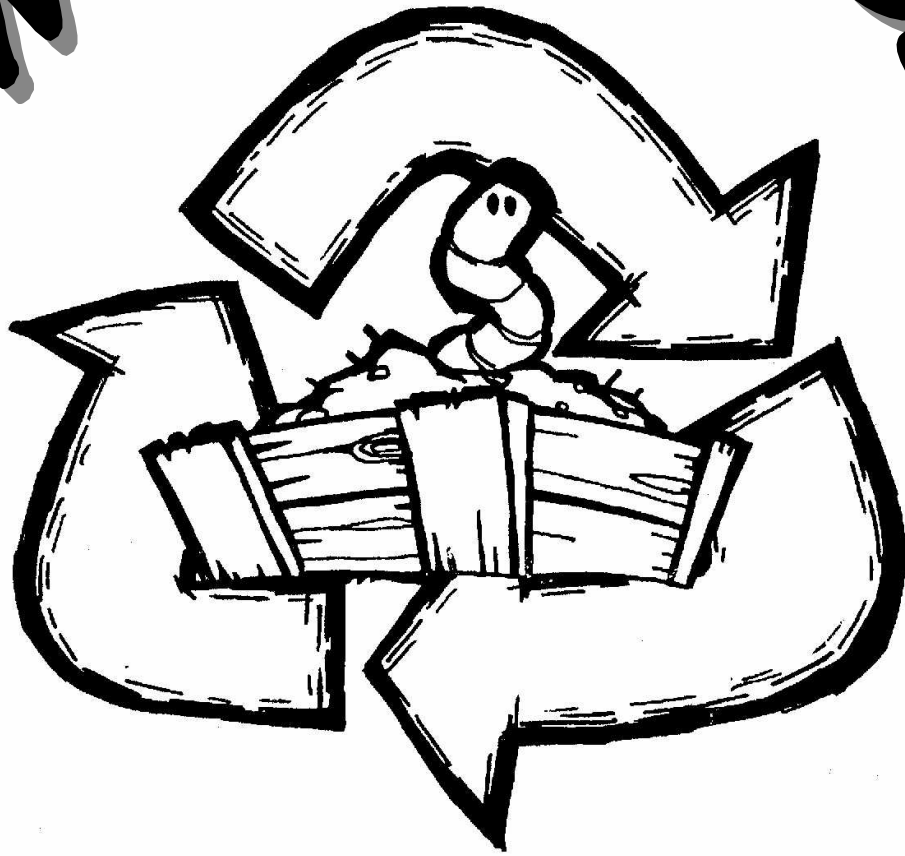


**'WASTE WISE'**



# **Organic Recycling Programme**

## **Classroom Resource Manual**

# Acknowledgements

Written by Julie Dennis

Illustrated by Gregg Broadmore

The following people made a major contribution to the development of the 'WASTE WISE' Organic Recycling Programme:

- Hamilton City Council Enviro Fund
- Tegan McIntyre (Environmental Projects Officer HCC)
- Recycling Operators Forum (Hamilton)

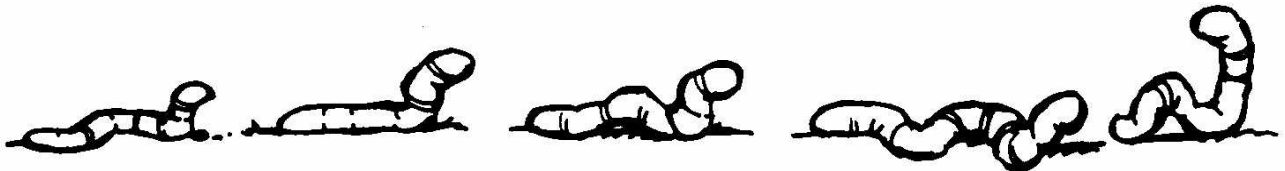
This classroom resource manual was initially developed as part of a facilitated programme, with regional educators working with local schools supported by local Councils, and coordinated by Julie Dennis. This classroom resource manual is now available as a 'stand alone' resource but it is recommended that you seek the services of local educators, worm farmers or school support personal to assist in the development of a whole school organic waste disposal system rather than treating the worm farm as a short term project.

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# 'WASTE WISE'



## Organic Recycling For Schools

The idea of this Classroom Resource Manual is to educate young people about the problems associated with Solid Waste and to introduce ideas for dealing with their School Organic/Green Waste.

The information contained in the Resource Manual is based on the three R's of Waste Management and is designed as a practical tool to help schools improve their knowledge and understanding of Organic Recycling.



## REDUCE REUSE RECYCLE



The activities contained in the Resource Manual encourage students to think about reducing the amount of waste they generate, how they can help by reusing Waste and what their options are for recycling. The focus is on turning Waste into a 'Resource'.

The teacher's most important role is to generate enthusiasm, provide encouragement and inspire the students to make a positive impact upon their environment through action and understanding.



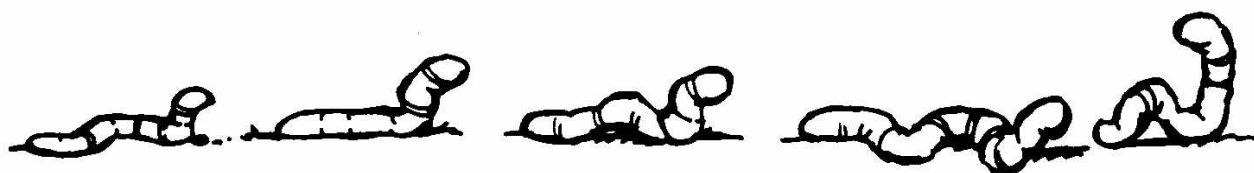


# Contents

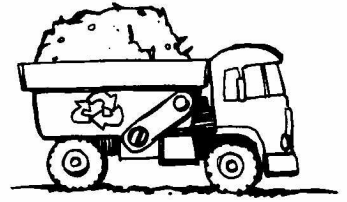


Although the focus of the Programme is on Organic Waste, it is necessary to briefly introduce other types of Waste and the methods of disposing of them. Each section will have an Objective, Key Words, a Teachers Guide and Activities.

	Page		Page
<b>Waste</b>		<b>Earthworms</b>	
Objectives, Key Words & Teachers Guide	1	Objectives, Key Words	19
Materials in Household Waste Bin	2	Movement	19
Activities	3	Breathe, Smell & Hear	19
Waste Audit	4	Eating	20
Waste Notes	5	Reproduction	20
<b>Reduce, Reuse &amp; Recycle</b>		The End Product - Vermicast	22
Objectives, Key Words & Teachers Guide	6	Harvesting the Vermicast	22
Activities	7	Activities	23
Recyclers Puzzle	8	Experiment in Worm Reproduction	24
Making 100% Recycled Paper	9	Worm Recipes - Worm Burgers	26
Reduce, Reuse & Recycle Notes	10	Choc Coated Worms	27
<b>Vermicomposting</b>		Earthworms Notes	28
Objectives, Key Words & Teacher Resource	11	<b>Appendix</b>	
Activities	12	School Check List	29
Worm Bin Design	13	Problem Solving Chart	30
Getting it Together - Bedding & The Worms	15	Data Collecting Sheet	31
Feeding the Worms	15	Recycling Guide	32
Maintaining the Worm Bed	16	Wormy Terminology	33
Worm Bin Animal Hunt	17	Nobody Likes Me...	34
Vermicomposting Notes	18		



# WASTE



**Objective:** To define what Waste is and where it comes from.

**Key Words:** Waste, Landfill.

**Activity:** Finding out what is in your School Waste.

## Discussion ideas:

- Q Who knows what WASTE is?
- Q What are some other names for WASTE?
- Q What types of WASTE does our School have?
- Q What types of WASTE do we have at Home?
- Q Where does our School WASTE go?
- Q What happens when it leaves our School?
- Q What is a LANDFILL?

## Teacher Guide:

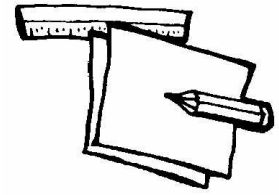
- Every year in New Zealand 1 million tonnes of Plant matter and Food Scraps are sent to Landfill, representing about 320Kg of Organic waste for each one of us. This accompanied by 60,000 tonnes of Paper and Cardboard (about 170kg per person). These are the main items in our Solid Waste pile, but we also discard many other things in the course of a year, including, for example, 300 million Steel Cans (about 80 per person) and 30 million litres of used oil (about 8 litres each). Information sourced from Ministry for the Environment (1997).
- The materials in an average Household Waste Bin consists of:
  - 45% Kitchen Scraps and Green Garden Waste
  - 24% Paper
  - 13% Plastic
  - 6% Glass
  - 6% Metal
  - 6% Other



# The Materials in an average Household Waste Bin.



# Activities

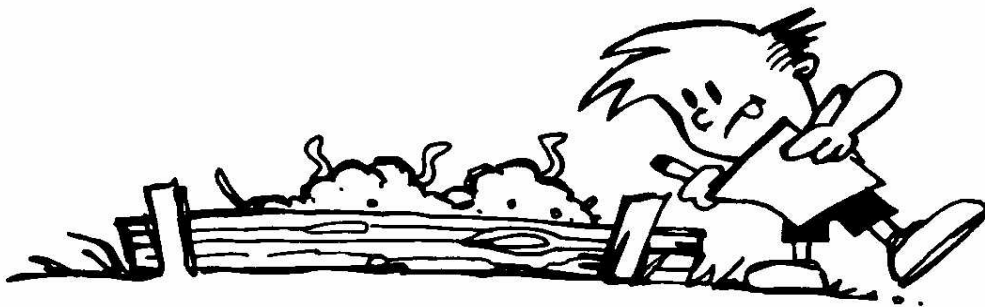
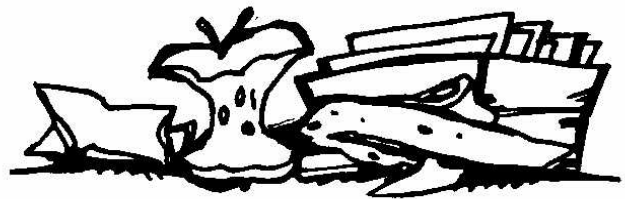


- Divide and separate the school waste into categories.
- Weigh the waste to find out the average volumes of each type per week/per month/per year.
- Produce graphs.
- Create a montage using pictures of each type of waste according to the percentage of volumes.
- Arrange a class visit to your local Landfill or nearest Refuse Transfer Station.
- Prepare a waste audit for the children to take home to help them identify what is in their home waste bin.
- Make Crosswords, Scrambled words, Word-finder games. Or how about a story such as:
  - ❑ I was a plastic milk container.....
  - ❑ Conversation in a rubbish bag.....
  - ❑ What will be waste in the year 2100.....



# Waste Audit

- List all the items your School throws away – Don't forget places like the Classrooms, Playground, Office, and Library. Make it easy: have buckets for different types of waste and make students divide their waste as they throw it away (then there is no need to rehandle the waste which is a health issue!).
- Weigh in Kilograms or Measure in Litres.
- Make a Chart of the Different Items.
  - ☐ Food
  - ☐ Paper
  - ☐ Plastic
  - ☐ Glass
  - ☐ Aluminium Cans
  - ☐ Others
- Brainstorm ways you can Reduce your Throw-a-way Habits.
- Do you have any Recycling Drop-off points near you for Recyclable Items?
- Calculate how many Worms you will need to eat all of your Food and Paper Waste.
- How Big will your Bin need to be?
- How many Food Waste Collecting Buckets will you need?
- Present your findings to the School with Graphs and Collage Pictures.



## WASTE NOTES:

[illegible]

# REDUCE, REUSE and RECYCLE

**Objective:** To encourage the three R's at school and at home.

**Key Words:** Reduce, Reuse, Recycle and Resource.

**Activity:** To investigate ways of reducing, reusing and recycling our waste and turning it into a resource.

## Discussion Ideas:

Q What waste can we REDUCE, REUSE and RECYCLE?

Q What does RECYCLE mean?

Q Why do we need to RECYCLE?

Q How can you tell if an item is able to be RECYCLED?

Q What is the RECYCLING Logo?

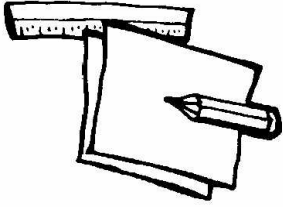
Q What products are made from RECYCLED materials?

Q What natural RESOURCES are used to make wastes?

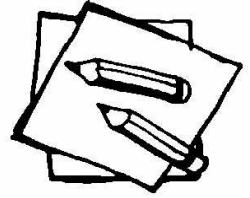
## Teacher guide:

- The Waste Analysis Protocol (1995/96) showed that approximately 72% of the current waste stream has the potential to be reused and recycled.
- Resources are naturally occurring materials that form our earth. Some resources are renewable but many are non renewable or finite.
- Every item created can be traced back to its origin, the Earth.





# Activities



- Explore ways of reducing your waste. Waste reduction means reducing the amount of waste we create, for example we can reduce by not buying products with a lot of packaging etc.
- Explore ways of reusing an item rather than throwing it away, for example using a glass jar for holding items, or for a plant terrarium, etc.
- Set up a School recycling box with reusable items for art activities.
- Make a classroom effort to reuse paper on both sides.
- Map out on a city map where your nearest recycling drop off points are (check with your local Council for details).
- Investigate what products are made from recycled materials, are they the same price?
- Try your hand at the following 'Recycler's Puzzle' (Page 8).
- Use some of your waste paper to make 100% recycled paper for your class art activities (page 9).



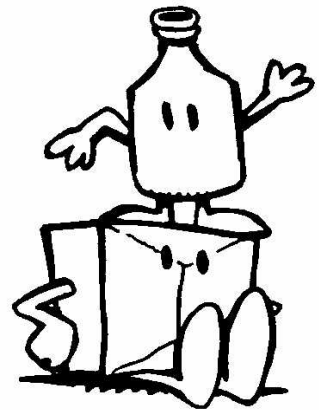
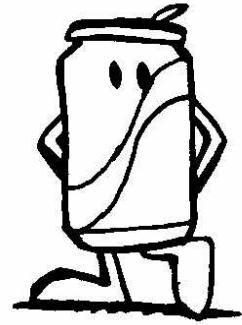
# Recyclers Puzzle

## Directions:

Can you find the 35 recycling words hidden below?

Look forwards, backwards, up, down or diagonally. Circle each word, then cross it off the word list. (The first one is done for you).

T	R	A	M	S	S	A	L	G	D	O	I	T	!
R	E	U	S	E	W	E	L	C	Y	C	E	R	E
H	D	E	M	N	L	A	N	D	F	I	L	L	E
R	U	Y	L	S	I	Y	G	R	E	N	E	R	A
C	C	L	A	I	S	J	B	O	T	T	L	E	S
L	E	V	T	B	O	W	O	R	L	D	I	S	Y
E	E	P	E	L	S	N	A	C	N	I	T	O	Q
A	B	W	M	E	O	A	F	Z	R	G	T	U	W
N	L	I	A	M	K	N	U	J	O	O	E	R	T
A	L	Z	G	R	E	E	N	B	R	W	R	C	S
I	L	E	A	R	T	H	W	O	R	M	S	E	A
R	I	U	N	X	W	O	R	M	F	O	O	D	C
P	O	Y	M	O	A	W	T	O	R	G	T	H	I
E	D	H	K	I	T	R	A	S	H	F	I	R	M
T	E	K	R	E	N	E	W	S	P	A	P	E	R
L	S	Y	M	D	O	I	D	E	T	V	A	T	E
L	U	B	N	E	W	D	U	M	P	E	H	A	V
C	I	N	A	G	R	O	M	M	I	O	C	H	J
I	T	Z	T	N	E	M	N	O	R	I	V	N	E



## Words:

ALUMINIUM, BOTTLES, CLEAN AIR, ~~DO IT!~~, DUMP, EARTHWORMS, EASY, ENERGY, ENVIRONMENT, FUN, GLASS, GREEN, JUNK MAIL, LANDFILL, LITTER, METAL, NEWSPAPER, ORGANIC, RECYCLE, REDUCE, RENEW, REUSE, RESOURCE, SAVE, SENSIBLE, SMART, TIN CANS, TIP, TRASH, USED OIL, VERMICAST, WASTE, WATER, WORM FOOD, WORLD.

# Making 100% Recycled Paper

## You will need:

- ❑ A bucket
- ❑ Sponge
- ❑ Blender, electric mixer, egg beater or whisk
- ❑ Hot water
- ❑ Waste papers of different colours (not glossy)
- ❑ Piece of fine metal mesh which will fit into a plastic tub or sink

## Extras:

Glitter, dried pressed flowers, leaves, herbs, spices, fragrant oils, to be added at steps 1 or 2)

## Method:

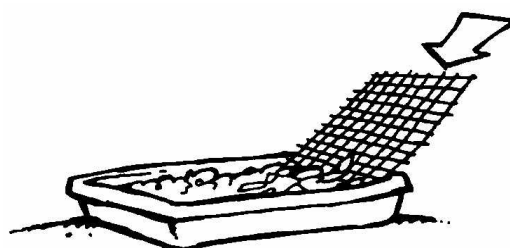
1. Shred paper into bucket(or blender) with hot water and whisk (or blend) until paper is pulped like a thick gravy.



2. Pour paper pulp into plastic tub or sink 1/2 filled with cold water.



3. Place fine mesh screen in tub of pulp, immerse and swirl, then lift screen straight up and out of water.



4. Gently sponge the paper pulp to remove excess water, carefully lift corners of paper and place on card to dry.

# REDUCE, REUSE & RECYCLE

## NOTES:

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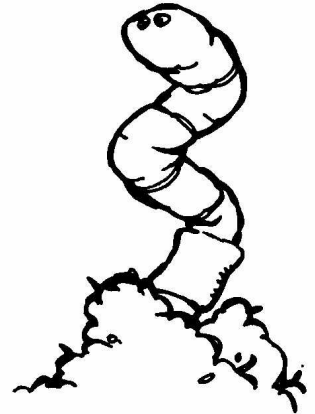
# VERMICOMPOSTING

## WASTE WISE WITH WORMS!

**Objective:** To dispose of the school's organic green waste in an environmentally friendly way.

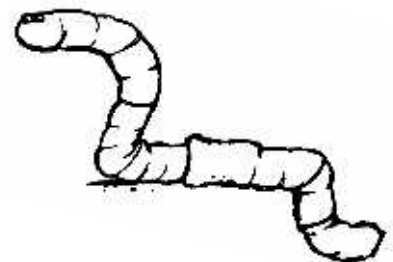
**Key Words:** Organic, Vermicomposting.

**Activity:** To set in place a vermicomposting unit to deal with the school organic wastes and use for further projects.



### Discussion ideas:

- Q What is VERMICOMPOSTING?
- Q What is ORGANIC green waste?
- Q Are there other types of composting?
- Q Who has a compost bin at home?
- Q Does it have worms in it?
- Q What compounds make up anything ORGANIC?



### Teacher guide:

- Vermicomposting is composting using earthworms rather than the thermo type of composting.
- The earthworms will eat anything organic, the definition of organic being anything which was once alive.
- The earthworm used in vermicomposting is the Tiger worm, *Eisenia fetida* or composting worm. This is the worm commonly found in the home compost bin and the common worm commercially farmed.
- Organic waste can be divided into Carbon/Brown and Nitrogen/Green at least a 1 to 3 mix works best.

# Activities

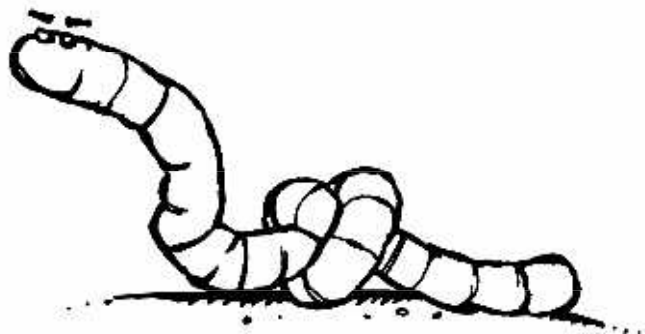
- You will need to calculate the volume of organic waste your school creates on a weekly basis (this includes food scraps and paper waste). Calculate your Carbon/Nitrogen mix.
- You will need to calculate how many worms you will need to put into your worm bin.
  - 1 kg (approx. 4000 worms) will eat 5 kg of food a week.
- You can start with a small number of worms and increase their food as they multiply in numbers.
- You will need to design a worm bin. Think about:
  - Where it will go?
  - Will it need a lid?
  - What size will it need to be?
  - Each square metre area can happily house 10 - 15000 worms.
  - Does it need to be outside or inside?
- You may like to visit an 'Organic Recycling Centre' in your region, to view the thermo type of composting.
- After your worm bin has been going for several months, animals other than earthworms often appear. Use the 'Worm Bin Animal Hunt' activity (page 17) to identify these.



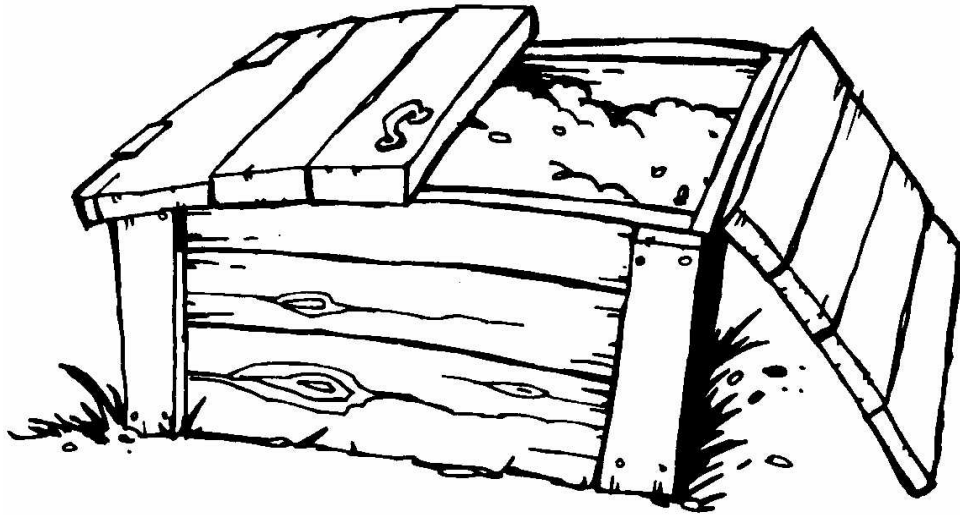
# The Worm Bin

## Design Details

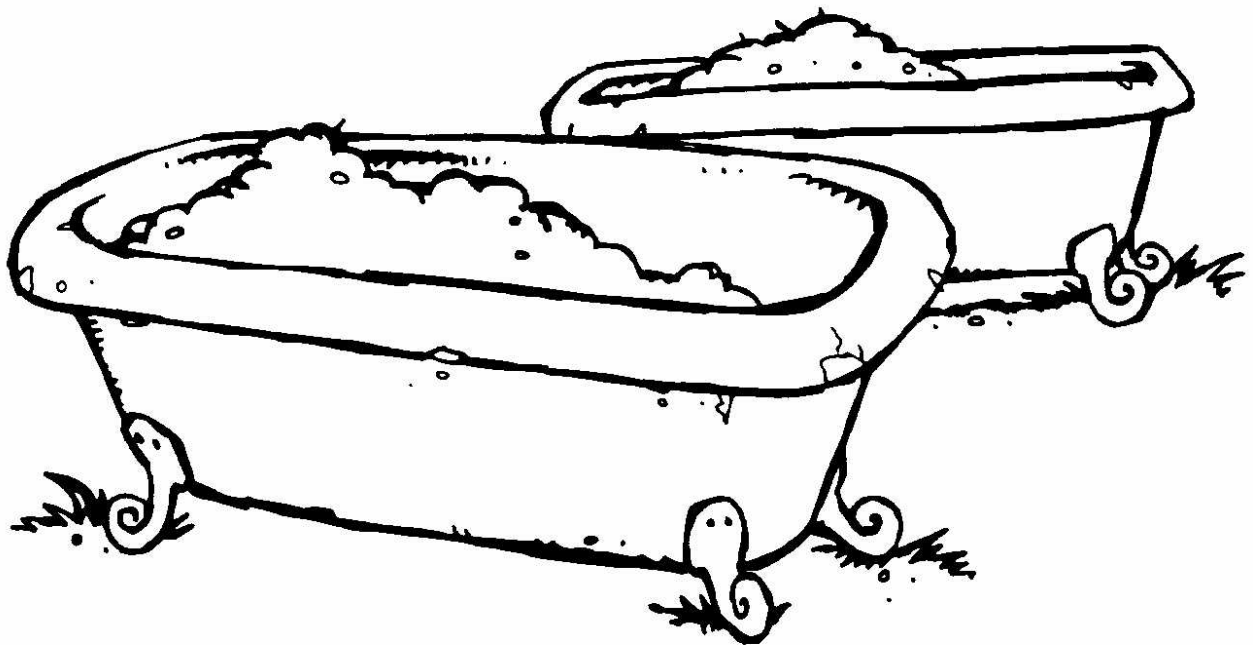
- The worm bin doesn't have to be elaborate. Be resourceful and use your recycling skills, the worms don't mind what they live in.
- Points to be considered are:
  - ❑ It doesn't need to be deep - 60cm to 1 metre high. Surface area is more important than depth.
  - ❑ It can be flat on the ground or with a bottom.
  - ❑ It will require a lid to keep the rain and pests out. Make it easy to handle for little hands and safe to prop up while feeding.
- Suggested recycled bins are:
  - ❑ Old fruit crates from fruit suppliers. Broken ones can be repaired.
  - ❑ Old baths - but you may need 2 or 3 of these.
  - ❑ Use recycled timber or iron for the sides of a flat-on-the-ground design.
- Other materials you will need:
  - ❑ 'Safe' bedding such as peat moss or compost.
  - ❑ Black plastic, slightly smaller than the size of the top surface.
  - ❑ Old carpet or underfelt to cover the top surface.
  - ❑ Dolomite or Lime to 'sweeten' any acidic foods.
  - ❑ Buckets for Food collection. Try to use recycled i.e. Paint Buckets.
  - ❑ Watering can for moistening food when feeding.



# Worm Bin Designs



'Remember be Resourceful'



# Getting it Together!

Now that you have decided on the size, shape and placement of your worm bin you will need to put it together. The next step is:

## The Bedding:

- The worms will need to have a 'safe' place to retreat to if their food gets too hot or acidic. This bedding is simply peatmoss or well broken down compost, laid about 20cm deep in the bottom of your worm bin. The bedding needs to be moist but not soaking, so do a 'squeeze test' - pick up a handful of bedding and squeeze it. If only one or two drops of water come out you have got it just right. If lots of water comes out it is too wet. If it is dry and powdery you will need to add more water. A sprinkle of Dolomite will be helpful just to make sure the bedding is 'pH neutral before adding the Worms.

## The Worms:

- The earthworms you will need are 'Tiger Worms'. These are the composting worms you will find in your home compost bins. You can purchase worms from a worm farmer or bring some in from your home compost bins. You will need to weigh the worms to calculate how many there are and how much they will eat.
- Remember: 1 kg = 4000 worms = 5 kg food eaten a week.



## Feeding The Worms:

- By now you will have calculated how much food you will be feeding your worms. You will also have learnt that a good mix - 1 part Carbon (Paper, leaves etc.) and 3 parts Nitrogen (Green waste such as lawn clippings and food scraps) will keep the worms happy and well fed. Each week you will need to sprinkle the food with a small amount of Dolomite to 'sweeten' any acidic foods.
- There are two ways you can go about feeding your worms.
  - The first is by feeding them everyday, or every second day, in a different area of the bin.

- The second way is by storing the food in a pre-composting bin first then feeding it to the worms once a week.
- The food is broken down and digested quicker if it is broken up into small pieces and is moist, so you will need to 'scrunch' up any paper waste (to introduce air into the feed) or break up any large food items and then moisten the food after it is placed into the worm bin with a watering can.
- A black plastic cover on top of the food will help it break down by keeping it dark and moist. Old carpet or underfelt on top of the plastic will help it stay moist and temperature controlled.
- Your worm bin should not smell. If it does, you may need to add a little more Dolomite to 'sweeten' it, or you may be overfeeding and need to stop feeding for a few days. There may be a few very small vinegar flies around the decomposing food but the plastic, carpet and lid will deter any other pests from your bin (see page 30 for problem solving).



## Maintaining The Worm Bin:

- The key to taking care of your worms is to leave them alone as much as possible. But that doesn't mean you can ignore them!
- Keep an eye on (and a good written record) how much food the worms are consuming and how quickly. Adjust the volumes accordingly.
- The moisture level is important so you will need to do a 'squeeze test' every now and then.
- As already mentioned, the worms like to live in a pH neutral situation, so a sprinkle of Dolomite each week is important to 'sweeten' any acidic foods.
- As long as their home is well maintained the worms will happily turn your wastes into a valuable plant food called vermicast.



# Worm Bin Animal Hunt

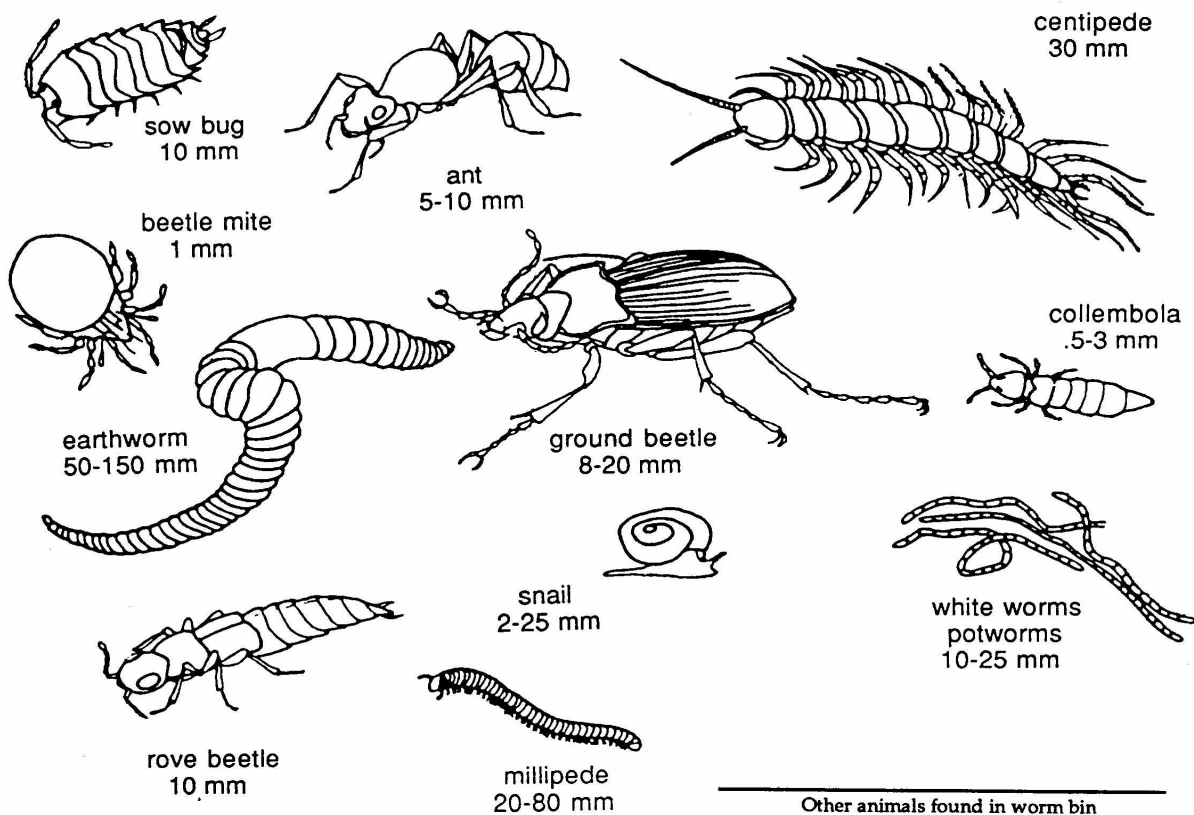
Co-existing with the worms in your worm bin will be a variety of other animals and organisms, try this activity to identify as many as possible and you may find others not listed here - happy hunting!

## Materials Needed:

- Small containers or plastic trays.
- Toothpicks or tweezers.
- Magnifying glass.

## Directions:

1. Place about 1/2 cup of bedding from your worm bin onto your tray.
2. Use a toothpick or tweezers to look for animals similar to those pictured below.
3. Circle the ones you find.
4. When you finish return the animals and other organisms to the worm bin (all except centipedes as these can sometimes eat the eggs and young worms).



# VERMICOMPOSTING

## NOTES:

[illegible]

# EARTHWORMS

**Objective:** To learn more about our school worms.

**Key Words:** Bacteria, Clitellum, Cocoon, Gizzard, Hermaphrodite, Mucus, Nervous, Setae.

**Activities:** To investigate how worms Move, Breathe, Eat and Reproduce.

## Discussion ideas:

Q How do worms move? Do they have legs?

Q Do they have teeth? How do they digest their food?

Q How do they hear? Smell? Breathe?

Q How do they have babies?

## Teacher guide:

### Movement:

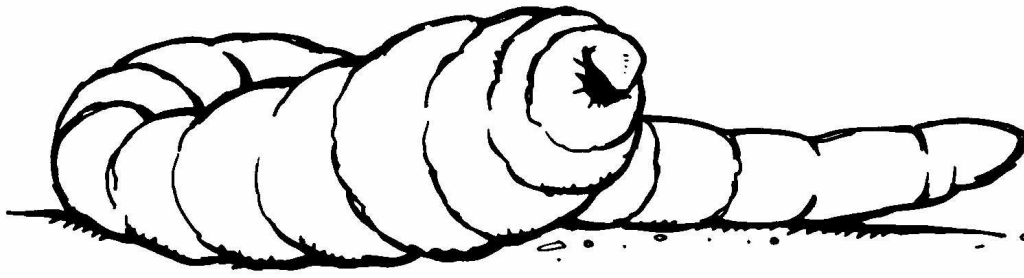
- Earthworms have a segmented, cylindrical body.
- To move either forward or backwards the worm uses its muscles. It uses its 'round' muscles squeezed together to make it long and thin. By squeezing together its 'long' muscles it is able to contract, making it short and fat.
- SETAE, the tiny bristles on some segments of the worm, dig into the surrounding matter to keep the worm from slipping, a good tool when it doesn't want to be pulled out by a bird!
- Earthworms have no bones and can bend their bodies in any direction, wriggle and even curl up into a ball.
- They excrete a MUCUS which helps them slide along.



### Breathe, Smell and Hear:

- Earthworms have no eyes, ears or lungs.
- They breathe through their skin. The air which is present between soil and food particles is diffused through their moist skin into a complex network of blood vessels.

- The MUCUS they excrete helps keep their skin moist.
- They have a complex NERVOUS system which enables them to sense light, food, acid conditions, vibrations and heat etc.



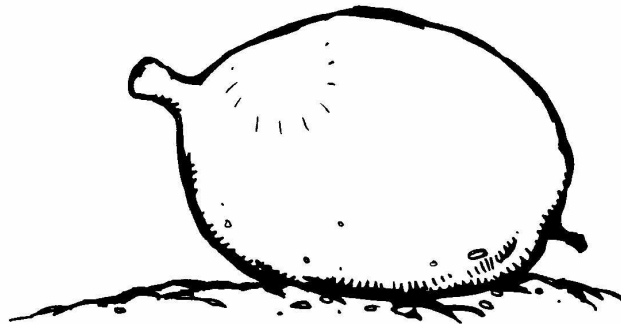
## Eating:

- An earthworm has no teeth so cannot chew.
- Its food needs to be soft and moist.
- BACTERIA and FUNGI play an important part by breaking down large particles of food first.
- The worm actually 'eats' the fungi and bacteria that are breaking down the food.
- The worm has a small pad of flesh that sticks out above its mouth. When the worm is eating the pad stretches out and scoops the food up, pushing it into its mouth.
- Muscles then pass the food down through its GIZZARD where tiny hard pieces of grit rub together and grind the food into smaller particles.
- The food leaves the GIZZARD and passes into the worm's digestive tract. The digestive tract has BACTERIA and strong juices in it which break down the food into even smaller particles.
- These nutritious particles are absorbed into the worm's bloodstream, which is pumped around the worm's body by up to five pairs of hearts.
- The remaining particles are passed out of the worm, this is called vermicast.

## Reproduction:

- Earthworms are HERMAPHRODITE, which means they are both male and female, but it still takes two worms to reproduce.
- In the act of mating the worms lie next to each other, nose to tail with clitellum touching (some worms hook their heads under their partners clitellum), it almost looks like they are tied in a knot, and exchange sperm.
- The worms then part and each worm secretes a thick MUCUS ring around its CLITELLUM. This ring contains the worms female eggs.

- As the MUCUS ring is passed over the worm's upper body it collects the exchanged sperm then slips along the upper body and head and off over its nose hardening along its journey to form a COCOON.
- Each COCOON will contain between 1 and 6 worms.
- Inside the COCOON the baby worms grow and are ready to hatch in approximately 3 weeks. The COCOON in this time has changed from yellow to dark brown in colour.
- The worms when first hatched are very pale in colour, and about the thickness of a strand of cotton, but soon start eating and change to a reddish brown colour.
- The new worm will continue to grow and in about 2 to 3 months will develop a CLITELLUM. It is now an adult and able to mate.
- The composting Tiger Worm can mate and lay an egg every 7 - 10 days, many other species of earthworms only mate once or twice a year.



## Life Cycle Diagram:

Two worms joined by mucus ring, exchanging sperm



Worms take about 3 months to become an adult



Baby worms hatch from one end of the cocoon in about 3 weeks time



Mucus ring passing over the head of the worm as it hardens into a cocoon



Each Tiger worm can mate and lay an egg every 7 - 10 days

Egg fertilisation takes place in the cocoon after being released from the worm

## The End Product - Vermicast:

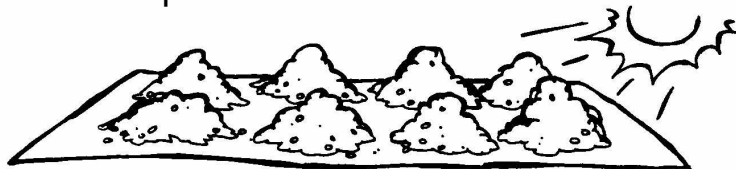
- After the food has passed through the worm it will have broken down into small particles. This is ideal plant food.
- Because each particle is so small the plants are able to use it straight away.
- This end product is known as vermicast and contains nutrients, minerals and BACTERIA, all important for healthy plant growth.
- It could be used as a school fund raiser by being bagged and sold to parents for their plants at home as well as being used to enrich your own school gardens.

## Harvesting the vermicast

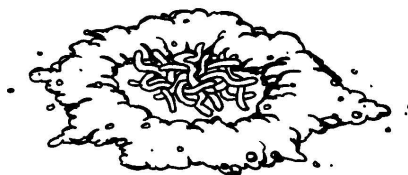
1. Feed only one side of your worm bin for two weeks prior to harvesting your vermicast. As the worms move to where the food is, this will ensure most of the worms have moved to the other side.



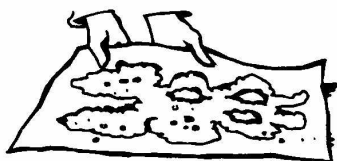
2. Dig out the vermicast from the unfed side and place in little piles on plastic sheeting in the sunlight. The worms will move away from the light and will burrow to the bottom of the pile.



3. Gently brush the vermicast from the top and sides of the pile and you should find any worms in a mass at the bottom of the pile.

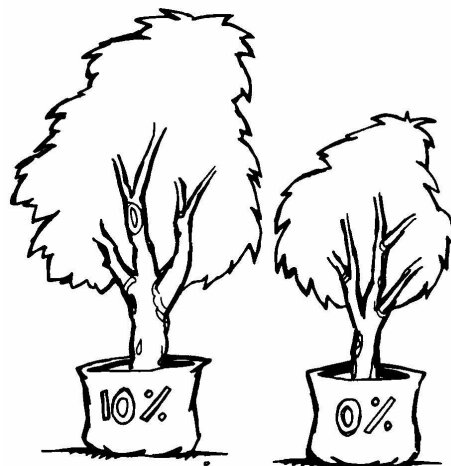
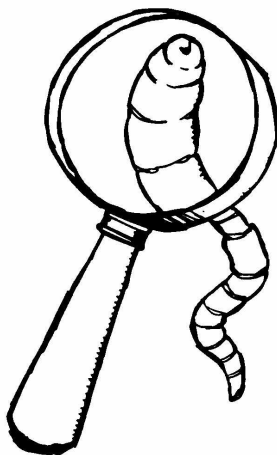


4. Gently place the worms back into the worm bin and bag the remaining vermicast for sale or place around your school gardens or lawns. Because it is a rich plant food it only needs to be sprinkled around plants on top of the soil, not dug in.



# Activities

- Examine a worm under a magnifying glass, can you see the Setae, Clitellum, Segments etc?
- Carry out 'The Worm Reproduction' experiment described on page 24.
- Using the same principle set up your own experiments to find out what foods they prefer.
- Carry out experiments to see how worms move. Observe them on different textures, e.g dry paper, wet paper, sandpaper, etc.
- Set up your own experiments using plants and castings to find out what % of castings you need for best growth, how castings compare with normal fertilisers, etc.
- Share with the rest of the school what you have learnt, present your information at a 'Wormy' Assembly invite parents, BOT etc,.
- Try one of the worm recipes on pages 26 & 27.



# An Experiment in Worm Reproduction



## You will need:

- 6 x 2 litre ice cream containers with several holes in the bottom.
- Worms.
- Good bedding material for the worms (Vermicompost from your worm bin).
- Water.
- Hessian bags or small pieces of underfelt.

**Step 1.** Set up each of the 6 ice cream containers as mini worm farms by placing equal amounts of bedding in each, wetting them to the same degree, then placing food scraps on top. Cover each container with a piece of Hessian or underfelt.

**Step 2.** Add different numbers of worms to each container: eg

1 worm
2 worms
10 worms
50 worms
100 worms
500 worms

(Mark how many on the container).

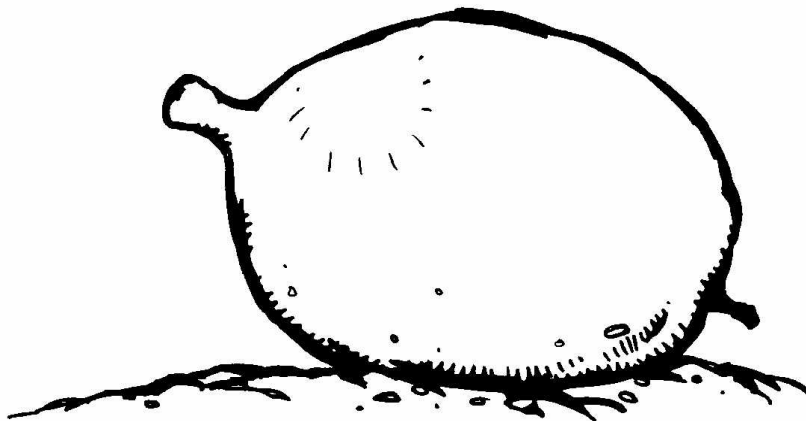
**Step 3.** Treat each container in exactly the same way, keeping moist and feeding every week with scraps. Add some dolomite every 2 or 3 weeks to keep each container 'sweet'.

**Step 4.** After a period of time - allow at least 1 month - empty each container and count the number of worms in each.

**Step 5.** What conclusions can you make concerning the reproductive rate and numbers of worms?

### **Worm Eggs:**

- ❑ See if you can find any worm eggs or capsules.
- ❑ They are about the same size and shape as a match-head. They are yellow-golden or orange-brown in colour.
- ❑ Gather about 4 or 5 and place them between 2 layers of wet Hessian and place in an ice cream container.
- ❑ Look at them at the same time every day and record your findings. (You can draw what you see).
- ❑ After about 2 weeks, the eggs should have hatched. Can you see any baby earthworms?
- ❑ Average out how many came from each egg.
- ❑ Replace any worms back into your worm bin.



# Worm Recipe

**Worms are nearly pure protein - you can eat them!**

Here are some wormy recipes for you to try (if you feel up to it!). Remember you must clean them out well first. To do this, take about 1000 live worms and wash them carefully. Place them in some damp bran in a container and leave them in there for at least 4 days. They will eat the bran and get rid of any dirt inside their bodies. Separate the worms from the bran and wash again. Drop them into boiling water and drain. Use fresh.

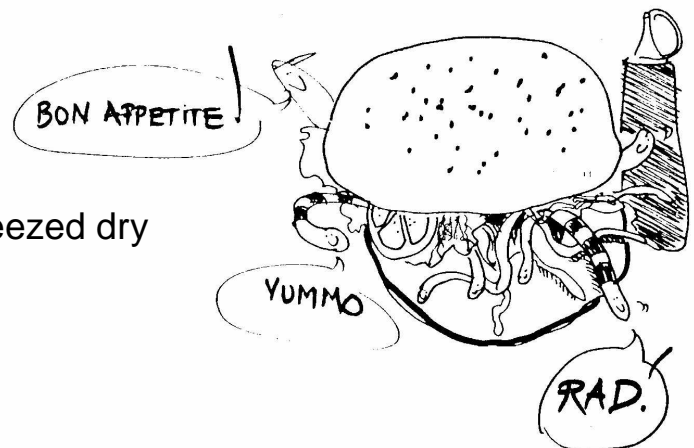
## Worm Burgers

### Ingredients:

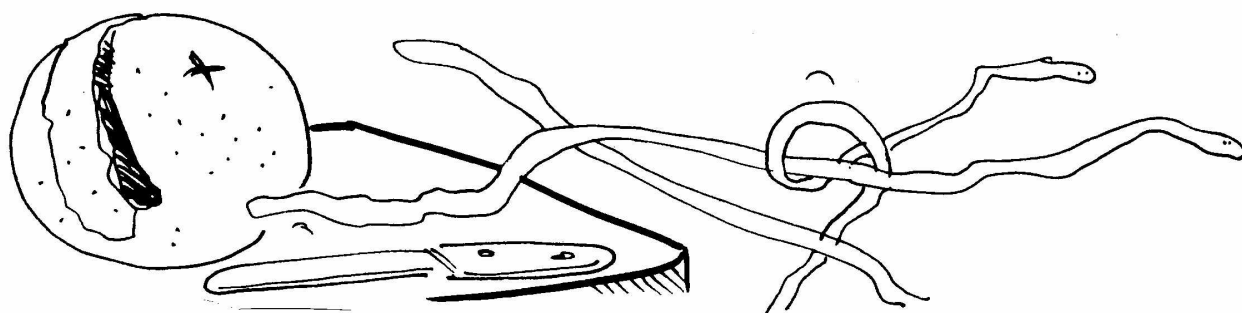
250gm cleaned worms (see above)  
1 onion  
2 slices bread soaked in milk then squeezed dry  
2 Tablespoons flour  
parsley  
salt & pepper

### Method:

- Place onion in food processor and chop.
  - Add all other ingredients and process only until just combined (do not mince).
  - Form into balls with wet hands and then flatten.
  - Fry gently in oil or butter until brown on both sides.
- Serve on a toasted bun with shredded lettuce, tomato etc.



If you're not quite up to eating real worms, you can still make yummy wormy things....



## Chocolate Coated Worms

### Ingredients:

Peel of 2 large oranges  
3/4 cup sugar  
1/4 cup water  
185gm cooking chocolate

### Method:

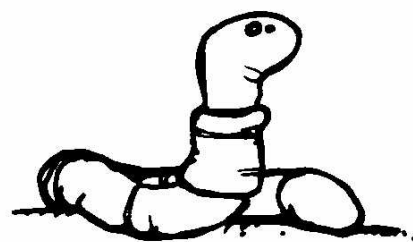
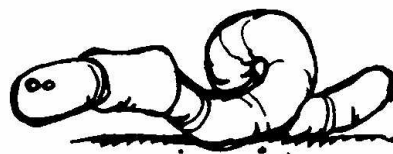
- Carefully peel the oranges and cut the peel into thin strips.
- Place peel in a pan of water and simmer for 5 minutes. Drain.
- Combine sugar and 1/4 cup of water. Stir over low heat until sugar is dissolved.
- Add peel and simmer for 10 minutes. Drain and allow peel to dry thoroughly (about 2 hours).
- Melt chocolate in a double saucepan over simmering water.
- Place several orange straws in the melted chocolate and remove carefully with a fork, tapping gently on side of pan to remove excess.
- Place choc-coated 'worms' on greaseproof paper to set.

Trick your friends by getting them to eat one!



[illegible]

# School Checklist

1. Conduct a school 'Waste Audit'.
2. Calculate amount of worms needed/waste produced/bin size.
3. Design worm bin.
4. Collect the materials for the worm bin –  
Remember to use Recycled! Have the students  
assemble the bin (where possible) with teacher or parent help.
5. Start small. Start where you can and build as you go. Don't wait!
6. Get funding/sponsorship or parents to pre-purchase worms.
7. Set up a schedule for waste collection. Provide 'Worm Food' bins.
8. Monitor and record the Daily/Weekly health of the worm bin.
9. Have students report their projects to the school assembly, invite BOT  
members and parents. Invite local Newspaper personal to the school.
10. Use the castings to grow vegetables in the school garden or use to nourish  
and beautify the school grounds.
11. Know you ARE making a difference – One Step at a Time!



## Problem Solving Chart:

PROBLEM	CAUSE	ACTION TO REMEDY
<p>Smelly Worm Bin</p> 	<p>*Over feeding causing compacted anaerobic conditions</p> <p>*Too much Food - Nitrogen</p> <p>*Too little Paper - Carbon</p> <p>*Bin too wet</p>	<p>*Fork through to aerate &amp; don't feed for up to 1 wk.</p> <p>*Monitor volumes fed.</p> <p>*Feed a good mix of C/N.</p> <p>*Fork through extra paper.</p> <p>*Make sure you 'scrunch' paper for adding air pockets in the food.</p> <p>*Check drainage.</p> <p>*Fork through and expose surface to air to dry.</p> <p>*Add dry paper bedding.</p>
Moulds & Fungi	*Occur naturally	<p>*Ignore them as they are an important part of the Bins life cycle.</p> <p>*This is what the worms eat.</p>
Vinegar Flies	*Exposed, Acidic Food	<p>*Neutralise with Lime.</p> <p>*Keep food covered.</p> <p>*Cover food with paper when feeding.</p>
Other Creatures	*Occur naturally	<p>*A good sign a healthy bin mirrors Nature.</p> <p>*A fitting lid will keep any unwanted pests out.</p>
House Flies	*Exposed Food	<p>*Keep covered with Polythene and Carpet.</p> <p>*Cover food with paper when feeding.</p>
Ants	*Occur naturally - after free feed	*If bin is raised stand legs in containers of water.
Over-Population	<p>*Excellent Care!</p> 	<p>*Divide and start another.</p> <p>*Sell extra as fundraiser.</p> <p>*Harvest Casts.</p> <p>*Try 'Worm Recipes'.</p>

# DATA COLLECTING CHART

[illegible]

# RECYCLING GUIDE

Some suggestions for Recycling or Reusing other Waste objects are:

## Aluminium Cans:

- ❑ School/Charity Drop Off Bins
- ❑ Metal Recyclers

## Tin Cans:

Local Drop Off Centres  
Metal Recyclers

## Books & Magazines:

- ❑ Paper Recycling Kerbside Collections
- ❑ Donate to Doctors Rooms, Charity Groups, Community Craft Groups
- ❑ Donate to Kindergartens or Primary Schools

## Clothing:

- ❑ Donate to Salvation Army, Red Cross, Church, Women's Refuge or Corso
- ❑ Kerbside Rag-Bag Collections
- ❑ Automotive Industry for Oil Rags

## Garden Waste:

- ❑ Compost at Home
- ❑ Deliver to Local Organic Recycling Centre

## Used Car Oil:

Most Shell Service Stations

## Glass, Bottles & Jars:

- ❑ Kerbside Glass Collections
- ❑ Recycle Bottle Banks

## Used Furniture:

Second Hand Dealers  
Red Cross or Salvation Army

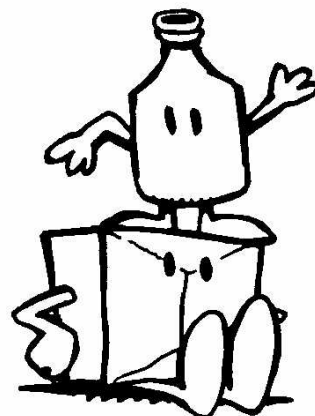
## Paper & Cardboard:

- ❑ Kerbside Paper Collections
- ❑ Compost with Green Waste at Home

## Plastic Softdrink & Milk

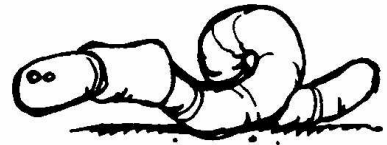
### Bottles:

- ❑ Kerbside Plastic Collections
- ❑ Local Drop Off Centres



# 'WORMY' TERMS:

- ❑ **Aerobic** - Condition in which organisms that uses Oxygen live.
- ❑ **Anaerobic** - Condition in which organisms that doesn't use Oxygen live.
- ❑ **Bacteria** - Tiny organisms that help with the decay of Worm Food.
- ❑ **Bedding** - Favourable environment for worms to 'live' in e.g. well rotted compost, peat moss etc.
- ❑ **Carbon** - Brown Organic matter i.e. leaves, paper, cardboard.
- ❑ **Clitellum** - Saddle or swollen band on adult worm. Contains glands, which secrete Cocoon forming mucus ring.
- ❑ **Cocoon** - Worm egg or capsule.
- ❑ **Environment** - Surrounding habitat.
- ❑ **Gizzard** - Part of digestive tract which grinds the food with the presence of tiny grit particles.
- ❑ **Hermaphrodite** - Having both male and female reproductive organs.
- ❑ **Landfill** - Tip or dump where waste is disposed of mixed together into a hole in the ground.
- ❑ **Mucus** - Watery secretion, slippery, produced by gland cells. Very important for worms survival.
- ❑ **Nitrogen** - Green Organic matter i.e. food waste, lawn clippings etc.
- ❑ **Organic** - Matter that was once alive.
- ❑ **Tiger Worm** - Common NZ composting worm. Name *Eisenia fetida*, identified by coloured bands varying from purple/red/brown/yellow.
- ❑ **Setae** - Tiny hairs or bristles on a worm, used for movement.
- ❑ **Vermicast** - Worm Poo.
- ❑ **Vermicomposting** - Composting with worms.
- ❑ **Waste Audit** - Sorting and cataloguing waste produced.
- ❑ **Worm Bin** - Container to house composting worms.
- ❑ **Worm Food** - Organic matter at a certain stage of decay.



# Nobody Likes Me...



Nobody likes me, everybody hates me,  
Think I'll go eat worms,  
Big ones, Small ones,  
Fat ones, Skinny ones,  
Worms that Squiggle and Squirm!

Bite their heads off,  
Suck their blood out,  
Throw their skins away!  
Nobody knows how much I like 'em,  
Eat 'em three times a day!

