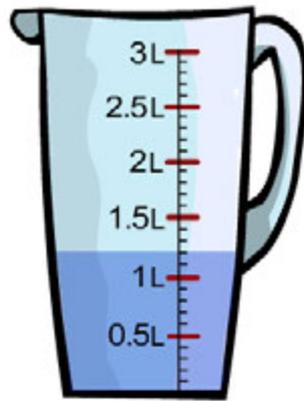
\_\_\_\_\_ mL  
\_\_\_\_\_ L

e)



\_\_\_\_\_ mL  
\_\_\_\_\_ L

f)



\_\_\_\_\_ mL  
\_\_\_\_\_ L

# ANSWERS

1.

<u>Millilitres</u>	<u>Litres</u>
a) 5000 mL	= 5 L
b) 2250 mL	= 2.25 L
c) 650mL	= 0.65 L
d) 3400 mL	= 3.4 L
e) 1050 mL	= 1.05 L
f) 500 mL	= 0.5 L
g) 4550 mL	= 4.55 L
h) 975 mL	= 0.975 L
i) 1200 mL	= 1.2 L
j) 2950 mL	= 2.95 L

2.

<u>Millilitres</u>	<u>Litres</u>
a) 1 L 500 mL	= 1.5 L
b) 250 mL	= 0.25 L
c) 2L 750 mL	= 2.75 L
d) 4 L 200 mL	= 4.2 L
e) 3 L 500 mL	= 3.5 L
f) 950 mL	= 0.95 L

3.

<u>Millilitres</u>	<u>Litres</u>
a) 900 mL	= 0.9 L
b) 250 mL	= 0.25 L
c) 300 mL	= 0.3 L
d) 150 mL	= 0.15 L
e) 700 mL	= 0.7 L
f) 1200 mL	= 1.2 L



# Henry sprays it safe

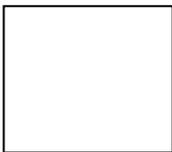
## CHANGING SQUARE METRES TO HECTARES

Remember that Joe first calculated the area of his garden in square metres ( $m^2$ ). Then he changed square metres to hectares (ha) because application rates are given in litres per hectare (L/ha).

This worksheet shows you how to change square metres to hectares.

**A hectare (ha) is the area covered by 10 000 square metres ( $m^2$ ).**

The area of this square is one hectare:



100 m

100 m

Area = length  $\times$  width  
= 100 m  $\times$  100 m  
= 10 000  $m^2$   
= 1 hectare

The area of this rectangle is one hectare:

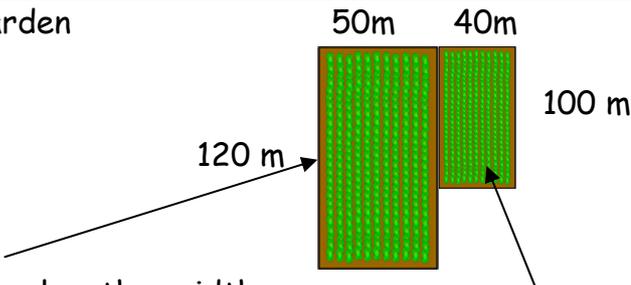


250 m

40 m

Area = length  $\times$  width  
= 40 m  $\times$  250 m  
= 10 000  $m^2$   
= 1 hectare

The area of this garden is one hectare:



50m

40m

100 m

120 m

Area = length  $\times$  width  
= 120 m  $\times$  50 m  
= 6 000  $m^2$

Area = length  $\times$  width  
= 100 m  $\times$  40 m  
= 4 000  $m^2$

Total area = 6 000  $m^2$  + 4 000  $m^2$   
= 10 000  $m^2$  = 1 hectare

Remember

**1 hectare = 10 000 square metres**

## Changing square metres to hectares without a calculator

To change square metres to hectares you divide by ( $\div$ ) 10 000. One way to divide by 10 000 is to move the decimal point 4 places to the left. (If you don't see the decimal point, it's at the end of the number.)

Sometimes there are less than 4 digits in the number. In this case, you just add zeros to the beginning of the number so you have 4 digits.

This means,  $550 = 0550$   
 $90 = 0090$

Example 1, Change 20 000 m<sup>2</sup> to hectares

$$20\,000 \div 10\,000$$

Move the decimal 4 places left  $2\,0000. \div 10000 = 2.0000 = 2$

So, 20 000 m<sup>2</sup> = 2 ha

Example 2, Change 2 500 m<sup>2</sup> to hectares

$$2500 \div 10\,000$$

Move the decimal 4 places left  $2\,500. \div 10\,000 = 0.2500 = 0.25$

So, 2 500 m<sup>2</sup> = 0.25 ha or a quarter of ( $\frac{1}{4}$ ) a hectare

Example 3, Change 800 m<sup>2</sup> to hectares

$$800 \div 10\,000$$

Move the decimal 4 places left  $0\,800. \div 10\,000 = 0.0800 = 0.08$

So, 800 m<sup>2</sup> = 0.08 ha

## Changing square metres to hectares with a calculator

Put the number of square metres into your calculator and divide by 10 000.

Example, Change 7 200 m<sup>2</sup> to hectares.

Put into your calculator:

7	2	0	0	÷	1	0	0	0	=
---	---	---	---	---	---	---	---	---	---

Answer on the calculator:

0.72
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So, 7200 m<sup>2</sup> = 0.72 ha

# ACTIVITY

1. Draw a line from the area in square metres to the same area in hectares. The first one has been done for you.

<u>Square metres</u>	<u>Hectares</u>
a) 10 000 m <sup>2</sup>	0.5 ha
b) 5 000 m <sup>2</sup>	0.7 ha
c) 2 500 m <sup>2</sup>	0.25 ha
d) 3 400 m <sup>2</sup>	1.2 ha
e) 25 000 m <sup>2</sup>	0.295 ha
f) 7 000 m <sup>2</sup>	1 ha
g) 3 800 m <sup>2</sup>	0.38 ha
h) 12 000 m <sup>2</sup>	0.34 ha
i) 1 200 m <sup>2</sup>	0.12 ha
j) 2 950 m <sup>2</sup>	2.5 ha

2. Write these measurements in hectares. The first one has been done for you.

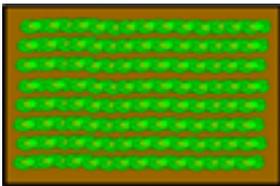
- a) 20 000 m<sup>2</sup> = 2 ha  
b) 1 500 m<sup>2</sup> = \_\_\_\_\_ ha  
c) 5 200 m<sup>2</sup> = \_\_\_\_\_ ha  
d) 7 250 m<sup>2</sup> = \_\_\_\_\_ ha  
e) 8 000 m<sup>2</sup> = \_\_\_\_\_ ha  
f) 500 m<sup>2</sup> = \_\_\_\_\_ ha

3. Here are some crops that need to be sprayed. Work out the area for each crop in square metres, then change the square metres to hectares. The first one has been done for you:

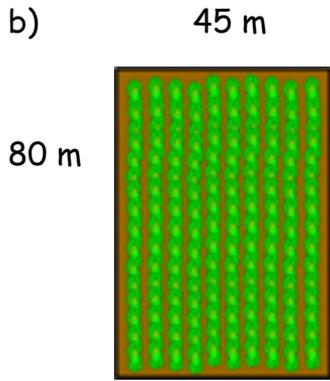
a)

75 m

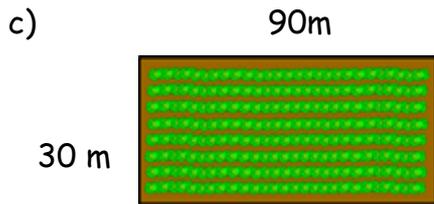
40 m



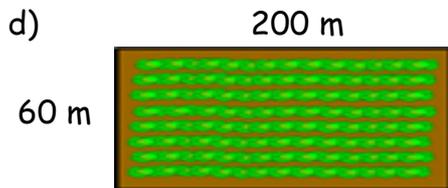
Area = 40 m x 75 m  
= 3 000 m<sup>2</sup>  
= 0.3 ha



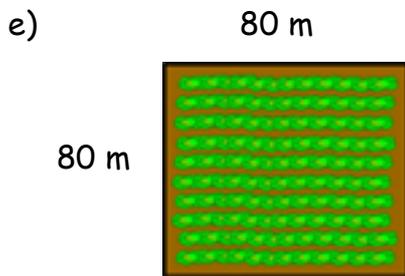
$$\begin{aligned} \text{Area} &= \underline{\quad} \text{ m} \times \underline{\quad} \text{ m} \\ &= \underline{\quad\quad\quad} \text{ m}^2 \\ &= \underline{\quad\quad\quad} \text{ ha} \end{aligned}$$



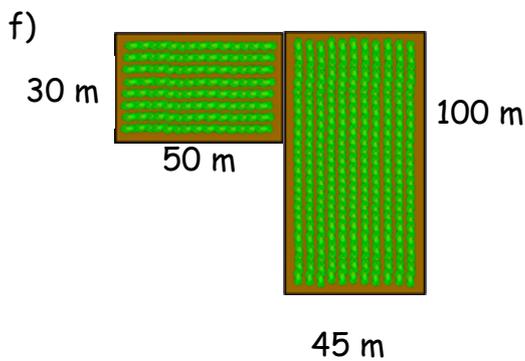
$$\begin{aligned} \text{Area} &= \underline{\quad} \text{ m} \times \underline{\quad} \text{ m} \\ &= \underline{\quad\quad\quad} \text{ m}^2 \\ &= \underline{\quad\quad\quad} \text{ ha} \end{aligned}$$



$$\begin{aligned} \text{Area} &= \underline{\quad} \text{ m} \times \underline{\quad} \text{ m} \\ &= \underline{\quad\quad\quad} \text{ m}^2 \\ &= \underline{\quad\quad\quad} \text{ ha} \end{aligned}$$



$$\begin{aligned} \text{Area} &= \underline{\quad} \text{ m} \times \underline{\quad} \text{ m} \\ &= \underline{\quad\quad\quad} \text{ m}^2 \\ &= \underline{\quad\quad\quad} \text{ ha} \end{aligned}$$



$$\begin{aligned} \text{Area 1} &= \underline{\quad} \text{ m} \times \underline{\quad} \text{ m} \\ &= \underline{\quad\quad\quad} \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Area 2} &= \underline{\quad} \text{ m} \times \underline{\quad} \text{ m} \\ &= \underline{\quad\quad\quad} \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Total area} &= \underline{\quad\quad\quad} \text{ m}^2 + \underline{\quad\quad\quad} \text{ m}^2 \\ &= \underline{\quad\quad\quad} \text{ m}^2 \\ &= \underline{\quad\quad\quad} \text{ ha} \end{aligned}$$

# ANSWERS

1.

<u>Square metres</u>	<u>Hectares</u>
a) 10 000 m <sup>2</sup>	= 1 ha
b) 5 000 m <sup>2</sup>	= 0.5 ha
c) 2 500 m <sup>2</sup>	= 0.25 ha
d) 3 400 m <sup>2</sup>	= 0.34 ha
e) 25 000 m <sup>2</sup>	= 2.5 ha
f) 7 000 m <sup>2</sup>	= 0.7 ha
g) 3 800 m <sup>2</sup>	= 0.38 ha
h) 12 000 m <sup>2</sup>	= 1.2 ha
i) 1 200 m <sup>2</sup>	= 0.12 ha
j) 2 950 m <sup>2</sup>	= 0.295 ha

2.

<u>Square metres</u>	<u>Hectares</u>
a) 20 000 m <sup>2</sup>	= 2 ha
b) 1 500 m <sup>2</sup>	= 0.15 ha
c) 5 200 m <sup>2</sup>	= 0.52 ha
d) 7 250 m <sup>2</sup>	= 0.725 ha
e) 8 000 m <sup>2</sup>	= 0.8 ha
f) 500 m <sup>2</sup>	= 0.05 ha

3.

<u>Area in m<sup>2</sup></u>	<u>Area in ha</u>
a) 3 000 m <sup>2</sup>	= 0.3 ha
b) 3 600 m <sup>2</sup>	= 0.36 ha
c) 2 700 m <sup>2</sup>	= 0.27 ha
d) 12 000 m <sup>2</sup>	= 1.2 ha
e) 6 400 m <sup>2</sup>	= 0.64 ha
f) 6 000 m <sup>2</sup>	= 0.6 ha

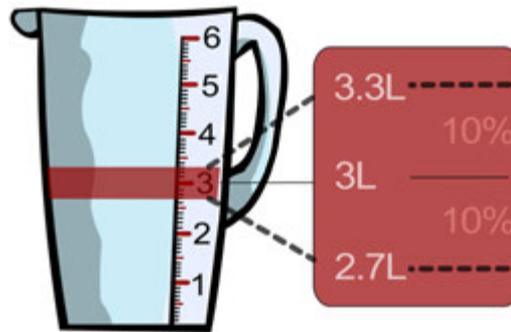


# Henry sprays it safe

## WORKING OUT 10 %

Remember that Joe checked the manufacturer's instructions to find the recommended nozzle output. It was 3 litres per minute (L/min). The nozzle output can be up to 10 % above or 10 % below the recommended output. That means the nozzle can spray between 2.7 L/min and 3.3 L/min and be within the range.

You can see this on the diagram below.



This worksheet shows you how to work out 10 % and find 10 % above and 10 % below the recommended output.

**Remember** 10 % is the same as  $1/10$  (one tenth) or 0.1  
 $10 \% = 1/10 = 0.1$

Let's see what to do if the recommended nozzle output is 800 mL/min.

1. Work out 10 % of 800 mL

a) **Without a calculator**

Because 10 % is one tenth of the number, the quick way to work out 10 % is to divide the number by 10

To work out  $800 \div 10$   
you can take off the last zero

$$80\cancel{0} \div 10 = 80$$

Or

you can move the decimal point one place to the left. (If you can't see the decimal point it's at the end of the number.)

$$800. \div 10 = 80$$

So, 10 % of 800 is 80

b) **With a calculator**

Put into your calculator:

8	0	0	x	1	0	%
---	---	---	---	---	---	---

Answer on the calculator:

80.
-----

or

Put into your calculator:

8	0	0	x	0	.	1	=
---	---	---	---	---	---	---	---

Answer on the calculator:

80.
-----

2. Work out 10 % above and 10 % below 800 mL

$$10 \% \text{ above} = 800 \text{ mL} + 80 \text{ mL} = 880 \text{ mL}$$

$$10 \% \text{ below} = 800 \text{ mL} - 80 \text{ mL} = 720 \text{ mL}$$

So, the nozzle output should be between 720 mL and 880 mL per minute.

# ACTIVITY

1. Work out 10 % of these recommended nozzle outputs.

- a) 500 mL \_\_\_\_\_
- b) 1200 mL \_\_\_\_\_
- c) 2500 mL \_\_\_\_\_
- d) 1 litre \_\_\_\_\_
- e) 325 mL \_\_\_\_\_

2. The first column of this table gives you the recommended nozzle output. Fill in the boxes in each row to find the acceptable range for the nozzle output. The first row has been done for you.

Recommended nozzle output (per minute)	10 % of the recommended nozzle output	10 % above recommended nozzle output	10 % below recommended nozzle output	Acceptable nozzle output range
250 mL	25 mL	275 mL	225 mL	225 - 275 mL
600 mL				
3000 mL				
2250 mL				
1500 mL				
750 mL				

3. A market gardener is checking his nozzle output. The manufacturer's instructions recommend 1 800 mL/min. He sprays water into a jug for one minute. His nozzle output is 1550 mL/min. Is his nozzle output within 10 % of the recommended nozzle output?

# ANSWERS

1.

<u>Nozzle output</u>	<u>10%</u>
a) 500 mL	50 mL
b) 1200 mL	120 mL
c) 2500 mL	250 mL
d) 1 litre	100 mL
e) 325 mL	32.5 mL

2.

<b>Recommended nozzle output (per minute)</b>	<b>10 % of the recommended nozzle output</b>	<b>10 % above recommended nozzle output</b>	<b>10 % below recommended nozzle output</b>	<b>Acceptable nozzle output range</b>
250 mL	25 mL	275 mL	225 mL	225 - 275 mL
600 mL	60 mL	660 mL	540 mL	540 - 660 mL
3000 mL	300 mL	3300 mL	2700 mL	2700 - 3300 mL
2250 mL	225 mL	2475 mL	2025 mL	2025 - 2475 mL
1500 mL	150 mL	1650 mL	1350 mL	1350 - 1650 mL
750 mL	75 mL	825 mL	675 mL	675 - 825 mL

3. No

# GLOSSARY - WORDS TO KNOW

A	Active constituent	The main chemical in a product that affects the pest or disease. It is important to know the active constituent if a person becomes sick from using the chemical.
B	Bars	A measurement of pressure. One bar = 100 kilopascals (kPa). More bars mean higher pressure, and so smaller droplets.
	Beaufort Scale	A guide to help you work out how fast the wind is blowing.
	Broad Claims for Use	The words on the label that tell you the crops and the pests or diseases the chemical is suitable for.
C	Calibrate, calibration	Setting your equipment to spray chemical in the right way and in the right amounts.
	Caution	CAUTION on the chemical label means the chemical is slightly poisonous. It will not kill you but it could still make you feel sick - so you should be careful.
	Chemical Application Rate	The amount of chemical you should use for each hectare. This is in the Directions for Use on the label.
	Corrosive	Can eat away skin or metal.
	Critical Comments	The words on the label that give you special information about how to spray the chemical.
D	Dangerous Goods	Chemicals which are dangerous to move or store because they can damage people, property or the environment. Dangerous goods are shown by diamond-shaped signs, for example, TOXIC 6 and FLAMMABLE LIQUID 3.
	Directions for Use	The section on the label that tells you how to use the chemical - the crops, the pests or diseases, the rate of application and special instructions.
	drumMUSTER	A place where you can safely get rid of chemical containers after use. There are drumMUSTERS at most rubbish tips.
E	Expiry date	The date by which you should use a chemical.
	Explosive	Can blow up or explode.
F	Flammable	Can catch fire quickly and easily.
	Foliage	The leaves on a plant or crop.
	Fungicide	A chemical product to treat fungal diseases.
H	Harvest	Picking the crop.
	Hazardous	Can hurt or harm people - for example, hurt your eyes or skin, make you sick if you breathe in the smell.
	Hectare	A measurement of land area. One hectare = 10 000 square metres. Most chemical and water application rates are for hectares.
	Herbicide	A chemical product which kills weeds and unwanted plants.
	Humidity	The amount of water or moisture in the air.
	Hygrometer	An instrument to measure humidity.

I	Insecticide	A chemical product which kills insects. Same as pesticide.
	Integrated pest management (IPM)	Using a number of methods to control pests - for example, destroying weeds where pests hide, improving drainage, and using good insects or 'beneficials' to control harmful insects. In IPM, chemicals are just one part of a larger pest plan.
	Kilopascals	A measurement of pressure. 100 kilopascals (kPa) = one bar. More kilopascals mean higher pressure, and so smaller droplets.
M	Material Safety Data Sheet (MSDS)	A sheet of paper containing health and safety information about a chemical product. You can ask the reseller for the MSDS for the product you are buying.
	Mode of Action	The words and numbers on the label that tell you the group of chemicals that the chemical product belongs to (eg GROUP 2A INSECTICIDE, GROUP L HERBICIDE, GROUP C FUNGICIDE). All chemicals in one group <i>act</i> on pests or diseases in the same way or <i>mode</i> . If you regularly use chemicals from the same group, the pests or diseases may develop resistance.
N	Nozzle output	The amount of spray mixture that comes out of the nozzle in one minute.
P	Personal Protective Equipment (PPE)	Clothes and equipment which keep you safe when working with chemicals, for example, goggles, gloves and boots.
	Pesticide	A chemical product which kills insects. Same as insecticide.
	Poison, poisonous	POISON on the chemical label means that the chemical will make you sick. DANGEROUS POISON means it will make you very sick and might even kill you.
R	Re-entry period	The time you must wait before it is safe to go back into an area you have sprayed with chemical.
	Residue	The chemical that remains in the plant, animal or soil after you spray.
	Resistance	When pests are no longer controlled by a chemical because chemicals from the same chemical group have been used too many times. See Mode of Action.
S	Sensitive areas	Areas that can easily be damaged by chemicals - for example, creeks and rivers.
	Signal Heading	The words on the label that tell you how poisonous a chemical is - VERY POISONOUS, POISONOUS, CAUTION.
	Spray drift	When the chemical you are spraying goes onto other plants, animals or areas. Spray drift can happen because of weather conditions, equipment problems or incorrect spraying methods.
	Spray width	The measurement of how wide the spray is. You spray the ground and measure from side to side in metres.

	Sprayer Application Rate	The amount of water (or chemical solution) your sprayer uses to cover a hectare. The rate should be within the range given on the chemical label. If it is not, you need to adjust your equipment, walking speed or spray width.
	Spray Application Record	A sheet to record the details about the use of a chemical - for example, crop, pest/disease, date, time.
	Storage Record Sheet	A sheet to record all the chemical products you have in your shed or storage area - for example the date you bought the chemicals, where they are in your shed.
T	Thermometer	An instrument to measure temperature
	Toxic	Can harm a person, animal or plant - for example, make a person sick.
V	Ventilated, ventilation	Air moving around - for example, there is usually good ventilation if a window is open
W	Water Application Rate	The amount of water to use for every hectare of crop.
	Withholding period	The time you must wait before you harvest a crop after spraying a chemical.

# Henry Sprays It Safe

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This resource supports the development of language, literacy and numeracy skills related to selected units of competency common to the Conservation and Land Management Training Package (RTD02), Rural Production Training Package (RTE 03) and Amenity Horticulture Training Package (RTF 03) that relate to chemical spraying at AQFI, II and III.



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