eco detectives

WORKBOOK FOR
THIRD & FOURTH CLASS

ENVIRONMENTAL & CLIMATE CHANGE
INVESTIGATIONS FOR PRIMARY SCHOOLS

RESOURCE CARDS

These Resource Cards are available in the Eco-Detectives Education Pack for use where indicated in this workbook, or for any associated class use.

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    Mixing Clay, Sand and Straw to Build Eco House
    © Albert Bates
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    © Department of the Environment, Heritage and Local Government
20. M6 Galway-Ballinasloe Motorway
    © Image Courtesy of the National Roads Authority
21. Children walking to school/undertaking a walkability audit for Green Schools
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26. Enquiry Planning for Students
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All materials in the ECO-Detectives Pack, including digitised Interactive Investigations, Workbooks and Resource Cards, are also available on the CD-ROM attached to the pack or online on the Primary Schools section of **www.enfo.ie**.

Change.ie and **Changeblog.ie** are part of the National Climate Change Awareness Campaign administered by the Department of the Environment, Heritage and Local Government.

Design: Roomthree Design

introduction

This Workbook is aimed at 3rd and 4th Class pupils. The enquiries and activities are appealing to children who at this age should be starting to use problem-solving techniques; be receptive to critical thinking and dilemma exercises; and be working scientifically while developing awareness of their social and personal interaction with others.

Make the children feel as if they are real **eco-detectives** by examining how they travel within their local environment (e.g. their journeys to school); learning about fuel consumption; the effect it has on the environment and how it contributes to climate change (the Greenhouse Effect/Global Warming). Encourage the children to describe everything they see through class discussions and drawings.

It is best to take the children outside when the weather is dry – it makes the whole experience much more pleasant for all concerned. The children can draw pictures of what they see, find and examine; these pictures can then be displayed in the classroom or around the school for all to enjoy!

contents

useful websites

- www.change.ie
- www.enfo.ie
- www.epa.ie
- www.noticenature.ie
- www.greenschoolsireland.org
- www.recyclemore.ie/recycle_at_school
- www.erp-recycling.ie
- www.weeeireland.ie
- www.changeblog.ie register here to receive a monthly environment eZine

key enquiry question

How do we affect the environment?

key focus

Identifying, discussing and acting upon an environmental issue

key questions

1. What journeys are made in our locality?
2. How do we get to school?
3. What impact does travel to school have on the environment?
4. How polluted is the air?
5. What is the Greenhouse Effect?
6. What activities impact on the environment?
7. How can we reduce our impact on the environment – but still have fun?

concepts

- Location
- Movement
- Natural and human environments
- Interdependence
- Impact of people on the environment
- Environmental awareness and care

skills

- Investigation / Enquiry
- Observation
- Collecting, sorting and presenting data
- Working as a group
- Sharing opinions

resources

- School grounds
- Investigation sheets

WEBSITES

- www.change.ie
- www.enfo.ie
- www.epa.ie
- www.smartertravel.ie

curriculum overview

Geography

- A sense of place and space.
- Geographical investigation skills.
- Maps, globes and graphical skills.
- Human environments: People living and working in the local area (People and communities, People and work, Transport and Communications)
- Natural environments: The human natural environment.
- Environmental awareness and care: Caring for my locality.

Science

- Working scientifically.
- Materials: Properties and characteristics of materials; Materials and change.
- Environmental awareness and care: Caring for my locality.

Maths

- Skills: Applying and problem-solving; Communicating and expressing.
- Data: Representing and interpreting data.

SPHE

- Myself: Safety and protection; Making decisions.
- Myself and others: myself and my family; Relating to others.
- Myself and the wider world; Developing citizenship.

English

- Receptiveness to language.
- Developing cognitive abilities through language.
- Emotional and imaginative development through language.

learning activities

- Observing and recording journeys made in the locality of the school through fieldwork.
- Presenting data on journeys made in the school locality by drawing.
- Collecting data about the how and why of travel to school through fieldwork / homework.
- Presenting data about journeys to school through child selected graphs.
- Presenting findings from a questionnaire relating to reasons for school transport choices through various means.
- Considering options to a dilemma on travelling to school.
- Carrying out experiments to determine the impact of transport on the air in the school locality.
- Carrying out an experiment to investigate the Greenhouse Effect.
- Presenting ideas about the impact of travel on climate and climate change.
- Planning options for improving transport choices around the school and wider locality.
- Presenting findings to the class and to the school community.

what do i do... what could i do?

key questions

- What journeys are made in our locality?
- How do we get to school?

outline

Children start an enquiry about travel in their locality. They consider how they make different journeys and how different types of travel might affect the environment.

Teachers may provide children with the following prompt words: Travel, How, Why, What, Impact, Environment, Climate Change, Future, Car, Bike, Walk, Sustainable, Transport.

preparation

Teachers should be familiar with the enquiry / investigation approaches to SESE (see Resource Cards 24-26) – specifically geography in the Primary School Curriculum.

learning outcomes

On completing these activities all children will be able to:

- describe journeys made in the locality by people or animals e.g. planes overhead, children being driven to school, bees flying, etc;
- devise questions about travel in the locality;
- decide on and collect data relating to travel in the locality; and
- present findings relating to travel in the locality and its environmental impact.

resources

- Clipboards/notebooks
- Investigation sheet: What Journeys Are Made In Our Locality (Investigation 10)

learning activities

1. Children observe journeys made in the locality and complete the Worksheet in Investigation 10.
2. Children write down questions relating to travel in their locality on strips of scrap paper. Children sort questions into categories.
3. Children develop 'big' questions about transport in their locality e.g.
   - How do people travel in the locality, including getting to school?
   - Why do people travel as they do?
   - What impact has this on the environment?
4. Children decide on data they will need to collect in order to answer their questions – this may include other activities in this resource pack.
5. Children collect the data, this may include surveys, interviews, etc.
6. Children can map/draw journeys made in the locality.

what journeys are made in our locality?

name:

class:

INSTRUCTIONS: Be an Eco-Detective! Think about all the journeys that are made in your locality - by people or animals... Who is going where? How are they getting there? What kind of power is used to make them move? Write your answers below...

Who is making the journey?	**Where** might they be coming from?	**Where** might they be going to?	**How** are they moving? **What** are they in or on?	**What** fuel is being used?

journeys in our locality

key question

- What impact does travel to school have on the environment?

outline

This activity involves the use of a dilemma to raise an issue with children and to explore complex questions with no absolute right or wrong answer. As well as developing their critical thinking, appropriate information and knowledge can be integrated in a meaningful way. They are usually presented as a series of cards that create a scenario; the characters may be real or made up. Embedded in the cards, is content to help develop childrens' background knowledge and understanding of the topic.

preparation

The dilemma needs to be photocopied so each pair /group of children has a copy. The children can cut up the dilemma. After it is used it can be kept in envelopes to be used again.

learning outcomes

On completing these activities all children will be able to:

- list the advantages and disadvantages of cycling, walking or driving to school;
- recall some general statistics on cycling to school in Ireland and elsewhere ; and
- consider their own actions in relation to travel to school.

resources

- Dilemma sheet: Should Seán cycle to school? (Investigation 11)
- Cards created from a copy of the dilemma sheet cut up
- Envelopes
- Scissors

learning activities

1. The children are simply given the cards. The story has a sequence of situations in which decisions have to be made on behalf of the characters in the story.
2. Children reflect on the dilemma individually, then together with peers. This allows them to actively reflect on their own ideas before sharing them or being influenced by their counterparts. It is very important in group work to promote tolerance and consideration; this could be something that is decided together with the class. However, the discussing and arguing is part of the fun!
3. Children present their thoughts on the original question.

NOTE

- Check **www.smartertravel.ie** for further information and ideas.

should seán cycle to school?

INSTRUCTIONS: Investigate whether Seán should cycle to school! Read what's in the boxes - cut them out if you like and group some together. Name some good or bad points about walking, cycling or driving. Do you think Seán should cycle to school? What would be the best way to travel to school?

Seán's school has racks for 6 bikes.

Seán lives in a small village in Co. Cork.

Seán's dad owns the petrol station in the village.

Seán loves cycling.

More children walk to school in Green Schools than in other schools.

It takes around 12 minutes to walk 1 km.

Seán's mum works in Cork City.

Ireland's average temperature increased by about 0.7 ºC in the last 120 years.

In 2008, there were 282,557 vehicles in Ireland.

2% of all journeys in Ireland are by bike.

27% of all journeys in the Netherlands are by bike.

Seán's grandmother lives next to the school.

In Monze, Zambia children walk up to 25km each day to get to school and back.

The chances of getting rained on going to school in Cork is around 12%.

The Green Schools programme results in about 500,000 litres of transport fuel being saved each year in Ireland.

WOW stands for Walk on Wednesdays.

Seán's brother gets the bus to his secondary school.

22% of car journeys to school in Ireland are under 1km.

Seán's mum worries about the dangers of cycling.

In a car, 80% of the energy is lost through heat and the exhaust.

In a car, 20% of the energy is used to turn the wheels.

25% of children in Ireland walk to school.

People driving to and from school in Ireland create huge amounts of CO_2 each year.

In 2002, 42% of children in Ireland (329,229) were driven to school.

Greenhouse gases trap heat in the Earth's atmosphere.

Carbon Dioxide (CO_2) and Methane (CH_4) are both Greenhouse Gases.

In 2004, there were 391 cars per 1000 people in Ireland.

The Greenhouse Effect is the rise in temperature that the Earth experiences.

Cars release a lot of Greenhouse gases into the air.

A 'walking bus' is a group of children accompanied by adults walking to school in a line.

ENQUIRY 12

journeys in our locality

key question

How polluted is the air?

outline

In this experiment children find out how polluted the air is.

preparation

Collect resources below.

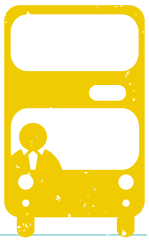
learning outcomes

On completing these activities all children will:

- know about pollution in the air;
- be able to compare levels of pollution in different places; and
- know about the sources of pollution.

resources

- White saucers or jam jar lids
- Petroleum jelly, e.g. Vaseline
- Labels
- Sticky tape
- Magnifier
- Investigation 12 worksheet 'How polluted is the air?'



learning activities

1. The children make an air monitor by putting petroleum jelly on a saucer or jam jar lid. They label each with their names and the places where they will put them. The children keep one to put in the classroom - to compare with outdoor ones. Pollution in the air will stick to the petroleum jelly.
2. The children put two air monitors outside, affixing them to something so that they don't blow away or get filled with rain. The monitors are then left in place for a week. The children collect their air monitors and look at them closely. Using a magnifier, they record what they see on the sheet. **NOTE: The children should not touch the petroleum jelly on the monitors and should wash their hands after the activity is complete.**
3. The children and teachers talk about the investigation.

NOTE

- Check **www.enfo.ie** or **www.epa.ie** for information on air quality.

how polluted is the air?

name:

class:

INSTRUCTIONS: Can you detect air pollution? Place your petroleum jelly in 3 locations - one in the classroom and two outside. Make sure they can't be blown away or rained on! Try and predict which will show the most air pollution. Leave them for a week and then examine them closely with your magnifying glass. What do you see?

OUR EXPERIMENT

We chose _____ **and** _____ **and** _____ **as locations**

We predict that air in _____ **will be the most polluted,**

because _____

WHAT WE FOUND OUT:

Collect your air monitors and look at them closely. Use a magnifier. Record what you see:

Classroom air monitor	Air monitor 1: _____	Air monitor 2: _____

QUESTIONS TO TALK ABOUT:

How dirty were the air monitors?

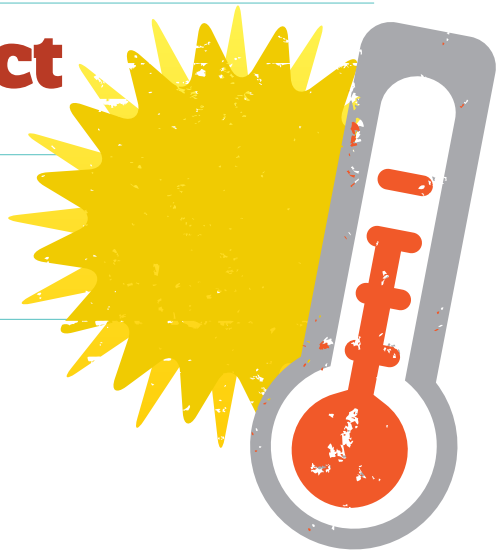
Was the air dirtier in one place than another?

If so, can you think why that might be?

How might air pollution be different in a different part of the country?

Are there any ways you can think of to reduce air pollution?

the greenhouse effect



key question

What is the Greenhouse Effect?

outline
Children find out about the Greenhouse Effect through various activities.

preparation
This activity works best outside on a sunny day.

learning outcomes
On completing these activities all children will be able to:

- carry out an experiment;
- describe the Greenhouse Effect; and
- consider the importance of the Greenhouse Effect.

resources
- Glass jar (at least 1 – or one per pair/group of students)
- Photo of a green house (resource card 08) or use interactive resource
- Thermometers (at least 2 – or two per pair/group)
- Greenhouse effect diagram (resource card 19) interactive resource (available on CD-ROM or primary schools section of www.enfo.ie)
- Investigation 13 activity sheet– Greenhouse Effect Experiment

learning activities

1. Look at a local greenhouse or show the children a photograph of the greenhouse (resource card 8). What is a greenhouse? What do we use them for? How do they work? See also interactive resource.
2. Lay the thermometers side by side and place the **glass** jar over one of them on a table or raised ledge in the school grounds.
3. Children **take and record readings** from each thermometer straight away, then again after 30 minutes and again after an hour - writing the details in Investigation 13 activity sheet.
4. Discuss the **difference** in temperature. It should be warmer in the jar because it traps the gases in the atmosphere.
5. Children **draw graphs**, of their choice (preferably line graphs) using graph paper. The graphs should show that the thermometer with the glass over it rises to a higher temperature.
6. Children should make use of the interactive resource/animation on the Greenhouse Effect which is included on the CD-ROM or at www.enfo.ie. Children watch an **animation** on the Greenhouse Effect.
7. Children **label** a diagram (see resource card 19), in groups, to show the process that is the Greenhouse Effect.
8. The children **discuss** the benefits and problems associated with the Greenhouse Effect.

questions and some answers (for teachers)

1. Why is it hotter inside the jar?
   > The glass lets the sun's energy inside, and then traps the heat.
2. What would cause the temperature in the jar to change at different times?
   > Different sun conditions.
3. In what way is the mini greenhouse like the earth's atmosphere? In what way is it different?
   > The earth traps the sun's heat like the jar, but the earth's atmosphere is not solid like the glass jar. Some of the gases in the earth's atmosphere escape into space and some are reflected back to the earth. The Greenhouse Effect occurs naturally and is an essential part of the global climate system. The problem is when the amount is being **increased** too much by man-made activities, such as burning fossil fuels, which traps more heat resulting in Climate Change, (including global warming and changes in global circulations of air and water).

greenhouse effect experiment

name:

class:

INSTRUCTIONS: 1. Write down the temperature in the jar and outside the jar. 2. Record the date and time for each reading. 3. Plot the readings on a line graph shown below using different colours for inside and outside readings

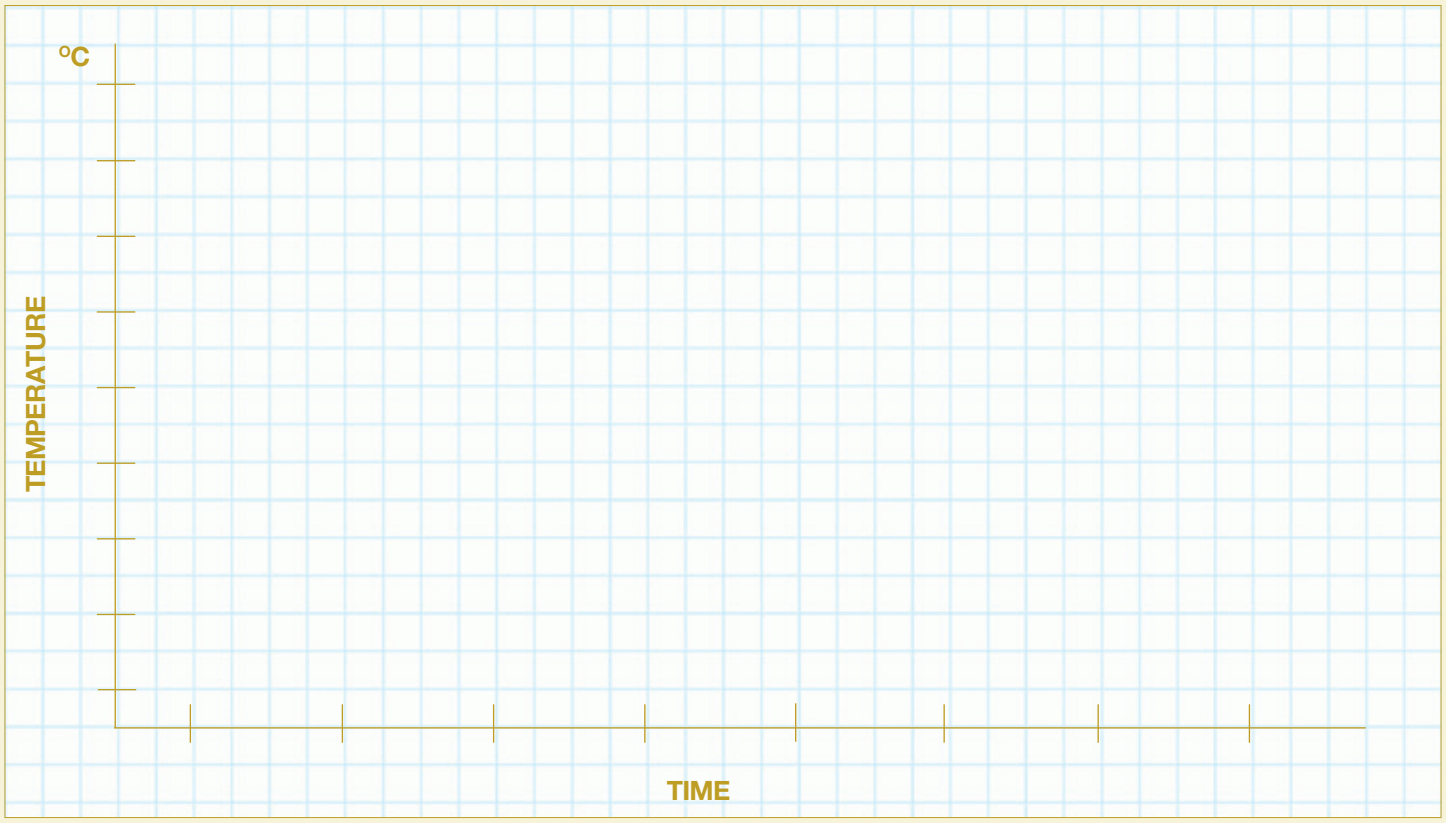
Discussion Questions

- What happened inside the jar?
- What would happen if there were two layers of glass?
- What happened outside the jar?
- Why is the jar like the world?

Recording the temperatures

Time	Temperature in the jar (°C)	Temperature outside the jar (°C)

Graphing the temperatures



what we get up to!

key questions

- What activities impact on the environment?
- How can we reduce our impact on the environment – but still have fun?

outline

In these activities children consider their actions and the impact of their actions on the environment.

preparation

Many of these activities need a bit of space and involve the children working in groups.
These activities could be completed at the start of other activities on climate change.

learning outcomes

On completing these activities all children will be able to:

- recognise the impact of their actions on the environment; and
- know that some activities have less negative impacts on the environment.

resources

- Select from resource cards 1-26 or use miscellaneous images from magazines and newspapers
- Small pieces of scrap paper, approximately 3cmX3cm or 'Post-It' notes

learning activities

1. Spread photographs on floor of classroom and ask children to circulate, looking at all the photographs.
2. Ask the children (alone or in pairs) to select a photograph they like.
3. Ask the children in pairs to talk about the photograph at their tables.
4. Ask the children to draw themselves on a small piece of paper or yellow 'stickie'. Put the picture of themselves in the picture. Ask them to use their senses:
   - What can you hear?
   - What can you see?
   - What can you smell?
   - How do you feel?
6. Get the children to talk about the activity they are doing in the picture.
7. With the whole class standing, rank the pictures as to which have the lowest and highest impact on the environment. This is virtually an impossible task, however it allows children to think about differing impacts on the environment.
   - Low impact activities: playing, cycling, walking, recycling.
   - High impact activities: flying, driving.
8. Using Investigation 14a, get the children to discuss the day-to-day things they do.
9. Ask children to cut out and rank the activities on the 'Possible Things To Do' (Investigation 14b) in side-by-side columns:
   - Which activities have the most positive impact on reducing their contribution to Climate Change?
   - Which are the easiest to do?
10. Make a Mind Map! See Investigation 14c.

things i do

INSTRUCTIONS: Using these boxes to start them off, get the children to stick notes of all the things they do around an image of themselves (or their family, or the entire class). This image may be hand-drawn or a photograph.

Walk in the park	Plant flowers	Watch TV
Make a picture with reused items	Play computer games	Walk to the local shop
Leave the light on all night	Pick up litter in school	Eat an orange from South Africa
Surf the internet	Play soccer	Walk in the countryside
Drop chewing gum on the ground	Play with dolls	Play with my pet
Fly to see a friend in England	Grow vegetables	Fly to the USA
Tidy my bedroom	Take a family drive to the shopping centre	Play GAA

possible things to do

INSTRUCTIONS: Get the children to cut out these boxes - both columns have the same actions. The investigation is to rank each column; firstly from the easiest to do, to the most difficult to do; secondly, to rank these actions from having the most positive impact to the least. Compare the lists.

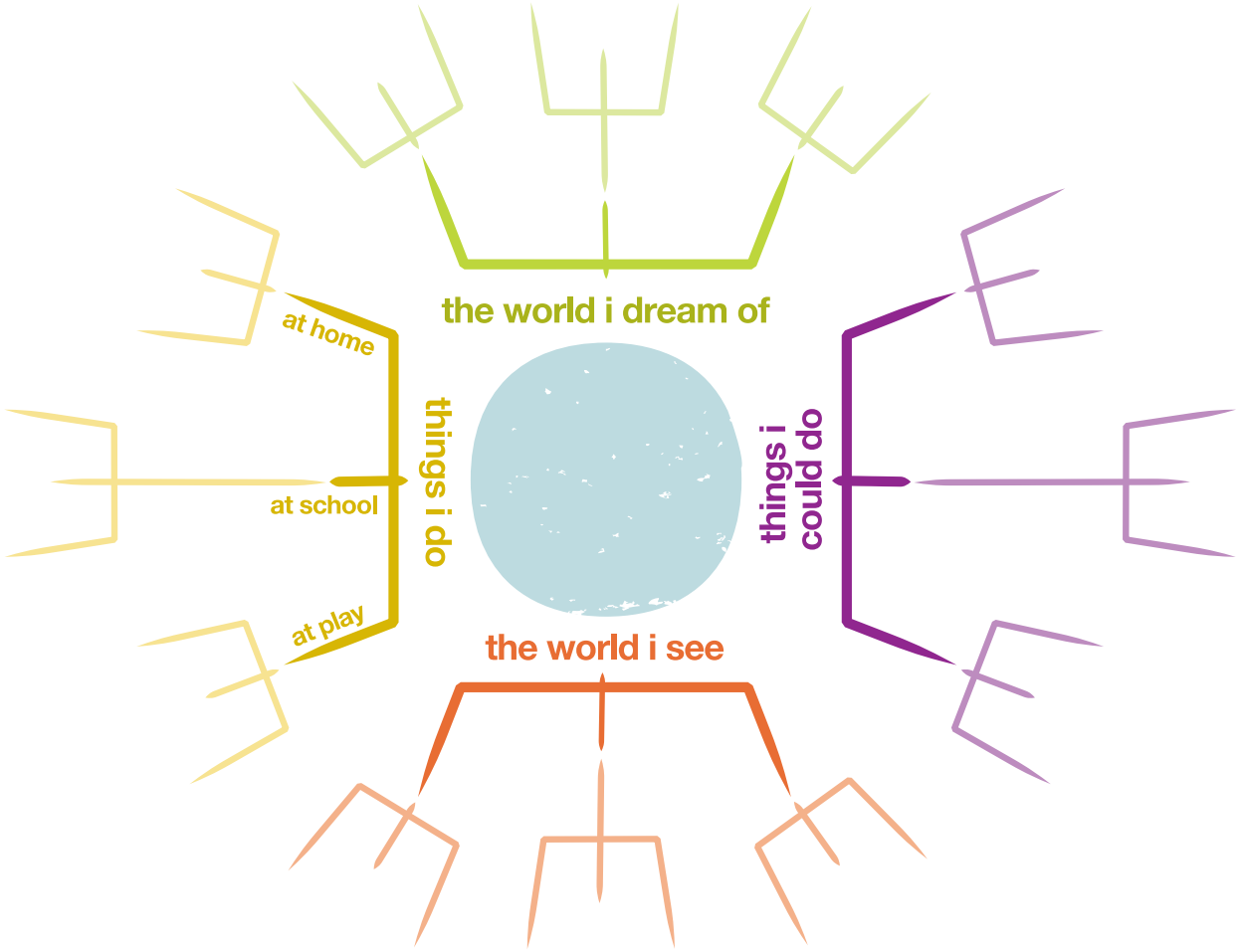
Turn the tap off while you brush your teeth	Turn the tap off while you brush your teeth
Buy a clothes airer	Buy a clothes airer
Buy clothes from a charity shop	Buy clothes from a charity shop
Go on holiday by ferry or train	Go on holiday by ferry or train
Grow some fruit and vegetables at home	Grow some fruit and vegetables at home
Join the local library	Join the local library
Mend torn clothes	Mend torn clothes
Recycle all glass at home	Recycle all glass at home
Switch lightbulbs to energy saving bulbs	Switch lightbulbs to energy saving bulbs
Take old toys to the charity shop	Take old toys to the charity shop
Take only one flight a year	Take only one flight a year
Turn off heating & lights in empty rooms	Turn off heating & lights in empty rooms
Walk to school	Walk to school

things i can do

name:

class:

INSTRUCTIONS: Draw a Mind Map and use this map to investigate the things you do, and the things you could be doing - at home, in school or at play... just add branches wherever you like. What is the world like now? How would you imagine a world in the future?



eco detectives game

START

1

2 you walk to school - march forward 5 spaces!

3

4

you buy a bag of individually wrapped sweets skip a turn to dispose the of wrappers

16

17

18

19

20 you forgot to turn out the lights last month - the electric bill is huge! go back 3 spaces

21

22

23

24 mum buys you a new bike - race forward 3 spaces

25

26 the school has a new garden. forward 2 spaces

27

28 your school joins green schools - forward 4 spaces

38

39

40

41 a bunch of neighbours get together to make a vegetable garden. forward 2 spaces

42

43

44

45 your neighbours get some solar panels and tell your parents - forward 3 spaces

46

47 your house is too warm, go back 3 spaces to reset the thermostat

48

49 dad offers to carpool with the neighbours on rainy days - forward 2 spaces

50

51

be an eco-detective!

A game for 2 or more players. Race your friends around the board today and find out all about the good and bad things you, your family and your community can do to help the environment and combat climate change.

you will need:

1 Dice
1 counter per player

instructions:

1. Everyone rolls a dice - highest number plays first to begin the game.
2. First player rolls a dice and moves forward that number of spaces. If that player lands on a special square, they must do whatever it says in that square.
3. The next player throws the dice.
4. To win, a player must reach the finishing line first, throwing the exact mumber to win the game.
5. Good luck!

What have you learned from playing the game?

1. What actions were bad?
2. What actions were good?
3. What else would be bad?
4. What good actions could you do?

Design: Roomthree Design

Comhshaol, Oidhreacht agus Rialtas Áitiúil
Environment, Heritage and Local Government

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Centre for Human Rights and Citizenship Education
St Patrick's College Drumcondra

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