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The Compost Curriculum

A handbook to enable teachers to use the composting process as a teaching resource in Devon's primary schools.

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Contents

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at school

The Compost Curriculum

Welcome to the Compost Curriculum! The aim of this handbook is to help you to use the composting process as an inspiring tool in your everyday teaching.

Introduction

It doesn't matter if you're a complete beginner or a seasoned rotter; whether you are just getting started; whether you have 'state-of-the-art' composting equipment, or a neglected 'dalek' hiding in the corner of the playground – this handbook will help you to make the most of composting as the amazing teaching resource it is!

Practical advice about setting up and operating a composting system in school can be found in the booklet, 'Compost: Schools Special' see www.dccn.typepad.com/
The focus of this Compost Curriculum resource is getting the whole school involved in composting through class lessons and Eco Team activities.

We follow the school year with monthly activities based around composting to use with a class of pupils. These are linked to the national curriculum and encompass English, mathematics, geography, science, history and PHSE amongst other subjects.

We have also included monthly activities for Eco Teams, designed to make your pupils ethusiastic 'compost experts' while helping them spread the compost message to the whole school.

How to use this resource

If you don't know where to begin with composting, or prefer a methodical approach, start on the following page where you will find a progress matrix. This will enable you to chart where you are in your composting journey in areas such as curriculum and school involvement. If you are a more confident composter feel free to dip into the handbook wherever you like and choose the activities which suit you best.

Teachers who are planning for a particular area of the curriculum should start with the table detailing the links between our Class Activities and the national curriculum 2014.

We have aimed to create activities which are suited to a wide range of school settings and can be adapted for use with different aged pupils. If your school does not have much outdoor space consider making your own table top composters in the 'Rot Pots' October activity. For something suited to a larger space or a more ambitious school, have a go at the 'Lasagne Garden' activity in March.

If you have your own innovative ideas for composting-linked classroom activities, we'd love to hear from you so we can spread the word to other schools. Please contact recycle@devon.gov.uk to share your ideas.

Top tips and composting facts are peppered throughout this handbook, along with real life case studies to show examples of Devon schools who are embracing their very own 'Compost Curriculum'!

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The Compost Matrix

Use the matrix below to work out your current strengths and the areas for development in terms of composting at school. Then plan your next steps towards getting your 'compost curriculum' fully embedded in school life.

	Stage 1 →	Stage 2 →	Stage 3 →	Stage 4 →
Materials composted	We do not compost on site.	We compost only garden waste e.g., weeds, hedge clippings, leaves.	We compost raw food and garden waste e.g., fruit and vegetable peelings.	We compost all food and garden waste including cooked food e.g., plate scrapings.
Involvement	Nobody is involved in composting in school.	One school adult does the composting e.g., the caretaker. There is little awareness in the rest of the school.	Some pupils and staff are aware of or involved in composting e.g., garden club, Eco Team.	All pupils and staff are aware of, or involved in, composting.
Using the finished compost	The finished compost is not used.	A school adult e.g., the caretaker empties the composter.	Some pupils make use of the compost in school e.g., the garden club.	All pupils and staff use the finished compost e.g., in class raised beds or in science lessons.
Curriculum	Composting does not feature in our curriculum.	Topics such as 'Growing Plants' mention compost but do not make links with our composter.	Some classes occasionally use the composter as part of their class work.	Every teacher uses the composter as part of their class work. We take the composter into consideration during planning.
Community	Nobody outside the school is involved with our composting.	The parents' school grounds group dig out the compost once a year.	Parents or the local allotment society advise and help us with our composting.	We have held open days and celebration events about composting involving the wider school community.

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The Compost Mix

Good compost needs a healthy balance between air and water, both of which can come from things that were once part of a plant. Air comes from the dry, woody materials which provide air pockets. These materials contain a carbon source and are referred to as 'browns'. Water comes from things like food waste and other moist, sappy materials. These contain nitrogen and are known as 'greens'.

Getting the right balance

Greens	Browns
Vegetable peelings	Straw
Fruit waste (and other food waste, depending on your composter)	Wood shavings / wood pellets (depending on your composter)
Old flowers and weeds	Cardboard / scrunched up paper
Grass cuttings / hedge clippings	Small twigs
Fresh leaves	Dead leaves

If you get a good balance of 'browns' and 'greens' right from the beginning, great compost will happen naturally. Aim for a 50:50 mix every time you put waste into your composter.

If your compost becomes too wet:
Moist, sappy materials such as grass cuttings and fruit waste add moisture but also break down very quickly, so on their own they become wet and smelly. They need the addition of tough, drier 'browns', which rot more slowly, to create air pockets and allow minibeasts to move around.

If your compost mix is too dry:
This can often be caused by too many dead autumn leaves, or perhaps twigs that are a bit too big to break down easily, and need breaking up. You should add more 'greens' if they are available, or you can add a little water from a watering can.

Compost Top Tip

If you are using an in-vessel system such as a Ridan, Jora or ScotSpin, wood pellets are the best source of 'browns'. They need to be added at a ratio of 1:6 – for every bucket of fresh food waste 'greens', add a sixth of a bucket of wood pellets.

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Links to the National Curriculum

The table below shows how each of the Class Activities within the Compost Curriculum links to the national curriculum in England 2014.

Month	Class Activity	Curriculum links
September	Food waste audit	**Mathematics** Measurement: lower KS2 *(weight / mass)* Statistics: Y4 and Y6 *(bar and pie charts)*
October	Making Rot Pots	**Science** Working scientifically: lower KS2
November	Let's talk about poo!	**English** Reading - comprehension: upper KS2 **Geography** Human geography: upper KS2
December	Compost Christmas gifts	**Science** Plants: Y3 *(the requirements of plants)*
January	Persuasive letter writing	**English** Writing - composition: upper KS2 *(persuasive letters)* Reading - comprehension: upper KS2
February	Worm survey	**Science** Working scientifically: upper KS2 Living things and their habitats: Y4 and Y6 *(grouping / classifying living things)* **Mathematics** Statistics: Y4 and Y6 *(bar and pie charts)*
March	Growing plants experiment	**Science** Plants: Y3 *(the parts / requirements of plants)* Working scientifically: lower KS2 *(experiment design; observational skills)*
April	Rotting rates	**Science** Working scientifically: upper KS2 *(experiment design; observational skills)*
May	Rotter spotters	**Science** Living things and their habitats: Y4 and Y6 *(classification keys)* Animals, including humans: Y4 *(food chains)*
June	Compost time lapse photography	**Mathematics** Statistics: Y4 *(time graphs)* Measurement: Y2 *(temperature)*
July	Compost sorting game	**Science** Living things and their habitats: Y4 *(environmental change)* **PSHE** Core Theme 3: KS2 Living in the wider world - respecting and protecting the environment

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Overview of Activities

Click on the month in the table below to navigate to the teachers' plans for the Class and Eco Team activities.

Month	Class Activity	Eco Team Activity
September	Food waste audit	Making a slatted composter from reused materials
October	Making Rot Pots	Making a leafmould bin
November	Let's talk about poo!	Compost assembly
December	Compost Christmas gifts	Compostable Christmas cards
January	Persuasive letter writing	'Compost' cakes
February	Worm survey	Making your own worm farm
March	Growing plants experiment	Lasagne gardening
April	Rotting rates	Compost scavenger hunt
May	Rotter spotters	Compost survey
June	Compost time lapse photography	Compost documentary photography
July	Compost sorting game	Compost celebration picnic

To return to this page at any time, click on the Recycle Devon flower at the bottom of the page.

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at school

Activities for September

Welcome to the start of another academic year – the perfect time to get started with new composting projects or give a neglected composting system a new lease of life! September is also the time to remind the whole school about systems for collecting materials for composting and recycling, and to recruit pupils to a team of 'rotters' responsible for keeping your compost bin(s) fed and happy!

Compost Facts: The bigger picture

Households in Devon sent 172,000 tonnes[1] of waste to landfill in 2012/13 - approximately 230kg of rubbish for every adult and child. At school, the average primary pupil produces 45kg of waste per year, 46% of which is food waste[2].

Tea bags, fruit cores and vegetable peels can be easily composted by most schools; many Devon schools also have specialist composting equipment to recycle both cooked and uncooked food waste.

By composting at school, you reduce the amount of waste being sent to landfill or Energy from Waste plants, and the need for transportation to large, centralised sites.

Equally important, a compost bin is a fascinating teaching resource which can be used to support pupils' learning across the curriculum.

Compost Top Tip: Balance is key

The key to successful composting is to mix materials full of water with those that provide air. 'Greens', such as fruit waste and vegetable peels, provide water and are nitrogen rich. Woody, carbon rich materials such as twigs, dead leaves, cardboard and wood shavings, the 'browns', provide essential air pockets.

Always balance your 'greens' and 'browns' so you're composting roughly the same volume of each.

"The ground's generosity takes in our compost and grows beauty! Try to be more like the ground."

Rumi

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[1] *Defra Waste Data Flow, 2012/13*

[2] *The nature and scale of waste produced by schools in England, Wrap, 2008*

Class Activity: September

Food waste audit

Pupils conduct an investigation to find out what types of food waste the school produces over the course of a week.They use the information to decide what type of composting system would be most suitable for the school.

Group	Whole class (upper or lower KS2)
Space needed	Normal classroom
Timing	1 hour whole-class introductory session on Monday; 1 hour whole class analysis session on Friday; 20 minutes small group weighing session each afternoon of the week.
You will need	• Teachers' information sheet 'What happens to our waste?' about Landfill and Energy from Waste (EfW) at the back of this handbook. • Buckets, caddies or black plastic bin bags to collect the food waste • Weighing scales (the hanging type is best if your collection containers have handles or you are using black bin bags; if not, use kitchen scales. • Recording sheets (see following page) • Results spreadsheet. Download from: zone.recycledevon.org/teachers/compost • Antibacterial hand soap and cleaning spray, cloths • An image of a landfill site.Download from: zone.recycledevon.org/photos
Health and safety	Ensure that the food waste is stored somewhere cool and for as short a period as possible. Although pupils are not handling food waste directly, they should wash their hands thoroughly with antibacterial soap after weighing the caddies / buckets / bags. Pupils should be adequately supervised when weighing the food waste to ensure it is not spilt.
Preparation	For this activity you need to collect all the school's food waste daily for a week. This should include: waste from pupils' fruit snacks, uncooked kitchen waste (e.g., vegetable peelings), and cooked food leftovers. Do not include waste from pupils' packed lunches. Each type of food waste should be kept in a separate caddy / container so it can be easily weighed. To ensure all lunchtime food waste is collected, and it is not mixed with non-food items (e.g., packaging from packed lunches), it is essential to talk to the kitchen staff and mid-day meal supervisors in advance. Explain the aim of the activity and ensure that they are happy to participate in the collection of the food waste for the week in question. Be sensitive to their roles in the production of the school meals, making it clear that the activity does not imply criticism of school food. To ensure the collection of all fruit waste, it will be necessary to talk to teachers and / or the adults supervising pupils during playtime, particularly in Key Stage 1.

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Introduction	Where does our rubbish go when we throw it in the bin? *See the teachers information sheet 'What happens to our waste?' at the back of this handbook to support you in responding to pupils' answers.* How can people help with this problem? Discuss how the school already uses the 3Rs (Reduce, Reuse and Recycle) such as recycling paper, reusing water bottles, using scrap paper drawers. People in Devon are pretty good recyclers. In 2012/13 we landfilled 172, 000 tonnes of waste (a family car weighs a tonne) and recycled / composted 200,000 tonnes. Our recycling rate is 54% which is much higher than most parts of England. BUT we still need to send less rubbish to landfill, and composting at school is one way to do this. Explain the activity to the class, introducing the three categories of food waste (fruit waste, uncooked food waste from the school kitchen, and cooked food leftovers). Ask pupils to predict which category of waste there will be most of. Do they have any other predictions, such as variations from one day to the next?
Main session	Divide the class into 5 mixed ability groups (one group for each day of the week). Each afternoon, one group of pupils weighs the three categories of food waste and records their answer. (They may need to be reminded to subtract the weight of the empty container, if you are using buckets / caddies. If your food waste is stored in bin bags this is not necessary.) Pupils might like to keep a chart visible on a display wall so that everybody can see results as the week progresses.
Plenary	After a week of weighing, enter the results into the spreadsheet provided and ask pupils to discuss the graphs generated. Were their predictions about the food waste correct? Are there variations from day to day? Why might this be? Using the total amount of food waste, decide which composting equipment would best suit your school. Guidance can be found at zone.recycledevon.org/teachers
Curriculum links	**Mathematics** Measurement: lower KS2 *(weight / mass)* Statistics: Y4 and Y6 *(bar and pie charts)*
Extension or simplification	Put on gloves and sort the 'fruit waste' category to find out how much of it is peels and cores that are ready to be composted, and how much is uneaten or partially eaten fruit. You may decide to have a campaign to encourage KS1 pupils to eat more of their fruit. If your investigation found a lot of cooked food waste, you may want to look into ways to reduce (rather than recycle) this. For more information see www.recyclenow.com/reducing-food-waste Investigate how much food waste is generated by pupils' packed lunches as part of a packed lunch waste audit. For more information see the resources section at zone.recycledevon.org/teachers

Class Activity: September

Food waste audit weighing sheet

School name: _____

Number of pupils on roll: _____

Number of school meals served each day: _____

To help work out which type of composting equipment is best for your school, you need to have an accurate picture of how much compostable waste you generate. Separate your food waste into the three categories below, and weigh each category daily for a week. Record your results in the table below.

Category	Weight (kg)				
	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
Fruit snack waste					
Uncooked food waste					
Cooked food					
Daily total					
Weekly total					

Transfer your completed results onto the spreadsheet provided at: zone.recycledevon.org/teachers/compost to create graphs and pie charts for analysis.

Eco Activity: September

Making a slatted composter from reused materials

Pupils (with adult support) reuse discarded wooden pallets to create a simple piece of equipment to compost the school's garden and uncooked food waste. They hold an inauguration ceremony to celebrate the compost bin's first 'feed' and to raise the profile of composting in the school.

Group	Eco Team and a minimum of two adults
Space needed	Outside space on flat, level ground, preferably near where the finished compost will be used.
Timing	Three hours to make the bin, once the materials have been sourced. This can be spread over as many sessions as you want – the part-built compost bin can be left outside in the meantime. 20 minutes for the (optional) inauguration ceremony.
You will need	• Four wooden pallets of the same size, with small gaps between the slats (approx 3cm gaps are ideal; 8cm or more is too wide). Pallets are widely available free of charge • Two planks of wood, the same length as the pallets • String, nails, hammer
Health and safety	Pallets splinter easily so consider wearing gloves. Adult supervision is essential when children are using hand tools.
Introduction	What composting equipment are the children familiar with? *Pupils may refer to: plastic 'dalek' composters; tumbling plastic composters; cooked-food composters such as the Ridan, ScotSpin or Jora (used by many Devon schools); wormeries and leafmould bins.* It's not always necessary to buy expensive composters – explain the activity: making a composter for almost no cost by reusing some pallets that would otherwise have been thrown away. *Look at the pallets and discuss why they will make a good compost bin. The gaps between slats will allow air into the compost bin for the micro-organisms and minibeasts that do the composting. The large size of the finished compost bin means it will get nice and warm in the centre, even in the winter.*
Main session	**Making the compost bin** 1. Stand three pallets on their edges to mark out three sides of the square compost bin. 2. When these are aligned, tie them together with thick string at each corner. Tie each corner 'post' in three places – top, middle and bottom. 3. Use the two lengths of wood to strengthen the front of the box – nail one slat across the top edge and one across the bottom to stabilise the structure and prevent the weight of the organic waste causing the box to splay open. 

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Main session (cont.)	4. Use the fourth pallet as a 'door' by tying one edge in to create a hinge.  
Plenary	Stand back and admire your wonderful new compost bin! Would the children who made it like to give it a name? Discuss how you are going to tell the rest of the school about what you have made and involve them in 'feeding it' regularly.
Extension or simplification	• Create two bays using three additional pallets. The bin should look like an 'E' shape from above, with two doors. You can fill up one side whilst the other is left to rot down. • Hold a ceremony to mark your new compost bin's inauguration. Invite key members of staff, parents and interested members of the local community. Make sure somebody has a camera to record this important event! First add some already finished compost from another heap, some leaf mould or some garden soil. (This will start off the composting process by introducing a good batch of healthy micro-organisms.) Then empty in a bucket of fresh fruit / vegetable peels ('green' materials), and a roughly equivalent volume of 'brown' materials (e.g., sawdust, twigs, cardboard.) Make sure everybody understands that the new compost bin needs a balanced diet of 'greens' and 'browns' to keep healthy! • You could cover your heap with a layer of cardboard to deter fruit flies and keep in the warmth. • Ask older KS2 pupils to write a news release to publicise the launch of your new compost bin in the local newspaper. See zone.recycledevon.org/teachers/compost for a writing frame to support them to do this.
Additional resources	• For a wooden composter with removable slatted front see: http://w.organicgardening.org.uk/pdfs/Making%20a%20New%20Zealand%20compost%20box.pdf

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Activities for October

Autumn is drawing in and it's the time to harvest your pumpkins to make warming soup and Halloween lanterns. Make a note to sow pumpkin seeds in June next year, as part of a science or Eco Team project. They will thrive in fertile conditions, so if you have a large open compost heap, sow the seeds directly into it and watch them flourish!

Compost Fact: Composting saves money

A typical primary school pays between £400 and £1,000 for waste disposal each year. With the cost of landfill increasing annually, this expenditure will only rise.

Making compost at school reduces the amount of waste in your bins, so less of your precious school budget is spent paying for rubbish collections.

Making your own compost also means you don't have to buy compost or artificial fertilisers. A win-win situation!

"However small your garden, you must provide for two of the serious gardener's necessities: a tool shed and a compost heap."

Anne Scott-James (English journalist and author 1913-2009)

Compost Top Tip: Keep autumn leaves

If you have deciduous trees in your school grounds, make the most of their autumn leaves by turning them into leafmould.

Sweeping the leaves up and putting them in a leafmould container will stop them blowing around, and in a couple of years you will have a nutrient-rich material for potting or top dressing your beds.

Use our simple instructions (see October's activity sheet) to make a leafmould container with your Eco Team and look forward to collecting up the leaves on a crisp autumn afternoon.

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Class Activity: October

Making Rot Pots

Pupils create a miniature compost heap in a bottle using a range of materials and observe it over several weeks to learn about the process of bacterial decomposition.

Group	Whole class (lower KS2) or Eco Team, working in groups of 2 or 3 pupils.
Space needed	In the classroom, or outdoors in fine weather.
Timing	Initially 45 minutes; then 10-15 minutes a week for 4 to 6 months to follow up by observing and discussing the Rot Pots.
You will need	• Rot Pots recording sheet. See following pages. • Clean 2L clear plastic bottles (1 per group). Discard the lid and cut around the top part, leaving a hinge (see image.) • Masking tape. • Newspaper / plastic sheeting to cover desks • White sticky labels and pens • Several jugs / small watering cans • Gloves (optional) • Bowls / buckets of compostable material such as: fruit and vegetable scraps, garden waste, shredded paper, cardboard and wood shavings. • Antibacterial soap 
Health and safety	Any food waste should be raw and freshly produced. It should not have come into contact with meat products. Consider pupils with food allergies – it may be appropriate for these children to wear gloves or to be responsible for recording without handling the food waste. Pupils should keep their hands away from their faces while working with the waste materials. They should wash their hands thoroughly using antibacterial soap at the end of the activity.
Introduction	What do pupils know about compost bins? What materials should we put in? What organisms are involved in the process of decay? What conditions do these organisms need? Refer to 'The Compost Mix' at the front of this book. *- Micro-organisms (bacteria and fungi) need air, water, warmth, food.* *- In a compost bin the water comes from fruit waste, vegetable peelings, and green leaves (the 'greens').* *-Tough, woody materials such as cardboard, wood shavings, dead leaves and small twigs (the 'browns') provide air pockets.* *- Both types of ingredients provide the food for micro-organisms.* *- With a good balance of 'greens' and 'browns' the micro-organisms flourish and break down the materials into compost. In doing so, they recycle the nutrients present in the 'greens' and make them available to plants when the compost is used in the garden.* *- Decay is nature's method of recycling living things.*

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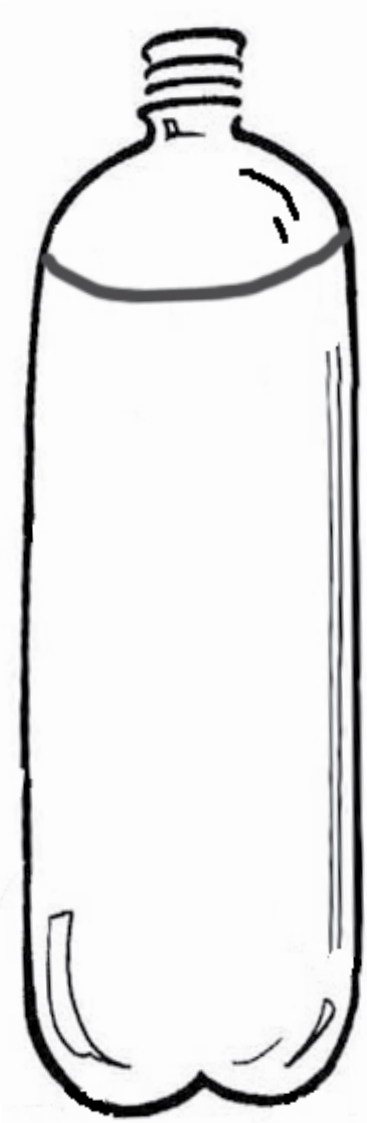
Main session	1. In pairs / small groups, pupils select a plastic bottle and add the compostable materials in layers. 2. Once the bottle is full to the open rim, they add a little water (about two tablespoons) to moisten the ingredients. 3. They fold over the hinged section and secure with masking tape. 4. The group choose a name for their rot pot, write it on a sticky label and stick it onto the bottle. 5. Having washed their hands, pupils make a careful record of what they have put into their rot pot using the rot pot recording sheet.
Plenary	Groups share what they put into their rot pot. They discuss the best location for their rot pots, based on their knowledge of the conditions needed for decay. (All rot pots can be placed together on a windowsill or outside, or a variety of locations identified – see below.) Pupils make predictions about what will happen to the contents of their rot pots over the next few months.
Curriculum links	**Science** Working scientifically: lower KS2
Extension or simplification	Experiment with different locations for the rot pots by changing one variable e.g., temperature, amount of light. Experiment with rot pots with different proportions of ‘greens’ and ‘browns’ and record the differences in decomposition.

Class Activity: October

Rot Pots recording sheet

Pupils' names	
Rot Pot name Put the name on a label and stick it on your Rot Pot.	
Record Record the different layers you have put in your rot pot on the picture of the bottle.	
Predict Predict what will happen inside the rot pot. What changes will you be able to observe?	

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Observe	Date	Observation
Observe the pots regularly (every week or two). Write down what you see.		
Compare Compare your observations with your predictions. What did you predict correctly? What surprises did you see?		

Eco Activity: October

Making a leafmould bin

Pupils build a container to create leafmould, a useful material for potting and seed-growing mixes as well as adding valuable organic matter to soils.

Group	Eco Team
Space needed	Outdoors
Timing	Approx 1 hour to make one bin. This activity is best done in September or early October, so your bin is ready for all the autumn leaves.
You will need	To make one container about 1.2 m^2: • Chicken wire - just over 5m • 4 wooden posts, 1.5m long • 1 pack fencing staples • Gloves (1 pair per child) • Tape measure • Hammer • Wire cutters • Spade • Sledge hammer
Health and safety	Chicken wire can have sharp edges and tends to spring around, so roll it out flat and handle it carefully, wearing gloves. Ensure adequate adult supervision of pupils when using hand tools.
Introduction	Discuss the importance of leafmould with the children and why a leafmould bin is useful. *Before deciduous trees shut down for winter, they extract as much food as they can from their leaves, leaving autumn leaves which are rich in carbon. The leaves fall from the trees and are broken down, mainly by fungi, to become leafmould. The fungi prefer cooler conditions than the bacteria that live in the compost bin, so large amounts of autumn leaves are best recycled separately in a leafmould bin. Once the leaves have rotted down, the leafmould can be used to improve the soil and help more plants to grow.*
Main session	**Making the leafmould bin** 1. Select where you want the container to go, and mark out the position for each upright post using the tape measure to set them approximately 1.2m apart in a square. 2. Dig holes at the four corners for each post, approximately 50cm deep. 3. Insert the posts into the holes and backfill with soil. 4. Stomp around the posts to ensure they are secure. 5. Attach one end of the chicken wire to the first post using fencing staples at the top, middle and bottom. 6. Stretch the wire to the next post and attach it using fencing staples. 7. Continue to the third and fourth post, and return to the starting point.

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Main session (cont.)	The leaf mould bin is now ready to be filled with autumn leaves. It does not need a lid or cover because leaves rot better when damp. Some leaves take two or more years to break down so it may be useful to build more than one enclosure to have a rotation system. 
Plenary	Talk about how the leaves will change in the coming months, and what you will use them for once they have become leafmould.
Extension or simplification	**Publicity** Take photographs of your leafmould bin to display on your Eco-Schools noticeboard and include in your parents' newsletter / school website. **Small amounts of leaves** If you only have small amounts of leaves, put them into black plastic bin bags. Make sure they are wet, and stab a few holes in the bags with a fork. Over a couple of years the contents will gradually transform into leafmould. (NB some leaves, e.g. plane and sycamore leaves, take longer – up to three years.) **Speeding up the process** Another option is to turn out your leafmould in the summer, mix in fresh lawn mowings, and put the mixture back into the leafmould bin to continue the decomposition process. **Sieving and using your leafmould** Once the leafmould is ready, sieve it and use it as an ingredient in potting and seed composts. Mix it roughly 50/50 with sharp sand* and it will make an excellent cuttings compost. Alternatively, use it on its own to top dress beds, pots and hanging baskets. (* You can substitute sharp sand with pearlite or vermiculite, commonly available in garden centres.)
Additional resources	To download Garden Organic's leaflet about making leafmould see: zone.recycledevon.org/teachers/compost

Activities for November

As winter approaches, November is a really good time to plant garlic and shallots. These need lots of nutrients to grow well, so remember to give them plenty of compost. When you get a fine day, take your Eco Team outside and prepare uncultivated ground for next spring by making a 'lasagne bed' (see the March Eco Activity sheet.)

Compost Facts: Compost adds air

Introducing compost to clay and compacted soil adds air spaces to its structure, making it 'aerobic' (with oxygen). In aerobic soils, essential micro-organisms thrive, breaking down organic matter and releasing the nutrients which plants need to grow.

Soils that don't have the air spaces become 'anaerobic' (without oxygen). When anaerobic micro-organisms break down organic matter, they generate by-products, such as ethanol, which are toxic to plants. Adding compost is central to maintaining aerobic soils and producing healthy plants.

Compost Top Tip: Add materials daily

Don't leave your peelings and cores festering in a caddy for days; under these conditions the anaerobic bacteria start to multiply and it could start to smell horrible. Always add fresh materials to your compost bin on the day they are produced to give the aerobic bacteria chance to compost them effectively. Remember to add an equal volume of 'brown' materials such as wood shavings. (See the Compost Mix page in the introduction for more details on 'greens' and 'browns'.)

"I'm queen of my own compost heap and I'm getting used to the smell."

Ani DiFranco (American singer/songwriter)

Class Activity: November

Let's talk about poo!

Pupils extend their understanding of composting by considering the treatment of human wastes in different cultures.

Group	Whole class (upper KS2)
Space needed	Classroom / ICT suite
Timing	2 x hour long lessons
You will need	Access to the internet
Health and safety	This activity is classroom based and has no health and safety considerations other than those of normal teaching.
Introduction	Many people dispose of fruit peel, vegetable scrapings and leftover food in the rubbish bin. Is there a better option? How can these materials be used as a resource rather than wasted? *Discussion may include: ways to reuse leftover food; different kinds of composting at home / school; and local authority food waste collections.* After we have eaten our food there is another form of waste – human excrement and urine. Watch this short video to find out what happens to human waste after we flush the toilet: www.bbc.co.uk/learningzone/clips/what-happens-to-our-sewage/13458.html We are often too embarassed to talk about human waste, but by avoiding the issue we are wasting valuable nutrients by flushing them down the loo! Do pupils know of any examples where people use human waste as a resource? *Children may suggest examples from history, from other parts of the world, or may have had experience of a composting toilet here in the UK.*
Main session	Pupils investigate ways in which people in different countries use solid and liquid human waste as a resource. They choose to research one of the options below (see the resources list for suggested websites) and decide how to present their findings to the rest of the class. 1. 'Liquid Gold' – using urine as a fertiliser • What can urine be used for? • How is is separated from solid waste? 2. 'Night soils' – using human poo as a fertiliser • What are 'night soils' and why are they called this? • How are 'night soils' used in different countries around the world?

Recycle Devon

Plenary	• Discuss the key points found during pupils' research • How is the management of human waste changing in Europe and further afield?
Curriculum links	**English** Reading- comprehension: upper KS2 **Geography** Human geography: upper KS2
Extension or simplification	Extend pupils' understanding by exploring the historical perspective. Research the 'Big Stink' or 'Great Stink' of 1858, which resulted in the introduction of new sewer systems in Victorian London. The following links provide a good starting point: cheekyhistory.blogspot.co.uk/2012/06/great-stink-of-1858.html www.choleraandthethames.co.uk/cholera-in-london/the-great-stink/ This site also includes a free downloadable pack for KS2 with a wide range of literacy activites: www.choleraandthethames.co.uk/library/Teachers_Pack.pdf
Resources	**Useful websites** 1. 'Liquid Gold' In Amsterdam: www.ubmfuturecities.com/author.asp?section_id=242&doc_id=526122 In Nepal: www.environmentalhealthnews.org/ehs/news/2012/urine-as-fertilizer In Finland: www.sciencedaily.com/releases/2007/10/071008093608.htm 2. 'Night soils' In Devon: www.thunderboxes2go.co.uk In Haiti: news.nationalgeographic.com/news/2011/10/111026-haiti-waste-poop-fertilizer-farms-soil-science-environment/ In India: www.pri.org/stories/2013-06-13/recycled-lunch-using-human-waste-grow-food-and-fight-climate-change

Eco Activity: November

Compost assembly

Pupils plan and deliver an assembly to engage the whole school with composting.

Group	Eco Team
Space needed	Classroom for planning and school hall for the assembly
Timing	This assembly can be planned and rehearsed in one session, or extended over several Eco Team meetings. You will need between 1 and 3 hours for preparation and 20 minutes for delivering the assembly. This is a good activity for the start of term so the school can implement actions included in the assembly.
You will need	• Compost assembly information sheets x5 (see following pages) • Projector facilities for the assembly (if available) • Compost assembly PowerPoint (optional) • Compost survey activity sheet (optional) Props for the assembly such as: • Compost caddies used in school • Gardening gloves • Examples of compostable waste e.g., apple core, teabag, banana skin, wood shavings • Examples of non-compostable waste e.g., plastic bottle, crisp packet, drinks carton • Compost from the school composter (if available) • Photographs of your school's composting equipment
Health and safety	Pupils should keep their hands away from their faces while working with compost and food waste. They should wash their hands thoroughly using antibacterial soap at the end of the activity if they have touched compost or food waste. Any cuts on pupils' hands should be covered when working with compost. It may be appropriate for children with skin conditions such as eczema to wear gloves if touching the compost or food waste.
Introduction	Explain to the children that they are going to create an assembly so the whole school can learn about the wonders of compost and find out how they can contribute to the school's composting systems. Ask pupils what they think the rest of the school needs to know about composting. Show pupils the 5 compost assembly information sheets and the available props. Explain that they are going to work in teams to plan and rehearse an inspiring assembly. Discuss ways to make the assembly enjoyable and memorable. You could suggest pupils use acting and humour, as well as images and explanations.

Main session	1. Divide pupils into mixed ability / age groups, with up to four pupils in each group. 2. Allocate a topic to each group, and hand out the group information sheets: i. Why compost? ii. What can we compost in our school? iii. How does compost happen? iv. How can YOU get involved? v. Compost chant. 3. Set a clear time-limit to each part of the assembly i.e. 4 minutes each if there are 5 groups. 4. Allow 30 minutes for the groups to read their sheets then plan and rehearse their section of the assembly. Support pupils as appropriate to ensure their presentation is clear, interesting and factually accurate. Have at least one rehearsal of the assembly with all the groups together, before delivering it to the whole school.
Plenary	Following the assembly, evaluate its success with the pupils. Did the audience appear engaged and interested? Did pupils receive any feedback from their friends / classmates? Which messages were particularly clear? Are there any areas that might need more information in the future?
Extension or simplification	Extension: the assembly can be done in conjunction with the Compost Survey activity - see May Eco Activity. Conduct the survey before the assembly, analyse the data and look for gaps in pupils' knowledge. Focus on these gaps when planning the compost assembly. The survey can be repeated after the assembly and the responses compared to those before to assess the impact of the assembly.
Additional resources	See example of Assembly PowerPoint here: zone.recycledevon.org/teachers/compost

Eco Activity: November

Assembly information sheet for pupils

Group 1: Why compost?

Read this information together and use it to plan your section of the composting assembly. Remember: you want the audience to learn something new about composting and to leave the assembly thinking "Wow! Composting is amazing!"

To help the environment

Composting is a great way to reduce the amount of waste your school sends to landfill or Energy from Waste. Most people know that landfill sites are filling up fast. What they may not know is that food and garden waste waste rotting in landfill sites produces methane, a greenhouse gas which is contributing to climate change. Compost bins don't produce methane, so the good news is that composting helps combat (or fight) climate change.

To save money

What would you prefer your school spends money on: paying to have rubbish collected or buying computers, books and playground equipment? Your school pays for the Council or a private company to empty its bins and take the rubbish away. Composting means less rubbish, fewer bins, and money saved.

Compost is packed with nutrients to help plants grow. Using your own compost to grow fruit and vegetables in the school garden means you won't need to buy either compost or fertilisers. That's more money saved!

To help wildlife

A compost bin is an amazing habitat, teaming with worms, woodlice, beetles, slugs, snails, centipedes and millipedes. These minibeasts are food for larger animals in the compost bin and school grounds. So a compost bin is part of a food chain that allows wildlife in your school grounds to thrive.

Eco Activity: November

Assembly information sheet for pupils

Group 2: What can we compost in our school?

Read this information together and use it to plan your section of the composting assembly. Remember: you want the audience to learn something new about composting and to leave the assembly thinking "Wow! Composting is amazing!"

Compost is nature's way of recycling organic material – things that were recently alive. Materials that won't rot, like metal, plastic and glass, can't be composted. In most schools the main things to compost are:

- Raw fruit and vegetable peelings - from pupils' snacks and the school kitchen
- Tea bags from the staffroom
- Leaves, twigs, weeds, and grass from the school grounds
- Torn up cardboard and shredded paper
- Bedding from vegetarian animals like guinea pigs and rabbits

If you're lucky enough to have a 'Ridan', 'ScotSpin' or 'Jora' composting system at your school you can also compost all your leftover cooked food. This special equipment is insulated, meaning that the food waste reaches a very high temperature. They are sealed units located off the ground, which makes them 'rodent unfriendly'.

Make sure you know what composting equipment you use in your school, so you can give the rest of the school the right information about what they can and can't compost!

Eco Activity: November

Assembly information sheet for pupils

Group 3: How does compost happen?

Read this information together and use it to plan your section of the composting assembly. Remember: you want the audience to learn something new about composting and to leave the assembly thinking "Wow! Composting is amazing!"

The materials we put in our compost bin are eaten by an amazing variety of bacteria, fungi and minibeasts. There are more micro-organisms in one teaspoon of compost than there are humans alive on the planet! As the materials are eaten, they 'decay' or 'decompose' and turn into compost. The recycling organisms need four things to live:

Food

This is the material you put into the compost bin – fruit peel, tea bags, cardboard etc. Just like you, the micro-organisms and minibeasts like a variety of food, not the same thing every day! They need a balanced diet of wet, 'green' materials which contain lots of nitrogen (e.g., grass clippings, vegetable peelings) and dry, 'brown' materials which contain lots of carbon (e.g., sawdust, twigs, cardboard).

Air

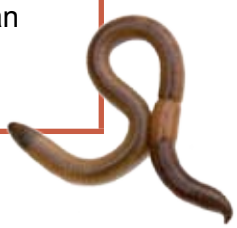
There's air in the space between the materials, which is why it's important to include materials like twigs and shredded paper with plenty of gaps. Sometimes your compost bin will need a bit of a mix to incorporate some extra air.

Water

Most of the water comes from the wet materials you put into the compost bin, like tea bags and banana peel. It can also come from the great Devon rain, or from a helpful pupil with a watering can if the compost is drying out!

Warmth

The micro-organisms in the compost bin make their own warmth as they eat and breathe, but the compost also needs some warmth from the sun. This is why composting happens faster in the warm summer than in the chilly winter.



Eco Activity: November

Assembly information sheet for pupils

Group 4: How can everyone get involved?

Read this information together and use it to plan your section of the composting assembly. Remember: you want the audience to learn something new about composting and to leave the assembly thinking "Wow! Composting is amazing!"

Decide how you would like pupils in the rest of the school to get involved in the school's composting.

You might want to consider:

- Reminding pupils where your food waste caddies are located and how to use them
- Asking teachers to compost their tea bags and fruit peels / cores
- Asking for volunteers to join a composting team or club
- Inviting pupils to join a gardening club to use the compost to grow fruit and vegetables
- Launching a competition to design labels for your compost caddies
- Reminding teachers to use the compost bin in science lessons on habitats and minibeasts
- Suggesting that pupils encourage their families to compost at home

If one class or teacher in your school is particularly good at composting, you could present them with a surprise 'star composter' award to motivate everybody else to get even better at composting.

Eco Activity: November

Assembly information sheet for pupils

Group 5: Compost chant

Read this information together and use it to plan your section of the composting assembly. Remember: you want the audience to learn something new about composting and to leave the assembly thinking "Wow! Composting is amazing!"

Your group's task is to finish the assembly with a brilliant compost chant, getting the whole school involved. An easy way to do this is using 'call and response' – you chant a line, then the audience repeat it. It's a bit like a game of tennis – the chant bounces back and forth between you and the audience!

Here are a couple of verses to get you started:

Think of all the landfill sites
Filling up, it's just not right.

Compost bins are really cool
In your garden and at school.

Now it's over to you to make your own verses about your school's composting. On a piece of scrap paper, make a list of words that rhyme with:

bin	**rot**	**brown**	**green**
core	**worm**	**peel**	**grow**

Use your rhyming words to make three or four more verses, each with two lines like the examples above. Make sure your last verse finishes on a really positive note. One option is:

Work together that's the plan
Make a difference? Yes we can!

Practise your chant until your group is really confident. You'll be leading the whole school, so it's important to say the words together clearly and rhythmically. Don't rush! You might find it helpful to set up a pulse first by clapping or slapping your hands on your thighs, then fit your chant with this rhythm.

If you've got plenty of time for rehearsal you could include instruments or make up actions to help people remember the chant. But the most important thing is that everybody can hear the words and enjoys joining in with the chant.

Don't let Devon go to waste

at school

Activities for December

It may be cold outside but December is the perfect time to spread compost (or well rotted manure) around the garden. Use it around fruit trees in a thick layer or 'top dressing', or add to trenches ready for planting next year's runner beans. If you have a particularly cold garden area, you can protect sensitive plants like marjoram and rosemary, by putting leaf mould around them.

Compost Fact: Compost locks up carbon

We know how important it is to reduce our emissions of carbon into the atmosphere to combat climate change. The good news is that compost can help!

Soils containing compost become 'carbon sinks', locking carbon molecules away and slowing down the rate at which they combine with oxygen to make carbon dioxide gas.

My whole life has been spent waiting for an epiphany, a manifestation of God's presence, the kind of transcendent, magical experience that lets you see your place in the big picture. And that is what I had with my first compost heap."

Bette Midler (singer, songwriter, actress)

Compost Top Tip: Get your systems right

Use colour coded bins throughout the school for different types of waste: compost, recycling and landfill. Make sure they are clearly labelled with words and pictures so that pupils and staff can easily understand what goes where. Pupils could design their own labels, perhaps in a whole-school competition.

Designated places for your containers will help people find them quickly - if they have to search for the right bin they may lose patience and use the nearest one, whether it's the correct type or not!

Recycle Devon

Class Activity: December

Compost Christmas gifts

Pupils use compost made in the school grounds to plant Paperwhite Narcissii bulbs in reused pots as a Christmas gift.

Group	Whole class (lower KS2) or Eco Team
Space needed	Classroom, or outdoors if warm enough. The activity might get compost on the floor so it is best to use an area that can be cleaned easily. Alternatively, put down newspaper, which can then be layered on your compost heap after the activity.
Timing	45 mins to 1 hour. The bulbs should flower in 4 to 8 weeks from when they are planted, so this activity can be done from late November onwards.
You will need	• A large bucket or container of finished compost from the school composter. This should be sieved if it still has large pieces in it. • Sand (any except builders' sand) or grit to mix in with the compost to help drainage; this is not essential, but will help the plants to thrive. • Plant pots. These can be plastic or ceramic, or you can even reuse fun containers such as old tea cups. Plant pots are often available very cheaply from recycling centres, and some garden centres have an area giving away used pots. Alternatively, put a request in the parents' newsletter asking for old pots that are lurking in the shed at home. • Paperwhite Narcissii bulbs. These are available from garden centres (your local centre might donate some) or online. You could also ask if any parents have spare bulbs to use. • Watering can • Antibacterial soap
Health and safety	Pupils should keep their hands away from their faces while working with compost and soil. They should wash their hands thoroughly using antibacterial soap at the end of the activity. Any cuts on pupils' hands should be covered when working with compost and soil. It may be appropriate for children with skin conditions, such as eczema, to wear gloves.
Introduction	Explain to pupils that they are going to make Christmas presents using the compost that they have been making all year in the school garden. Can they explain what finished compost can be used for? Why is it good for plants? *Finished compost can be used on garden beds or for potting up plants. It provides nutrients and water for plants to grow and hosts micro-organisms that help plants to stay healthy and thrive. Plants also need air around their roots. In a small pot even compost can get waterlogged. Adding sand to the potting mixture will help drainage and keep plenty of air around the plant's roots.*

Recycle Devon

Introduction (cont.)	Explain that pupils are going to plant Narcissii bulbs, which will flower in the winter, after Christmas. *Bulbs are stores of energy for plants. When they have water and warmth they will start flowering. Discuss with pupils the features of the bulbs, and ask them to predict where the roots and leaves will emerge.*
Main session	Pupils collect a pot and bulb/s to plant up. They fill the pot half full of compost or compost/sand mixture. They place the bulb(s) in the pot, with the shoot (pointed) end upwards, then fill it up leaving the top third of the bulb(s) exposed. If planting more than one bulb they can be very close, but ideally not touching. If using other bulbs, follow the planting instructions on the pack.
Plenary	How should we care for the bulbs? What do plants need to grow? *All plants need air, light, water, nutrients and room to grow. The Narcissii will get food from the compost and, once they have leaves, from the sunlight through photosynthesis. They also have some food stored in the bulb.* *The bulbs need water, and the compost will need to be kept moist by watering, probably once or twice a week. Check them every few days and if the compost feels dry, give them some water. If they get too much water they won't get enough air and might rot. Avoid getting the compost 'soggy', and let it dry out before watering again if it is.* Pupils may also enjoy discussing who they would like to give their Narcissii to, and planning how to explain to the recipient where the compost was made.
Curriculum links	**Science** Plants: Y3 *(the requirements of plants)*
Extension or simplification	Other winter flowering bulbs or corms can be used, such as Hyacinths, Amaryllis, Cyclamen and Iris. Be aware that Hyacinth bulbs can cause allergic reactions so gloves should be used. Plants use bulbs as an energy store to get them through the rest of the year when they are not flowering. You could cut a bulb in half and see what it looks like. Onions are a type of bulb. Before planting their bulbs, pupils could decorate their plant pot. They could also make a gift tag from a reused Christmas card to accompany their eco-friendly gift.

Eco Activity: December

Compostable Christmas cards

Pupils use biodegradable materials to produce compostable Christmas cards.

Group	Eco Team
Space needed	Classroom or art room with an easily cleaned floor
Timing	1 hour (plus overnight drying time)
You will need	• Thin card • Flour and water paste • Glue brushes • A selection of organic materials such as twigs, dried leaves, pine cones, dried grass • Sticky labels • Antibacterial soap
Health and safety	Pupils should wash their hands after the activity using antibacterial soap.
Introduction	Explain to pupils that they are going to make a very special Christmas card that can be put in the compost bin once the Christmas celebrations are over. Discuss what materials it should be made out of in order to be compostable. Remind children that only things made from living things will rot, and that we need a mixture of 'green' and 'brown' plant materials to make good compost. *'Greens' are things which add water to the mixture such as fruit waste, vegetable peelings and grass cuttings; 'browns' help to add structure and allow air to get into the mix. People sometimes forget the 'browns' but they are essential to help micro-organisms thrive in the compost heap.* This activity will use 'browns' such as card, twigs, dried leaves, pine cones, hay or straw to create Christmas cards which can be composted after use.
Main session	Make a biodegradable 'glue' using 3 parts flour to one part water. Mix thoroughly. Give each child a large piece of thin card and a large pile of 'browns' and allow them to design and decorate their card.
Plenary	• Can pupils remember what is so special about their card? Who would they like to give it to? How will they make sure it is composted after it's been enjoyed over the Christmas period? • Make a label to stick on the back saying 'Hand made from compostable materials' or 'Please compost this card after use.' • Cards will need to dry somewhere warm for 24 hours before being taken home.

Recycle Devon

Extension or simplification	Adapt the ‘compost scavenger hunt’ activity (see April Eco Activity) to gather up materials before making your cards. Consider including some non compostable items in pupils’ selection of materials and challenge them to select only appropriate ones for their compostable card. Compose an acrostic poem to go inside the card using the word COMPOST, combining a Christmas and ‘composty’ message for the recipient of the card. Make cards for the governors / headteacher to remind them how important the Eco Team is and raise the profile of compost.

Activities for January

January is the month to sow hardy broad beans outside. For a warmer indoor activity, pupils can fill cardboard tubes with a mixture of your school's compost and sharp sand and sow the large seed directly into it. Or try reused glass jars so pupils can marvel at the development of the plant's roots and shoots as part of science lessons.

Compost Fact: Compost means less digging

You can never have too much compost in your garden. Digging clay soils can be heavy work; sandy and peaty soils are easier, but digging can disturb the soil ecology and chop up earthworms.

By spreading generous amounts of compost on the surface of soil, you can sow and plant into this layer and leave the earthworms to do the digging.

"A good compost pile should get hot enough to poach an egg, but not so hot it would cook a lobster"

Anonymous

Compost Top Tip: Keep your composter warm!

The composting process slows down naturally during the colder months since bacteria work best in warm conditions. If you have a cooked food (in-vessel) composter, such as a Ridan, Jora or a ScotSpin, it will be ready-insulated to keep the action going.

However, it's a good idea to keep an eye on it, especially in sub-zero outdoor temperatures! A plastic 'dalek' or cone style compost bin will benefit from a layer of insulation in very cold weather in the form of a straw or bubble-wrap jacket, or similar.

The larger your container or heap, the more heat it will generate naturally – as long as it is fed with a good balance of 'greens' and 'browns'. (See the Compost Mix page in the introduction for more details on 'greens' and 'browns'.)

Class Activity: January

Persuasive letter writing for new composting equipment

Pupils write persuasive letters seeking help in sourcing equipment to introduce or extend composting in their school. Letters could be written to potential funders, such as the PTA, asking for financial help, or to local businesses who might be persuaded to donate equipment to the school (e.g., a local DIY store or garden centre.)

Group	Whole class (upper KS2)
Space needed	Normal classroom
Timing	1 hour
You will need	• Reused paper for drafting the letters • The compost information sheet on the following page • Images of the composting equipment you would like to source • Compost persuasive letter writing frame (optional)
Health and safety	There are no health and safety considerations for this activity, other than those for normal classroom teaching.
Introduction	Explain that the class is going to use persuasive writing skills to compose letters asking for help to get new composting equipment for the school. Ensure that they know what composting already takes place at school, what equipment you would like to introduce, and the cost of the new equipment. If you are planning to write to local businesses asking for donations of composters or other equipment (e.g., gloves, caddies) ask pupils to suggest retailers that could be approached. As appropriate, divide the class into groups to write to different audiences.
Main session	Pupils' letters will need facts about why the school wants to start composting / compost more, presented in a persuasive manner. Discuss how the reasons for composting in the Compost Information Sheet could be presented in a more persuasive way. What sort of language would persuade the recipient of the letter that pupils in the school are passionate about composting? What information would customise the dry facts for your school? Pupils may want to include in their letters: how much your school spends on waste collections each year; which pupils will benefit from the responsibility of organising the composting; who in the school will use the compost when it is finished; what will be grown using the finished compost; who will eat any fruit / vegetables grown in the compost; links to other initiatives in the school to reduce the amount of waste sent to landfill, such as recycling and reusing. An optional writing frame is provided to help pupils structure their letter. See the resources section at zone.recycledevon.org/teachers

Recycle Devon

Plenary	Ask pupils to swap the letters they have written and, in role as the letter's recipient, provide each other with feedback. Which parts of the letters are particularly well worded and persuasive? Are there any sections which could be improved? Make final edits to the letters, write / type them up, then post them to their intended recipients.
Curriculum links	**English** Writing - composition: upper KS2 *(persuasive letters)* Reading – comprehension: upper KS2

Class Activity: January

Compost information sheet for pupils

Why compost at school?

1. Save the school money

Schools pay to have the contents of their rubbish bins taken away, usually to landfill sites. When a school starts composting, they don't put their food waste in their rubbish bins and so they will have less rubbish. This means they should be able to reduce the number of bins they need, or the frequency of collections. Less money spent on rubbish collections means more is available for things like playground equipment, books and computers.

2. Make something useful

Compost contains nutrients that help plants in the school garden to grow. By making their own, schools do not need to buy compost or fertilisers.

3. Help the environment

By composting food waste and garden waste, we reduce the amount of rubbish being sent to landfill sites. This is good because landfill sites are filling up, fast. It also means that fewer vehicles are needed to collect the waste, and reducing pollution from vehicle exhaust emissions.

When food waste and garden waste are sent to landfill, they rot and produce methane, a greenhouse gas that contributes to climate change. However, when food waste and garden waste are composted successfully, with plenty of oxygen, the process does not produce methane.

In Devon, some of our rubbish is taken to an 'Energy from Waste' Plant (EfW). Here the food and garden waste, along with other rubbish, is burnt at very high temperatures, destroying the nutrients it contains. Making compost and putting it onto the land returns these nutrients back to the soil and keeps the natural nutrient cycle going.

4. Teach pupils essential skills and knowledge

Pupils who are involved in composting can learn practical skills and develop a sense of responsibility. Teachers can link composting to science lessons, making learning about plants, habitats and micro-organisms relevant and interesting for their pupils.

5. Have fun

Many pupils and adults enjoy practical hands-on activities such as composting and gardening.

Eco Activity: January

'Compost' cakes

Pupils make delicious cakes in the shape of a 'dalek' compost bin, using plastic cups as moulds. The cakes can be used as a treat for the Eco Team to recognise their important role in the in the school's composting, or shared with others to thank them for their contribution to the composting process and create a positive attitude to composting.

Group	Eco Team
Space needed	Food preparation space (no cooking required)
Timing	1 hour (plus)
You will need	To make 10 cakes: • 2 mixing bowls • 10 plastic cups • Spoons • Plates/serving trays • Rolling pin • 1 large plastic sandwich/freezer bag (or similar) • 1 pack chocolate cookies (Oreos or similar) • Jelly 'worm' sweets and other 'bug' shaped sweets • Chocolate cakes/muffins (ready made) • Two packets instant chocolate dessert (such as Angel Delight) • 100g unsalted butter (at room temperature) • 250g cream cheese • 50g caster sugar
Health and safety	Ensure pupils have washed their hands and surfaces are clean before handling food. Adult supervision is required at all times. Check whether any pupils in the group have food allergies. (It may be necessary to appoint them as official photographer so they do not handle the food). Cakes should be consumed within 48 hours.
Introduction	Explain that the group are going to make 'compost cakes'. Discuss what you are going to do with the cakes. Eating them yourselves is an option. Other possibilities include: • Sharing them with the kitchen staff to thank them for composting their vegetable peelings. • Using them as prizes for a compost-related competition (e.g., designing a caddy label). • Using them to reward individual teachers and pupils who are particularly supportive of the school's composting / recycling. • Sharing them during a picnic to celebrate the school's new composting equipment or achievements (see July's Eco Activity). • Selling them at a school fair or cake sale to raise funds for composting or gardening equipment.

Recycle Devon

Main session	Making the cakes 1. Crumble the chocolate cake/muffins into a large bowl. 2. In another bowl, combine the butter, cream cheese and caster sugar until smooth and creamy and mix in two packets of instant chocolate pudding – already made following the pack instructions. 3. Lightly butter the inside of each plastic cup. 4. Build up layers of crumbled cake and chocolate mix in each cup. Draw the comparison with layering materials as you put them into the compost bin, to get a good mix of 'greens' and 'browns'. 5. Press down firmly on the top of the mix, tip it upside down onto a plate, then carefully remove the cup to leave a freestanding compost bin shaped cake. 6. Decorate the compost cakes with 'bug' shaped sweets, while talking about how important the minibeasts in the compost bin are to the composting process. 7. Crush the chocolate cookies in the plastic sandwich bag using a rolling pin. Ensure that the bag is securely fastened and that air has been removed before crushing! 8. Arrange your compost bin cakes on a plate, artistically surrounded by a scattering of edible 'soil' (biscuit crumbs).  
Plenary	How you finish the activity depends on who is going to eat the cakes. If you are planning to eat them with the Eco Team, enjoy! If you are going to give some cakes to others, discuss what you are going to say to the recipient to make a special event of the cake award. If you plan to sell your cakes, discuss how much you will charge for each and how you will package them using only compostable / recyclable materials.
Extension or simplification	Take photographs during the cake preparation, and write up the recipe for the school newsletter or website to spread the composting message to parents and the local community. If you are using the cakes as thank yous or prizes, take photographs during their presentations, and display them on your Eco-Schools notice board with captions explaining why each person was awarded a compost cake.
Additional resources	For a large cake to share try here: cooking.allwomenstalk.com/fun-april-fools-day-recipes/6/ Or, if you're feeling extremely adventurous, wonder at this incredible 'pudding in a pot': cumbriafoodie.wordpress.com/2012/07/31/pudding-in-a-plantpot-blooming-crazy/#more-2329

Don't let Devon go to waste

at school

Activities for February

Chilly February is the perfect time to plan the year ahead in the garden. Stay inside in the warm, give your class a budget and a handful of seed catalogues, and watch a numeracy lesson unfold as the school garden dreams of a blooming summer!

Compost Fact: Compost feeds the soil

Using compost in your garden will dramatically increase the life in your soil, both the amazing minibeasts visible to the naked eye and those that can only be seen using a microscope.

There are over 600 million beneficial bacteria in just one level teaspoonful of healthy soil; adding compost increases the concentration of these essential micro-organisms.

As well as recycling nutrients from dead vegetation into a form that growing plants can use, soil microbes provide food for a whole range of other organisms. These, in turn, feed the next layer of the food chain – soil has its own fascinating and complex web of life.

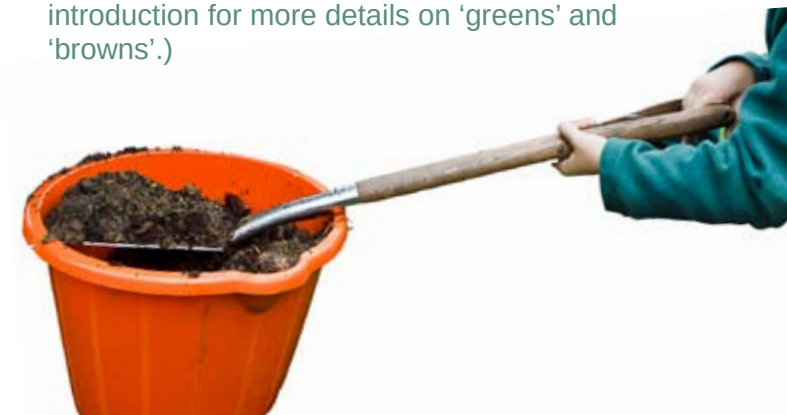
"Confess yourself to heaven,
Repent what's past, avoid what is to come,
And do not spread the compost on the weeds
To make them ranker."

Hamlet, William Shakespeare

Compost Top Tip: Give your compost a boost!

When setting up a new compost bin, add a spadeful of compost from an existing bin or heap to introduce a good mix of microbes and kick-start the decomposition process. Under optimum conditions, colonies of bacteria can double in size every hour; in 24 hours one bacterium can become over 8 million!

Later in the year, give your resident microbes a treat by adding a bucketful of fresh grass mowings to your compost bin. With its large surface area and plenty of surrounding oxygen, grass provides a feast for micro-organisms, boosting the temperature of your compost and speeding up the rotting process. Don't forget to balance the grass, a 'green', with some 'brown' materials. (See the Compost Mix page in the introduction for more details on 'greens' and 'browns'.)



Recycle Devon

Class Activity: February

Worm survey

Pupils learn about four different types of worm, and then conduct a survey to find out how common they are in a range of habitats. They analyse their survey results using charts, and draw conclusions about the adaptation of different worm types to a range of conditions.

Group	Whole class (lower or upper KS2)
Space needed	The main session should take place outdoors in a range of habitats, ideally including: 1. a compost heap / bin 2. a garden bed 3. a lawn 4. a woodland or hedgerow Refer to the habitat guidance notes on the survey sheet (see following pages) for more details. If the school does not have access to all of these habitats, you may wish to adapt the recording sheet to include the habitats you do have in your school grounds. The second part of the activity is classroom based.
Timing	45 minutes outside, plus 45 minutes to 1 hour in the classroom. If possible, choose a day when it has rained recently.
You will need	• Riverford's Big Dig worm survey booklet; see page 5 for an identification key, (print 1 per pair of children); see page 2 for images of the four types of worm. Download from zone.recycledevon.org/teachers/compost • Worm recording sheet; see following pages (1 per pair of children) • Worm survey data spreadsheet zone.recycledevon.org/teachers/compost • Trowels (1 per pair of children) • Pencils, clipboards, rulers (1 of each per pair of children) • Used plastic carrier bags (1 per pair of children) • Magnifying glass, gloves (optional) • Squared paper, coloured pencils for making charts (optional) • Antibacterial soap
Health and safety	Pupils should keep their hands away from their faces while working with compost and soil. They should wash their hands thoroughly using antibacterial soap at the end of the activity. Any cuts on pupils' hands should be covered when working with compost and soil. It may be appropriate for children with skin conditions, such as eczema, to wear gloves.
Introduction	1. Discuss with pupils why worms are described as the 'gardener's best friend.' *They turn waste food and weeds into compost; they mix nutrients into the soil; and they move through the earth making air and water passages that are essential to help plants grow. They are also an important source of food for wildlife like birds, badgers and hedgehogs.* 2. Explain that they are going to conduct a survey to learn about worms and the habitats in which they live. 3. Introduce pupils to the four main types of worm using the images and explanations on page 2 of the Riverford Big Dig worm survey booklet. Encourage pupils to practice pronoucing the four worm group names: • Endogeic (pronounced *end-oh-GEE-ick*) • Epigeic (pronounced *epp-ee-GEE-ic*) • Anecic (pronounced *an-EE-sic*) • Composting

Recycle Devon

Introduction (cont.)	4. Introduce pupils to the worm identification key on page 5 of the Riverford Big Dig worm survey booklet. 5. Introduce pupils to the worm survey recording sheet and explain the activity. 6. Emphasise the importance of caring for the worms and any other minibeasts they find and of taking care to avoid contact between compost / soil and their eyes or mouth.
Main session	Pupils work in pairs, or small groups, each with a clipboard, pencil, trowel, plastic bag, worm identification sheet and worm survey recording sheet. Following the instructions on the worm survey sheet, they visit each of the four habitats and survey how many of the different worm groups there are, and record any other observations such as finding worm eggs, or lots of juvenile worms. After completing the survey pupils should return the worms to the location in which they were found. They should wash their hands before returning to the classroom. Inside, pupils create one or more charts of the data they have collected. Alternatively, they can use the pre-formatted worm survey data spreadsheet provided. This makes a simple bar and pie chart for each habitat, and a comparison chart showing the number of each type of worm in all four habitats. As well as being used by groups of children to display their results, it can also be useful as part of the plenary to collate results from the whole class (see below.)
Plenary	Discuss the survey results and compare the charts for the different habitats. Pupils could consider: • Whether the number of each type of worm varies from one habitat to another and why this might be. (You would expect to find more litter dwellers in the woodland / hedgerow habitat because leaf litter is this type of worm's main food. There will probably be more composting worms in the compost habitat because of their preference for the warm, moist conditions of the compost bin as well as the food available in this habitat.) • Whether each group of pupils has similar results. (Reasons for large variations could be features of the area surveyed, such as some areas of soil being damper, shadier or more compacted than others.) • What other habitats they might expect to find the different types of worm, based on the survey's results.
Curriculum links	**Science** Working scientifically: upper KS2 Living things and their habitats: Y4 and Y6 *(grouping / classifying living things)* **Mathematics** Statistics: Y4 and Y6 *(bar and pie charts)*
Extension or simplification	To simplify, the worm survey can be carried out in fewer habitats – the recording sheet is a Word document that can be easily edited. The session could be extended to include research into worms and their lifecycles.
Resources	More detailed identification keys and further useful information on worms can be found on www.earthwormsoc.org.uk Take part in Riverford's Big Worm Dig – for more information see www.riverfordbigwormdig.com/

Class Activity: February

Worm survey record sheet for pupils

Date of survey: _____

Names of surveyors: _____

Instructions

1. Find a space in each habitat, thinking about the guidance notes (see below).
2. Using a trowel, dig up and remove a section of soil 25cm x 25cm square and 25cm deep. Use a ruler if you need to.
3. Put the soil onto your plastic bag on the ground.
4. Look carefully through the soil. Use the worm identification key to identify the different types of worm that you find.
5. Count how many worms there are in each group and record your findings in the table.
6. Make a note of anything else you see that is interesting e.g., worm eggs, juvenile worms.
7. Carefully, put the soil and worms back into the hole where they came from. Make sure that there are no holes or uneven bits of ground that people could trip over.

Important

Keep your hands away from your face while you are working with soil and compost, and wash them thoroughly before going back to the classroom.

Always treat the worms and other minibeasts with respect.

Habitat 1: Soil in a garden bed

Guidance notes: find a space in the garden beds where there are no crop plants growing.

Worm group	Number	Worm group	Number
Litter dwellers (epigeic)		Deep burrowers (anecic)	
Soil eaters (endogeic)		Composters (composting)	
Total number of worms			
Other observations:			

Habitat 2: Woodland or hedgerow soil

Guidance notes: find space in a wooded area or under a hedge which is not walked on regularly and is not covered in grass.

Worm group	Number	Worm group	Number
Litter dwellers (epigeic)		Deep burrowers (anecic)	
Soil eaters (endogeic)		Composters (composting)	
Total number of worms			
Other observations:			

Habitat 3: Lawn or turf

Guidance notes: find space in an area of lawn or turf which can be dug up. This should be in an area that will not be too noticeable, around the outside of the grassy area.

Worm group	Number	Worm group	Number
Litter dwellers (epigeic)		Deep burrowers (anecic)	
Soil eaters (endogeic)		Composters (composting)	
Total number of worms			
Other observations:			

Habitat 4: Compost heap

Guidance notes: use a compost bin or heap.

Worm group	Number	Worm group	Number
Litter dwellers (epigeic)		Deep burrowers (anecic)	
Soil eaters (endogeic)		Composters (composting)	
Total number of worms			
Other observations:			

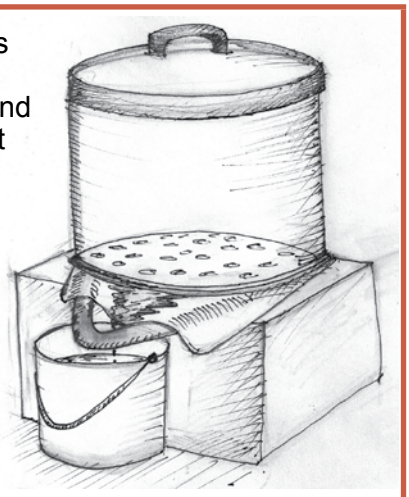
Eco Activity: February

Making your own worm farm

Pupils make their own wormery from reused materials. Once the wormery is set up, they enjoy being livestock farmers and taking care of your 'herd' of worms!

Group	Eco Team and a minimum of two adults
Space needed	Outside space or indoor workshop space if available
Timing	Two hours
You will need	• A saw • A drill • An old plastic drum (approximately 50cm in diameter) • A lid to fit the drum (e.g., an old dustbin lid) • A piece of pond liner or thick polythene • Some concrete blocks or similar to raise the drum up • A small bucket • Bedding materials e.g., leafmould, finished compost, shredded paper or cardboard. • Worms - you can find these in an existing compost heap or order them from a worm supplier. For suppliers see overleaf. • Antibacterial soap
Health and safety	Ensure that the plastic drum used to contain safe materials, such as fruit juice. (These are often advertised in newspapers' small ads or at garden centres, as they also make great water butts.) Adult supervision is required at all times, particularly when children are using tools. Pupils should wash their hands after the activity using antibacterial soap.
Introduction	What do pupils know about worms? They are amazing creatures and, as the team will know, essential in composting. Introduce the idea of 'worm farming'. This means keeping worms as livestock, just as you would keep cows or chickens! You become farmers responsible for the wellbeing of your herd of worms. Chickens lay eggs and cows make milk – what valuable resource do worms make that people can use? The main products from a wormery are worm 'compost' and a liquid rich in nutrients sometimes known as 'worm juice', which people cannot drink but is good for feeding plants!
Main session	**Making the worm farm** 1. Saw the drum in half. 2. Take the bottom half, and drill plenty of holes in its base (see illustration overleaf). 3. Set the half drum on blocks or bricks so that it is slightly higher than the bucket. 4. Put a piece of plastic sheeting underneath the half barrel to divert liquids into the bucket. It helps to make a support for the plastic by wedging two thin lengths of wood in a triangle shape (see illustration). This will help to divert the liquid down the plastic sheet and into the bucket. Place a slightly thicker length of wood under the barrel at the back, so it is tilting forwards slightly for drainage. This liquid (or 'worm juice') makes excellent plant food, diluted 1:10 with water.

Recycle Devon

Main session (cont.)	5. Put a generous layer of bedding materials in the bottom of the container (leafmould, finished compost, shredded cardboard) and make sure it is damp to create the perfect moist conditions for the worms. 6. Add your worms, either from an existing compost heap or bought from a supplier. See link below. 7. Let the worms settle into their new home for a few days before you start to feed them. 8. Feed small amounts each day, increasing the worms' rations as their numbers multiply. Worms enjoy a range of foods including fruit and vegetable peelings and eggshells. Limit the amount of citrus fruits you feed (e.g., orange peel) as this creates an acidic environment and leads to unhappy worms! Chop larger items such as apple cores into smaller pieces to speed up the rate at which the worms eat them.  
Plenary	Stand back and admire your wonderful new wormery! Discuss how you are going to tell the rest of the school about what you have made and involve them in caring for your new livestock.
Extension or simplification	• If you have time, use the other half of the barrel to make a second wormery. When your first one is full (this will take about a year, depending on the size of your wormery) you can transfer its top layers containing most of the worms to the new barrel with a generous layer of bedding material and start the whole process again. Then you can harvest the worm compost from the first barrel and use it in the garden or plant pots as a nutrient-rich top dressing. • Stacking wormeries can be made by adapting plastic storage boxes. For full instructions on this please refer to the additional resources section below. • Find out more about the life cycle of worms and create an informative display for the rest of the school.
Additional resources	For suppliers of worms and wormeries see: apps.rhs.org.uk/advicesearch/Profile.aspx?pid=726#section5 For more information on how to make and use a wormery see: www.woodwose.net/thatremindsme/2010/10/making-your-own-wormery/

Don't let Devon go to waste

at school

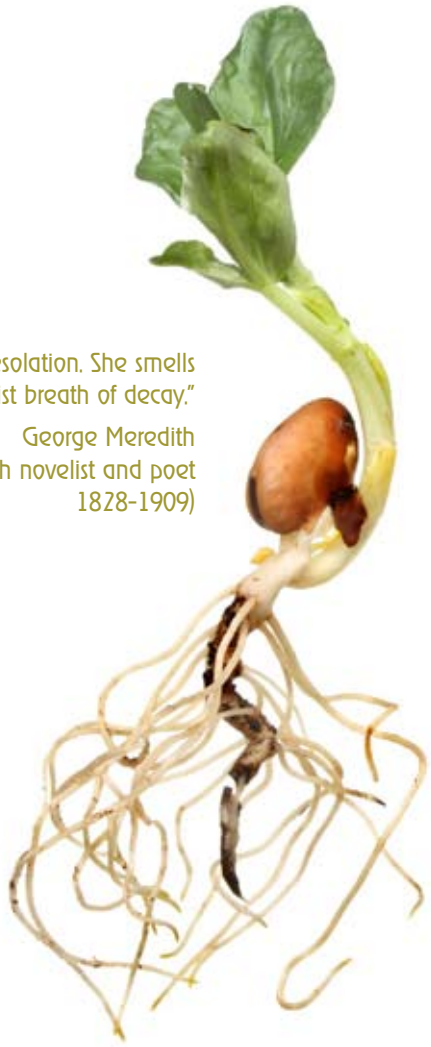
Activities for March

Spring is on its way, the garden is awakening, and now is a good time to create a 'lasagne garden' (see March activity sheet). You can also make a potting mix using your wonderful school-made compost mixed with one third sharp sand – perfect for planting seeds such as pot marigolds, lettuces and parsley. Sharp sand helps the compost to drain more freely and is preferable to builders' sand due to its chemical composition.

Compost Fact: Compost protects plants

Adding compost to your garden replenishes the soil's micro-organisms and helps plants to resist pests and diseases. Some of the bacteria form a protective layer around the plants' root hairs, preventing viruses and diseases from getting in, while microscopic fungi help the roots to absorb nutrients.

What goes on in healthy soil is amazing and worth several books in its own right!



"The Earth knows no desolation. She smells regeneration in the moist breath of decay."

George Meredith
(English novelist and poet
1828-1909)

Compost Top Tip: Get involved with Climate Week

Climate Week is a national event held each March - see www.climateweek.com to find about events in your area. This is the perfect time to remind the whole school community that, by composting, you are playing an important part in combating climate change. You are reducing the amount of organic matter sent to a landfill site, where it would rot anaerobically (without oxygen) and generate methane; and you are avoiding the purchase of peat based composts, the extraction of which releases greenhouse gases. As you take part in Climate Week activities, make sure staff and pupils give themselves a pat on the back for doing their bit to tackle this important global issue.

Recycle Devon

Class Activity: March

Growing plants experiment

Pupils conduct an experiment to see what happens when they grow plants in different growing media.

Group	Whole class (lower KS2)
Space needed	Classroom with space to hold many plant pots, preferably near a sunny window
Timing	1 hour for the initial session. Several weeks for the ongoing experiment, taking approximately 15 minutes per observation.
You will need	• 1 small plant pot per child (ask pupils to bring reused pots from home to avoid buying new ones) • Seeds e.g., choose one of the following: runner beans, broad beans, peas, mustard, calendula • A variety of growing media e.g., compost made at school, shop-bought compost , soil from the school garden, cotton wool, shredded paper, grit / gravel • Permanent marker pens • Recording sheet (see following pages) • Measuring jugs or spoons to ensure that all seeds are watered with the same volume of water • Antibacterial soap
Health and safety	Pupils should keep their hands away from their faces while working with compost and soil. They should wash their hands thoroughly using antibacterial soap at the end of the activity. Any cuts on pupils' hands should be covered when working with compost and soil. It may be appropriate for children with skin conditions, such as eczema, to wear gloves.
Introduction	What do pupils already know about what helps plants grow? *Air, light, water, nutrients, and room to grow* Where do plants get each of these requirements from? *The key point to draw out is where the nutrients come from: the soil and/or compost the plant is growing in.* Is it possible to grow plants without soil or compost? Explain that the class is going to design and conduct an experiment to find out.
Main session	1. Introduce the different growing media to the pupils. Ask them to predict in which one plants will grow best, and to explain their reasoning. 2. Discuss with pupils how to design the experiment. The growing medium is being changed, so other variables (light levels, amount of water, temperature) must stay the same. How can this be achieved? Is there anything else that should be standardised between the plants? *Pupils may suggest planting all the seeds at the same depth in the growing medium or planting all the seeds the same way up.*

Recycle Devon

Plenary	Discuss the pupils' findings: • Which growing medium was most successful? • Were the children's predications correct? • Were there any surprises, or variations between groups? • What further experiments might be needed to explore these issues?
Curriculum links	**Science** Plants: Y3 *(the parts / requirements of plants)* Working scientifically: lower KS2 *(experiment design; observational skills)*
Extension or simplification	Experiment with other variables and encourage pupils to think of their own enquiries to investigate. For example: • What happens if you add feed to the water? • What happens if you have a pot with no drainage that gets completely waterlogged? • What happens if there is no light available?

Class Activity: March

Growing plants record sheet for pupils

Pupils' names: _____

Plan

List the growing media your group will be using

1) _____

2) _____

3) _____

4) _____

Predict

Which of the growing media will be most successful? How will you judge this?

We think that the _____ will be most successful at helping plants to

grow because _____

We will measure how well the plants are growing by _____

_____

Observe

Look at the the plants regularly (at least once a week). What do you see? Record your observations:

Date	**Growing medium**	**Observations** (measure height, sketch what you see, write a description, take a photo)

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Date	Growing medium	**Observations** (measure height, sketch what you see, write a description, take a photo)

Date	Growing medium	**Observations** (measure height, sketch what you see, write a description, take a photo)

Compare your observations with your predictions.

What did you predict correctly? _____

_____

Were there any surprises? _____

_____

Based on your observations in this experiment, is there anything you would you like to investigate further?

_____

Eco Activity: March

Lasagne gardening

Pupils create a new garden bed using school compost and the no-dig or 'lasagne' method.

Group	Eco Team
Space needed	Outdoors, in an established garden area, or an area that is being created as a new garden. A weedy or turfed area is fine. The new bed should be no more than 1m wide so pupils can reach its centre when gardening.
Timing	1.5 hours Ideally this activity should be done in the autumn or winter so the bed is settled in well for sowing seeds in the spring.
You will need	• A tape measure, string and small stakes / bamboo canes to mark out the bed area • Large sheets of corrugated cardboard (remove any staples / tape) • Several newspapers • Compost from the school composter (mixed with leafmould if you have it) • Straw (optional) • Wheelbarrow • Garden forks and spades • Watering cans • Antibacterial soap
Health and safety	Pupils should keep their hands away from their faces while working with compost and food waste. They should wash their hands thoroughly using antibacterial soap at the end of the activity if they have touched compost or food waste. Any cuts on pupils' hands should be covered when working with compost. It may be appropriate for children with skin conditions such as eczema to wear gloves if touching the compost or food waste.
Introduction	Explain to the children that they are going to create a new bed for the school grounds using the 'lasagne method.' The good news is that, unlike some ways of making a new bed, this method does not need a lot of hard work, like digging and weeding! Talk about how lasagne is made up of layers of pasta and sauce - the 'lasagne' gardening method uses a similar layering approach. The pasta will be replaced by cardboard and newspaper, and the sauce with compost from the school's compost bin. Briefly discuss how this compost was made, and why it is so good for growing new plants. *It is packed with nutrients from the fruit / vegetable / garden waste put into the compost bin / heap.* Explain that the layers of cardboard and compost are known as 'mulch' and they will stop weeds from growing by starving them of light. Talk about why it is important for the mulch materials to be both biodegradable and kept damp. *Over time they will rot and be incorporated into the soil beneath by our friends the worms.*

Recycle Devon

Main session	**Making the bed** 1. Cut back any grass and weeds in the area for the new bed. It is NOT necessary to dig them out. 2. Measure and mark out the bed with a stake at each corner and use string to mark the edges. The bed should be no wider than 1m so that pupils can reach the centre when gardening. 3. Cover the bed area with a single layer of cardboard, overlapping the edges so no ground is visible. Add a layer of newspaper and soak this first layer thoroughly. 4. Put a 3cm layer of compost / compost mix on the cardboard / paper layer. 5. Add another layer of newspaper (or straw) and water well. 6. Add another 3cm layer of compost / compost mix. 7. Carry on layering up the materials if you have more, but four layers should be sufficient. Make sure that your last layer is compost / compost mix as this will be your seedbed.
Plenary	Step back, admire your work and plan some crops to grow in it once your bed is ready. If you create our lasagne garden in the autumn, it will be ready for planting the following spring. If you make it in the spring, you can start planting straight away. Discuss what will happen to the materials you have used in the next few weeks / months. *The damp cardboard, paper and straw will start to rot, and the weeds / grass underneath the bed will die because they have been starved of light. They too will rot, and their nutrients will mingle with the compost.*
Extension or simplification	This method can be done on a small or large area. The activity can be linked to experiments covering patches of grass with different materials and monitoring what happens. Try: cardboard, black plastic, clear plastic, compost and wood chip. It is particularly interesting to note the difference between materials that exclude light and any that don't.

Activities for April

As you prepare for Easter celebrations and turn your attention to eggs, don't forget that eggshells are a welcome addition to your compost bin at any time of the year. Crush them up before mixing them in (wash your hands well afterwards) and the worms will love them! Younger children will enjoy making an Easter gift by growing cress inside half an empty eggshell, using damp cotton wool or compost as a growing medium.

Compost Fact: Compost buffers soil pH

The pH of a soil, or how acidic / alkaline it is, affects which plants will thrive in it. Adding compost to soil acts as a chemical 'buffer' and helps avoid extremes of acidity or alkalinity. This means a wider range of plants can be grown, as the compost makes conditions in the soil more favourable.

"Truth is the strong compost in which beauty may sometimes germinate"

Christopher Morley
(American writer and editor 1890-1957)

Compost Top Tip: Let the air flow!

Whatever type of composter you are using, always add some 'browns' when you add your 'greens', to introduce pockets of air. If you have school guinea-pigs or rabbits, their soiled bedding acts as the perfect 'brown.' Or ask parents or local businesses for donations of wood shavings or sawdust – for those working with wood these are often waste materials which they are more than happy to see put to good use. In a 'dalek' composter, torn up cardboard works well as a 'brown' – ask pupils to tear up boxes during wet play!

If you have an in-vessel composter such as Ridan, ScotSpin or Jora, daily tumbling / turning will incorporate air and mix your materials nicely. A 'dalek' or similar composter will benefit from an occasional forking to mix in extra air, although this isn't essential if you get your balance of 'greens' and 'browns' right.

Recycle Devon

Class Activity: April

Rotting rates

Pupils investigate the decomposition rates of everyday items made from organic and non-organic materials.

Group	Whole class (upper KS2) or Eco Team
Space needed	This experiment can be set up either indoors or outdoors. The area should be one that can get a little bit messy or is easily cleaned.
Timing	1 hour, then 4 weekly observation sessions of 15 minutes.
You will need	• One or two plastic storage boxes filled with soil or compost • String • Plastic labels and permanent marker • Test items such as: apple core; banana peel; wooden stick; plastic bottle; woollen sock; drinks can; sheet of paper; stone • Trowels • Recording sheet: see following pages • Camera (optional, but very useful) • Antibacterial soap
Health and safety	Pupils should keep their hands away from their faces while working with compost and soil. They should wash their hands thoroughly using antibacterial soap at the end of the activity. Any cuts on pupils' hands should be covered when working with compost and soil. It may be appropriate for children with skin conditions, such as eczema, to wear gloves.
Introduction	What do pupils know about decomposition? What causes materials to decompose? What materials decompose quickly? Why? *The general word 'decompose' is used to describe the two different processes by which materials break down:* *a) Organic materials, which are things which have recently lived, decay / rot through the action of bacteria and fungi. These micro-organisms thrive in warm, damp conditions, and need oxygen to live.* *b) Non-organic materials, such as plastic and metal, do not decay / rot. They may decompose in other ways (e.g., through the action of light or water), and thereby break down into smaller particles.* Explain to pupils that they are going to conduct an experiment to investigate the rates at which different materials decompose in soil. Will soil provide good conditions for organic materials to decay? Why? *Soil is teeming with micro-organisms that are involved in the process of decay. Unless it is compacted, soil also contains small pockets of oxygen to support these micro-organisms.*

Recycle Devon

Main session	1. Ask pupils to suggest appropriate items to include in the experiment, ensuring that a range of organic and non-organic materials is included. Objects should be made from a single material. 2. In pairs / small groups, ask pupils to order the items according to how long they predict each will take to decompose when buried in soil. Write or draw their predictions on a time line. 3. Tie a 30cm piece of string to each item and at the other end tie a label with its name written in waterproof pen. 4. Fill the storage box/es with soil / compost, and bury the items completely, leaving the labels sticking out at the top. 5. Water the soil / compost to ensure it is moist. 6. Decide on an appropriate place to leave the box/es. A warm location is best, such as a corner of the classroom or a sunny place in the garden. 7. Keep an eye on the soil / compost - do not allow it to dry out or freeze. 8. Every week for four weeks dig up the items to observe, photograph and record their state of decomposition.
Plenary	Compare the findings to the pupils' predictions. Were they correct? Are there any surprises? Are there any items that have not changed at all during the period of the experiment? Pupils may suggest researching this on the internet. If they follow up this idea, be aware that a lot of the research done on decomposition rates has been in a marine, rather than soil, environment. *"After Life: the strange science of decay" shows a fascinating look at life decomposing in a simulated house.* Look here: www.bbc.co.uk/programmes/b012w66t or here: www.youtube.com/watch?v=Qbw9GJKG32I
Curriculum links	**Science** Working scientifically: lower KS2 *(experiment design; observational skills)*
Extension or simplification	The experiment could be continued for weeks or even months.

Class Activity: April

Rotting rate record sheet for pupils

Record your weekly observations of the different materials in the table below.
Take a photograph each week to complement your written observations.

	Observations			
Object	**Week 1**	**Week 2**	**Week 3**	**Week 4**
E.g., Apple core	E.g., flesh has gone brown and skin is starting to crinkle.			

Eco Activity: April

Compost scavenger hunt

Pupils explore the school grounds and, with the provided Compost Scavenger Hunt tick sheet, identify different materials that can or cannot be composted.

Group	Eco Team or Whole class (upper KS1 / lower KS2)
Space needed	Outdoors in the school grounds (playground, wildlife area, grassed areas etc).
Timing	45 minutes to 1 hour
You will need	• Compost scavenger hunt tick sheet. See following page. • Pencils and clipboards (one of each per pair of pupils)
Health and safety	Pupils should be instructed not to handle any waste materials – the Scavenger Hunt is a survey to find out more about materials in the school grounds, not an activity to collect them.
Introduction	What do pupils know about compost? What materials can be put in a compost bin? What can't? Why? *Compost is made from materials that were recently living, usually parts of a plant. Compostable materials are divided into two groups: fresh, wet materials known as 'greens', such as grass clippings, fruit and vegetable peels, green leaves or weeds; and dry materials which are known as 'browns', such as dead leaves, cardboard, small twigs, wood shavings and scrunched up paper.* *In the compost bin these materials are recycled by micro-organisms and minibeasts, which need a balanced diet of 'greens' and 'browns' to thrive and make compost. Materials such as plastic, metal and glass, which are not made from anyhing that was recently living, will not break down in the compost bin, as they cannot be 'eaten' by the recycling organisms.* *Although they come from a living organism and will therefore rot, we do not put meat or cooked food in a compost bin because these will attract vermin. Special compost equipment is available for these items, such as Ridan and Jora composters.* Explain the activity to pupils and introduce the recording sheet. Emphasise health and safety considerations specific to your school, as well as instructing children not to handle waste items that they find.
Main session	Pupils work in pairs in the school grounds and complete the Compost Scavenger Hunt tick sheet.
Plenary	Review what pupils found during the Scavenger Hunt. Are there any materials that could be composted in your school compost bin, but are not being? Are there any other issues that need action (e.g., litter)?

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Extension or simplification	To focus pupils' thinking on litter, ask them to make a tally of each type of litter during the Scavenger Hunt. Follow up with a litter pick, ensuring pupils wear gloves and are given clear instructions about handling litter safely. Provide each group with two bags; one for litter that is 'compostable' (e.g., banana skins) and the other for items that are 'non compostable' (e.g., crisp packets). Share your results with the rest of the school and launch a whole-school campaign to reduce the amount of litter dropped in the school grounds. Repeat the initial tally after a few weeks to see if your campaign has been successful.

Eco Activity: April

Compost scavenger hunt: Tick sheet

See if you can find some of these compostable (and non-compostable) materials around your school grounds. Tick the box next to the ones that you find.

‘Greens’

Surprisingly, these are not always green! These are the ‘wet’ materials that add water and nutrients to compost.

Grass clippings ☐

Garden weeds ☐

Fruit peelings ☐

Vegetable peelings ☐

Other ‘greens’ _____ _____ ☐

‘Browns’

These are the ‘dry’ materials that add carbon to the compost and make air pockets.

Small twigs ☐

Dried leaves ☐

Cardboard or paper ☐

Wood chips or sawdust ☐

Other ‘browns’ _____ _____ ☐

Non-compostable materials

Some materials can’t be composted and should be recycled if possible, or put into the rubbish bin. See if you can find any.

Plastic bottle ☐

Crisp packet ☐

Carrier bag ☐

Tin foil ☐

Recycle Devon

Activities for May

May is the best time to mulch; this means spreading a deep layer of bulky organic materials onto the ground, and compost is the perfect mulch. It improves soil structure, stimulates plant growth, retains moisture and suppresses weeds. Any big bits of material that are not fully composted can be put back into the compost bin, to help the composting process, as they have useful bacteria and fungi living on them.

Compost Fact: Compost supports wildlife

The compost heap is teaming with life and a magnet for all kinds of creatures. Predatory beetles, frogs and toads hunt for larvae and smaller creatures; slow worms love the warmth and happily munch on worms, slugs and snails; birds will pick off insects, invertebrates and larvae from an open heap; and bats will visit for a midnight snack!

Compost is made up of millions of living organisms, and by using it to feed your soil, you are supporting a whole food web in your school grounds and beyond, right up to the top predators such as birds of prey, foxes, badgers and hedgehogs. It is worth making compost simply to support local biodiversity.

Compost Top Tip: Spread the compost message

Compost Awareness Week takes place each May, with a wealth of interesting and unusual activities, talks and events taking place around the world. This is the ideal time to hold a whole-school compost event using the resources in this pack to spread the compost message throughout the school and into your local community. See www.homecomposting.org.uk for more details.

"Trespassers will be composted" (sign stuck in a compost bin beside a pair of trousers tucked in to old boots)

Joseph Jenkins, author

Recycle Devon

Class Activity: May

Rotter spotters

Pupils investigate and identify organisms living in the compost habitat, and consider how they are adapted to their environment.

Group	Whole class (lower KS2) or Eco Team
Space needed	The activity can take place outside near the compost bin, or inside the classroom. Pupils will need to put their trays of compost on a flat surface in good light.
Timing	45 mins – 1hour. If a longer session is available, the compost can be collected with pupils as part of the activity. For a shorter session, it should be sourced in advance.
You will need	• A medium-sized bucket of compost collected from an active compost bin (compost from the centre of the bin will contain the widest range of organisms) • Copies of the 'Rotter Spotter' sheet: see following pages, and/or the 'Compost branching key' available to download from: zone.recycledevon.org/teachers/compost (1 sheet per pair of pupils) • Old metal spoons (1 per pair of children) • White trays or trays lined with white paper (1 per pair of children) • Magnifying glasses (1 per pair of children) • A microscope connected to the classroom interactive whiteboard (optional) • Antibacterial soap
Health and safety	Pupils should keep their hands away from their faces while working with soil / compost. Any cuts on their hands should be covered; it may be appropriate for children with skin conditions, such as eczema, to wear gloves. All pupils should wash their hands thoroughly using antibacterial soap at the end of the activity. If working in the classroom, desks should be thoroughly cleaned after the activity.
Introduction	Ask pupils to share with a talking partner three words to describe a compost bin. Discuss their responses as a class. Did anybody use the words 'fascinating', 'amazing' or 'habitat'? This session will help pupils to realise that a compost bin is exactly that: a fascinating and amazing habitat! Ask pupils to consider the conditions inside the compost bin habitat. *It is dark, damp, and warm. The water comes from the 'green' materials put in the compost such as fruit and vegetable skins. The warmth results from bacterial action as the materials start to break down. There is not much space, but plenty of oxygen for small organisms, since 'brown' materials such as twigs or sawdust provide lots of little air pockets.* Ask pupils to predict what organisms they will find in a compost bin, given the conditions they have identified. *The main organisms found in the compost bin are shown on the 'Rotter Spotter' sheet. Pupils' incorrect answers can be interesting and worthy of discussion e.g., a caterpillar does not like a compost bin habitat because it likes fresh, living leaves, not dead ones.*

Recycle Devon

Main session	Explain the activity to the children, emphasising the importance of health and safety, and taking care of the recycling organisms. Pupils work in pairs, each with a tray of compost and an identification sheet. They investigate the compost sample and identify organisms found. If a microscope connected to an interactive whiteboard is available, it is interesting to draw pupils' attention to the particular features of individual organisms. The class can discuss how these show their adaptation to their habitat e.g., the segmented bodies of centipedes and millipedes make their bodies very flexible, allowing them to move through the small spaces in the compost with ease. (The bright light of the microscope and the heat it generates are not comfortable for organisms used to dark, damp conditions, so the compost should not be kept under the microscope for too long.)
Plenary	Discuss the organisms found in the compost bin. Were pupils' predictions correct? Were there any surprises? Introduce the picture of compost food web and discuss which parts of the compost food web were found. What words would pupils now use to describe a compost bin? At the end of the activity, return the organisms to the compost bin so they can continue their vital recycling job.
Curriculum links	**Science** Living things and their habitats: Y4 and Y6 *(classification keys)* Animals, including humans: Y4 *(food chains)*
Extension or simplification	The 'Rotter Spotter' guide is suitable for younger / less able pupils; the branching key is appropriate for older / more able pupils. Older pupils could use the 'Rotter Spotter' guide during the activity and then create their own branching key as a follow up activity. Follow up by investigating the organisms in other habitats within the school grounds. Pupils can consider the compost bin conditions and suggest other areas that have similar conditions. Alternatively, collect materials from another area (e.g., a pile of rotting leaves) and compare the organisms found in this habitat with those in the compost bin.

Class Activity: May

Rotter Spotter ID sheet for pupils


Slug

Slug eggs


Snail


Centipede


Worm


Worm eggs


Ant


Ant eggs


Millipede


Springtail


Woodlouse


Spider


Maggots


Earwig


False scorpion

Recycle Devon

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Eco Activity: May

Compost survey

Members of the Eco Team conduct a survey of Key Stage 2 pupils to find out how much they know about composting. Based on their findings, they make a plan to ensure that all pupils understand why composting is important, what can and can't be composted, and how they can do their bit to support the school's composting.

Group	Eco Team
Space needed	Access to a computer for analysing the survey's results
Timing	Two hours – this can be spread out over several sessions according to when your Eco Team meet and how long your meetings last.
You will need	• Clipboards and pencils (one of each per pair of pupils) • Printed A4 survey recording sheets (one per pair of pupils). See following pages. • Printed A3 survey recording sheet (for demonstration purposes) • Compost survey results spreadsheet. This can be downloaded from zone.recycledevon.org/teachers/compost
Health and safety	Ensure adequate adult supervision whilst the Eco Team are moving around school conducting the survey.
Introduction	Discuss with the Eco Team what they know about composting. This might include: why composting helps the environment; what can and cannot be composted; what minibeasts and micro-organisms are involved in the composting process; how to use compost in the garden to grow more plants. *Pupils can refer to the assembly information sheets used in November's Eco Activity 'Compost assembly'.* Members of the Eco Team are compost experts! But how much do other pupils in the school know about composting? Explain that the team is going to do a simple survey to find out. Based on the results, they will decide how to spread the composting message further.
Main session	Show pupils the printed survey sheets and read through the questions together. Use the A3 sheet to model using a tally to record pupils' responses to each question. Emphasise the importance of asking the questions in a neutral way to avoid leading pupils towards the correct answers. Discuss with the team how many children they think should be surveyed. *Would it be fair to talk to 5 children in a school of 350? Why not?* Statisticians have formulae for working out sample sizes for different types of survey. The table below shows a sample size to be reasonably sure you are getting a good picture of your pupils' composting knowledge.

KS2 pupils	Sample size
60	33
120	44
180	50
240	53
360	58

Recycle Devon

Main session (cont.)	To calculate a sample size based on your exact pupil numbers see the additional resources section for a web link. Once you have decided how many pupils to survey, discuss with the team how to choose which pupils these should be. It is important to include children of different ages - the easiest way to do this is to divide your total sample size between your KS2 classes. Then decide how to select the individual pupils from each class. If you ask for volunteers you risk getting a sample of compost enthusiasts, so it is better to do a 'lucky dip'. Finally, discuss logistics such as timing and how pupils will be grouped for conducting the survey. If your Eco Team meets at lunch time, it may be possible for pupils to conduct the survey straight away, talking to pupils in the playground. If the team meets after school, discuss the best way to conduct the survey, sharing out responsibilities within the group.
Plenary	Having conducted the survey, pupils input their results into the compost survey results spreadsheet, which generates simple graphs and charts. Analyse and discuss the results of the survey. Key questions are: 1. Do pupils know what can and cannot be composted? *All items on the survey can be composted except food cans, plastic bags, crisp packets and bubble wrap.* 2. Do pupils know what composting equipment you have at school? 3. Do pupils understand why composting is important? *All statements on the survey are correct except 'Composting helps recycle plastic and metal' and 'Composting makes more pupils cycle to school.'* Are there any knowledge gaps or common misunderstandings? What can the Eco Team do to fill these gaps? They could, for example, plan a compost themed assembly; make new labels for compost caddies; run a poster design competition; or make a compost themed display for the Eco notice board.
Extension or simplification	If the results of your survey show that your KS2 pupils are already knowledgeable about composting, discuss how to celebrate this expertise and build on it by, for example, educating pupils about the importance of balancing 'greens' and 'browns.' For more information on 'greens and browns' see 'The Compost Mix' in the introductory section at the front of this handbook. If you are planning a campaign to raise awareness of composting, or introducing new composting equipment, conduct this survey before and after your whole-school activities, and compare the results of the two surveys.
Additional resources	Use www.raosoft.com/samplesize.html to calculate a sample size based on your pupil numbers. Set a 10% margin of error and a 90% confidence level. The population size is your number of KS2 pupils on roll. Leave the response distribution at 50%.

Eco Activity: May

Compost survey: Recording sheet for pupils

Date of survey: _____ Number of children to be surveyed: _____

Names of people conducting the survey: _____

_____

Record the year group of each child taking part in your survey using a tally:

Yr 3	Yr 4	Yr 5	Yr 6

Ask:

1) Do you know what composting is?

Yes	No	Not sure

2) Do you compost at home?

Yes	No	Not sure

3) What do you think should be put in a compost bin?

	Yes	No
Grass clippings		
Leaves		
Food cans		
Cardboard		
Shredded paper		
Sawdust		

	Yes	No
Plastic bags		
Vegetable peelings		
Crisp packets		
Egg shells		
Banana skins		
Bubble wrap		

Recycle Devon

4) What composting equipment do we use at our school?

 ‘Dalek’ composter	 Jora	 Ridan	None
 Hot Box	 Slatted composter	 ScotSpin	Not sure

5) Which statements about composting do you agree with?

	Agree	Disagree	Not sure
Composting helps wildlife in the school grounds.			
Composting reduces the amount of waste we send to landfill sites.			
Composting helps us to recycle plastic and metal.			
Composting saves the school money.			
Composting helps us grow our own fruit and vegetables.			
Composting makes more pupils cycle to school.			

Don't let Devon go to waste

at school

Activities for June

Summer is here, the growing season is in full swing, and the warm weather will be providing the perfect conditions for bacteria and fungi to break down organic waste in your compost bin. This is a great time to try this month's time-lapse photography activity, since the contents of your compost bin will be changing rapidly.

Compost Fact: Fewer artificial chemicals needed

Adding chemical fertilisers to soils may have short-term benefits for plants, but the salts they contain can be detrimental to essential soil micro-organisms. Chemical herbicides and fungicides will also kill vital bacteria and fungi in the soil, damaging the finely balanced soil ecosystem.

In contrast, adding compost increases the variety of micro-organisms living in the soil, provides plants with natural nutrients, and supports plants to resist disease and pests. Reducing your reliance on chemicals will also save money, and has broader environmental benefits since many chemicals are manufactured from fossil fuels.

Compost Top Tip: Dig in to Recycle Week!

Recycling food and garden waste by composting is an excellent way to transform a 'waste' material into something useful for the garden. It also keeps organic waste out of landfill where it can create methane, a potent greenhouse gas.

Recycle Week is a national event held each June. See www.recyclenow.com for more information including activities and competitions for schools. This is a great time to celebrate the different ways you recycle at school, including reminding staff and pupils about your composting successes.

"The longer I live the greater is my respect for manure in all its forms."
- Elizabeth von Arnim, Novelist

Class Activity: June

Compost time lapse photography

Pupils use time lapse photography to record the rapid decomposition of a newly established compost bin over a two week period.

Group	Whole class (lower KS2)
Space needed	You need outdoor space to set up a new 'dalek' compost bin. The ground should be level with enough space to lift of the bin, photograph the contents, and replace the bin. There should be a stable place where the camera can be positioned to photograph the contents of the bin repeatedly from exactly the same viewpoint.
Timing	This activity needs warm ambient temperatures, so is best done during the summer. Allow 1 hour to build the initial bin contents and 15 minutes every day (or as often as possible) for two weeks to take the photographs.
You will need	• An empty 'dalek' type plastic compost bin • A camera • A large quantity of organic matter (see details below) • A probe thermometer • A computer connected to an interactive whiteboard to view the photos • Compost photo sequence sheet (see following page) • Antibacterial soap
Health and safety	Pupils should be supervised by an adult at all times. Safe lifting and handling practices should be observed when handling bulky materials. Pupils should keep their hands away from their faces while working with compost, and should wash their hands thoroughly using antibacterial soap at the end of the activity. Any cuts on pupils' hands should be covered when working with compost. It may be appropriate for children with skin conditions, such as eczema, to wear gloves.
Preparation	1. Stockpile your 'browns' in the weeks before the activity. See 'The Compost Mix' sheet at the front of this handbook for more details. 2. Prepare the area for the compost bin. 3. Plan ahead, so that on the day you set up your compost bin you have plenty of fresh 'greens'. (Do not stockpile these – they must be fresh.)
Introduction	What do pupils know about composting? Remind / explain that it is important to get a mixture of 'greens' and 'browns'. Refer to 'The Compost Mix' sheet for more details. Explain that you are going to set up a new compost bin and, instead of filling it with materials over weeks or months, you are going to fill it to the top in one go. If you get the mix of 'greens' and 'browns' right, and the weather is warm, the composting micro-organisms will multiply rapidly and the materials will begin to compost. To record this amazing process you are going to return to the bin every day and take its photograph. Show pupils the 'compost photo sequence sheet' and discuss what changes they can see.

Recycle Devon

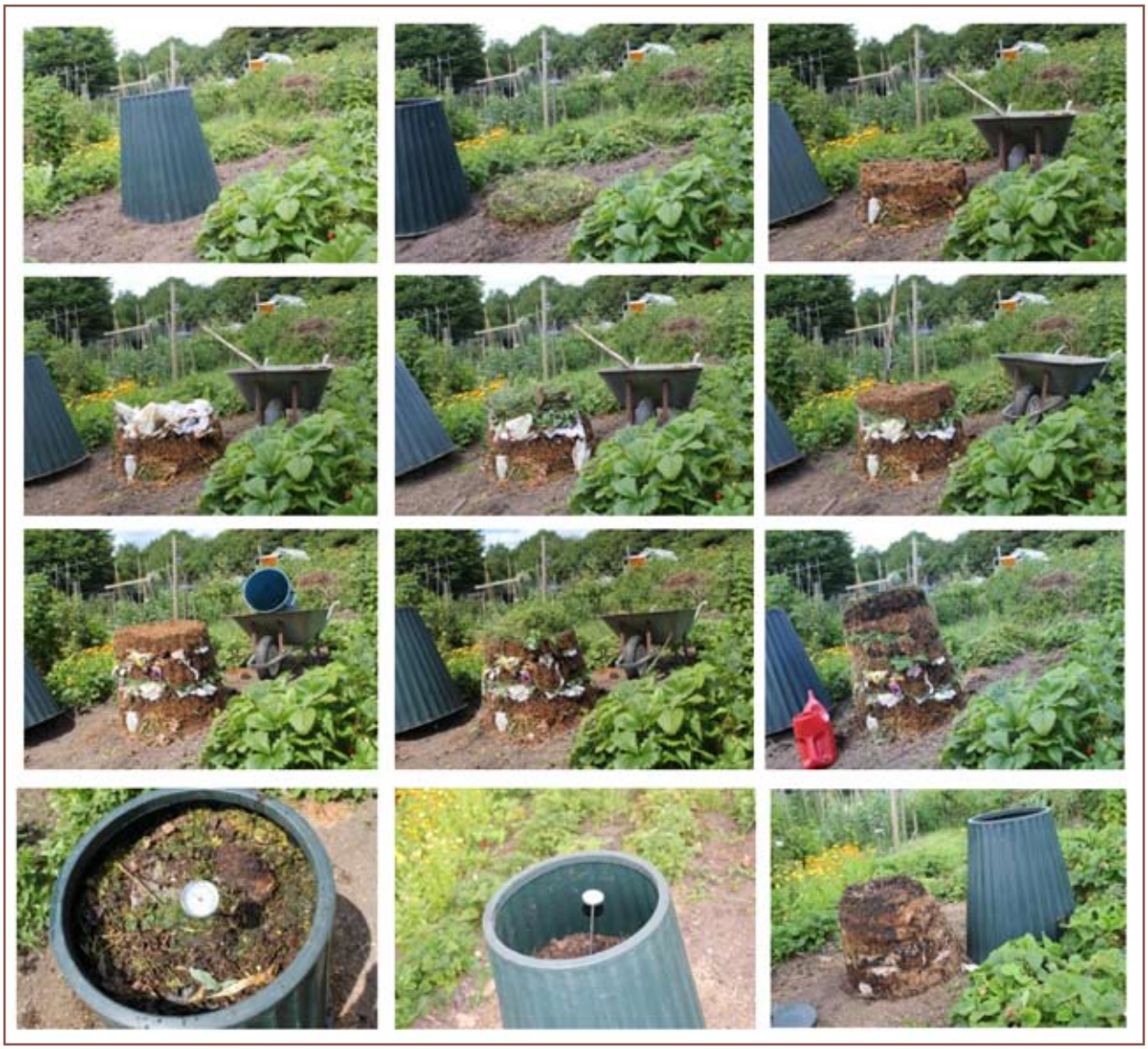
Main session	1. Place the empty ‘dalek’ on the ground and fill it with alternating layers of ‘green’ and ‘brown’ materials, ensuring you have a roughly 50:50 mix. This may be carried out by the whole class, space permitting. 2. Once the bin is full, remove the plastic ‘dalek’ and take a photograph. Use a fixed point to ensure that every photograph is taken from exactly the same place. Replace the ‘dalek’ over the materials. 3. Take the temperature of the materials using a probe thermometer and record the result. 4. Visit the composter each day, remove the ‘dalek’ and take a photograph from the same spot. Take the temperature of both the air and the compost using the probe thermometer and record your results. (You will need to push the thermometer into the compost pile, not just the surface.) Divide the class into smaller groups and send them out on a rotational basis, accompanied by an adult. 5. After about five days the contents of the bin should have shrunk down noticeably and you will notice its temperature start to fall. Turn the heap to add air, and use a watering can to add water if the materials are beginning to dry out. This will kick start the composting process and you will see the temperature rise again. Take a photograph and record the temperature of the air and compost, every day for two weeks.
Plenary	Download your photographs and display them as a slide show to demonstrate the materials in the compost bin rapidly decomposing. Display the temperatures underneath each photograph so the children can see a correlation. Use the temperature readings to plot a time graph showing air and compost temperatures. The air temperatures are likely to fluctuate, whilst the heap will show a steady increase, showing that the warming is not due to the weather but the actions of the micro-organisms. If you observed a temperature drop which increased after watering and turning the heap, explain how micro-organisms are living creatures that need water and oxygen to survive, just like humans do! Discuss how to share your photography (and temperature recordings) with the rest of the school in assembly, on your school website, or on your Eco notice board.
Curriculum links	**Mathematics** Statistics: Y4 *(time graphs)* Measurement: Y2 *(temperature)*
Extension or simplification	If you do not have a ‘dalek’ composter, you can make a heap directly onto the ground, but the results may not be as fast or dramatic.
Resources	To see a short film using time lapse photography of a compost bin search “Nicky Scott Compost” on You Tube or use the link below: www.youtube.com/watch?v=cYHHhLi0b3Y

Class Activity: June

Compost time lapse photography sheet

The first 10 photographs below show a ‘dalek’ compost bin being filled using layers of ‘greens’ and ‘browns’. Photo 10 shows its starting temperature being taken using a probe thermometer.

The last two photographs were taken a week later and show the contents of the bin reaching 50°C and beginning to shrink.



This sequence was made in mid June 2010 when the outdoor temperature was 20°C. The temperature of the compost increased by 10°C each day until it reached 50°C. If the heap had been bigger, or the bin better insulated, the temperature could have gone even higher.

Eco Activity: June

Compost documentary photography

Pupils learn about documentary photography and experiment with taking inspiring photographs of the school's composting. They write captions to accompany their images, and display them for the whole school to enjoy.

Group	Eco Team
Space needed	• A classroom with interactive white board (IWB) and internet access for whole-group introduction. • Pupils move around the school to take photographs, both indoors and in the school grounds . • A classroom with IWB for reviewing your photographs and writing captions (session 2).
Timing	• 1 hour for taking photographs. • 1 hour for selecting the photos to display and writing captions. • 30 mins for displaying the photographs (this can be done by an adult, if necessary, although involving pupils is preferable.)
You will need	• Digital cameras – one per pair of pupils if possible. • Lead, to download your photographs from the cameras to the school server (or a computer with a card reader.) • Paper and pens and / or computers for writing captions. • A colour printer to print your photographs.
Health and safety	Pupils must be adequately supervised at all times. Demonstrate safe ways of taking photographs from different angles (e.g., how to take aerial shots without climbing onto furniture; checking the ground before lying down to take a shot from below.)
Introduction	What do pupils understand by the term 'documentary'? *A definition is "Using pictures or interviews with people involved in real events to provide a factual report on a particular subject." Pupils will probably volunteer examples of television documentaries about wildlife or history.* Explain that documentary photographers use photographs and captions to inform people about what is happening in the world. A group of photos and captions on a theme is called a photo essay. Well taken photographs and inspiring captions are a great way to spread positive messages about caring for the environment. Show pupils the stunning photographs of documentary photographer Rodney Dekker on the theme of 'Waste'. At www.rodneydekker.com click on 'Photos' then select the photo essay named 'Reclaimed Journeys'. Use the arrow buttons at the bottom of the page to scroll through the images. To see the captions hover over the word 'INFO'. Looking at the photos, introduce pupils to some features of documentary photography: • Action shots of people doing things (e.g., photos 6 and 11) • Taking photographs from interesting angles (e.g., photos 4 and 7) • Portrait shots of key individuals (e.g., photo 14)

Recycle Devon

Main session	Explain that the team is going to become documentary photographers and take photographs of the wonderful composting taking place at the school. Make a list of possible shots for your photo essay e.g., • A child putting an apple core into a compost caddy • Children carrying the compost caddies through the school • A portrait shot of the school cook or caretaker • Pupils collecting up cardboard / leaves / other materials for composting • An aerial shot of a full compost caddy • A close-up of the contents of your compost bin • Children using the finished compost to grow fruit and vegetables in the school grounds • An empty classroom rubbish bin • Children / adults enjoying eating produce from the school grounds. The exact photographs taken will depend on your school, the time of year, and pupils' own suggestions. The most important thing is to capture different stages of the composting process. Don't forget to ask permission from people before taking their photograph. Make sure the pupils know how to use the digital cameras. If necessary, explain about taking outdoor shots with the sun behind you. A free download of top tips for photography is available here: www.naturedetectives.org.uk/packs/photography_pack.htm Organise the team into groups and discuss how you are going to share out the photographs on your list. It may be useful to set a limit for the number of photographs taken on each theme – quality is more important than quantity, but it's also fun to experiment with different camera angles etc.
Plenary	Download all the photographs onto the school's server and discuss them as a team. Decide which are the best shots to include in your photo essay. Write factual captions to accompany each one, and display your finished photo essay on a prominent display board for the whole school to see.
Extension or simplification	A photo essay usually includes at least one quote. Discuss with the team who you could interview to get an interesting quote for one or more of the captions (e.g., the headteacher, caretaker, school cook.) Build on the documentary photography experience by taking photographs of other 'eco' activities in the school, such as recycling, reusing, saving energy or healthy eating.

Don't let Devon go to waste

at school

Activities for July

It's almost the end of term so prepare your compost bin for the long summer holidays. Empty out tumbling systems (e.g., Jora, ScotSpin) into your maturation bins to avoid them seizing up. Ridans do not need to be emptied, but will benefit from a weekly turn by a friendly caretaker or parent during the school summer holidays. For more traditional compost systems such as plastic 'daleks' or slatted boxes, mix well with a fork to ensure they are aerated before leaving for the summer.

"Money is like manure: It's not worth anything unless you spread it around."

Author unknown

Compost Fact: Compost saves water

Adding organic matter to soil improves its capacity to retain water, particularly useful if you have free-draining sandy soils. Adding compost to your soil allows it to make the most of our wonderful Devon rain. The result: healthier plants and less work for gardeners! What's more, saving water has wider environmental benefits. The purification of our water to make it safe to drink is an energy-intensive process; by using less of the treated water in our gardens and homes we save energy, which helps combat climate change.

Compost Top Tip: Use your compost

Sieve a little of your finished compost and you will be amazed how it looks – just like something you would pay good money for at the garden centre! For potting on seedlings or houseplants, use a mixture of your compost with sharp sand, avoid builders' sand as it has too many chemicals in it, sharp sand has been washed.

Even if you only have limited school grounds, your compost can soon be used up in pots, and hanging baskets. It is not permissible to sell, or give away, bags of your school made compost. However, you could sell plants that are potted in small amounts (yogurt or plant pots worth) of it at your summer fete, to raise money for next year's gardening projects. You can show off your beautiful plants while spreading the composting message to the local community.

Recycle Devon

Class Activity: July

Compost sorting game

Pupils compete in teams to sort pictures of everyday ‘waste’ items into three categories: Compost, Recycle and Waste.

Group	Whole class (lower KS2)
Space needed	A classroom with an interactive whiteboard (IWB) for whole-class introduction; a hall or large classroom (with the furniture pushed back) for the game.
Timing	1 hour
You will need	• Images of landfill sites and Energy from Waste plants can be downloaded from zone.recycledevon.org/photos • Teachers’ information sheet ‘What happens to our waste?’ which you can find at the back of this handbook. • Images of your school’s composting equipment • An example of your school’s recycling bin, compost collection container, and rubbish bin • 3 containers (e.g., buckets) • Sorting cards. You can download and print these from: zone.recycledevon.org/teachers/compost 
Health and safety	The game is a relay race. To avoid pupils colliding with each other, ensure that only one pupil from each team is running at any time. Each runner must be seated before the next member of the team starts their turn.
Preparation	Find out in advance what is recycled in your school and what can be recycled from pupils’ homes in the local area (see your local council’s website recycling page for this information). The cards provided for this game contain images of the most commonly recycled materials but ‘correct’ answers may vary. The important thing is for pupils to start considering their options when disposing of waste and thinking about how many materials can be recycled or composted. Make a label for each sorting container: ‘waste’, ‘recycle’ and ‘compost’.
Introduction	Ask pupils who has thrown some rubbish in the bin this week. Do they know where it goes? See the teachers information sheet ‘What happens to our waste?’ in the back of this handbook, to help you extend pupils’ understanding. Ask pupils to think of ways that the school implements the 3Rs (Reduce, Reuse and Recycle) to help with these problems and care for the environment. Show your school’s recycling container(s) and check that all pupils know what goes in them. Refer also to scrap paper drawers, refillable water bottles and other examples of reducing and reusing. Ensure that pupils know the correct order of importance of the 3Rs (1.Reduce 2.Reuse 3.Recycle). It is best to try and reduce the amount of waste we produce, then to reuse it, before recycling because the recycling process uses energy.

Recycle Devon

Introduction (cont.)	Discuss the school's composting. What type of composting equipment do you have? What can be put in it? What useful end product is produced? Show the image(s) of your school's composting equipment and talk about how the compost is a useful resource that helps plants to grow in the school garden. Draw out the fact that all organic matter (anything that recently lived) will rot, but that things like meat, dairy and cooked food should not be put in most compost bins because they will attract vermin and flies. If your school is lucky enough to have specialist composting equipment that will compost cooked food (e.g., a Ridan or Jora), explain that this is a sealed, insulated unit which is vermin-unfriendly and will reach high temperatures to kill off harmful bacteria.
Main session	The relay game takes place in a hall or similar large area. Divide the class into four mixed ability teams and invite them to invent a team name connected to composting or recycling· Explain how the game works. 1. Four benches are laid out round the hall in a large square (one for each team). 2. In the centre of the square are three containers labelled 'waste', 'recycle' and 'compost'. 3. Each team is given a set of image cards with various items on e.g., paper, apple core, crisp packet. 4. Taking turns, the teams must race to sort the picture cards into the correct container. Only one member of each team can run at a time. 5. The game stops when the first team runs out of cards. 6. Scoring: each team scores one point for a card in the correct place and has one point deducted for cards in the wrong place. 7. Bonus points may be awarded for team work, attention to health and safety, communication etc.
Plenary	Announce the winners and use the results to focus class discussion. Did all the teams make similar mistakes? If children in this class are unsure about what goes in the compost bin, what about the rest of the school? What can we do to make sure all pupils and staff know what can be recycled and composted? *Pupils may suggest making labels for your compost and recycling collection containers; holding an assembly to spread the message; making posters about recycling and composting.*
Curriculum links	**Science** Living things and their habitats: Y4 *(environmental change)* **PSHE** Core Theme 3: KS2 Living in the wider world – respecting and protecting the environment
Extension or simplification	How is the school's recycling and composting system different from the one pupils may have at home? Use local recycling leaflets and information to compare. Literacy work on the design of leaflets can be linked to this activity.
Resources	Your school can borrow 'Scrapman' a KS2 literacy resource pack based on waste and recycling. The leaflet comparison activity mentioned above is part of this resource and provides recycling leaflets from all District Councils of Devon. To borrow the Scrapman resource, email recycle@devon.gov.uk

Eco Activity: July

Compost celebration picnic

Members of the Eco Team plan and organise a whole-school picnic to raise the profile of composting and celebrate the school's composting achievements.

Group	Eco Team to organise; whole school community to take part.
Space needed	Outdoor space is preferable.
Timing	An afternoon or possibly after school.
You will need	See main session below.
Health and safety	Ensure a risk assessment of the planned activities is carried out.
Introduction	Discuss with the Eco Team what they enjoy about helping the school to compost. Are there any aspects of composting that they don't like? Why is it worth putting up with these negatives? Make a list of why composting is so important in helping the environment. *Possible answers include: it makes less waste for landfill/Energy from Waste, reduces methane/greenhouse gas emissions, saves money by not buying compost, creates a valuable resource from our 'waste' materials, and supports wildlife in the school grounds and beyond.* Congratulate all pupils on being part of this essential 'eco' activity.
Main session	Having reminded the Eco Team why composting is so important, it's time to involve the whole school. School adults and the Eco Team work together to plan a celebratory picnic for the whole school community. This could take many forms but here are some suggestions: • Run whole-school competitions such as 'name the composter', 'decorate the caddy' or 'design a label for the fruit waste bin'. • Ask pupils (and staff!) to arrive for the picnic dressed as their favourite fruit or vegetable. • Make picnic food using produce grown in school. Don't forget to compost your peelings and leftovers, and make sure to use reusable plates and cutlery where possible, not plastic disposables. Ask the Eco Team to create display boards, posters and leaflets to hand out during the event, explaining why composting is important.
Plenary	Get feedback from parents/carers who attend the event to see if they have learnt anything new or been inspired to take action. The Eco Team could design a questionnaire for this purpose.

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Extension or simplification	Extend the introductory discussion by planning a survey of pupils throughout the school to find out their thoughts on composting. (See Eco Activity for May - Compost survey) Take plenty of photographs at your picnic to display on your Eco-Schools notice board or on the school website. Ask older members of the Eco Team, or a KS2 class, to write a newspaper article about the event and send it to your local newspaper with an eye-catching photograph. Or invite a reporter from the paper to attend your event.

Don't let Devon go to waste

at school

Case Study

Newton Ferrers C of E Primary School, South Hams

Background

Newton Ferrers C of E Primary School is in the Ivybridge Learning Community and has 100 pupils. It composts all food waste, cooked and uncooked, in a ScotSpin with two HotBoxes, and garden waste in a wooden slatted compost bin. There are two teachers who are designated compost operators.

Pupil involvement

There are food waste caddies in all classrooms, the playground and the kitchen. Pupil compost monitors collect the caddies after lunchtime and meet an adult at the ScotSpin to empty them. The caddy in the kitchen is heavy so it is collected by the adult.The finished compost is used by everyone in the school garden to grow fruit and vegetables.

Curriculum links

The HotBoxes are regularly used during science work on minibeasts and habitats. Spoons and non compostables (from accidental throwing-away) are sometimes found in the HotBoxes and are used in teaching about decomposition and the effects of landfill. Older KS2 pupils record the temperature of the ScotSpin and learn about heat energy and biomass as part of their science curriculum.

Benefits to the school of composting

Over time the children are understanding the cyclical nature of kitchen-composter-garden-kitchen. Working for its second Eco-Schools Green Flag, the school used the development of its gardens, including composting, as a major project towards the award. Newton Ferrers Primary School was featured in a BBC video about reducing school food waste. See: www.bbc.co.uk/programmes/p015gjvx

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at school

Case Study

Alphington Primary School, Exeter

Background

Alphington Primary School is in the West Exe Learning Community and has 360 pupils. They have a Ugandan Keyhole Garden; Standard Ridan with 3 HotBoxes; 3 wooden slatted composters; leaf mould container. The Keyhole Garden was set up by a visiting Ugandan farmer / teacher, working with Year 4 pupils. This is a garden in the shape of a keyhole with a basket for compostable waste at its centre. As the materials break down the nutrients leach into the surrounding garden, helping the plants to grow. Materials composted include a small amount of fruit waste with garden weeds and clippings in the Keyhole Garden; cooked food, peelings from the school kitchens and fruit waste in the Ridan; fruit waste and garden waste in the slatted composters and leaves in the leaf mould container.

Pupil involvement

Caddies to collect food waste are located in every classroom, as well as the playgrounds, staff room and dining hall. Each class has a pupil monitor who empties the caddy on a daily basis.

Curriculum links

The link between Alphington and Uganda extends to the food grown in the school garden, as well as their method for producing compost. Pupils are trying to grow maize and pumpkins in the same way the Ugandans do, and comparing the different climate conditions, with links to science, geography and maths.

Benefits to the school of composting

The compost generated by the wide range of composting equipment in the school is used in the school garden by both KS1 and KS2 pupils as part of curriculum work.

The school has a 'Green AmbassadorsTeam' who do assemblies and spread the word on a wide range of environmental themes, including composting and recycling.

For more information on Keyhole Gardens, including instructions on how to set one up in your school, see the resources section on www.sendacow.org.uk

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at school

Case Study

Okehampton Primary School, West Devon

Background

Okehampton Primary School is in the Okehampton Learning Community and has 630 pupils. An Eco-Schools Green Flag school, it composts all raw food waste from eleven KS1 classrooms, as well as raw food from the staff room and food technology lessons. The school has a large Ridan, a Jora, three HotBoxes, two wormeries and three 'dalek' compost bins. These are operated by the school's Eco-Coordinator, with daily practical help from teaching assistants and pupils.

Pupil involvement

Each KS1 class is responsible for emptying its own fruit waste caddy – the TA does this accompanied by one or two pupils. The children and TA turn the wheel of the Ridan. Pupils from Year 6 turn the Ridan further at lunchtime each day, to ensure that the compost is sufficiently mixed and moving efficiently through the composter's body.

Curriculum links

Pupils have enjoyed the composting workshops provided by Resource Futures as part of the Devon Waste Education programme. Years 3 and 4 have studied the science of the composting process and how the school's equipment works.

Benefits to the school of composting

Pupils are engaged and enjoy learning about the composting process by undertaking experiments such as 'Cook an egg!' (Place an egg in a plastic bag and tie some string around it. Put this in the centre of the compost bin and leave for several hours. Pull on the string to help you retrieve the egg and crack it onto a plate to see if the compost has been hot enough to hard boil it.) Pupils are also encouraged to utilise their fine motor skills by sorting out the worms in the 'Can O'worms' wormery when a layer needs emptying.

Recycle Devon

What happens to our waste?

Waste in Devon

Households in Devon produce more than 350,000 tonnes of rubbish each year. Whilst the County is one of the best in the UK at recycling and composting (over 50% of this waste is currently recycled/composted), a large amount of 'rubbish' still needs to be disposed of.

Currently (March, 2014) 45% of Devon's non-recyclable waste is sent to landfill sites. There are three landfill sites for household waste in Devon:

- Deep Moor near Great Torrington
- Broadpath near Uffculme
- Heathfield near Kingsteignton

However, this is set to change in the near future. The European Landfill Directive has been a key driver in encouraging local authorities to find more environmentally friendly options to landfill.

Many areas of the UK are looking to Energy from Waste (EfW) technologies as an alternative. Devon is one of these areas and within a year from now only 17% of our household waste will be landfilled.

Devon currently (March, 2014) has two EfW plants under construction:

One in Plymouth (due to open in spring 2015) which will take 245,000 tonnes of non-recyclable waste per year from Plymouth, Torbay, South Hams, West Devon and south Teignbridge. This facility will create electricity and heat for use locally. www.plymouth.gov.uk/swdwp

One in Exeter (due to open in spring 2014), which will take 60,000 tonnes of non-recyclable waste per year from Exeter, East Devon, north Teignbridge and potentially Mid Devon. This facility will create electricity which will be exported to the national grid. www.tiru-uk.co.uk/exeter

Devon County Council is currently exploring ways to dispose of non-recyclable waste from the north of Devon.

Landfill sites

Most pupils will know that 'rubbish' is sent to the 'dump', and they may be aware that our landfill sites are filling up. More detailed discussion with children about waste and landfill should draw out the following points, as appropriate to their age and ability:

- We are running out of space in landfill sites.
- Leachate, a dark coloured liquid, is produced when rainwater filters through the rubbish, and from rotting organic material such as food waste. This needs to be carefully managed to keep it out of rivers and streams.
- Methane gas is produced from rotting organic materials in the rubbish. As this is a greenhouse gas, which contributes to climate change, it is important to prevent it from being released into the atmosphere. Instead, it is sucked out of the landfill site using miles of pipes and is burnt to create electricity.
- Once 'rubbish' is buried in landfill, any resources it contains are wasted. This may include items that should have been reused or recycled, such as plastic or glass. Disposing of these in landfill also represents a waste of the time, energy and water used to manufacture them.

Don't let Devon go to waste

at school

Energy from Waste (EfW)

The new EfW plants burn non-recyclable waste at very high temperatures (over 850 degrees Celsius) in a process that creates electricity, and potentially heat, for local housing and industry. We are able to recover 'energy' from our 'waste'. Excess electricity is sold to the grid. The Plymouth plant will provide heat to Devonport Dockyard and will be one of the most efficient facilities in Europe.

This 'recovery' from the waste is in many respects preferable to landfill, but valuable resources are still lost when the waste is burned. This 'recovery' process should therefore be used only after we have **Reduced, Reused and Recycled** as much as possible. When discussing this exciting new technology with children, it is very important for them to understand the place of EfW in the waste hierarchy.

When the non-recyclable waste is incinerated, it leaves two types of ash. Bottom ash, from the burnt waste, has any metal removed, and will then be used in construction projects, such as new road surfaces. Fly ash, which is collected when the gases produced during the burning process are thoroughly cleaned, will be taken to a specialised landfill site.

EfW plants are tightly regulated to ensure that they do not cause any harm to the environment or public health. Gases from incinerating the non recyclable 'rubbish' are filtered so finely that few particles are released into the air.

Strict limits on emissions such as dust, mercury, dioxins and furans, are imposed by European legislation. Both plants will be regulated by the Environment Agency to ensure they operate well within the legal limits.

Further information can be found here:

www.plymouth.gov.uk/swdwp
www.tiru-uk.co.uk/exeter
zone.recycledevon.org/teachers/energyfromwaste
www.southwestwaleswastepartnership.co.uk/residual-waste/energy-from-waste/
www.recycleforgreatermanchester.com/clientfiles/File/8c%20TRF%20flow%20diagram.pdf

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Resources & further information

Devon Schools Sustainability Bulletin

This is emailed to subscribers every half term and is packed with news, resources and ideas about composting, gardening, recycling, energy and biodiversity for Devon schools.
If you would like to subscribe email: recycle@devon.gov.uk

Composting and waste in school

Organisations and websites

Devon County Council (DCC) – Waste Education Team
DCC has a Devon based recycling and waste education website for teachers. This has curriculum-linked teaching resources with local facts and figures, and promotes practical action within schools. DCC also offers Devon schools a grant to help them reduce their rubbish and organises visits to landfill sites and recycling centres.
Web: zone.recycledevon.org/
Email: recycle@devon.gov.uk

Devon Community Composting Network (DCCN)
DCCN supports composting in schools across Devon and Torbay. They offer practical support on setting up and improving school composting systems, compost check-ups, workshops and assemblies to get the whole school engaged in composting.
Web: www.dccn.org.uk
Email: nicky.scott@devon.gov.uk or melissaharvey.dccn@gmail.com

Resource Futures (RF)
Resource Futures run the waste education programme for Devon's schools. Funded by DCC, this includes teacher training, competitions, audits and action planning and a series of exciting, curriculum-linked, free waste education workshops for primary and secondary schools across Devon. RF also work intensively with a limited number of schools each year, to help promote and set up, or improve, their recycling and compost systems.
Details of their workshops can be found at: zone.recycledevon.org/teachers
Email: waste.education@resourcefutures.co.uk

Leaflets and books

'Compost School Special', from Devon Community Composting Network. This booklet goes through all of the nuts and bolts of setting up a cooked food waste composting system in school, including the equipment, the legislation, funding the system and how to get the whole school involved.
It can be downloaded for free from: www.dccn.org.uk

'Making compost in school', from Garden Organic and the Food for Life Partnership, is a concise leaflet about setting up compost systems in school. It is focussed on garden waste compost systems, but does include a small section on cooked food waste composting and has a several compost related activities.

Recycle Devon

Microbiology and decomposition

Organisations and websites

Fungi Futures
Fungi Futures make and sell simple mushroom growing kits, which grow oyster mushrooms on used coffee grounds and recycled cardboard. Their GroCycle project has developed a kit that can use your own coffee waste to grow mushrooms.They are also developing a school specific mushroom growing kit: www.fungi-futures.co.uk/ and grocycle.com/

The British Mycological Society (BMS)
The BMS provide a variety of resources for education and outreach activities around fungi, such as lesson plans and displays. Their website hosts 'myco kids', a fun online site that takes children through the life processes of mushrooms and their role in decomposition and fermentation. They also have a range of mushroom related activity sheets and useful health and safety advice around working with fungi in schools.
www.britmycolsoc.org.uk/education/

Microbiology Online
Microbiology online have a range of information, resources and activities for teachers to use to teach about the world of microbes, including their roles in disease and in decomposition.
www.microbiologyonline.org.uk/teachers/

Gardening in school

Organisations and websites

Garden Organic
Garden Organic produce a range of clear, practical and fun guides to gardening in school.
www.gardenorganic.org.uk
www.foodforlife.org.uk/Resources/Teachingresources

Royal Horticultural Society (RHS)
The RHS have a range of resources, seasonal gardening tips, recipes and courses on gardening in school. These are free to download from:
apps.rhs.org.uk/schoolgardening/default.aspa

Leaflets and books

'**Gardening in School: all year round'** by Clare Revera, published by Southgate. This includes activities for every month in the school year, with detailed, visual instructions for garden construction, growing and learning activities. It has a section on setting up a gardening club and includes a CD with additional resources such as crop planning and risk assessment templates.

'Plot to Plate: grow, cook, create!' by Wendy McMillan and Melissa Real. This is a seasonal journey through growing and eating healthy food in schools. With simple, healthy recipes and activities tested by children.

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Food and growing in school

Organisations and websites

Food for Life Partnership
A network of schools and communities across the UK, committed to bringing good food into schools through the whole food cycle. Their website includes recipes and ideas for cooking in schools, resources for teaching about food, information for school caterers, films and information for farmers wishing to host school visits. www.foodforlife.org.uk/

Growing Schools
A website designed to support teachers to use the 'outdoor classroom' as a resource across the curriculum. It includes activity plans, curriculum links, health and safety and advice on places to visit.
www.growingschools.org.uk

Sustainability in school

Organisations and websites

Sustainability and Environmental Education (SEEd)
A web based hub for bringing together best practice in sustainability and environmental education. Their website includes campaigns for sustainability in the curriculum, training for teachers, case studies and networking.
se-ed.co.uk/edu/

Footprint futures
A range of curriculum based, inspiring education activities around sustainability, including energy, transport, buildings, food and consumption.
www.footprintfutures.org.uk

School visits and activities in Devon

Embercombe
Based near Exeter, Embercombe is a centre for experiential land based learning. They offer inspiring days and longer programmes for schools around food growing, farming, cooking, working on the land and working with other people. www.embercombe.co.uk

Paignton Zoo
Paignton Zoo offer curriculum based activity days around wildlife, conservation, food chains and climate change. www.paigntonzoo.org.uk

Ashburton Husbandry School
Based near Ashburton, South Devon, the Husbandry School offer inspiring school workshops around land based skills including growing food, land based history, traditional rural skills, livestock and art. www.husbandry.co.uk

Diggin It
Diggin It supports schools with the development, enterprise and sustainability of their gardens. They offer a hands-on experience of activity and curriculum based learning at the Diggin It site in Stoke, Plymouth. www.digginit.org.uk

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For more information contact recycle@devon.gov.uk

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