

e-waste kit



LESSON AIMS

- **Students learn about electronic waste (e-waste) and its associated harmful effects on the environment**
- **Students learn solutions for disposing of e-waste in an environmentally friendly way**
- **Students become aware of the environmental impact that technology is having on the world we live in.**
- **Students learn about the different ways in which energy is used and to find out why and how to save energy generated by IT equipment.**

BACKGROUND MATERIAL

What is e-waste?

Electronic waste or e-waste is electronic equipment that is no longer in use. This includes computers and computer related equipment such as monitors, cables, keyboards, mice and speakers as well as mobile phones. e-waste is the fastest growing type of waste in the world.

A 2006 report **e-Waste in New Zealand: taking responsibility for end-of-life computers and TVs** prepared by the Computer Access NZ Trust estimated that there are 10 million electronic devices currently in use in New Zealand, with nearly one million being added each year.

Much of this equipment is now reaching the end of its life and is being disposed of in landfills. According to a 2006 survey conducted by the Ministry for the Environment (MfE) nearly a quarter of a million computers stored in people's homes are not being used. There are also an estimated 3.3 million mobile phones in New Zealand, one quarter of which are no longer in use.

The problem is that landfilling stores the waste rather than allowing for recovery and reuse of valuable materials. There's also a risk that hazardous substances will leach from landfills into surrounding land and waterways, polluting our environment.

What are the effects of e-waste?

The highly-toxic chemicals leached by old electronic equipment such as lead, mercury and cadmium, pose a threat to the environment, wildlife and also human health. Exposure to mercury can cause brain damage, while lead damages our blood and nerve system as well as being highly toxic to plants and animals.

What is eDay?

eDay is a community initiative, supported by industry and local authorities, designed to raise awareness of the hazardous nature of electronic waste (e-waste), while offering an easy way to dispose of old computers and mobile phones in an environmentally sustainable manner. eDay 2008 will take place on Saturday 4th October at various locations across the country.

eDay was created in response to a growing concern about the volume of e-waste being dumped in landfills around the country and the potentially toxic effect it could have on the environment.

The event was piloted in Wellington in 2006 with the support of Dell; some 54 tonnes of unused computer hardware were disposed of in one day. In 2007 eDay extended to 13 different regions and collected a massive 415 tonnes of IT equipment.

What happens to the e-waste once it is collected?

All equipment will be sorted at the drop-off site on eDay before being transported to recycling plants within New Zealand or overseas. Once it arrives at the recycling plant, the computer equipment will be disassembled and recycled for reuse. All mobile phones will be shipped to Singapore. If the mobile phone is still in working order it will be reused, while non-working mobiles will be disassembled and recycled.

e-waste kit

How can we help to reduce e-waste?

Recycling potential e-waste is a safe way to dispose of unwanted electronic equipment in an environmentally sustainable way.

There are several simple ways New Zealanders can help to reduce e-waste, such as:

- Leasing equipment or buying second-hand computers
- Donating or selling old computer equipment that can still be used
- Recycling old toner cartridges and hardware

What are manufacturers doing to reduce e-waste?

Manufacturers of electronic equipment are also taking responsibility for reducing e-waste, for instance Dell, Hewlett Packard and IBM will arrange to pick-up unwanted computer equipment free of charge from their customers. There are also computer recycling companies who provide schools and low-income families with computers. Old mobile phones can be sent to Vodafone and Telecom for recycling.

What other waste is associated with computers?

All computers, cell phones, game consoles and anything else electronic use electricity. To make this electricity, we often harm the environment by sending greenhouse gases into the atmosphere. Any chance we have to reduce our energy use, we help the environment.

With increased use of electronic devices such as computers, PDAs and cell phones, a lot of energy is wasted when these devices are left on and unattended. A computer can waste up to five times the energy used by leaving a light bulb on (based on a 60W lightbulb and a 300W computer). So it's very important to take steps to save energy with these devices.

Here are some ways to save energy:

- Buy energy efficient computer products by looking for the energy rating.
- Turn off your computer when you are not using it.
- Unplug phone chargers when you are not using them.
- Select the right sized monitor to meet your needs. The bigger the monitor, the more energy it uses.
- Consider using an LCD monitor rather than a CRT monitor.
- Select printers that offer two-sided printing to reduce paper and energy usage.
- Enable the energy saving settings on PCs and peripherals - a computer in idle mode uses 20 to 50 times the power of a computer in standby mode.
- Turning off lights when you leave the room.

Energy resources:

The Energy Efficiency and Conservation Authority website has easy to understand explanations about different kinds of renewable energy.

www.eeca.govt.nz/renewable-energy/

A good visual representation of the different energy sources can be found at

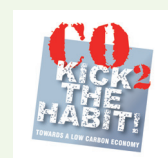
www.mfe.govt.nz/publications/ser/enz07-dec07/html/chapter5-energy/page2.html

For tips on things you can do to make your home healthier while using less energy visit

www.sustainability.govt.nz

Learn about sustainable living

www.unep.org/wed



e-waste kit

CLASSROOM ACTIVITIES

Primary and intermediate school student activities

1. Introduce the students to the concept of e-waste, by explaining what e-waste is and the damage it can do to our health and the environment.
2. Ask students to conduct some research about e-waste on the e-day website and other useful information sources found below. Encourage students to make a poster or collage to raise awareness about the issue and highlighting the problem of e-waste.
3. Students can conduct an audit within their own household or school to see what potential e-waste they would have in the future. Students could then make an e-waste plan (similar to a Civil Defence plan) covering their strategy for dealing with their e-waste in the future. Encourage them to 'think outside the square' by using De Bono's green hat (see over the page for more detail).
4. Have students find out about the recycling of e-waste products and produce a flyer or brochure giving the public information about where things such as toner cartridges and hardware can be dropped off for processing.
5. Use the attached activity sheet (worksheet 1) to introduce students to the idea of identifying potential e-waste sources in the picture. Now ask them to draw a map of their own classroom (could be a paired or group activity) and identify the e-waste sources from their own environment.
6. Have students write a jingle or rap about the issue of e-waste and perform it for the rest of the class or the school at an assembly.
7. Have students 'hunt out' energy wasting equipment in the classroom and/or home.
 1. Discuss what things in the room could waste energy and how they can stop the wastage.
 2. Divide the class into small groups.
 3. Have the groups conduct an 'IT Energy Hunt' seeking out items on the attached worksheet 2 and circling the corresponding face.
 4. The worksheet will determine whether the classroom (or home) is a 'waster' or a 'saver'.

High school student activities

1. Ask students to research the e-day website and other resources and design an alternative logo for eDay that is specific to their local area. These should be aimed at encouraging people in their community to reduce their e-waste.
2. Students with access to audio visual equipment could record an advertisement or jingle or rap for local radio stations or a TV advertisement highlighting the problems of e-waste and encouraging New Zealanders to dispose of these items in an environmentally-sustainable way.
3. Ask students to measure an average-sized computer monitor and calculate how many monitors it would take to fill up a netball court (measuring 30.5m x 15.25m). They can then use this information to complete task 4.
4. According to the MfE there are 250,000 unused computers being stored in people's homes, how many netball courts would it take to dispose of this number of monitors? Students may like to write an essay or newspaper article with their findings.
5. Ask students to imagine they are journalists writing an environmental impact report for their local newspaper about e-waste. Ask them to describe the impact on the environment and people's health and suggest simple ways that their community can reduce this damage.
6. Do some price comparisons between the costs of leasing and buying computer equipment. This information could be presented as a report similar to that done by the Consumer Institute <http://www.consumer.org.nz> - this would also be okay for primary students.
7. Have students find out about what happens to the computer and mobile phone parts that are not reused in the same way. They could present their findings as a flow diagram to show the lifecycle of a recycled product.

e-waste kit

*8. Using De Bono's Thinking Hats, have students consider the issue of e-waste using different points of view. These could be shared in groups orally or presented in some written or diagrammatic form.

White hat: What do we know about the issue? What do we want to know?

Red hat: How do we feel about it? Why do we feel that way?

Yellow hat: What are some of the positive aspects about e-waste?

Black hat: What are some of the negatives?

Green hat: What lateral thinking ideas can we come up with to help with this issue (think outside the square)?

Blue hat: Reflect on each of the aspects above. What else needs to be considered?

*Six thinking hats

Edward de Bono's six thinking hats is a good technique to use when considering different points of view.

- **Wearing your white hat** - look at the statement and see what you can learn from it. Look for gaps in your knowledge. Are there things you need to know or find out to help you make sense of this situation?
- **Wearing your red hat** - consider your feelings. What is wrong with this situation? How does it make you feel?
- **Wearing your black hat** - look at all the bad points.
- **Wearing your yellow hat** - consider the good points of this and all of the possible benefits and values.
- **Wearing your green hat** - think creatively and develop creative responses to this situation.
- **Wearing your blue hat** - what other thinking is needed here?

SOURCES AND FURTHER INFORMATION

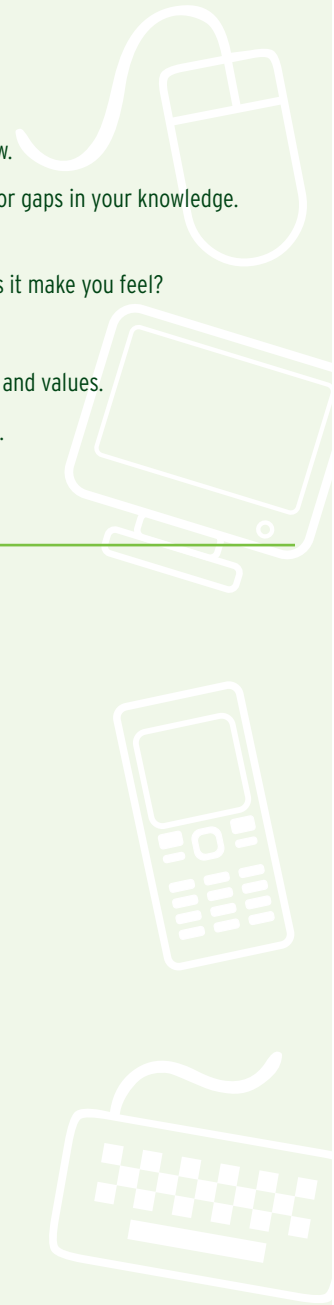
Ministry for the Environment - www.mfe.govt.nz

Computer Access NZ Trust (CANZ) - www.canz.org.nz

The Ark - www.the-ark.co.nz

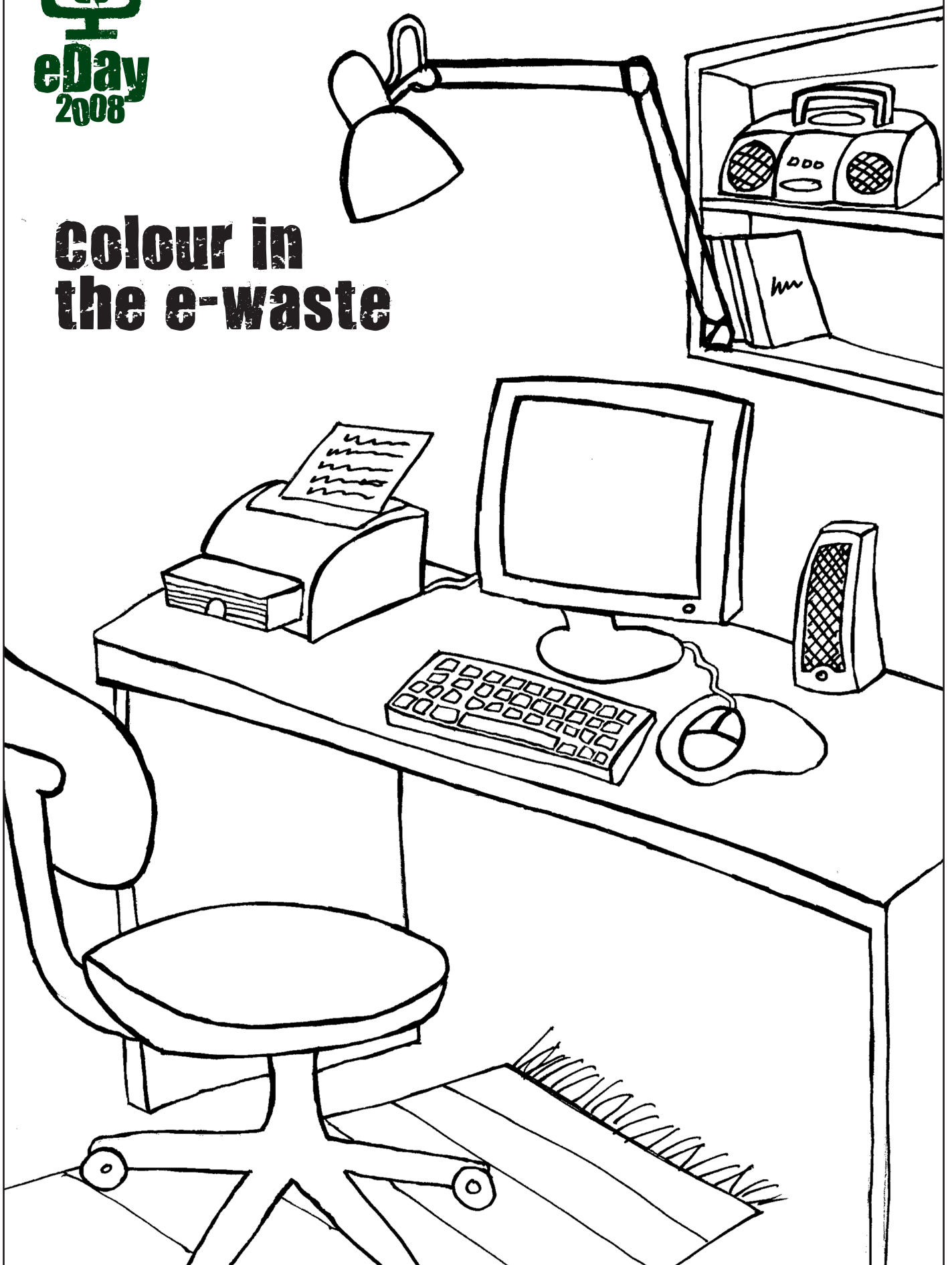
Remarkit - www.remarkit.co.nz

e-Day 2008 - www.eday.org.nz





colour in the e-waste





Computer and IT Energy Hunt

WORKSHEET 2

Hunt out energy wasters and see how your classroom is doing. Go through each question and circle the face that best fits your situation. When you have answered all of the questions, count up how many of each face you have circled.



1. How is your classroom computer left when you are not using it?

Leave it on

Use sleep feature

Turn it off



2. How do you leave your printer when you are not using it?

Leave it on

Use sleep feature

Turn it off



3. Do you or your parents unplug your phone charger when you are not using it?

Never

Occasionally

All the time



4. When you get a new computer, what do you do with the old one?

Throw it away at the dump

Leave it at home

Take it to an e-waste recycler



How did you score?



Two or more SAD FACES?

High energy user. Unfortunately you are using too much energy! Remember by using less energy, you will save money on your electricity bill and help the environment too. Ask your teacher and parents to see what you can do to reduce your energy use!



Two or more NEUTRAL FACES?

Moderate energy user. You are doing okay with energy usage, but there are still steps you can take to improve. Review the quiz with your teacher and parents and see what changes you could make to reduce your energy usage.



Two or more HAPPY FACES?

Low energy user. Congratulations! You are very energy efficient. Keep up the good work and educate your family and friends about how they can save energy!