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Teachers' Notes

The Gravity Discovery Centre (GDC) at Gingin, situated in pristine bushland, provides students with unique opportunities to visit and study within one of the world's top 10 biodiversity 'hot spots' (http://www.biodiversityhotspots.org).

The activities in this package are divided into Pre-visit School Based Activities, On Site Activities to be carried out while at the Gravity Discovery Centre, and Post-visit follow up activities to be done on return to school.

This package, "Nasty Creepy Crawlies" encourages students to explore the Life and Living and Investigating Scientifically substrands of the Science Learning Area by studying an invertebrate common to the area, the Kangaroo Tick. The activities provided are intended to be flexible and adapted by teachers according to the level, interest and prior knowledge of their students. The exercises have been divided into suggested school-based activities, which can be carried out before and after the visit to the GDC (the suggested order may be reversed depending on the students), and on site activities. As presented, the activities have been designed to build on one another with progressively higher level outcomes being addressed and so may be carried out sequentially or alternatively, individual activities that best suit your students may be selected.

The tasks address outcomes at levels 3-6 in both the Life and Living and the Investigating Scientifically substrands. An indication of the levels covered in each activity has been provided in the accompanying teacher's notes.

A word of warning! Students should be made aware of the dangers associated with collecting and examining invertebrates. Besides "redbacks", a number of other animals that may be harmful are likely to be present in the bush. Students are advised not to venture too far from the designated tracks and to take the usual precautions when walking in the bush.

SUGGESTED PREVISIT ACTIVITIES

Pre-visit Activity 1 – Fact Finding Mission

This activity has been designed as a low level (level 2-3) task for students to familiarise themselves with characteristics of the Kangaroo Tick. The information acquired in this activity can be further utilised in subsequent tasks.

Outcomes

This activity allows the student to potentially:

- make connections among living things and/or the environment: *Life and Living: Level 3*
- describe patterns of similarities and differences within and between groups of familiar living things: *Life and Living: Level 3*

Cross curricular and science sub-strand links

- English: Reading– Students read a wide range of texts with purpose, understanding and critical awareness.
- Society and Environment – Investigation, Communication and Participation: Level 2: Students, when given a focus question , can identify aspects to be considered and use simple data gathering techniques to collect information.

Prior learning

No prior knowledge is necessary for this exercise although some background on parasitic biotic relationships and biological classification may be a helpful starting point for students.

Background Information

Some websites that may be of use to students include:

- http://encarta.msn.com (type 'tick' or 'arachnid' in the search field)
- http://members.ozemail.com.au/~norbertf/anatomy.htm
- http://www.ento.csiro.au/aicn/name_c/a_1421.html
- http://medent.usyd.edu.au/fact/ticks.htm

Pre-visit Activity 2 – A day in the Life of a Kangaroo Tick

This activity can be an alternative to Activity 1 or may be used as a means of applying the information gained in activity 1.

Outcomes

This activity allows the student to potentially:

- make connections among living things and/or the environment: *Life and Living: Level 3*
- describe patterns of similarities and differences within and between groups of familiar living things: *Life and Living: Level 3*
- describe processes that connect living things in an ecosystem: *Life and Living: Level 4*
- explain interactions between living things and the external environment over time: *Life and Living: Level 5*

Cross curricular and science sub-strand links

- English – Reading: Level 2: – Students use basic strategies to locate, select and read a range of simple texts.
- English– Writing: Level 2– Students produce brief written texts to communicate experiences, information and feelings.

Prior learning

No specific prior learning necessary

Background Information

Information gained in pre visit activity 1 may be useful in completing this task.

Process

Students may choose to present this work in a number of ways including story/essay form, role play, poster, webpage or Powerpoint presentation.

Pre-visit Activity 3 – Design a Fact Sheet

Like the previous activity this can be employed to allow the students to make use of the information gathered in Activity 1. Alternatively this activity may be used as a post-visit task following the students' visit to the GDC. If carried out before, the students may wish to reassess their efforts in the light of experience gained during the visit.

Outcomes

This activity allows the student to potentially:

- make connections among living things and/or the environment: *Life and Living: Level 3*
- describe patterns of similarities and differences within and between groups of familiar living things: *Life and Living: Level 3*
- describe processes that connect living things in an ecosystem: *Life and Living: Level 4*
- explain interactions between living things and the external environment that change over time: *Life and Living: Level 5*

Cross curricular and science sub-strand links

- Investigating Scientifically: Conducting: Level 3 – Students record data in simple tables, diagrams or observations.
- English – Writing: Level 3: Students combine several ideas in logical sequence to write a small range of text types; recognise the needs of particular audiences and purposes in writing; demonstrates control over many of the conventions of language; experiments with others; and uses strategies for planning reviewing and proofreading.

Prior learning

Some understanding of what constitutes a species would be helpful for this activity however this is covered at the beginning of the lesson.

Background Information

Information gathered from pre-visit activity 1 or similar would be a useful starting point for this task.

Process

Following time for group discussion, a general brainstorming session may be a useful tactic.
Brainstorm Questions? *What are the important things students visiting the GDC need to know about Kangaroo Ticks? What headings might your fact sheet have?*

If you wish to level the students' work in this task it might be appropriate to explain to students that they should be attempting to explain the points in their fact sheet rather than just presenting them. eg. ***Why*** do the ticks belong to the phylum, genus, order and family they do? ***How*** do they know when a host is approaching? ***Why*** do you have to be careful to remove the mouth parts of a tick that has attached itself to you? etc.

An example of a Fact Sheet from the W.A. Museum has been included in this package and may be used as a comparison and source of discussion once the students have completed their fact sheets. A self-evaluation exercise could be included allowing students to self assess and level their work
Discussion Questions? *Which fact sheet do you think is better considering the audience it is designed for? How could you have improved your fact sheet? Is there any important information missing*

Pre-visit Activity 4 – Design an Experiment

Students may wish to plan an experiment to be carried out on site during their visit to the GDC. From the information they have already discovered about Kangaroo Ticks (eg. Pre visit Activities 1-3) they may like to come up with their own investigation.

Outcomes

This activity allows the student to demonstrate planning outcomes from the Investigating Scientifically strand of the Curriculum Framework. Generally this means *students plan investigations to test ideas about the natural and technological world.* All levels can potentially be demonstrated using this activity.

Prior learning

Some prior experience in planning investigations is desirable

Background Information

Pre-visit activity 1 would provide useful background information for this task.

Process

Lead the students in a discussion of possible investigations. Among the topics they may wish to examine are:

- What are the favoured habitats of the Kangaroo Tick?
- What is the estimated population of Kangaroo Ticks at the DGC site?
- What is the ratio of males:females in the Kangaroo Tick population?
- What are the special features of the Kangaroo Tick that allow it to adapt to its lifestyle?
- What is the effectiveness of different insect repellents?
- What is the effectiveness of different methods of collecting the ticks?

Having decided on their topic/topics for investigation the students should consider the questions posed on the student worksheet. After students have had time to work through the questions, teachers may like to lead a discussion on the final question, *Are there any other considerations? Possible problems?* This is the opportunity to ensure students are aware of:

- the relevant dependent and independent variables in their investigation
- aspects of fairness in the testing
- the validity of data collected – will they be representative of the what is being studied?
- reliability of the data – are they consistent and reproducible?

ON SITE ACTIVITIES

Science Investigation - Data Collection and Analysis

This activity provides students with the opportunity to follow through with the investigation planned in pre-visit activity 4

Outcomes

This activity allows the student to potentially:

- make connections among living things and/or the environment: *Life and Living: Level 3*
- describe patterns of similarities and differences within and between groups of familiar living things: *Life and Living: Level 3*

- describe processes that connect living things in an ecosystem: *Life and Living: Level 4*

Cross curricular and science sub-strand links

- Investigating Scientifically: Conducting: Level 3 – Students use simple equipment in a consistent manner and record data in simple tables, diagrams or observations.
- Investigating Scientifically: Processing Data: Level 3 – Students display numerical data as tables or bar graphs and identify patterns in data and summarise data.
- Mathematics: Measurement – Students use direct and indirect measurement and estimation skills to describe, compare, evaluate and construct.
- Mathematics: Chance and Data – Students use their knowledge of chance and data handling processes in dealing with data and with situations in which uncertainty is involved.

Prior learning

Some awareness of graphing techniques, in particular the use of bar graphs is needed.

Background Information

Process

Methods of collection will be demonstrated to the students at the DGC. Digital cameras and a camera microscope are available to record their findings and examine in detail any specimens collected. Students should be warned about the danger of collecting specimens from the bush. Where possible they should avoid touching the specimens with their bare hands.

Analysis and completion of a report may be conducted on site or later, on return to school. Depending on the level of the students the science investigation proformas supplied (student worksheets for on site activity) may be useful. Alternatively students can be instructed to produce their own report using the standard headings:

- Title
- Abstract
- Hypothesis
- Materials
- Method
- Results
- Discussion
- Conclusion

It may be relevant to discuss with students that some investigations will not have a hypothesis, such as those seeking to find new information eg. population studies. These studies may end with a hypothesis rather than begin with one. This concept of inductive investigation may be new to students who are more familiar with the deductive, hypothesis testing procedure.

Variation can be introduced to the task by allowing presentation of results in different formats such as a:

- Poster
- Fact sheet
- Powerpoint presentation
- Oral presentation

SUGGESTED POST-VISIT ACTIVITIES

As previously mentioned, these suggested activities may be interchanged with the pre-visit activities.

Other activities that may complement these tasks and can either be carried out before or after the on site visit might include:

- Exploring other parasitic relationships eg. Compare and contrast the knowledge gained about this external parasite with an internal parasite, such as the tapeworm.
- Explore other biotic relationships eg. How important is the presence of vegetation? Water etc?
- Examine foodchain relationships eg. What effect might a sudden change in kangaroo population have on the tick population? How might this affect other species in the area?
- What effect do ticks have on humans? What medical implications are there connected with exposure to ticks?

Student Worksheets

LIFE AND LIVING

Nasty Creepy Crawlies

Secondary Module

Years 8-10

PRE VISIT ACTIVITY 1

Fact Finding Mission

You are going to spend some time studying an unusual animal, the **Kangaroo Tick**. To help you build background knowledge of this small creature see if you can find the answers to as many of the following questions as possible

1. What does the Kangaroo Tick look like?

_____

_____

_____

_____

2. The female and male look different. Explain the difference and draw a labelled diagram of each.

Female Kangaroo Tick

Male Kangaroo Tick

Why do you think they are different?

_____

_____

3. The Kangaroo Tick has an alternate popular name that comes about because of its appearance. Describe the appearance and give the name.

_____

_____

_____

_____

_____

4. What is the scientific name for the Kangaroo Tick?

_____

5. What Phylum, Class, Order and Family of Animal does the Kangaroo Tick belong to?

Phylum: _____

Class: _____

Order: _____

Family: _____

6. What other animals belong to this Class?

_____

7. Why do you think the Kangaroo Tick belongs to this Class?

_____

_____

_____

_____

_____

_____

Why do you think the Kangaroo Tick belongs to the Family it does?

9. In what parts of Australia is the Kangaroo Tick found?

_____

_____

_____

_____

_____

10. The Kangaroo Tick is a parasite. Explain what that means

_____

_____

_____

_____

_____

11. In Biology, what is a host?

_____

_____

12. What type of parasite is the Kangaroo tick?

_____

13. What are the most common hosts of the Kangaroo Tick?

_____

14. What other animals can act as hosts for the kangaroo tick?

_____

15. What does the Kangaroo Tick feed on?

_____

16. What special features does the Kangaroo Tick have that helps it feed?

_____

_____

_____

_____

17. Describe, with the aid of a diagram, the life cycle of the Kangaroo Tick including:

- Where mating usually takes place.
- Where the eggs are laid and how many there are.
- A description of the larvae.
- A description of the other stages of the tick.

_____

_____

_____

_____

_____

_____

_____

18. If you wanted to find Kangaroo Ticks in the bush where would be a good place to look?

_____

19. What can happen if a Kangaroo Tick attaches to a human?

_____

20. What precautions should humans take to avoid Kangaroo Ticks attaching to them?

_____

_____

21. How should you remove an attached Kangaroo Tick?

22. What other interesting facts did you discover about the Kangaroo Tick?

Make sure you list the references you used to find your information.

PRE VISIT ACTIVITY 2

A Day in the Life of a Kangaroo Tick

Pretend you have turned into a Kangaroo Tick!
Find out what your day would be like!

1. What would my day be like?

Thinking about the life of a kangaroo tick. Find out what your new life will be like. Here are some questions

- Where will you live?
- What will you eat?
- What does your body look like?
- Are you a pest or are you helpful?
- How do you spend your day?

2. Let's see what you will look like!

Get a picture of yourself from the web. Print out your picture and write a story about your life. Make sure you answer the questions above.

Discuss these points with a partner or in a small group and make some notes before beginning.

PRE VISIT ACTIVITY 3

Design a Fact Sheet

You, as an authority on **The Kangaroo Tick**, have been asked to design a fact sheet for students visiting the Gravity Discovery Centre in Gingin

Points to consider when designing your fact sheet:

- In writing any piece of scientific information you must consider who you are designing it for and make sure you use the correct scientific language.

- Diagrams and illustrations make the presentation more interesting and are useful to convey important information.

- Make sure the presentation is clear and neat and the information you include will be useful. Including appropriate headings can help achieve this.

- Design a rough draft of the way you want your fact sheet to look before beginning. What headings will you use? Where will you place your diagrams and illustrations?

_____

_____

_____

_____

_____

_____

_____

_____

_____

Discuss these points with a partner or in a small group and make some notes before beginning..

PRE VISIT ACTIVITY 4

Design an Experiment

While visiting the Gravity Discovery Centre in Gingin you will have the opportunity to study some aspect of the Kangaroo Tick. You can decide what you want to research from the class suggestions or come up with your own study (make sure you check with your teacher that your idea is possible)

When designing an experiment a number of things need to be considered including:

- What do I want to find out?

_____

_____

_____

_____

_____

- What equipment/materials will I need?

_____

_____

_____

_____

_____

_____

- What is possible to study in the time and with the facilities and equipment available? Do I need to make changes?

_____

_____

_____

_____

_____

_____

- What data/measurements/ samples will I collect?

- How will I collect these things?

- What will I do with the things/data I collect?

- Is my plan safe? Are there any special precautions I need to take into account?

- Are there any other considerations? Possible problems?

ON SITE ACTIVITY 1

Planning and Report Worksheet for Science Investigations levels 2/3

Adapted from:

Student name_____

Other members of your group_____

I am going to investigate:

What I think will happen:

What I am going to do:

What I will need:

How I will make it a fair test:

What happened:

Was this what I expected?

Why it happened:

What was difficult for me:

How I could improve this investigation:

ON SITE ACTIVITY 1

Planning and Report Worksheet for Science Investigations levels 3-5

Adapted from:

Student Name_____ Class_____

Other members of your group_____

What are you going to investigate?

What do you think will happen? Explain why.

Which variables are you going to:

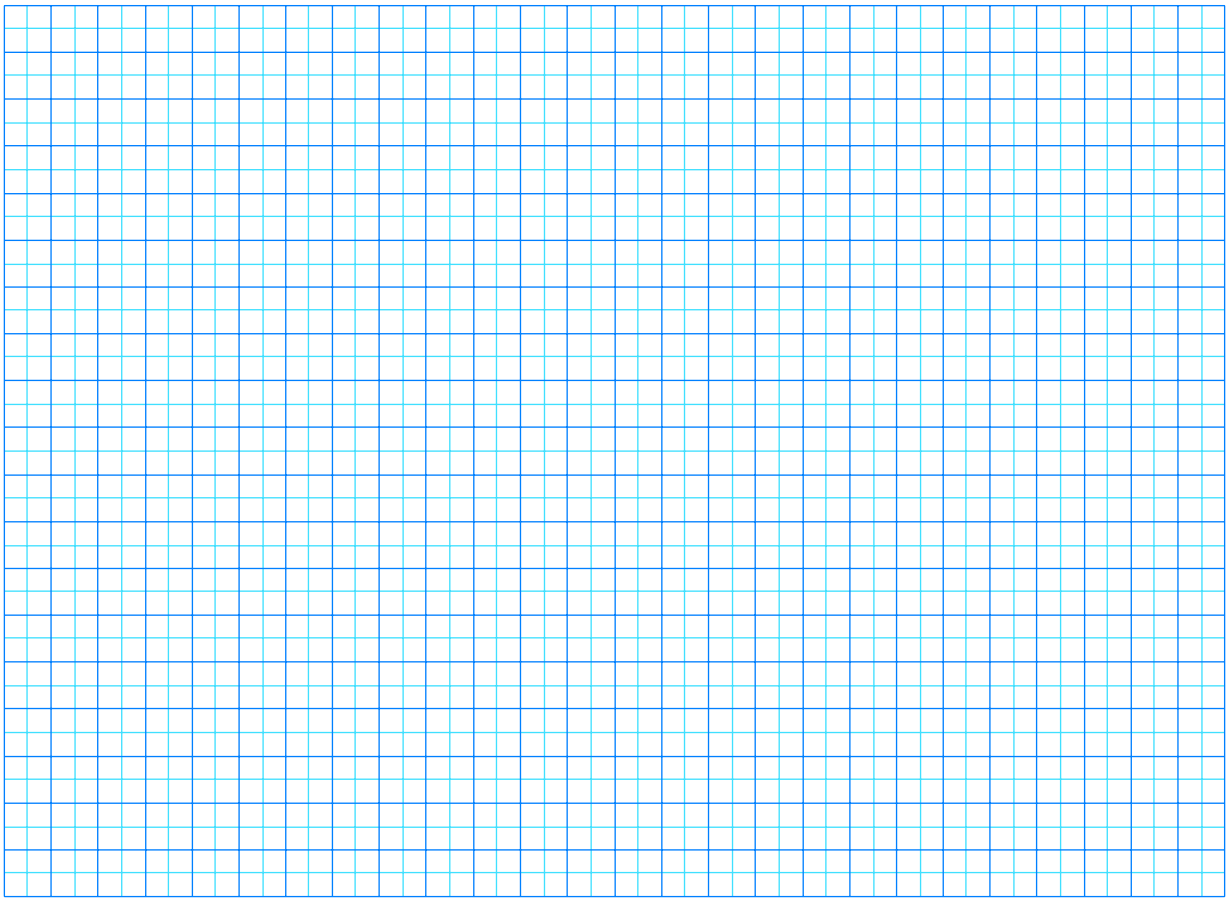
- Change?
- Measure?
- Keep the same?

How will you make it a fair test?

What equipment will you need?

What happened? Describe your observations and record your results.

Can your results be presented as a graph?



What do your results tell you? Are there any relationships, patterns or trends in your results?

Can you explain the relationships, patterns or trends in your results? Try to use some science ideas to help explain what happened?

What did you find out about the problem you investigated? Was the outcome different from your prediction? Explain.

What difficulties did you experience in doing the investigation?

How could you improve this investigation, for example, fairness, accuracy?