

Science Toolbox

The Science Toolbox was first produced in print for the New Zealand Ministry of Education by Learning Media, Wellington, in 1998.

This resource is now online to ensure that the information on pricing and suppliers of science materials is kept up to date (Last updated July 2012).

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Associated resources

The Science Toolbox is designed to be used in collaboration with [*Safety and science: A guidance manual for New Zealand Schools*](#) (accessed from the Science Technician's Association of New Zealand website).

Science equipment – The Science Toolbox

The Science Toolbox is a resource that supports NZ primary school teachers to identify materials for use in their science programmes.

Schools do not need to buy every item listed, nor do the lists include everything needed for science programmes. The equipment and consumables lists:

- help teachers identify gaps in a school's current provision for a science programme
- suggest other ways to use existing materials and promote the cross-curricular use of materials.

Planning for science programmes

This section contains information for teachers overseeing school science programmes. It includes advice on budgeting, identifies some lower cost options for consumables, gives safety information, and advice on the storage and issue of materials.

Budgeting

It is essential that the science curriculum area is allocated an adequate budget each year to cover the cost of new purchases, maintenance, and consumables. Some primary and intermediate schools budget up to \$35 per student per year for science. The teacher in charge of science is responsible for making a strong, realistic case for budget allocation to the principal and board of trustees. Teachers should not have to provide incidental classroom resources themselves. Some schools allocate each teacher a discretionary budget of \$50–100 for this purpose.

Planning for purchasing should be carried out when long-term teaching plans are formulated. At this stage, lists of required resources can be made. The teacher responsible for science can then work from these lists to prepare, for the year's programme, a budget and a purchase plan that meet the needs of all staff. It may be necessary to prioritise some purchasing or spread payment over a period of time.

Preparing a long-term science plan (3–5 years) may be helpful for buying more expensive capital items. These may include microscopes, LEGO Technic, meters, and sophisticated measuring instruments such as barometers, anemometers, and balances. Small schools may find it useful to

pool resources with other schools for buying more expensive capital items and establishing a local science resource library.

The school budget also needs to allow for the purchase of learning materials for students and curriculum materials for teachers, including subscriptions to magazines and science teacher associations.

Sourcing materials

Consumables and equipment

Teachers with responsibility for science can use these lists to help make decisions about buying science materials.

Adapt the lists to suit your school's particular needs. Extra columns can be added to record such information as:

- stock levels of existing equipment and materials
- priority for obtaining new equipment and materials
- dates, prices, and sources of purchases.

These records provide the information needed for regular stocktaking and for planning new purchases or collection campaigns.

MS Excel Downloadable version

 [Science Toolkit - Equipment list](#) (Excel 55 KB)

 [Science Toolkit - Consumables list](#) (Excel 51 KB)

MS Word Downloadable version

 [Science Toolkit - Equipment list](#) (Word 112 KB)

 [Science Toolkit - Consumables list](#) (Word 112 KB)

Safety equipment

The equipment list does not include the safety equipment that every board of trustees must provide to ensure that science teaching takes place in a safe and healthy environment. See "Suggested minimum safety equipment" for further information.

Low-cost options for materials

Low-cost alternatives can be used for some items, such as spring clothes pegs instead of alligator clips.

Asking parents

Many materials are common household items which can be provided by parents at the start of the year or unit of work. Use this letter to parents to help set up a collection.

 [Sample request letter](#) (Word 2007 15 KB)

Other sources

Materials can be obtained through liaison with local intermediate and secondary schools and tertiary institutions, who may be prepared to lend equipment and materials.

The [New Zealand Association of Science Educators](#) in your [region](#) may also be able to suggest alternative local sources or help to set up partnerships with other schools.

Various organisations, such as your parent-teacher association, local businesses, or other local community organisations, may be able to help provide resources.

Recommended collectable items

These items can be collected over time and stored for use in the science programme.

- Bones (for precautions when handling bones, feathers, and birds' nests – see page 32, [Safety and science: A guidance manual for New Zealand school \(Revised edition, 2000\)](#)).
- Feathers
- Birds' nests (preferably stored in zip-lock plastic bags)
- Shells
- Cones (from pine and conifer trees)
- Stones, rocks, and minerals
- Leaf skeletons
- Sand
- Dried insects
- Fishing floats
- Pressed leaves and flowers
- Seeds
- Old appliances or toys
- Cross-sections of tree trunks.

For storing these items, large four-litre margarine or mayonnaise plastic containers are useful. They are often available from restaurants.

Suggested tools

These basic tools are useful for setting up and carrying out science projects.

- Cordless drill
- Craft knives
- Glue gun
- Hacksaw
- Hammer
- Pliers
- Screwdrivers
- Slag hammer – for breaking soft rocks (for safety reasons, carpentry hammers must not be used for breaking rocks)
- Wire-cutters
- Wire strippers.

Field trip kit

When preparing kits for field trips, use the following list as a guide.

- Beating sheets (for laying under bushes to catch animals shaken off)
- Bamboo stakes (graduated)
- Bottles for water samples
- Bowls
- Buckets
- Clipboard and plastic bags or plastic pockets
- Compass
- Forceps
- Funnel
- Girl Guide biscuit box (useful containers for kits)
- Gloves
- Hoops or quadrats (for population counts)
- Identification material, such as keys, posters, or pictures
- Knotted cord (knotted every 25 or 30 cm)
- Magnifying glasses
- Measuring tape
- Nets (could be made from pantyhose)
- Paintbrushes

- Paint trays or palettes
- Paper towels or cotton wool
- Patty pans
- Pens and paper
- *Pooter* (enables catching and observation of tiny insects without touching them)
- Pottles with lids
- Random number table
- Ruler
- Sieves
- Snips or scissors
- Stopwatch
- Thermometer
- Torch
- Towel
- Trowel or scoop
- Well trays, ice cube trays, or paint trays (for holding/sorting individual specimens)

Safety

Suggested minimum safety equipment

Relevant items from the following list must be readily accessible in a classroom during science activities. Most of them could be stored in a large plastic box that can be easily taken to the classroom when required.

- Fire extinguisher or bucket of sand (for smothering small fires)
- Fire blanket
- First-aid kit
- Source of water (such as a bucket of water)
- Rubber-hose shower attachment (to use as a safety shower)
- Plastic jug (to use for washing eyes with clean water)
- Safety glasses or goggles
- Lab coats (old shirts)
- A container for broken glass and other sharp materials. See page 30, [*Safety and science: A guidance manual for New Zealand school \(Revised edition, 2000\)*](#).

Safety procedures

It is advisable for students to wear some form of protective clothing, such as an old shirt, when carrying out chemical reactions or using biological materials.

Safety glasses or goggles should be worn if the particular activity involves a risk to eyes. Safety glasses require regular sterilisation, preferably by ultraviolet light. Local hospitals, universities, or research institutes may be able to carry out the sterilisation.

Cutlery used in science activities must be clearly labelled at school and kept separate from cutlery used for eating.

Organisation

Storage

Many items listed can be used in more than one curriculum area. It is important to have a central storage area (a clean, dry, cool place) so that equipment can be easily found and replaced.

Organisation

Each school needs to decide how to store science equipment and materials. Some schools:

- organise material alphabetically
- use a thematic approach
- use the contextual strands of Science in the New Zealand Curriculum
- use a combination of these.

Consider the following points when organising storage for your school.

- Plastic tote trays, storage cubes, or large cardboard boxes are useful containers for sets of equipment for topics such as electricity or weather. Accompany each of these with a subject-based colour-coded card. This could include a list of contents, a list of required items that are not stored in the resource room, and a list of extra items that might be required and their location. It is easier to check the contents of such containers if they do not have lids.
- Tote trolleys make it easier to store tote trays, and to transport equipment and materials.
- It is useful to have small boxes, such as ice cream containers, that contain only a set quantity of equipment and that are labelled with the number (for example, "10 scissors, 10 thermometers") because it is immediately obvious when equipment is missing.
- Arranging items alphabetically in the central storage area makes them easier to locate.
- Labelling shelves and boxes is essential. Use removable labels on trays.

- Keep tools in a separate, labelled toolbox. See the 'Suggested tools' page for a list of useful tools.
- Keep heavy items on low shelves.
- When selecting containers, consider who will need to carry the equipment.
- Always clean and dry equipment before storing it. Wash glassware in soapy water and leave it to drip dry. A bucket of warm water can be used as a portable sink.

Storage of special materials

- Store magnets with "keepers" on to protect the magnetism.
- Wrap and store lenses and magnifying glasses in covered containers (to protect them from dust and scotches).
- Store chemicals in clearly labelled jars or bottles on a shelf with a retaining rail and in a cool place that is not easily accessible to students. Store hydrochloric acid and other corrosive chemicals separately from any metals, tools, instruments, or electrical equipment. Poisons must be stored in a locked cupboard. Do not use food or drink containers for storing chemicals. For more information, see [*Safety and science: A guidance manual for New Zealand school \(Revised edition, 2000\)*](#), specifically the "Storage" section on pages 16–17 and "Chemicals" section on pages 61–63.

Issue and retrieval of materials

Establish a system for issuing and retrieving science materials from storage.

Many schools use a reservations book and/or library cards to keep track of these materials.

Teacher aides or parent helpers could be delegated responsibility for monitoring the issue and retrieval of materials as well as for monitoring stock levels. A whiteboard or sheet of poster paper on the door of the storage area can be used for teachers to note items that need replenishing or repairing.

Resources should be checked regularly to ensure that enough stocks are held and that equipment is in good repair. Chemicals may need to be checked for expiry dates. (For more information, see the printed version, page 40 of [*Safety and science: A guidance manual for New Zealand school \(Revised edition, 2000\)*](#)). This task can often be delegated.

Students can be trained as monitors to be responsible for the daily management of materials in classrooms.

Each classroom should have a secure cabinet or cupboard where materials or ongoing activities can be kept. Teachers must have ready access to replacement items (in case of breakage or loss) without having to leave the classroom.

Equipment list

The list of suggested equipment is organised alphabetically. It includes sourcing information, suggestions for use, and any relevant notes.

MS Excel Downloadable version

Download the Microsoft Excel version of the "Equipment list" and adapt it to suit your school's particular needs. Extra columns can be added to record such information as:

- stock levels of existing equipment and materials
- priority for obtaining new equipment and materials
- dates, prices, and sources of purchase

These records provide the information needed for regular stocktaking and for planning new purchases or collection campaigns.

 [Science Toolkit - Equipment list](#) (Excel 55 KB)

 [Science Toolkit - Equipment list](#) (Word 112 KB)

Suggested minimum safety equipment

Relevant items from the following list must be readily accessible in a classroom during science activities. Most of them could be stored in a large plastic box that can be easily taken to the classroom when required.

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It is advisable for students to wear some form of protective clothing, such as an old shirt, when carrying out chemical reactions or using biological materials.

Safety glasses or goggles should be worn if the particular activity involves a risk to eyes. Safety glasses require regular sterilisation, preferably by ultraviolet light. Local hospitals, universities, or research institutes may be able to carry out the sterilisation.

Cutlery used in science activities must be clearly labelled at school and kept separate from cutlery used for eating.

Consumables list

An active science programme involves using materials that cannot be recovered for future use – these are "consumables".

The list of suggested consumables includes sourcing information, suggestions for use, and relevant notes.

 [Science Toolkit - Consumables list](#) (Excel 51 KB)

 [Science Toolkit - Consumables list](#) (Word 112 KB)

Lower-cost sources of consumables

Consumables such as chemicals can be obtained in a variety of qualities or grades, which are reflected in the price. A school science programme does not usually require high-grade (Analar grade) chemicals. Many substances of a suitable quality can be bought from a supermarket or garden centre.

Low-cost alternatives can be used for some items, such as spring clothes pegs instead of alligator clips.

Many materials are common household items and can be provided by parents at the start of the year or unit of work.

 [Sample request letter](#) (Word 2007 15 KB)

Other useful items can be collected over the years as opportunities arise.

- Bones (for precautions when handling bones, feathers, and birds' nests – see page 32, [Safety and science: A guidance manual for New Zealand school \(Revised edition, 2000\)](#)).
- Feathers
- Birds' nests (preferably stored in zip-lock plastic bags)
- Shells
- Cones (from pine and conifer trees)

- Stones, rocks, and minerals
- Leaf skeletons
- Sand
- Dried insects
- Fishing floats
- Pressed leaves and flowers
- Seeds
- Old appliances or toys
- Cross-sections of tree trunks.

For storing these items, large four-litre margarine or mayonnaise plastic containers are useful. They are often available from restaurants.

Suppliers and services

National	
<p><u>Delta Educational</u></p> <p>PO Box 56420 Auckland 0508 654 321 +64 9 6293234 (Auckland calls) Fax: (09) 620 5080 Email: sales@deltaed.co.nz</p>	<p><u>Thermo Fisher Scientific</u></p> <p>Ph: 0800 933 966 Email: NZinfo@thermofisher.com</p>
<p><u>Nature Discoveries</u></p> <p>Educational science and nature related products. Email: info@nature.co.nz</p>	<p><u>NZ Chemical Suppliers</u></p> <p>Email: info@nzchemicalsuppliers.co.nz</p>
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