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What is *Kids and Science*?

Kids and Science is a hands-on science program created especially for young children ranging from preschool age to year 2. The content focuses on everyday things such as water, light, insects, seeds, sand and rocks, and ramps and wheels. By participating in a series of motivating, problem-solving investigations, children are guided to explore, observe, discover relationships, and record and communicate their observations about the world around them.

The activities in *Kids and Science*:

- provide a complete range of science skills and processes across familiar topics in life, earth and physical science
- can enrich any other science materials you may currently have in place
- can be used to build integrated units involving science, English and mathematics.

The *Kids and Science* program consists of six resource books that cover topics in life, earth and physical science, all available from Hawker Brownlow Education:

Seeds and Weeds
Insects and Other Crawlers
Rocks, Sand and Soil
Water and Ice
Materials and Constructions
Light, Colour and Shadows

What is the Philosophy of the Program?

Kids and Science emphasises the development of scientific thinking rather than the acquisition of specific scientific knowledge or principles. The program is based on the premise that young children will learn best about the nature and processes of science when they:

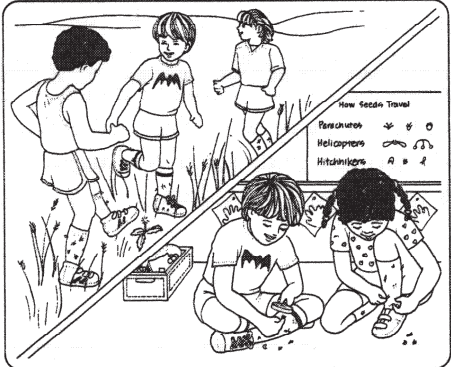
- actively explore materials first-hand in open-ended investigations
- are guided by thought-provoking questions
- are encouraged to describe their observations and discoveries to others
- are given many opportunities to record their observations in a variety of meaningful ways (experience stories, drawings, graphs, tables, poems and so on).

How is the Program Organised?

Each *Kids and Science* resource book is divided into activities. Each activity is designed to be used with a small group of children and should take approximately one science class to complete unless otherwise specified. The activities are sequenced by difficulty – the simpler activities occurring first in any one book. It is not essential, however, to use the activities in order from beginning to end.

Each activity consists of two facing pages. The left-hand page lists the title, a summary statement describing the activity, the targeted skills, the necessary materials and how to set up for instruction. There is also an illustration that shows the children engaging in the activity.

The right-hand page is divided into three sections: *Starting Out*, *Guiding Children's Actions* and *Stretching Their Thinking*.

<p>Activity 16</p> <h3>Hitchhikers</h3> <p>Investigation Collecting seeds that have hooks.</p> <p>Skills Classifying Describing likenesses and differences Creating an experience chart</p> <p>Materials Hand lenses; socks for each child.</p> <p>Setting Up Have each child bring a pair of old socks to school. Kneesocks or an extra-large pair are best. Have the hand lenses ready to use when the children come back from their walk.</p>  <p>Seeds and Weeds 44 Kids and Science</p>	<h3>Starting Out</h3> <p>Before the children set out for their walk, tell them to put on their socks.</p> <h3>Guiding Children's Actions</h3> <ol style="list-style-type: none">1. Take the children on a walk through a field in which there are lots of different kinds of dry grasses and weeds. As you walk, talk about the different kinds of weeds you see.2. When you have completed the tour of the field, direct the children's attention to their socks. They will probably find that many different kinds of seeds (cockleburs, wild oats, ivy seeds, and so on) have gotten hooked on their socks.3. Return to the classroom and let the children pluck the seeds off their socks and examine them with hand lenses.4. Tell the children to sort the seeds by putting the ones that are alike together in piles on pieces of paper. Ask questions like these:<ul style="list-style-type: none">• How does the seed attach to the sock? What part of the seed attaches to the sock?• How many different kinds of seeds did you collect on your socks?• How are the seeds alike? How are they different?• Did your neighbor find any seeds hooked on his or her sock that you did not see on your socks?• What part of the seed caught on the sock?• Which seeds are hardest to pull off the sock? <h3>Stretching their Thinking</h3> <p>Give each of the children a piece of burlap. Have them make a picture or design by attaching the hitchhikers they found to the burlap.</p> <p>Kids and Science 45 Seeds and Weeds</p>
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Starting Out presents a warm-up activity, challenge or question to capture the children's interest and get them underway on the activity.

Guiding Children's Actions is the core of the activity. It provides step-by-step instructions for conducting the activity. All instructions are clearly numbered and specific questions are provided for directing children's thinking.

Stretching Their Thinking provides a variation of the basic activity and is designed to extend students' thinking. It may follow the basic activity on the same day or it may be presented on another day.

Materials for Constructions

Children investigate the physics of force, motion and equilibrium through activities in which they construct walls, ramps, bridges, towers, seesaws and wheeled vehicles. In addition, they classify building materials by strength, weight and other properties. They also observe objects moving down slopes, investigate chain reactions and build a pulley lift.

Here are the materials needed for the activities that follow:

- 180-centimetre plank
- balance scale
- buckets
- building blocks
- dominoes
- glass pie dish
- marbles
- modelling clay
- paper and plastic plates
- pie tins
- rope
- straws
- table-tennis balls
- tennis balls

Sorting Mats and Graphing Mats

In addition to the hands-on materials listed above, students will also use sorting and graphing mats to help them organise and record their discoveries. These mats are handy tools for children when they are classifying and labelling their materials, and provide an instant visual display of organised information. Word or picture labels can be used to name the studied categories. Actual objects can be put in the columns of the sorting mat or in the grid of the graphing mat.

A reusable sorting mat can be made with a large sheet of white vinyl. Use coloured tape to make a two-column chart on one side of the mat and a three-column chart on the other side of the mat. The graphing mat can be made in a similar way except that it has a grid format. A three-column graph could be created on one side of the mat and a four-column graph on the other.

Activity 1

A Material World

Investigation

Classifying building materials.

Skills

Comparing ✧ Labelling ✧ Classifying

Materials

Paper plate; metal pie tin; glass pie dish; wooden plate or shallow bowl; plastic plate; building materials such as straws, wooden blocks, mirrors, Lego, cardboard boxes, Tinker Toys, wire, toothpicks, washers, paperclips, marbles, tongue depressors or icy-pole sticks, cans, coffee stirring sticks, dominoes, torn paper, nuts and bolts, coat hanger, foil.

Setting Up

Set the different plates, pans and bowl out on a table. Have some paper for making labels nearby. Keep the building materials available for later sorting.



Starting Out

Show a paper plate, a metal pie tin, a glass pie dish, a wooden plate or shallow bowl, and a plastic plate to the children. Ask them what material each is made of and write a label for each (*Paper, Metal, Glass, Wood, Plastic*). Compare the objects by asking questions such as these:

- Which plate is heaviest? Lightest?
- Which could you bend? Tear? Wash?
- What would happen if you put each of the plates in the oven? Which would burn?
- If you dropped each of the plates, which would break?
- In what other ways are the plates different?

Guiding Children's Actions

1. Set out the collection of building materials and have the children sort them by putting each object into the plate made with the same kind of material. When they finish sorting, ask questions like these:
 - How are all the metal objects alike?
 - How are all the glass objects alike?
 - Which objects are shiny? Dull?
 - Which are smooth? Rough?
 - Where does wood come from? Paper?
2. Have the children find other things in the classroom to add to the plates.
3. Then have them find objects (things made of rubber or cloth, for example) that do not belong in any of the bowls. Ask them to tell what each thing is made of and to name other things that are made of the same material.

Stretching Their Thinking

Have each child choose a material such as glass and make a book showing pictures of things made of that material. The children can search for pictures in old magazines or catalogues. When they have cut out several pictures of things made of a material such as metal, suggest that they paste them on paper and staple the pages together to form a book. Encourage children who need a challenge to sort the materials into subcategories. A child working on a book about metal, for example, could put hardware on one page, kitchen items on another, furniture on a third page and so on.

Activity 13

Fence Sense

Investigation

Exploring patterns in fence building.

Skills

Describing and extending patterns ✧ Comparing size and shape

Materials

Icy-pole sticks; glue; scissors; modelling clay.

Setting Up

Have the icy-pole sticks, glue, scissors and clay ready to use after the children have been for their walk.



Starting Out

Go with the children on a fence/wall hunt. As you find interesting fences and walls, talk about what they are made of (wood, brick, stone, wire) and how they were made. With brick walls, direct the children's attention to the way the bricks have been laid in alternating rows. Ask: What shape are the bricks? Are all bricks the same size? With wood fences, compare the sizes of the wood planks used.

If a fence or wall has an especially interesting pattern, see if the children can describe it. Give a name to each fence part and have the children name the part as you touch it (post, rail, rail, post, rail, rail and so on, for example). Or have the children describe a colour pattern in a row of bricks (red, red, red, green, red, red, red, green and so on).

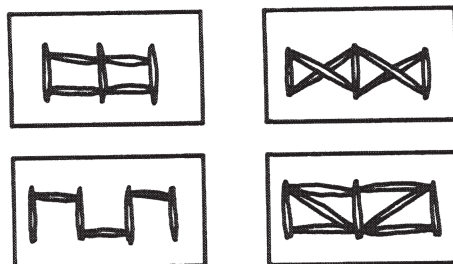
Guiding Children's Actions

1. Provide some icy-pole sticks, toothpicks and glue, and have each child design a fence. They can cut the sticks to various lengths if they wish and then glue the sticks together to form the fence sections. Have them build their fences flat on a table or desk at first.
2. When the glue dries, help them make their fences stand up by poking the fence posts into balls of modelling clay which have been pressed onto the table.
3. When the children have completed their fences, talk about how the fences were made. Discuss the patterns and ask the group to tell what would come next in each section.
4. If desired, have the children work in pairs, each extending the fence begun by their partner. Then add the fences to the model city created in Activity 12.

Note: Children who have difficulty making the fences with icy-pole sticks could use ordinary building blocks instead. Encourage them to create interesting patterns with their blocks and let them extend each others' patterns.

Stretching Their Thinking

Draw some fence patterns like those shown below on cards. Have the children make and extend these fence patterns.



Weight Lifters

Investigation

Lifting weights with a lever.

Skills

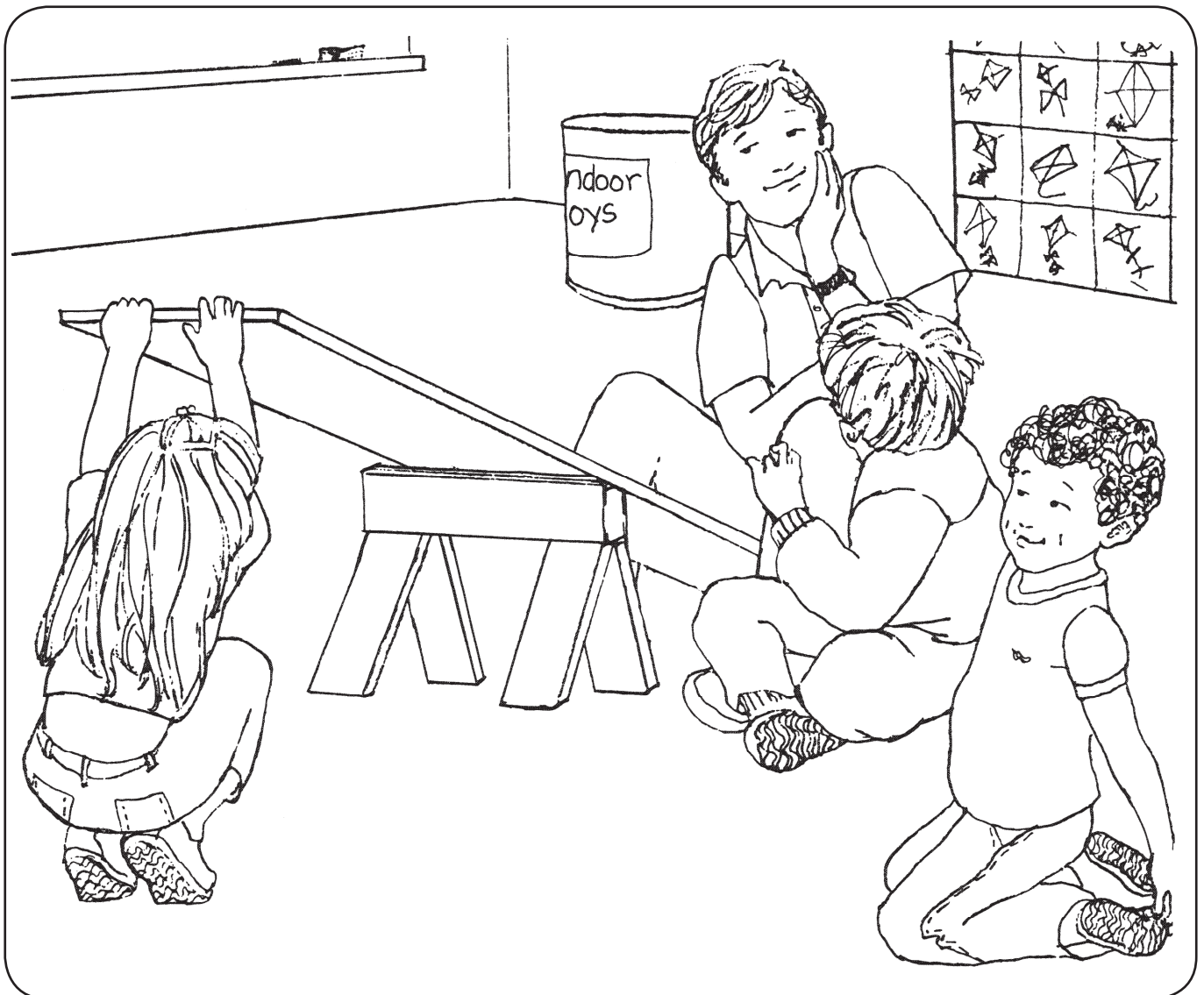
Observing reactions ✧ Recording data ✧ Comparing weight ✧ Describing relative position ✧ Recognising cause and effect

Materials

Plank about 2 metres long; block of wood; Weight-Lifters Data Sheet (see page 77); objects to balance on the seesaw; balance scales.

Setting Up

Prepare a copy of the data sheet for each pair of children.



Starting Out

Have the children work in pairs. Let the pairs take turns trying to balance the plank on the block of wood and make a seesaw as they did in Activity 21, but with a larger plank. Have each pair take turns placing an object on one side of the seesaw. The partner tries to balance it with one or more different objects. The objects can be placed anywhere on the seesaw. Each pair of children can record the names of the objects that balanced on the data sheet. As they work, talk about their observations with questions like:

- Is your object heavier or lighter than your partner's?
- If you want to balance something that is heavier, should you put it close to the end or close to the centre of the plank?

Let the children use a balance scale to verify their weight estimations.

Guiding Children's Actions

1. Stand on one end of the plank and challenge the children to think of a way that only one child could lift you. Let them puzzle over various ways they can do it.
2. If the children are stymied by the problem, suggest that they try moving the block (fulcrum). If they move the fulcrum closer to you, one child's weight on the other end of the plank should be sufficient to lift you.
3. Once the children have succeeded in lifting you, they will probably be interested in using the lifting machine to pick up other heavy things in the classroom. Let them explore the possibilities.

Stretching Their Thinking

Have the children apply what they have learned to real seesaws. Sit on one side of the seesaw and ask the children how they could make the seesaw balance. They could try having one or more children sit on the opposite side of the seesaw. Or they could have one child sit on the other side and have the teacher move closer to the fulcrum. Suggest other ways they can explore the seesaw. For example:

- How could you get a heavy child and a light child to balance the seesaw?
- Who thinks they could balance this heavy rock?
- Should (Mary) move closer to the centre or further away to make the seesaw balance?