Little ant, big problem!

Fire ant resource pack for primary schools

Teaching strategies: incorporating the rationale of the project and broad lesson plans, integrating four Key Learning Areas with QSA outcomes (downloadable as a PDF).

Resource sheets: photocopiable worksheets, or OHTs, linked with teaching strategies (downloadable in Word format for teachers to edit for each class).

Contract activities: photocopiable workbooks for students to complete as homework or extension work (downloadable in Word format for teachers to edit).

Photo: Texas A&M University

Teaching resources for teachers and students to learn more about FIRE ANTS and to help protect Australia from these pests.

Teaching Strategies

Resource Sheets

Contract Activities

TEACHING STRATEGIES

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The Department of Primary Industries and Fisheries (DPI&F) seeks to maximise the economic potential of Queensland's primary industries on a sustainable basis.

Our focus is on four key areas – industry development, biosecurity, fisheries and forestry.

Our business is about:

- strengthening the profitability and viability of Queensland's primary industries
- maximising market and community confidence in the integrity of Queensland's agribusiness
- ensuring the sustainable management and economic development of Queensland's fisheries
- maximising the market value of state-owned commercial forestry assets within a sustainable development framework
- innovative science and research and development that will maximise growth, value-adding and profitabilitiy.

Inquiries should be addressed to:
Manager, DPI&F Publications
Department of Primary Industries and Fisheries
GPO Box 46
Brisbane Qld 4001

OVERVIEW OF ACTIVITIES AND LEARNING OUTCOMES

Suggested program time — two weeks

<table>
<tr>
<td>English

Researching and producing reports on fire ants (or an alternative text type, as negotiated with class) incorporating:

• information and scientific reports
• punctuation conventions
• subject specific vocabulary.

Learning outcomes:
Cu3.2, 3.3; Op3.2, 3.3; Cr3.2, 3.3.</td>
<td>Science

Conducting an investigation relating to treatment for ants incorporating:

• designing and conducting an experiment
• interpreting results
• communicating results.

Learning outcomes:
SS3.2, SS3.3</td>
</tr>
<tr>
<td>Maths

Handling of data (drawn from science module of unit) incorporating:

• timetables
• making and reading maps and plans of local area
• degrees of turn, compass points
• estimation and comparison
• tables and graphs.

Learning outcomes:
N3.1, M3.2, CD3.2, S3.</td>
<td>SOSE

Investigating the effects of an invasive species and considering group and personal obligations to the environment, incorporating:

• timelines (small and large scale)
• cause and effect
• using local and international maps
• making and acting on plans regarding places we value.

Learning outcomes:
TCC3.2, TCC3.4, PS3.2, PS3.3, PS3.4, PS3.5</td>
</tr>
<tr>
<td colspan="2">Thematic extensions</td>
</tr>
<tr>
<td>H&PE

Extension from SOSE: students consider places they value in terms of health and helping to keep those places healthy; students work together on a plan to protect places we value.

PH3.5, PD 3.4</td>
<td>LOTE

Extension from English: students write a simple report in their LOTE.

Composing 3.6</td>
<td>The Arts

Extension from English: presenting an advertising campaign alerting the community to the fire ant threat.

Me 3.2</td>
<td>Technology

Extensions from English: analysing research resources and creating an advertising campaign.

Link from SOSE: creating a 3D model of the world (map or globe) showing shipping routes.

I3.1, 3.2

TP3.1, 3.2, 3.3, 3.4</td>
</tr>
</table>

ACKNOWLEDGEMENTS

Several Queensland teachers, past and present, have helped create these resources. Thanks are due to Sharon Damrow, Fynn Stark, Rebecca Power and Kimberley Cunial, as well as to the Public Relations staff at the Fire Ant Control Centre.

INTRODUCTION

This document is an integrated unit framed around the problem posed by the introduction of fire ants into Australia. Learning activities are designed to provide opportunities for students to achieve QSA outcomes at Level 3, over a period of two weeks or as appropriate for individual classes.

Rationale

The purpose of this unit is to learn about fire ants, gaining knowledge through research and then to disseminate this learning to the wider community, developing a range of language, scientific, mathematical and social science skills in the process.

This unit has been written as fully integrated, with lesson plans, resource sheets and extension ideas in the expectation that teachers at this level could pick the unit up and put it straight into practice. However, fire ants as a topic naturally leads to a number of learning outcomes, and could be linked to the study of insects, for example, or invasive species. The modules in this unit could be re-written to stand alone or be incorporated into other units, such as invasive species.

The motivation behind the creation of this unit is the very real potential for fire ants to seriously damage our outdoor lifestyle, our unique environment and our agricultural industries. It is important to raise public awareness of this issue and encourage public support of the DPI&F eradication program recognises the vital role played by the community in the fight against fire ants.

Background information

The Fire Ant Control Centre is part of the Department for Primary Industries and Fisheries. Our purpose is to eradicate fire ants, a serious ant pest from South America that was only identified in the Brisbane area in 2001.

Fire ants have the potential to seriously damage our environment, agricultural industries and outdoor lifestyle. The general public play a vital role in our program as community support is essential to finding every last fire ant.

Detailed information and history of the national fire ant eradication program may be found at www.dpi.qld.gov.au/fireants. Education and Training Officers from the DPI&F are available to make fire ant presentations at schools in the greater Brisbane area and can send supporting materials (posters, brochures, etc) to schools free of charge.

Inquiry

While it would be straightforward to gather educative activities under the theme of Fire Ants, this unit takes an integrated, rather than thematic, approach, framed around the concept of fire ants and taking an inquiry-based approach to fire ants as a problem. Are they a problem? Why are they a problem? To whom are they a problem? What can we do about it?

Focus task

Students will research the problems presented by the fire ant incursion into Queensland and present a report to the school community on this issue, alerting them to the fire ant threat and encouraging them to do their part to keep fire ants out. There is scope to extend this to be a multi-modal presentation, a media campaign, and/or a grass roots political movement.

Sequencing of activities

Activities providing opportunities for students to reach outcomes pertaining to English, Science, Maths and SOSE have been set out in separate modules (with links to LOTE, H&PE, The Arts and Technology where appropriate within those modules). The orienting activity is aligned with the English module, with following activities needing to be spliced from the modules, as best suits your class. The Maths and Science activities are inter-reliant; this needs to be taken into account when organising how you carry them out.

Real life application/purpose

Fire ants are a very real problem in south east Queensland. By learning about them and the eradication program, students have a genuine opportunity to make a valuable contribution, with local application and results, to a national effort.

Assessment

Anticipated evidence of learning is included with each major activity in each module. A self-assessment sheet for completion by students is included for the English module; this format could be repeated separately for other modules or used for selected outcomes across the unit.

Cross-curricular priorities

In addition to the direct focus literacy lessons provided in the English module of this unit, there are opportunities to widen vocabulary, to appreciate the value of the text when trying to share a message with the wider community and the motivation to get this message across.

The function of the mathematics module in this unit underpins the role of numeracy in understanding data in real world applications. There is a capacity for encouraging students to 'have a go' through estimation and a requirement to use time and think about how the passage of time can affect a situation.

The knowledge, awareness, attitudes and social processes that students can develop in this unit will contribute to their growth and development both as individuals and members of society. By responding to the need to protect the environment and share a message with the community, students are contributing to their society and making socially responsible choices and plans for action.

By making an investigation that can lead to action, students have access to a vertical integration of information and empowered action. The study of the cause and effect of the spread of fire ants gives an insight into the consequences of personal and concerted actions and encourages belief in, and motivation to work towards, recovery and renewal.

Life-long learning

This unit, with its real world focus, and the requirement to develop and draw on skills in related but separate disciplines, provides a range of opportunities for students to nurture the characteristics of life-long learners.

Current scientific concepts

Different ants have different dietary requirements/preferences — these might even differ depending on the time of year — therefore there may not be a great deal of consistency in the type of baits that attract ants. These differing preferences are the main means of targeting fire ants over native ants with the baits the DPI&F uses — soybean oil has been added to the bait as fire ants are attracted to it, while many native ants do not find oils attractive.

Students' prior understanding

Students may have varying perceptions and feelings about ants. Not all ants are dangerous. It is not the purpose of this unit to make students generally fearful of ants or to encourage students to kill ants, but to learn more about fire ants in particular and to develop skills and understandings through the associated activities. Some students may feel an eradication effort is objectionable and such feelings will need to be addressed if they arise in the classroom context.

Terminology

Terms associated with ants and invasive species are essential to the activities in this unit. Some students may already be familiar with these terms but they may be new to them in this context; these activities will provide opportunities for all students to develop or extend their understanding and the use of these terms. This list is not exhaustive.

ant	queen	brood	eggs	nest
mound	forage	tunnels	pheromone	ecosystem
competition	lifecycle	bait	treatment	surveillance
measure	time	estimation	compare	experiment
data	results	predator	larvae	eradicate

Resources

There is a resource bank of worksheets provided with this unit, keyed to each KLA. Further suggested resources are listed in each module.

School authority policies

Teachers need to be aware of and observe school authority policies that may be relevant to this unit.

Safety policies are of particular relevance to the activities in this unit. It is essential that student activities, particularly in the science module, are conducted according to procedures developed through appropriate risk assessments at the school.

In this module, teachers need to consider safety issues relating to:

- hygiene when handling foodstuffs for the science investigation
- safety when handling ants. It is not expected that any fire ants will be detected in the science investigation; however, other stinging/biting insects may be encountered in the course of the investigation and this possibility should be allowed for.

The DPI&F do not expect children to handle fire ants but do encourage responsible adults to collect samples of ants they suspect may be fire ants.

Teachers also need to consider policies relating to the ethical care and use of insects in the learning environment.

Equity considerations

It is envisaged that these activities take place in a supportive environment. Some students with disabilities may need assistance with some activities. Advice should be sought from their support teachers.

The point will be made, when considering eradicating fire ants, that these ants are not native to Australia. Students may draw some parallels here with native/immigrant people and care should be taken to balance the need to discuss these matters as a class while ensuring discussion and activities are inclusive of all class and community members.

It is important that these equity considerations inform decision making about teaching strategies, classroom organisation and assessment.

Unit evaluation

Teachers are encouraged to evaluate this unit to inform their own future use of it and that of colleagues. The DPI&F welcomes any feedback from school users of these teaching materials.

THIS UNIT OF WORK	Yes	Sometimes	No
• successfully worked towards identified outcomes • was well sequenced and easy to follow • was well integrated across KLAs • catered for the needs of all students in the class • maintained student and teacher interest • used a variety of teaching strategies • used a variety of resources • allowed for a range and balance of assessment techniques			
Identified needs for future use of this unit:			

Further information

A range of brochures, posters and information sheets is available free of charge from the Fire Ant Control Centre (13 25 23). The DPI&F website has a section devoted to fire ants (www.dpi.qld.gov.au/fireants). DPI&F Education and Training Officers based in Oxley are available to answer queries and can be booked to make presentations to classes at school. Below are references for two articles that will further teachers' understanding of the topic and should be tracked down easily.

Robson, F (2003). Invasion of the Killer Ants. Readers Digest. Jan 26–33.
Moloney, S and Vanderwoude, C (2002). Red Imported Fire Ants: A threat to eastern Australia's wildlife? Ecological Management and Restoration. Vol 3 No 3 Dec 167–174.

English

Core learning outcomes addressed in this unit

Reading and viewing

Cu3.2 Students use knowledge of the relationship between text types and their commonly associated purposes to select texts for own reading and viewing purposes and interpret subject matter by making connections between directly stated information to identify main ideas in reports.

Op3.2 Students identify the function of different stages of the generic structure, and draw on some sentence and clause patterns associated with particular text types; make meaning of a range of visual/written resources used to develop subject matter, signal relationships and organise and link ideas; and draw on sound, visual and meaning patterns to decode words.

Cr3.2 Students suggest why aspects of subject matter may have been omitted, and identify how attributes, processes and visual resources have been used to construct positive or negative representations of people, places, events and things.

Writing and shaping

Cu3.3 Students achieve negotiated purposes by selecting relevant subject matter and considering audience interest, when elaborating ideas with supporting details in reports.

Op3.3 Students organise and link ideas using generic structure, text connectives and layout; include complex sentences, circumstances and visual resources; use commas to mark a clause and use apostrophes; and draw on sound, visual and meaning patterns to spell unfamiliar words.

Cr3.3 Students identify which attributes, processes and visual resources along with aspects of subject matter they have chosen to construct positive or negative representations of people, places, events and things in their expositions.

** If students negotiate a culminating piece of work involving a spoken or multi-modal presentation, there will be opportunities to address further core learning outcomes and associated core content in this unit.*

Level specific core content addressed in this unit

Discourse

- people and the groups to which they belong share knowledge, values and practices (discourses)
- that shared knowledge, values and practices of groups are represented in texts.

Text types

- descriptions and information reports (reports) and their commonly associated cultural purposes
- the generic structure associated with these text types
- the names and functions of the common stages of the generic structure of these text types
- some of the patterns of textual resources commonly associated with these text types.

Subject matter

- subject matter is selected according to purpose, text type and the main ideas being developed in the text
- in text types like reports, main ideas are developed by elaborating on ideas and information with supporting details
- a clause can represent what is happening, who or what is taking part and the circumstances surrounding the activity
- components of a clause can be processes, participants, attributes and circumstances

- clauses can be combined, using conjunctions, to form compound and complex sentences that elaborate subject matter
- elements of visual resources (proximity of participants in images, shot types, timelines, scales) develop the subject matter of written, visual and multi-modal texts
- aspects of subject matter can be included or omitted to construct particular representations
- people, places, events and things can be represented in positive or negative ways by making choices in the written (attributes and processes) resources.

Roles and relationships

- writers consider the interests of their audience (readers).

Mode and medium

- different textual resources are available when using different modes and mediums
- ideas and information are organised and linked to guide the listener, reader and/or viewer
- textual resources including text connectives, layout, vectors, paragraphs, headings, sub-headings, chapters and hyperlinks can be used to link ideas and information in a text
- images and page/screen layout contain salient elements that draw the viewers' attention or lead the eye
- relative size, colour, movement, human participants, distinctive framing, and centrality are elements of salience
- neat handwriting is important for some writing/shaping purposes and audiences
- neatness depends on consistency of shape, size, slope and spacing.

Conventions

- how to draw on sound, visual and meaning patterns in words to decode and spell words
- the names and functions of punctuation marks, including commas to mark a clause and apostrophes in contractions to show ownership.

Purpose

Activities in this module of the fire ant unit provide students with opportunities to work with texts on fire ants before producing their own report. The unit as a whole investigates fire ants from a number of angles and lends itself to a culminating student effort in the form of a report, presenting results of research carried out throughout the unit. As such, the English module of the unit focuses on the generic structure of a report, supporting students towards producing a report for publication. More able students may opt to produce a scientific report focusing on the experiment carried out in the Science module. Teachers, potentially through negotiation with the class, may elect to explore alternative text types that are suggested by this unit (e.g. a persuasive exposition: 'Why we must fight the fire ants'; a personal recount: 'I was attacked by fire ants!'). Students may also choose to work in groups to make a multi-modal presentation to the wider school community, alerting them to the threat of fire ants and encouraging them to help in the community effort to beat fire ants.

Students will have the opportunity to:

- investigate the generic structure of reports using the subject of fire ants
- consider the way fire ants are represented and consciously decide on their own representation of fire ants (e.g. positive/negative)
- use and improve use of appropriate punctuation, decoding and encoding techniques and, where relevant, effective verbal, non-verbal and written presentation.

In concert with the activities undertaken through the other Key Learning Area (KLA) modules of the unit, students will gain knowledge and understanding on the subject of fire ants in Queensland and, in negotiated formats, share their information with an outside audience.

Overview of activities

Introductory →	Developmental →	Culminating
• Invasion of the fire ants! (also introductory for the other KLAs in unit)	• Need to know • Spot the difference • Vocab focus • Punctuation focus	• Putting it together

Resources to support learning:

- information on fire ants (brochures, posters, etc available from DPI&F, 13 25 23)
- access to DPI&F website: www.dpi.qld.gov.au/fireants
- Resource Sheets (included)

Invasion of the fire ants!

An introduction to the subject of fire ants, emphasising the potential fire ants have to seriously damage many aspects of Australian life. Students will have the opportunity to contribute information they already have and make plans to build on and share this information.

Whole class: Ask the class to quickfire a number of Australian animals and plants; list these on the boards or, if artistic talents allow, draw them under a nice shady tree, all happily co-existing together. Do the same for a number of activities the students like doing (if they come up with all indoor activities try to elicit some outdoor ones). Ask each student to write down, on a slip of scrap paper, one of the items off the board. (They can double up if there aren't enough for one each or have several each if there are some left over).

Ask the class to consider the possible effects of some exotic ants, an invasive species that has come to Australia from overseas. Looking at the ideas on the board, do they think any of these plants, animals or activities could be seriously affected by some tiny, but numerous, ants? If they need something to get them thinking, ask them to consider the effects of another invasive species such as rabbits or cane toads. Tell the class you're going to read them a report on the effects of fire ants — they are to screw up any slips of paper that have something that will be seriously affected by fire ants.

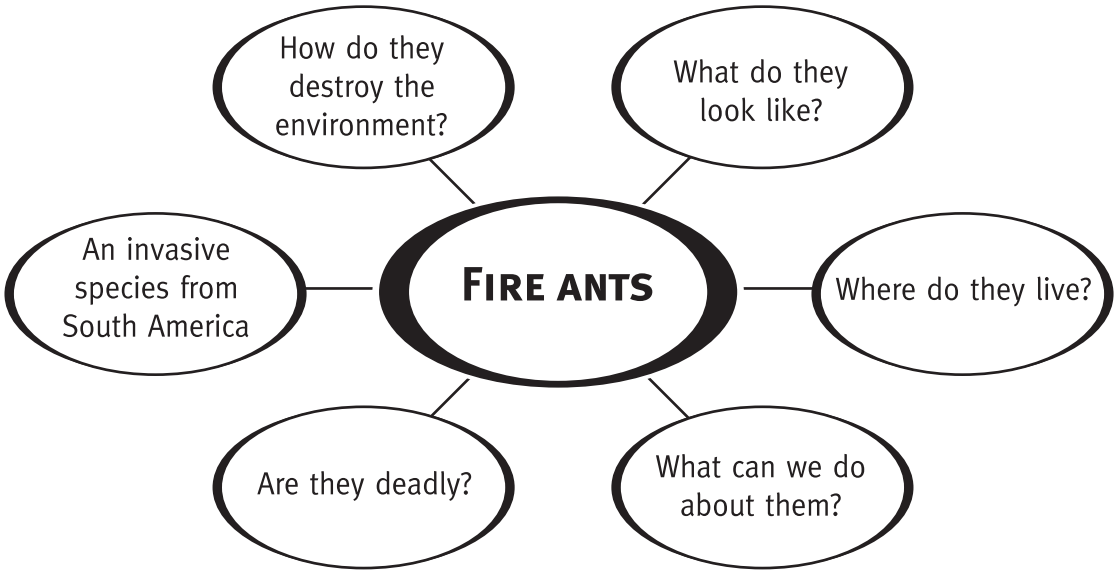
Read the 'Impact of Fire Ants' report (English 1) (or introduce DPI&F speaker at this point).

How many slips of paper are left? Lead a class discussion on how ants could cause so much damage and threaten our way of life to such an extent. Ask the class to think about whether they personally could be affected by fire ants.

This discussion should raise a number of questions and at the same time give you some insight into any prior knowledge students have about fire ants and any misconceptions they hold. Confirm with the class that they need more information about fire ants and agree with them to research fire ants to find out more.

With the class, create a mind map with fire ants in the centre linked to any information you already have about fire ants as well as questions you have about them.

For example:



Make a plan with the class to find out about fire ants with the objective of sharing the information with your school community. This may be a good time to talk about ways of sharing the information — there should be several valid suggestions of ways to do this but, in order to teach the generic structure of one of these ways, you need to settle on one main option. This unit has been written with a report as that option. If you and your class decide, for example, that a narrative or exposition would be more appropriate, you will need to change the generic direct teaching aspect of this module to suit that text type (some resources are included for studying exposition).

Anticipated evidence of learning. Students:

- contribute to brainstorm and discussion
- identify activities affected by fire ants
- identify areas requiring more information; pose questions for research
- contribute to planning of sharing information

Need to know

Students consider sources of information and start a knowledge bank to store information as they find it.

Before we can tell anyone else about fire ants, we need to find out about them ourselves. To do that, we need to research our topic. Where do students think they can access information about fire ants? Because fire ants have only been in Australia since 2001, they may not feature in school encyclopaedias. Other options for fire ant information include the web (www.dpi.qld.gov.au/fireants) and council libraries. Newspapers often feature fire ant stories and may be another source of information. The DPI&F will supply posters, brochures and speakers to the school free of charge upon request (13 25 23).

You may choose to do a one-off research session, or have a board set up where students can add information as they come across it (pinning up brochures, articles, or snippets they have written down). As this unit unfolds, students will learn more and more about fire ants and should be able to collate this information somewhere that they can all access it.

Anticipated evidence of learning. Students:

- suggest places to search for information
- identify fire ant information when they encounter it
- select relevant information from research

Suggested thematic extension

A critical analysis of the sources of information researched by students will give opportunities to address the **Technology** learning outcome for:

- ***Information 3.1:*** *Students describe advantages and disadvantages of different sources and forms of information*

Spot the difference — Report writing

Students study two pieces of writing to identify the features of a report and practise report writing.

Give class access to the two pieces of writing on cane toads (English 2a+b) (give each student a copy, read them aloud to class, or show on overhead projector). Ask class to read/listen with the following questions in mind: what is different about these two pieces of text? What can they learn about cane toads from each one? How does the writer represent cane toads? The letter, a personal recount, gives more of a 'feel' for cane toads and the report gives more factual information.

Individually or as a class, compare the language features of the two pieces (English 3).

Now look at the report on cane toads in detail, breaking it down for its generic structure. Ask students to identify the title, the classification statement, description and conclusion.

Give students an opportunity to practise writing a simple report, choosing another animal to write about, briefly researching as required (English 4).

Anticipated evidence of learning. Students:

- recognise how language is used to create different representations
- identify some language features of the two genre
- when writing a simple report, observe generic structure of a report
- when writing a simple report, use appropriate language features and generic structure

Suggested thematic extension

Students could do a simple report in the class's Language Other Than English in order to address the **LOTE** outcome for:

- ***Composing, 3.5:*** *Students write a few linked sentences on familiar topics using well-rehearsed language to cover basic information and write a simple personal recount or report following a model.*

Vocab focus

Students have opportunities to develop new vocabulary encountered in this unit.

In their research on fire ants and throughout this unit, the class will come across a range of new terms. There is a Newspaper Vocabulary exercise provided in the resource sheets (English 5a+b) to give students the opportunity to practise 'predict and check' comprehension with new words.

You could also take a themed approach, basing word building exercises around the topic of fire ants, e.g. finding words with ant in them (relevant, antic, pendant); make an acrostic based on fire ants; make as many three-letter words as possible using the letters from *Solenopsis invicta*.

Anticipated evidence of learning. Students:

- can identify words that are new to them
- are willing to use context to predict meaning of new words
- can check definitions and consider new words in terms of extant vocab

Punctuation focus: commas and apostrophes

Students rehearse the use of commas and apostrophes.

Whole class direct teaching of clauses and use of commas to mark clauses. Refresh other uses of commas. What's the difference between a comma and an apostrophe? Refresh use of apostrophes (contractions and ownership).

Individual: Use the newspaper article on a fire ant attack to practise this punctuation (English 6).

Anticipated evidence of learning. Students:

- differentiate between commas used to mark clauses and other uses
- can identify some components of clauses
- can identify the use of apostrophes as contractions or ownership
- can appropriately use commas and apostrophes

Putting it together

Through drafting, students produce a negotiated text.

By this stage of the unit, the class should have accumulated a range of material on fire ants and have formed some opinions and ideas. They should now be at a stage to settle on a text type and start the first draft of it.

During this process they should keep in mind:

- getting the facts right — referring to research materials
- audience
- organising their information
- using appropriate vocabulary
- choosing illustrations/diagrams/figures, if using them
- observing genre conventions
- representation — positive, negative or neutral.

When satisfied with the above, producing a final copy:

- format
- presentation
    - spelling
    - punctuation
    - handwriting (or printing, etc)
    - captions and labelling of any illustrations, etc.

Much of this will depend on the text type the student has settled on.

Anticipated evidence of learning. Students:

- select appropriate subject matter
- develop main ideas by elaborating on ideas and information
- use clauses appropriately, forming compound sentences where appropriate
- use appropriate visual resources
- consider how they represent their subjects
- consider the audience they intend their presentation for
- observe generic structure associated with chosen text types
- use appropriate textual resources and presentation

Extension ideas

- If you're not already planning to write up the Science investigation in a report form, some students may elect to do so as an extension of the text type under study in this module, in which case the structure of a scientific report should be observed — see English 7.
- Students who elect to make a multi-modal presentation could create a media campaign to alert their community to the fire ant threat (flyers, film and print advertisements, promotional giveaways ...)

  Elements of this extension could be used with the whole class to address the following learning outcomes:

    - ***The Arts, Media 3.2:*** *Students present media texts to a specified audience using presentation techniques associated with particular media forms.*
    - ***Technology, Information 3.2:*** *Students select and use techniques for generating modifying and presenting information for different purposes.*
- Return to the text used in the orienting activity (English 1) and critically analyse, considering the purpose for the text and the writer's motives. What does the writer believe about fire ants? How would this text differ if the writer held very different beliefs? Why has that photograph been used?

Alternatives

Some exposition exercises are included with the resource sheets for those classes choosing to base this unit on that text type, or extend with it (English 9+10).

Science

Strand: Science and Society

Key concepts:

- Science as a 'way of knowing' is shaped by the way humans construct their understandings
- Decisions about the ways that science is applied have short- and long-term implications for the environment, communities and individuals.

Core learning outcomes covered in this unit with elaborations

SS3.2 Students recognise the need for quantitative and qualitative data when describing natural phenomena.

Importance of quantitative data:

- difference between quantitative and qualitative data
- communication of information
- comparison — not open to personal opinion.

Collection of quantitative data:

- measurement
- use of appropriate tools for taking different measurements — telescope, microscope, meters, gauges
- appropriate display of data for identification of patterns.

SS3.3 Students make predictions about the immediate impact of some applications of science on their own community and environment, and consider possible pollution and public health effects.

Impact of applications of science on the community:

- caring for the environment — breeding threatened species, conserving areas where threatened species live.

Purpose

Activities in this module provide opportunities for students to understand that:

- scientific investigations can be conducted to test ideas
- ideas may need to be changed due to experimental results
- experiments may not always be successful
- results can inform applications of science in the real world.

Students have opportunities (in conjunction with Maths module) to:

- construct a hypothesis (make a prediction)
- negotiate design of an experiment to investigate their hypothesis
- collect information (data) generated by experimental investigations
- look for patterns and meaning in the data collected
- use tables and graphs to communicate data to other people
- infer and interpret from data
- communicate results of experiment to an audience
- relate experimental results to real world applications

Overview of activities

Introductory →	Developmental →	Culminating
• Invasion of the fire ants! *(see orienting activity, English module)*	• What is tasty to a fire ant? • Taking the bait • Interpreting results	• Communicating conclusions

Resources to support learning:

- resources for Maths module in order to handle data
- foodstuffs for baits
- paper plates or similar items on which to put baits
- polaroid or digital camera if used for recording ant numbers
- Resource Sheets (included)

Introduction to fire ants: the class should already be familiar with fire ants as an invasive species from the introductory activities to this unit as a whole. Students may not necessarily agree that fire ants should be eradicated, but they should be aware that the government's goal (through DPI&F) is to get rid of fire ants from Australia completely. Perhaps emphasise the concept that fire ants play an important role in their native environment and only become a 'pest' when they are moved into a new environment — usually through human activities.

What is tasty to a fire ant?

Students discuss ways of getting rid of pests, focussing on use of baits. Students design an experiment to test what baits might work with ants.

Working scientifically:

Investigating:	Understanding:	Communicating:
○ accessing resources ○ clarifying and challenging ○ designing and performing experiments ○ engaging with problems ○ forecasting ○ formulating questions ○ hypothesising ○ identifying variables ○ making plans ○ predicting	○ applying ideas and concepts ○ developing possible, probable and preferred options ○ formulating and elaborating ideas ○ selecting and justifying	○ arguing a position; negotiating ○ clarifying ideas and concepts ○ discussing thinking ○ envisioning alternative futures ○ explaining ideas and decisions ○ exploring and elaborating ideas ○ expressing points of view ○ listening and questioning ○ responding and debating ○ supporting decisions ○ using scientific terminology

One of the methods that the DPI&F uses to eradicate fire ants is to lay bait that the ants gather, take back to the nest and feed to the rest of the workers, the Queen and the brood. There is a chemical in the bait that stops the ants reproducing. *(See 'Science 1, which may be copied to an OHT to show class)*

Lead class discussion on the use of baits:

Relate to other insect treatments:

- When else are baits used to treat insects? (e.g cockroach traps)
- How else are insects controlled? (e.g. fly spray, repellent, fly swat) Why might baiting be better for treating ants? (e.g. so many ants, hard to find nest)
- Are there other insect treatments that interrupt the reproductive cycle? (yes, for example, flea collars, council mosquito treatment).

Relating to fire ants taking the bait:

- How does the DPI&F know the ants will take the bait?
- What is it about the bait that makes ants want to take it?
- How do you think the DPI&F came up with the idea to make the bait the way it is?

Scientists in Australia and also in the U.S. spend a great deal of time studying baits and how to make them attractive to fire ants.

- What sort of food do you think ants would like to eat? (make a list of class suggestions). Try to consider what these foods are made of, e.g. fats, sugars, etc.
- If you are a scientist, how can you test which ones of these really are attractive to ants?

Hopefully, class will come up with the idea of testing different foods to see which ones would be effective baits.

We can test different kinds of foods to see which one ants like the best. If we wanted to use a food as ant bait, it would have to be very attractive to ants.

Designing an experiment:

As a class, decide on four foodstuffs to try as baits (think about what will be practical in terms of cost, availability, ease of handling).

Solicit ideas from students on how they could present the baits to the ants, and how they will know which one of the four is the most popular with the ants.

Your class may come up with a different (better!) idea, but here is one way of doing it:

- use paper plates or pieces of card, one plate per group of four
- label to identify the group (for example, a,b,c)
- divide each plate in four, write a foodstuff/bait on each quadrant
- each student in the group is to be responsible for counting the ants on one bait; write students' names in their quadrants
- put baits in the appropriate quadrants
- lay baits.

In your groups of four, decide where (on the school grounds) to put the experimental baits. Have a large map of the school grounds prepared (or on an overhead transparency). Where do the groups think will be a good place to catch ants — try to get a range of different sorts of places (environments) to put the baits out (sunny, shady, grassy, bare dirt, concrete), but ensure there are a couple of plates in each environment to allow for testing for consistency of results. Mark each spot on your map with a code to the groups (for example, a, b, c).

Refer to maths unit for negotiation of how long the bait plates will be in place.

Before conducting the experiment, give students an opportunity to record their predictions for what will happen and why (Science 2).

Sources of evidence of student learning could include:

- contributions to discussions
- making suggestions
- contributions to negotiation of experiment design
- completion of prediction worksheet

Taking the bait

The class carries out the experiment it has prepared and records available data. Please refer to the maths module of the unit for lead up to laying the baits.

Investigating:	Understanding:	Communicating:
○ accessing resources ○ collecting information ○ handling materials ○ making observations ○ measuring	○ applying ideas and concepts ○ dealing in an orderly manner with the parts of a complex whole ○ drawing conclusions ○ examining and evaluating ○ making comparisons	○ discussing thinking ○ describing ○ envisioning alternative futures ○ arguing a position ○ using scientific terminology

The groups will need to count the number of ants on each plate. Each student in a group can be responsible for one foodstuff, so they can all count at the same time. Ask them to think in advance about counting the ants — they will need to be quick as they will be moving; what will they do if they move across the line between two foodstuffs; what will they do if there are too many or they are moving too much to keep track of counting? Negotiate some counting 'rules' with the class. An alternative may be to take polaroid or digital photos of the plates, so the students can count stationary ants.

Placing baits

- when the class is ready, place the plates in the chosen spots
- after the negotiated time, go back to them and record the number of ants, ensuring children know on which segment of the plate to count the ants
- once numbers have been recorded, the plates can be discarded.

Teachers may wish to collect samples of ants to send to DPI&F for identification. If so, please ensure ants are sent in a container (e.g. film canister) to ensure they are not squashed in transit. It is preferred that ants are not live; only a few are required for identification. Please include details of where the ants were collected and your own contact details so we can let you know what kinds of ants you have submitted.

What if there are very few or no ants?

If there are no ants, lead a class discussion as to why this may be. Is it too hot? Too wet? What do scientists do if their experiments don't produce any results?

Could you choose another day to repeat the exercise. Could you try a class excursion to a nearby park to repeat the exercise?

If all else fails, provide the class with statistics of your own so they can progress to the data exercises. (For example, Y5 students from another school also tried this, with the following results for the whole class:

Bait	Number of ants
Peanut butter	40
Breadcrumbs	16
Cheerio slice	76
Cooking oil	57

Sources of evidence of student learning could include:

- contributions to discussions/negotiation
- participation in experiment — placing, observing, recording

Interpreting results

Students consider the data gathered from the experiment in qualitative and quantitative terms and try to reach some conclusions. Please refer to maths module of unit for handling of data.

Investigating:	Understanding:	Communicating:
○ clarifying and challenging	○ analysing	○ arguing a position
○ engaging with problems	○ applying ideas and concepts	○ clarifying ideas and concepts
○ looking for patterns and meanings	○ assessing and reassessing	○ creating diagrams
○ judging observations	○ constructing meaning	○ creating tables and graphs
○ seeking reasons	○ drawing conclusions	○ discussing thinking
	○ examining and evaluating	○ exploring and elaborating ideas
	○ generalising	○ expressing points of view
	○ inferring from data	○ listening and questioning
	○ interpreting data	○ responding and debating
	○ judging credibility	○ summarising and reporting
	○ making and judging deductions and inductions	○ using scientific terminology
	○ making comparisons	
	○ reflecting and considering	
	○ suggesting	

Please refer to QSA Science Sourcebook Module 'Measurement in Science' for a detailed lesson on quantitative and qualitative data if your class has not already been introduced to this concept.

Referring to the graph that collates the results of the whole class, lead the class in forming descriptive statements. For example, 'there were lots of ants on the peanut butter', 'there weren't very many ants on the honey', etc. These are qualitative statements — rehearse the meaning of this and the alternative to qualitative, i.e. quantitative, do they know what it means? If they break the word down, what other word is there? Quantity — can they make a statement from the data that deals with quantity and so is a quantitative statement? For example, 'there were 40 ants on the peanut butter, there were 16 ants on the honey', etc.

What can students infer from this information? For example, 'ants like peanut butter best, ants don't like corn flakes at all'. Now try to merge the two so students can make an observation supported by the data. For example, 'the ants in our experiment like peanut butter best because

there were 20 more ants on the peanut butter than on any other bait'. Students may consider how this may apply beyond the experiment — do they think their data can be related to ants in general? To be strictly scientific, any results from the experiment can only be related to the ants in that area on that day. If appropriate, class may discuss reasons why their data may not apply in other situations. For example, proximity to ant nests could make more difference to numbers of ants on baits than type of environment.

Ask the groups of four to look at their results and make statements about the data, as you have done with the whole class results. Do any groups have outcomes that differ from the whole class? If so, why do they think this may be — refer to schoolyard plan to see if environment made a difference to results among the groups.

Sources of evidence of student learning could include:

- contributions to discussions
- formation of statements — quantitative, qualitative
- participation in group exercise

Communicating conclusions

Students observe the practice of formally reporting scientific studies and have the opportunity to produce their own scientific report.

Working scientifically:

Investigating:	Understanding:	Communicating:
○ accessing resources ○ exploring phenomena	○ constructing meaning ○ dealing in an orderly manner with the parts of a complex whole ○ drawing conclusions ○ elaborating ideas ○ reflecting and considering ○ selecting and justifying ○ synthesising ○ using ideas, theories and principles	○ clarifying ideas and concepts ○ describing ○ discussing thinking ○ expressing points of view ○ illustrating ○ retelling and restating ○ summarising and reporting ○ using scientific report genres ○ using scientific terminology

When scientists carry out an experiment, they need to report their results. Often, these reports will be published in a scientific journal. If at all possible, have a scientific journal available for the class, so they can see how reports are produced for the relevant scientific community (an education or similar journal could also be useful if a scientific one is not available).

Ask students what they think should be included in a report on the experiment they have just done. Elements should include (though may be called something different), title, prediction, equipment, method, results (including figures if they are needed), conclusions (See English 7).

Students could each then produce a report, or each group of four can collaborate on a report, doing a couple of sections each. The reports could then be collated to form a class science journal, with the other elements of a magazine included (for example, cover, contents page, etc.). This could be done over a period of time to include reports from other experiments the class conducts over the course of the term or year.

Sources of evidence of student learning could include:

- contributions to discussions
- production of report observing scientific genre
- conclusions reached in report

Maths

Learning outcomes

Number concepts

N3.1 Students compare, order and represent whole numbers to 9999 and common and decimal fractions, calculate cash transactions and describe other methods of payment.

Time

M3.2 Students read, record and calculate with 12-hour time, and interpret calendars and simple timetables related to daily activities.

Data

CD3.2 Students design and trial a variety of data collection methods and use existing sources of data to investigate questions of their own and others, organise data and create suitable displays, identifying and interpreting elements of the displays.

Location direction and movement

S3.2 Students interpret and create maps and plans using a range of conventions, describe locations and give directions using major compass points, angles and grids.

Analysis of learning outcomes

Number 3.1 Students know:

- patterns of whole numbers to 9999
- patterns of common and decimal fractions
- similarities and differences in patterns of whole numbers and in patterns of common and decimal fractions
- place value of each digit within a whole number and decimal fraction
- whole numbers and common and decimal fractions have positions relative to other numbers
- how to compare and order whole numbers, common and decimal fractions
- ways of representing whole numbers, common and decimal fractions
- the same whole numbers or common and decimal fractions can be represented using different combinations of smaller numbers
- parts of a whole can be represented as common or decimal fractions.

Space 3.2 Students know:

- conventions for maps, plans and grids
- how to use conventions to create maps and plans
- how to use conventions to interpret maps and plans
- the four major compass points
- the relationship between the amount of turn and the change in direction
- how to describe locations using major compass points, angles and grids
- how to give directions using major compass points, angles and grids.

Chance and Data 3.2 Students know:

- data collection is planned to investigate questions of their own and of others
- design data collection methods to investigate questions of their own and of others
- plan for and conduct trials of data collection methods

- know ways to organise data
- know ways to display data
- create suitable data displays• identify elements of data displays
- interpret data displays using elements of displays.

Measurement 3.2 Students know:

- conventions for, and purpose of, calendars
- how to read a calendar to locate events
- how to sequence events by time
- units of time
- ways of measuring and comparing durations
- 12-hour displays represent the points in time and the passing of time
- structure of a 12-hour display
- how to read and interpret key times on analogue displays
- relationships between different units of time.

Core content covered in this unit

N3.1 Students compare, order and represent whole numbers to 9999 and common and decimal fractions, calculate cash transactions and describe other methods of payment.

Numeration	*Number sense*
○ greater than ❯, equal to =, less than ❮	○ position and order of numbers

M3.2 Students read, record and calculate with 12 hour time, and interpret calendars and simple timetables related to daily activities.

Units and conventions	*Relationships*
○ 12 hour displays (analogue and digital) ○ timetables (e.g. school) ○ calendars – abbreviations for days ○ conventions – dates – a.m./p.m.	○ digital and analogue time ○ parts of minutes and hours (quarter, half) ○ duration

CD 3.2 Students design and trial a variety of data collection methods and use existing sources of data to investigate questions of their own and others, organise data and create suitable displays identifying and interpreting elements of the displays.

Collecting and handling data	*Exploring and presenting data*	*Identifying and interpreting variation*
○ collection methods – experiments ○ classify, record and check data ○ existing data sources – publications	○ displays – tables – picture graphs (one-to-many representations) – bar graphs ○ main elements of displays – titles – axes – scales	○ comparative and quantitative language ○ variety of displays to illustrate data features and variation

S 3.2 Students interpret and create maps and plans using a range of conventions, describe locations and give directions using major compass points, angles and grids.

Location and movement	*Direction and angle*
○ combinations of alphanumeric grids and maps ○ plans ○ conventions – keys and legends – grid references – orientation to north	○ the four compass points ○ connection between compass points and the amount of turn (degree)

Thinking, reasoning and working mathematically

Students:

- ○ 'see' the mathematics in the situations encountered
- ○ plan, investigate, conjecture, justify, think critically, generalise, communicate and reflect on mathematical understandings and procedures
- ○ select and use relevant mathematical knowledge, procedures, strategies and technologies to analyse and interpret information.

Purpose

Activities in this module provide opportunities for students to demonstrate an understanding of:

- purposes and methods of estimation
- the passage of time, and analogue and digital representations of times
- comparison and representation of numbers numerically, graphically and pictographically
- the collection, organisation and uses of data
- the creation and utilisation of maps and plans.

Overview of activities

Introductory →	Developmental →	Culminating
• Invasion of the fire ants! *(integrated with rest of unit)*	• Making plans according to timetables • Making and reading maps • Degrees of turn • Degrees of turn — compass points • Compass points — application to a plan • Estimation and comparison • Handling data – tables – graphs – many-to-one correspondence	• Lessons from the Science module are integral to this module. The interpretation of data carried out in the Science module forms the culminating part of these maths activities.

Resources to support learning

- resources for Science experiment in order to generate data; where experiment is not succes sful, prepared data (included in Science module)
- pictures of ants on OHTs for estimation/counting (pictures supplied); plus clear sheet for grid work
- polaroid camera and film if using for recording ant numbers
- Resource Sheets (included)
- a plan or map of your school grounds
- teaching clocks, preferably one per student
- a compass
- school timetable

Making plans according to timetables

Students consider class and school timetables when planning the science experiments and try to judge the passage of time. Optional refresher on analogue/digital time.

When deciding with students on placement of plates for experiment, ask them to consider the school timetable — when is the best time to have the plates outside so they are not disturbed by other students, e.g. will other classes be outside for PE? How can we check what other classes are doing? (consult school timetable, if there is one, or timetables of other classes).

As a class, discuss how long the plates should be out for — will ten minutes be long enough for ants to get there? Half an hour? If they think 'the longer the better', consider that if the plates are out there too long, the ants might carry all the baits away and not be there to be counted. Plan with the class what they will do and place the activity in the class timetable for the week, if you have one, or make a note of it on the board and in books (e.g. Ant experiment: Wed, 10th Feb, 9:30 a.m. — 10.30 a.m.).

When the plates are out there, try taking down any clocks etc and give each student one chance to say when they think the agreed time is up.

** Option: as a warm up exercise for this, you could use the minutes and hours cards Maths 1, cut up, for students to select one from each set (hours, minutes, a.m./p.m.), arrange as a digital time and then show the time on an analogue clock.*

Anticipated evidence of learning – Students:

- can use the timetables to inform planning of experiment
- refer to calendar to set time aside for experiment
- are aware that a shorter or longer passage of time will make a difference to the experiment
- use and recognise conventional abbreviations for days and months in this application
- can estimate duration of the passing of the experiment time
- can identify analogue times from given digital times

Making and reading maps

Students use and extend plans of the school ground and navigate using grid references.

If possible, provide students with a handout showing major features of the school ground. As a class (modelling on OHP if preferred), enter conventional information such as title, orientation to north, etc.

Using rulers, add letters and numbers to page borders to allow grid referencing (if necessary, draw lines across plan with pencil).

Discuss keys and legends and decide on a class convention for the plan (e.g. playground equipment, fences, water fountains, toilets). Add some of these to plans as a class in agreed grid referenced locations.

Students then complete plan with further additions of their own choice.

Students add plates in their chosen location (please refer to the Science module).

As a class, make a record, using grid references, of where all the plates are going (if desired, you could make a battleships-style guessing game of this with students suggesting grid references and other students checking their plans to see if their plate is in that area).

Quiz the class on location of various things on the plan, with students illustrating their answers by using the four points of the compass; for example: Where is our classroom? North of the playground.

The Grid Reference Quiz worksheet (Maths 2) could be used to round out this lesson or be completed in class before the next lesson to consolidate the above lesson (or be used for homework).

** Option: Using someone's plate as a starting point, note grid reference and ask class to go directly north and name the next grid reference. Note: continue with several more grid points in the same direction. What do the students notice about the coordinates? (e.g. if starting with B, 4, should all be Bs?). Repeat moving west (for example, should all be 4s?). Discuss and predict for other directions and other starting points.*

Students could work in pairs to plot directions from one part of the school plan to another, then take turns to follow each other's directions, either on the plan or on the ground. It may be easier to do this on a fresh blank grid.

Degrees of turn

Students follow and give directions using degrees of turn and clockwise/anticlockwise.

Confirm class know clockwise and anticlockwise. Ask a student to stand up and then turn to face the back of the room. Was it a clockwise or an anticlockwise turn? Can anyone say how far the student turned? (halfway). Repeat with different students:

— turning to different sides of the room

— turning different degrees of turn from quarter way to all the way round.

How else can we describe how far they turned? How can we measure it? What unit is used? How is this written? Who knows how many degrees you've turned if you've turned full circle? So, how many for half? Quarter? Write major compass angles up and ensure class can read the notation, for example 90°, 180°. Where else are degrees used in measurement? Ensure students are clear on the different applications of degrees in temperature and angles.

Now model the turns again using an analogue clock, if possible with each student following with their own clocks (use photocopied clock faces and hands if necessary). Set the time, for example, at 3:00, say you are going to move the hour hand 90° clockwise and ask class to work out what time it will then be, then test it with their own clocks. Work through several of these exercises, ensuring you cover 0°, 90°, 180°, 270° and 360°, and work clockwise and anticlockwise, using minute and hour hands. Ask class how to get from 7 p.m. to 7.30 p.m. (for example, turn minute hand 180° clockwise). Again, work through several.

Now ask students to stand and move through turns on the spot described using degrees and direction. Ask individual students to make a turn and describe what they're doing.

Finish with worksheet on clock angles (Maths 3) or use as refresher before next lesson (or assign as homework).

** Option: extend this concept with a lesson on fractions of angles.*

Anticipated evidence of learning — Students:

- can give and follow directions using anticlockwise and clockwise
- understand the relationship between degrees and amount of turn (parts of a circle)
- understand the different applications of 'degrees' as units of measurement
- can give and follow directions using degrees of turn

Compass points — degrees of turn

Students apply degrees of turn to the points of the compass.

Rehearse previous lesson's exercise of moving to face different parts of the classroom. If possible, determine where North is in the classroom, ask standing students to face north. If they turn 180° clockwise, which direction are they now facing? Draw a compass on the board, showing the four main points. Can they think of an acrostic phrase to help them remember the order they go in? (for example, Nice Emus Swim Wetly). Again go through an exercise asking students to turn to the points of the compass — you could pretend you are outback explorers, turning west to see the ranges, east to see the sea, north for an oasis/mirage/mob of brumbies, etc (ask students to make suggestions).

Finish with worksheet on compass turns (Maths 4) or use that sheet as refresher before next lesson (or assign as homework).

Anticipated evidence — Students:

- know the major points of the compass
- understand the connection between compass points and degrees of turn
- can give and follow on the spot directions using compass points

Compass points — application to a plan

Students use points of the compass to follow and give directions on a plan of the school grounds.

Referring to the class plan of the schoolyard used in the science experiment, talk class through giving directions from a starting point to a playground feature (for example, school gate to water fountains — north three squares, west two squares, etc).

Independent work: students write out directions from a starting point to their group's plate (could do with group members).

** Option: students create a map of an island and write directions to find buried treasure (this could be a homework option).*

Anticipated evidence of learning — Students:

- can describe and follow a pathway using compass points

Estimation and comparison

Students practise techniques for estimating, then apply to counting ants. Students also validate estimations and rehearse comparison notation.

Give a whole class example of estimating with a jar of some classroom paraphernalia (beads, bricks, crayons ...). All children write down a guess of how many in jar. Now to count them —are there too many to count? You could apportion them ten to a child and then multiply by ten. You could weigh ten, then weigh the total and work it out from there.

Now to estimate ants — use a big example (Maths 5, photocopy onto A3 or OHT). Everyone writes down an estimation. Now to validate — can you count them without losing track? Try dividing the page up into sections in a grid pattern, count how many in each section and then add the sections together. You could then check this count by writing the digits on the ants as you count them.

Independent work — with worksheets (Maths 6), students carry out estimation and validation exercises based on the whole class example.

Remind students of the use and meaning of ‹ and › signs. You may choose to use the comparison section at the bottom of the worksheet as extension work for early finishers. Alternatively, bring the whole class together to do these equations on the board as a finalisation of this lesson.

Anticipated evidence of learning — Students:

- are willing to take the risk of making an estimation
- follow the validation methods
- record results meaningfully
- use the ❮ ❯ symbols correctly when comparing numbers

Handling data

Students analyse data from the science experiment, presenting it in a number of forms, considering the relative merits of each.

Tables

Using worksheet (Maths 7), individual children record their group's results in a table and consider the data to determine which bait was the most attractive to ants.

As a whole class, collate each group's data on the board; students enter this data on their worksheets and answer the questions below. Discuss as a class to draw conclusions regarding the comparative attractiveness of the different baits as per Science module.

Graphs

Conduct a whole class discussion on the relative merits of using tables and graphs for displaying and analysing results.

Independent work – using the results from their group's study, each student completes a graph, as per worksheet (Maths 8). If necessary, model this on OHP (copy worksheet onto OHT).

** Option: using photocopiable sheet of ants (Maths 9), students cut out ants and use to make pictograph*

Many-to-one correspondence

Referring to the whole class collation of data for the experiment, lead a class discussion on constructing a graph to display this data. Children should conclude that they would need several pieces of paper to be able to colour in enough squares to display the data with one-to-one correspondence (one square per ant).

Using OHT from whole class modelling, if used, or starting with new graph, enter data for a single group. Tell students you are changing the scale on the y-axis — rub off the numbers and replace with a two-for-one scale. Demonstrate how this changes the number of ants represented for each bait. Is this going to allow students to enter whole class data onto the same size grid? No? Then what else can they suggest? Decide on five-to-one, demonstrate.

Independent work — using collated data from whole class, students construct a graph using many-to-one correspondence.

** Options: students may choose to create a horizontal or vertical graph. You may also like to give them the option of creating a pictograph.*

Anticipated evidence of learning — Students:

- as part of the Science module experiment, develop the investigation, negotiate categories for classification of data, negotiate data collection methods, conduct data collection, evaluate data and method/conditions of collection
- check accuracy of data
- if necessary, use existing data sources to create a display
- identify range of results, comparing across categories
- consider suitability of different forms of data display, evaluating effectiveness in terms of illustrating data
- select and apply titles, name axes
- describe displays using comparative and quantitative language
- select appropriate scales, using many-to-one correspondence when appropriate
- design and create a display

SOSE

Strands, core learning outcomes and core content

Time, Continuity and Change

Key concept: Changes and continuities **Key process:** Creating

TCC3.2 Students create sequences and timelines about specific Australian changes and continuities:

- introduced species including pests associated with modern shipping trade
- identify aspects of an event in a text and transpose to a simple timeline

Key concept: Causes and effects **Key process:** Communicating

TCC3.4 Students organise information about the causes and effects of specific historical events:

- specific historical events such as introduction of animal species
- causes and effects such as
  - in/direct
  - human, environmental
  - positive, negative
  - economic, ecological
  - political, social, cultural
- gather information from a range of sources and organise in a given table, flow chart or notes
- design a flow chart showing stages of an event from cause/s to effects
- skim text for main ideas and arrange into cause and effect columns in a table
- design questions for an investigation into why an event happened

Place and Space

Key concept: Processes and environments **Key process:** Creating

PS3.2 Students create and undertake plans that aim to influence decisions about an element of a place:

- elements
  - living, non-living, catchments
- places
  - ecosystems, school community
- decisions about places
  - local council
  - student, parent, teacher
  - personal, business
- engage in a creative and strategic process
  - identify an issue about an element of a place
  - gather information about the issue and decisions made to date
  - brainstorm options and classify as possible and/or preferred
  - develop a plan with a target audience in mind
  - consider possible consequences of plan
  - implement plans
  - evaluate effectiveness of the plan in terms of outcomes achieved

Key concept: Stewardship **Key process:** Participating

PS3.3 Students cooperatively collect and analyse data obtained through field study instruments and surveys to influence the care of a local place:

- local places
- care of a place
  - who cares for a place
  - how places are cared for
- field study instruments and surveys
- cooperatively collect and analyse field study data
- influence the care of a place
  - synthesise data to focus on cause of problem
  - act to influence by identifying audience and appropriate strategy

Key concept: Spatial patterns **Key process:** Communicating

PS3.4 Students use and make maps to identify coastal and land features, countries and continents, and climate zones:

- maps
  - atlas and wall maps with simple legends, abbreviations and scale
  - models
  - coastal and land features
  - continents and countries
  - climate zones
  - climatic terminology
- use and make maps to identify features
  - verbally describe places on a map by interpreting standard symbols, references, abbreviations and terminology
  - use standard symbols etc to locate land and coastal features, countries, continents and climatic zones on a range of maps
  - create simple maps of local to global places using invented and standard symbols, etc

Key concept: Significance of place **Key process:** Participating

PS3.5 Students describe the values underlying personal and other people's actions regarding familiar places

- familiar places
  - school grounds, local area, catchment, reserves, parks
  - defined by culture, spirituality, nature, leisure
  - places that evoke personal feelings or have meaningful connections
- values
  - ecological, monetary, economic, heritage, spiritual, religious, cultural, recreational/fun
- actions
  - using, protecting, conserving, exploiting, abusing, neglecting

Purpose

Activities in this module provide students with opportunities to investigate the effects of fire ants as an invasive species and students' own capacity for addressing the threat of fire ants in their local area.

Students will have the opportunity to investigate the introduction of fire ants to Australia, examining cause and effect, the timeframe of events and the geographical movement of the ants.

In concert with the activities undertaken through the other modules of this unit, students will organise and present their learnings about fire ants and share their completed materials with an outside audience.

Introductory →	Developmental →	Culminating
• Invasion of the fire ants! *(integrated with rest of unit)*	• What happened, when and why? • How did that happen? • Just where are they now?	• We care, so what can we do?

Resources to support learning:

- fire ant literature
- Resource Sheets included
- contact details in community

What happened, when and why?

Identify key events and show them on a timeline, first for several introduced species as a group; then specifically regarding the introduction of fire ants, which may be done individually.

If necessary, re-establish that fire ants are not native to Australia. What does native mean? What's the alternative? What other introduced species are there in Australia? How long do we think they may have been here? (For example: Animals: rabbits – 1850s, foxes – 1845, deer – 1803, cats – 1770s or even earlier, mosquito fish – 1920s, mice – 1770s or even earlier, and cane toads – 1935. Plants: lantana – 1850s, and the prickly pear – 1800s).

(You could lead a discussion covering: Are introduced species always a bad thing? What makes an animal a 'pest'? What is a pest plant called? [a weed]).

Make a timeline on the board, covering the years 1700 to 2000 in 50-year blocks. Following the class's instructions, enter the introduction of several species on the timeline. Give the timeline a title. Where would we put fire ants on that timeline?

Consider as a class: this timeline is quite large scale — it shows hundreds of years and just the main event of when a species was introduced. What else might we want to know about an introduced species? What other events might have occurred? (examples might include when prickly pear was controlled by the moth; when toads crossed the state boundary; when myxomatosis was introduced; when it was realised lantana was a problem ... or whatever else the class thinks of).

Fire ants have been introduced to Australia very recently, so we have access to a lot of documented information on the sequence of events and can use a smaller scale when looking at it.

Give class the 'History of fire ants in Australia' (SOSE 1), either as individual/pair/group handouts or on the overhead. Ask class to highlight events that happened at particular times. There should be 12 clearly outlined separate events/dates. As a class, discuss these events — what scale would be appropriate for making a timeline regarding fire ants in Australia? Would it make sense to put them on our timeline that spans three hundred years? What would make more sense?

Depending on the ability level of your class, you could hand out the 'events' cards (SOSE 2) and ask them to put them in order (individually/in pairs/in groups/as a class). You could then ask them to identify the relevant dates, or, give them the 'date' cards and ask them to match them to the events.

Again, depending on your class, working as suits them, decide on a scale for a timeline to plot these events on (just 2001 in months? 2000-2006 in years and/or months?) and then construct a timeline showing the events relevant to fire ants 'invading' Australia.

Anticipated evidence of learning. Students:

- can identify key events
- show events on a timeline

How did that happen?

Analysing the introduction of fire ants in terms of cause and effect, first ensuring class is comfortable with this concept, and organising the causes of fire ant introduction as a flowchart.

Introduce the concept of cause and effect using an overhead with the picture of the broken window (SOSE 3)(there is a sound effect 'clip' available online from Microsoft you could use with this too. If preferred, you could use something physical in the classroom rather than a picture to lead into this discussion). Looking at the broken window, ask the class to come up with ideas regarding what happened. Students should be able to suggest a scenario that includes answers to some of the questions of 'who, what, when, where, why, how'. Once they've suggested a few scenarios, look at their stories more closely for specific answers to those questions, and where they haven't already come up with something, give them the opportunity to do so.

Conclude this discussion by making it clear that the final effect is the broken window; the cause is, for example, a ball:

the ball hit the window ➡ the window broke.

There could be other, deeper, cause and effect occurrences, such as a girl throwing a ball. Write the various possible causes on cards and then put these in order shuffling until correct as necessary.Write the causes on the board, in order to show the flow of cause and effect. For example: Jon didn't do his homework ➡ Jon wasn't allowed out to play cricket ➡ Jon didn't go to the park ➡ Sara missed Jon at the park ➡ Sara went to Jon's house ➡ Sara tried to attract Jon's attention through the window but he couldn't hear her ➡ Sara threw the ball at the window to get Jon's attention ➡ the ball hit the window ➡ the window broke.

The effect that we want to investigate — using all of these questions — is the introduction of fire ants to Australia. Working as suits your class (for example, in groups suggesting answers to all the questions; one question per group; one question per individual), come up with suggested answers to the 'W' questions. The students might like to consider this with access to fire ant informative literature or website, or the Brief History from the previous lesson (SOSE 1). Responses might include (but should not be limited to):

- what?
    - fire ants!
- where?
    - where did they come from? The USA, originally from South America
    - where are they now? Only in the south east Queensland/greater Brisbane area

- who?
    - who brought them into Australia? We don't know
    - who let them into Australia? We can't say for sure
    - who found them here? A resident in Richlands; gardeners in Port of Brisbane
- how?
    - how did they get in? Most likely on shipping containers
- why?
    - why did they come here? Most likely just coincidence
    - why did they establish here? Conditions are right for them (weather, etc)
- when?
    - were they introduced? Not sure, we think between 1995 and 1998
    - when were they detected? February 2001
    - when will we get rid of them? We hope by June 2007!

Having considered those questions surrounding the event, what does the class think caused the introduction of fire ants to Australia? This could have a range of responses and has no single correct answer. Encourage them to look further than 'an ant stowing away on a container'. Organise these ideas into a flowchart as above. Your chain of events might look something like this:

Fire ants invade the US ➡ a shipping container is placed on fire ant infested ground for a long period ➡ fire ants build nests up against the container ➡ the container is lifted onto a ship with clods of dirt still attached to it ➡ the container isn't 100% cleaned and fumigated when it gets to Australia ➡ the infested container is taken to Richlands ➡ fire ants infest the local area ➡ a nursery in the area sends infested pot plants to a garden in another suburb ...

You might like to follow this up with students considering how we can stop a similar incursion from happening in the future.

Conclude this lesson with students working in pairs or individually to organise this information in a table (or set this as homework).

Anticipated evidence of learning. Students:

- suggest obvious causes of a given effect
- think of questions to probe information for less obvious causes
- gather information and organise as a flowchart
- organise cause and effects as columns in a table

Just where are they now?

** Pinpointing the current extent of fire ant infestation in Australia on a greater Brisbane area map; then looking at the global spread of fire ants and movement via shipping, producing a map showing relevant features.*

Refer to the Brief History again, if necessary, or research using the web/fire ant literature/etc, to identify geographical areas of prominence (Richlands, Port of Brisbane/Fisherman's Island, Wacol, Oxley). Depending on your class, you may want to:

- photocopy a map of the Brisbane area and ask students to highlight relevant areas
- trace map then complete as above (may include shire boundaries, etc).

Looking at a map of Australia, ask students to identify the area that has fire ants. Compare the size of this area with the rest of Australia. Elicit some opinion from students on this (responses might include that it's a tiny area by comparison or maybe we don't need to worry about it. But ask the students to think about other invasive species previously discussed. They all started off in a tiny area but then took over whole states). We are concerned about fire ants because they're in our area — would we be bothered if they were somewhere far away (such as Cairns, Mt Isa, Perth)? People in those areas are concerned about our fire ants — all the states in the country have put money into the fire ant eradication programme; it's a national concern because they could spread to the rest of the country, as they are doing in the U.S.

Show the class a world map (large scale/on overhead) and identify major international fire ant 'hot spots' (refer to the Brief History document again if necessary to name Brisbane, Texas, Brazil, Paraguay, Taiwan, Hong Kong and China). Looking at the map, as a class, trace a possible shipping route from Brazil to Texas. Now, in groups or individually — with globes if possible or atlases — trace possible shipping routes from Texas to Australia. Note the existence of the Panama Canal. If you don't have globes, remind class that the earth is round and shipping could go either way (consider photocopying a world map or asking students to trace from an atlas so they can then roll the paper to more clearly visualise how ships could travel either way around the world).

Anticipated evidence of learning. Students:

- can identify geographical areas mentioned in a text
- can locate places on a local area map
- can create a local area map employing standard symbols and conventions
- can use a globe or global map to identify countries, coasts and suggest shipping routes
- can interpret a globe or global map using standard symbols and conventions

Suggested thematic extension

Potential Technology Integration, *Technology Practice,* ***TPI3.1****: Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges;* ***TPI3.2****: Students collaboratively generate design ideas and communicate these using presentations, models and technical terms;* ***TPI3.3****: Students cooperatively develop and follow production procedures to make products that reflect their design ideas; and* ***TPI3.4****: Students test and judge how effectively processes and products of their own and of others meet the design challenge.*

Students design and construct a 3D model of the world (either map or globe) showing shipping routes from Texas to Brisbane, drawing on knowledge gained in fire ant unit and conduct further research as they deem necessary, choosing the materials and methods of construction as appropriate.

We care, so what can WE do?

Students will identify places that they care about and devise a plan to protect them from fire ants

By now, there should be class consensus that fire ants are not a good thing! Would students want them in their own backyard? Why not? If you need to stimulate some discussion on this, you might like to share the following anecdote: one family in south west Brisbane had such a bad problem with fire ants in the yard that they could no longer keep their pet dog and had to give it away to family friends.

Another family couldn't use their trampoline any more as they couldn't go into the yard without getting stung (they actually dragged it to the side of the house and jumped off the steps onto it, but you might not want to tell the class that part because it sounds quite fun, but could be dangerous!)

This discussion should elicit the concept that our yards are places that we value — you might want to focus on this term and consider some of the different meanings of it, and different ways we value things. When we talk about valuing a place like our own yard, we are considering its recreational value and what it means to us as our own space. Children may be familiar with the term of value in the context of a purchase being 'good value', or an item being valuable or even invaluable. Often these terms could have monetary significance, but what are reasons to value something? (for example, families value their pets and you mightn't want to sell your dog even if someone offered you a lot of money; you value your friends; your parents value you above anything material; we value our health, good looks, clean air, being Australian the responses here will very much depend on your class). The things we value reflect our values. Consider the syllabus comments on 'value' to enrich this discussion as is appropriate to your class.

So, we value our yards. What other places do we value and why? Again, consider the syllabus definition of 'place' to fully explore this concept with the class. List the places on the board or individually. Next to each place, list some reasons why we value those places (or use worksheet SOSE 4').

As a class, consider how these places would change if they became infested with fire ants. How could we, as individuals or as a class, ensure that these places don't become fire ant infested? Responses will depend on your class, but they might question why they should do something (personal responsibility, social responsibility); how they, as children, could effectively do something (power in unity, having a go when not confident of victory against just standing by).

Again, depending on the level of response of your class, they should now be able to work out some kind of plan that should incorporate the following factors:

1. What they want to achieve
2. Some steps toward achieving it
3. Who they may need to work with
4. Who they will want to tell about their plan (audience)
5. What form their message could take (medium)
6. When they think they could achieve each step and the whole plan (timeframe)
7. How they will know if they have achieved what they wanted to (evaluation).

Your class may choose to contact local politicians and campaign to ensure local public places are kept fire ant free. The class may decide that the way to keep their favourite places fire ant free is to inform people about fire ants, so as to prevent their spread and detect them if they are there (this works in with the English module of this integrated unit). The points above might then become:

1. Ensure people know not to spread fire ants and to be vigilant in looking for them
2. a. Ensure we have our facts together
   b. Decide on our key message
   c. Produce our message
   d. Deliver our message
3. Teachers, librarians, information officers from DPI&F, park/school/sportsground staff
4. Parents and school community, possibly including local politicians
5. Brochures, power point presentation, speech
6. A daily schedule over two weeks
7. Survey the audience for understanding of key points in message.

This is an example only. If your class comes up with a different end goal, their plan will look very different.

Anticipated evidence of learning. Students:

- understand and use the terms 'value', 'place' and 'action'
- identify places of value to them and what people's values may be
- work together to devise a plan to protect a place of value
- participate in putting a plan into action
- as part of a plan, research the needs of the area, identify who is responsible and can help, and also how and to whom they can communicate their message of action

Suggested thematic extension

Potential Health and Physical Education integration, *Promoting the Health of Individuals and Communities,* ***PH3.5****: Students describe features of places where they live, work and play that influence the health of themselves and others, and propose ways they can help the people who are responsible for keeping these places healthy.*

Enhancing Personal Development, ***PD3.4****: Students demonstrate communication, cooperation and decision-making skills to collaborate in social, team or group situations.*

The lesson investigating the elements of places we value could be extended to address ***PH3.5***.

Students working together to create and implement an action plan to protect their areas from fire ants could demonstrate knowledge and processes showing achievement of ***PD3.4***.