

Science Primary

Guide

Website References

Website references contained within this document are provided solely as a convenience and do not constitute an endorsement by the Department of Education of the content, policies, or products of the referenced website. The department does not control the referenced websites and subsequent links, and is not responsible for the accuracy, legality, or content of those websites. Referenced website content may change without notice.

Regional Education Centres and educators are required under the Department's Public School Programs Network Access and Use Policy to preview and evaluate sites before recommending them for student use. If an outdated or inappropriate site is found, please report it to <curriculum@novascotia.ca>.

Science Primary

© Crown copyright, Province of Nova Scotia, 2019, 2019

Prepared by the Department of Education and Early Childhood Development

This is the most recent version of the current curriculum materials as used by teachers in Nova Scotia.

The contents of this publication may be reproduced in part provided the intended use is for non-commercial purposes and full acknowledgment is given to the Nova Scotia Department of Education.

Science Primary

Curriculum Guide

2019

Contents

Outcomes and Indicators and elaborations	1
Learners will investigate sand and water through the senses.....	2
Learners will compare living things through the senses.....	12
Learners will investigate materials through the senses.	17
Learners will test movement of objects.	33
Appendix A: Experiences for investigating sand and water through the senses	37
Appendix B: Experiences for comparing living things through the senses	53
Appendix C: experiences for investigating materials through the sense.....	61
Appendix D: Experiences for testing the movement of objects	75

Outcomes and Indicators

Learners will investigate sand and water through the senses.

Indicators:

- Investigate (or compare) the properties of sand and water (COM,CT)
- Investigate floating and sinking (COM,CT)
- Investigate capacity of various containers to hold sand and water (COM, CT, TF)
- Investigate how water interacts with a variety of materials (COM, CT, TF)

Learners will compare living things through the senses.

Indicators:

- Investigate living and nonliving things (CZ, COM, CT)
- Investigate change in living things (CZ, COM, CT)
- Classify living things (COM, CI, CT)

Learners will investigate materials through the senses.

Indicators:

- Investigate properties of materials (COM, CT, TF)
- Investigate classification of materials (COM, CT, TF)
- Investigate change in materials (COM, CT, TF)

Learners will test movement of objects.

Indicators:

- Investigate types of movement (COM, PCD, CT)
- Test properties of objects that affect sliding and rolling (COM, CI, CT, TF)
- Test properties of ramps that affect movement (COM, CI, CT, TF)
- Investigate balance (COM, CT, TF)

Learners will investigate sand and water through the senses

Background

Sand and water provide a physical experience that is accessible and familiar from which learners ask big questions and begin to gather observational evidence. Learners will learn to differentiate among their senses and explore the types of information that they gather with each sense. Learners will be able to express their observations using descriptive vocabulary specific to each sense. Through the investigation of sand and water, learners will gain an understanding of cause and effect and begin to explore the control of variables. Learners will be challenged to make predictions and explain their thinking. Learners will begin to gain an understanding of how tools enhance their observations of the world around them.

Indicators

- Investigate (or compare) the properties of sand and water (COM,CT)
- Investigate floating and sinking (COM,CT)
- Investigate capacity of various containers to hold sand and water (COM, CT, TF)
- Investigate how water interacts with a variety of materials (COM, CT, TF)

Concepts (and Guiding Questions)

Properties of Sand and Water

- How are sand and water alike? How are they different?
- How can I use my senses to learn about sand and water?
- How are the sounds made when pouring sand and water different?
- How can I tell if sand is a liquid or a solid?
- Which solids pour most like water?

Capacity

- How much water can a container hold compared to another one that looks different?
- How can the capacity of a container be estimated?

Buoyancy

- How can I predict whether an object will sink or float?
- How can I make a sinking object into one that floats?

Absorption

- How can I determine whether a material will absorb or repel water?
- How do materials that absorb/repel water compare?

Skills

Investigate

Ask a simple question; locate 2-3 obvious details to support an answer; communicate findings

Elaborations—Strategies for Learning and Teaching

Sand

Sand investigations begin with careful observation using the senses. Tasting is not appropriate for this substance. Students will explore how sand feels, flows, piles, and slides. Students will compare sand with

other substances such as dirt, marbles, salt, and sugar. Sand is a solid, but it has fluid properties. Students might note whether sand is a liquid (it pours) or whether it is a solid (it is hard to crush).

Sand investigations provide many rich opportunities for learning science, math, and language. The students should have time to explore and investigate freely with sand and to use a variety of objects with the sand. During sand exploration, much of the learning will happen spontaneously and will be shaped by the interests of the students. Along with the free exploration provided by sand play, the teacher can invite the students to have additional observation experiences and to highlight characteristics of this unique yet common substance.

Sand consists of small particles of a variety of rocks and minerals, which may include feldspar, quartz, and mica. These particles vary in size, shape, and colour, but all are comparatively small. Sand is formed from gradually disintegrating rocks. If the particles are sharp and angular, the sand tends to be new. If the particles are rounded and smooth to the touch, the sand is likely to be older. Sand is an interesting substance to explore because, although it is a solid, there are several ways in which dry sand behaves like a liquid. It pours and sprays. When a little water is added, it behaves like a liquid again: it pours, it finds its own level, and it does not hold a print or impression for long. Students can explore these characteristics of sand and continue to fine-tune the language they are developing to describe observations and phenomena.

Sand box investigations

Many grade primary classrooms have a sandbox or pans of sand for part or all of the year. As the students are using the sand area for open investigations and play, they are experiencing the properties of sand. In conversations with the students as they play in the sand area, the teacher can ask students to describe what they are doing and what they are noticing about the sand. There should be natural flow from the students' play to more focused observing and investigating based on the students' own questions and things they want to try.

Pouring, dribbling, and spreading dry sand

Students can observe what happens when they use their clenched fists as funnels to pour sand. Invite students to observe what the sand does when they pour it from their hands in a steady stream. Can the student make a tower by pouring the sand? How does the sand move? Can the student make a pattern on the pouring surface with the stream of sand? Can the student release a little sand at a time, dribbling it onto a pile or tower? Can the student use their hands to spread the sand into a thin covering of the work surface? What does the sand look and feel like when it is being spread out in a thin layer?

Touching dry sand

The students investigate the effects of adding water to sand by exploring different samples of sand with their hands (and feet, if space is available). Begin by providing dry sand in the class sandbox or dish pans for each pair of students. Invite the students to pour some dry sand onto a large tray or piece of thick craft paper (for ease of pouring back into source container). Students can observe the pouring sand. Next, they should use their fingers to spread the sand over the work surface, describing the feeling of the sand particles. Students can draw patterns in the thinly spread sand, discussing how the sand feels and looks as they work with it.

Observing dry, damp, and wet sand

After observing and discussing dry sand, the teacher can provide pairs of students with shallow trays of each of the three sand samples—dry, damp, and wet. The students can make comparisons of each, observing using two or three senses. They can try pouring each sample of sand and observing how each pours. They can try pressing hands or other shapes into each sample to see if they can make patterns, noting how well each type of sand holds a pattern.

Using samples of the three sand types—each securely locked in a plastic baggie—students can compare moving, settling, tipping, and the effects of pressure. They can rub the plastic baggies to see if there are differences in the sounds made when the different sand samples are rubbed.

Students can be blindfolded and feel the different dry, damp, and wet sand samples to see if they can distinguish one from another using the sense of touch.

Sifting sand

Gather a collection of materials that sand will sift through, such as colanders, flour sifters, fabric netting, door screening, funnels, strainers, different gauges of needlepoint plastic, and fly swatters. Show the sifting materials to the students at a group meeting time. Encourage them to identify and discuss the uses of these objects. The teacher can ask the students to make predictions about how sand will flow through each material or object. Do they think sand will flow through? Will it flow through quickly or slowly? The teacher can provide a chart divided into two columns, one for fast sifters, and one for slow sifters. The students can then record some predictions. Then students can test the sifting materials by working in small groups with trays of sand, or they can test the predictions later at centre time at the sand table.

As an extension, students can be invited to make their own sand sifters using cardboard and paper scraps and other junk materials in the classroom. Student-made sifters should be tested and added to the class record chart as either fast or slow sifters.

Piling sand

Students can investigate how sand finds its own level by pouring it to try to create piles and towers. Invite students to begin by pouring a containerful of dry sand into the middle of a bowl. They should notice that the sand forms a cone shape. Ask students to continue to try to make higher cones. What happens as they add more and more sand?

Who has made the highest cone?

Students can repeat the cone-making investigations with damp sand and wet sand, observing and describing what happens.

Tilting sand

Students can spread sand over the bottom of a tray. The sand could vary from dry to damp to wet. Observe what happens in each case when they slowly tilt the tray over the sand table.

Pouring sand down a chute

Students can pour different consistencies of sand (dry, damp, wet) down a chute held at various angles. Teachers might make a chute from plastic containers. Students should observe how the sand piles up. Then they should try things with the sand and the chute to see if there are differences in the shape or height of the pile. They might try different sized chutes or chutes made of different materials. They might

try pouring faster or slower. They might try using more or less sand to see if the piles will look different. Students can compare the piles that they are creating with the chutes to piles of sand or gravel that they may have seen made by dump trucks. Students can use toy dump trucks to tip sand into piles and observe the shape and size of the piles.

Observing different types of sand

Teachers can create a set of containers holding different types of sand—fine beach sand, coarse sand from clay-like soil, pool filter sand, etc.

Students can observe the different sand samples using a handheld magnifying glass. Students should notice the different sizes and colours of sand particles. They should use the sense of smell to try to detect any differences in odour and the sense of touch to feel the different sizes and textures of sand particles. Sand samples can be shaken in plastic or paper containers to observe any differences in the sound the samples make when shaken against a container.

Students can make records of their sand observations in the science log or journal and contribute to class records.

Water

During free play or centre time with water, students will generate numerous questions about water and what happens when it is poured, disturbed, and sprayed; what happens when a variety of objects are put in water; and how different materials absorb or repel water. Students will explore the concept of capacity using water and a variety of containers.

Throughout the year, teachers can provide opportunities for students to investigate properties of water as they explore at a water table or in water pans. Young students are often fascinated by all the different ways they can manipulate water using simple apparatus such as plastic containers, plastic bottles, buckets, spoons, and straws. Many children enjoy investigating with floaters and sinkers, creating boats to hold “stuff,” and watching the patterns and speed of sinking objects. Prior to any focused investigations, students should have time to informally investigate with water, to make observations and discoveries on their own, and then contribute ideas for class investigations.

Throughout these explorations, the teacher should encourage the students to make careful observations and to use a variety of media to share their observations. Additional vocabulary should be added to the sense charts to include new descriptors that arise with the water observations.

Pouring substances

Teachers can provide a focus for water investigations by asking students to make careful observations of the surface of water and other substances as they are poured from one container to another. Provide a collection of containers such as detergent bottles, yogurt and ice cream containers, beakers with spouts, and different types and sizes of spoons. Ask students to pour water from container to container. Ask students to watch how the water moves as it is poured and how the level of the water moves to find the lowest level in the container.

Ask students to pour granular substances such as sand, cereal or grains, fine bath salts, crushed dried leaves, salt, ground rice, rice, tiny seeds (e.g., poppy), and small pebbles from the container to a flat surface such as an aluminum pie plate or plastic tray. Ask the students to observe how the substance pours and what the surface of the substance looks like after it has been poured onto the pie plate or tray.

The students can compare the similarities and differences between these substances and water. Students will be able to observe, but finding the language to compare may be a bit difficult. Teachers should be aware of this struggle.

For example, the teacher can ask the students to pour sand, cereal, or salt on one side of a flat dish to make piles and then try to do the same with water on the other side of the dish. Observe what happens to the surface of the water and the surfaces of the granular substances.

Causing disturbances in water

To further explore the properties of water, students can observe what happens when they use their fingers, hands, and other objects to cause disturbances in the surface of water. Using a water table, dish pans, or large bowls, students can let the water settle until it is absolutely still and then try disturbing the water by dropping a small, light object into the middle and watching how the pattern of ripples forms and continues to move for some time. Students might make a diagram or drawing of what they observe. Ask the students to try dropping the small, light object nearer the edge of the pan. They can then compare the pattern with the previous one. Ask students to notice what happens when the ripples hit the edge of the container.

Students can continue to explore what happens to the surface of the water when they cause disturbances. The teacher can encourage the students to suggest ways in which they can disturb the water to produce different effects. Some suggestions might include dropping a small, light object, then a larger light object, and comparing patterns on the surface; dropping small, heavy objects to observe what happens and to notice patterns on the surface; blowing with a straw across the surface of the water and observing what happens; drawing a fingertip lightly and quickly across the surface to try to make V-shaped ripples. Students can place their pan or bowl of water in a sunny spot and notice reflections on the ceiling or walls. Can they make reflections of the ripples on the ceiling? Can they make the bright spot on the ceiling move?

Teachers can hold a class discussion that addresses the students' prior experiences outside school with ripples and patterns in water. They may suggest patterns such as those that ducks make when they swim; that boats make as they move through water; that raindrops make falling in a puddle; and that waves make in a pool, bathtub, lake, or ocean. Students can illustrate these patterns and find illustrations in children's books and magazines.

Dropping water

The teacher can create collections of objects for dropping water onto dry surfaces and onto the surface of water. Droppers might include thick paintbrushes, plastic medicine droppers, straws, plastic coffee stirrers, or toothpicks. Collections of surfaces for dropping might include cardboard, old wood, fabrics, metal, pliable plastic, rigid plastic, finger paint, cardboard, felt, fabrics, sandpaper, petroleum jelly, and waxed paper.

After students have had time to explore freely with collections of droppers, the teacher can ask the students to plan some investigations with water dropping. The teacher can suggest explorations to challenge the students to further explore properties of water and to refine their observation skills.

Some possible explorations are: shaking a thick paintbrush full of water onto a table to make drops of water; dropping water on various surfaces, noticing how the droplets form, and their size; moving

droplets along by gently blowing or tilting the surface; using a straw or cocktail stick to put two drops of water so close together that they touch. Students can try dropping small amounts of water from various heights onto various surfaces, noticing sound, shape, and spread. Students can watch drips as a tap is turned off, noticing size, shape, travel, and sound on impact.

Students could try to make the largest drop possible from the tap without causing a stream of water. Students can observe rain falling on the school ground, observing the splashes on the ground.

Exploring floating and sinking

Teachers can create collections of materials and objects that students will use to investigate concepts such as buoyancy and absorption. In these investigations, the concepts and the collections will overlap. The focus of science learning is observation, willingness to try things, curiosity, and inventiveness. The students will be forming their own ideas about how buoyancy works, but should not be expected to give explanations at this time. Students' current understanding will be evident in the observations they make, in the things they try, and in the predictions they make about what they expect to happen when they try something. Students could look at shape, size, and other characteristics to help them to decide whether their objects will float or sink. Questions they raise about floating and sinking can be addressed. Some may be: Will my boat float if I make it a different shape? Using a sponge bucket, how can the sound be changed?

Students can select objects from the collections, and after predicting what they think will happen, they can test to see which will sink and which will float. They can sort objects based on their sinking and floating predictions and then record their final sort by drawing or making a display of the objects and materials they tested. Students are not expected to understand the concept of absorption. This activity is a vehicle to strengthen their observations using their senses. By expressing observations based on their senses through a variety of activities, students will increase their vocabulary and experiences.

Making and testing "boats"

Teachers can create a collection of containers that float, including containers that float well and some that can float but sink easily when moved or tipped. Students can explore how the containers float best, how much of a load each container can carry before sinking, and how they can make a container sink. Students might choose materials to test.

Students should develop questions to explore, drawing on the senses. These questions might include: Does it look as if it will float? How does it feel? Do those that feel heavy sink? There are opportunities here to further extend observations based on the senses.

The purpose in asking questions such as these is to encourage students to observe more closely what happens when various materials are made wet. Watch for growing attention to detail and increasing sophistication in ways of expressing observations. Terms the students may use in connection with absorption explorations include: drips on, drips through, soaks up, spreads out/spreads over, soggy, mushy, squelches, stiff, stringy, transparent, blot, soak, pour, drip, drop, disappear.

Students can use bits of materials such as paper, Styrofoam, plastic, leaves, Plasticine, and tinfoil to make boats that will float. Students should test their boats and prepare to share with the class what they made and how it worked. Students can investigate how to make a sinking item float.

Investigating materials that absorb water and materials that are water repellent

Provide collections of objects and materials that absorb water and materials that are water repellent. Invite the students to conduct a variety of explorations with water and these materials. Such explorations might include the following:

Students can wet a group of different materials and describe how they look and feel before wetting and after wetting.

Students can observe what happens when they use different techniques to wet the materials. In one session, students can wet objects and materials by immersing them in water; in another session, they can wet by dropping water from spouted pourers or medicine droppers onto the materials. Another time, they can suspend a selection of different materials from a line above a pan of water allowing only the edge to touch the water. Students can make and compare observations of what happens when water is used in these different ways.

Students can listen to the sounds made by wet materials when they are scratched, rubbed, and squeezed.

Students can sort objects and materials from the collection into sets of absorbent and non-absorbent materials.

Students can add objects and materials to the class collection. Students can bring materials from home to add to the class collections. They should try to predict which materials will be absorbent and which will be non-absorbent as they add them to the collection.

Students can investigate the addition of water to a collection of different paper products to see if differences in types of paper make a difference in absorbency. A paper collection might include office paper, scribbler paper, toweling, toilet paper, wax paper, paper plates (of varying quality), blotting paper, construction paper, paper cups, and tissue paper. Students can sort these items into groups, such as fast absorbers, slow absorbers, and non-absorbers.

Investigating materials used for absorbing liquids

Students can investigate the various materials from home and school that are used for cleaning up liquids, such as paper towel, cleaning cloths, rags of various materials, sponges, and mops. As they clean up after their own water investigations, students can observe and compare how different materials absorb water. They can make judgments about the best materials for cleaning up in the classroom.

Art experiences to explore absorption

The class can discuss ways in which absorbent materials can be made more water repellent. Students can add grease to paper and then observe what happens when drops of water are added to the coated paper. They can compare this to their observations of water drops on ungreased paper and on wax paper.

Crayon relief art

The teacher can invite students to use a crayon relief technique to create pictures and ask them to observe what happens to watery paint as they wash over the sections of the paper covered with crayon as compared to the sections not covered.

Paint blob art

Students can drop paint on one-half of a sheet of paper and then fold it in half to create a paint blob shape. Students can observe the pattern they created as well as noticing the way the paint spreads and stops spreading to form the shape.

Dripping paint

Students can drip watery paint on absorbent paper, observing what happens as they vary the size of the drops, the force of dripping, the colour of paint, and the position of the brush over the paper. The work created can be let dry and displayed along with a transcribed record of the observations the student made during the process.

Tasks for Instruction and/or Assessment

Sand

- Is the student increasing the range of vocabulary used to describe sand? Words and phrases to note include the following: crumbles, falls in, fills up, flattens out, levels off, piles up, sinks in, smooths out, trickles, pointed, crumbly, curved, dry, damp, flat, gritty, hard, high, level, low, and lumpy.
- Does the student conduct ongoing explorations with sand?
- Does the student ask questions about sand that lead to explorations and investigations? Ask students questions such as, what are you observing here? How are you observing?
- When the students are working with dry, damp, and wet sand samples, notice the student's awareness of the change in sand characteristics when water is added.
- Was the student able to manipulate the different sand samples effectively, keeping each sample in its container?
- As the students investigate the dry, damp, and wet sand samples, ask questions such as the following: What does it feel like—smooth, soft, cold, sharp, lumpy? How does it feel when you pour it through your fist? Which sand goes through your fist most easily? Is it easy to spread sand when it is dry, damp, or wet? What kinds of patterns did you make in the dry, damp, and wet sand samples?
- After pouring or dribbling dry sand, students can draw the patterns they created on the pouring surface using crayons or markers. Do the student's records resemble the pattern made with the sand? Does the student think of other ways to record the sand patterns?
- As the student tests the various sifters, observe the student's ability to use manipulatives to carry out the exploration. Can the student pour sand through the object or material? Does the student watch carefully and decide whether the sifting was slow or fast? Does the student refer to the class prediction chart when carrying out the exploration? Does the student add to the class chart by recording objects or materials under the fast and slow columns?
- After all sifters have been tested and the students have contributed to the class recording chart for fast sifters and slow sifters, invite students to order a collection of sifters from slowest to fastest.
- As the students observe the different types of sand, look for the following types of behaviours: uses fingers and hands carefully to touch and manipulate samples of sand; controls placement of sand on work surface; holds magnifier appropriately, shares observations with others orally; makes a drawing or diagram of the sand particles as seen through the magnifier.
- As students investigate pouring sand down chutes, notice how they are manipulating the materials to make different sand piles. Ask the student questions such as: What happened when you poured sand

down the chute? Can you make a tall pile? How? Can you make a flat pile? How? Which chute worked best for you? Why do you think that? Do people use chutes like this outside of school? What for?

Water

- In group discussion time and in individual conversation, note the types of words and phrases the student is using to describe characteristics of water. Note the types of terms and phrases students could be using in relation to the water investigations, including wet, dry, empty, full, bubble, blob, drip, drop, pool, puddle, wave, ripple, spout, dribble, pour, splash, wavy, and droplet.
- As students explore water and other substances, observe the ways in which each student approaches the materials, tries things, shares discoveries, perseveres with further exploration, or moves on to some other activity.
- Does the student use a growing range of water-related concepts and vocabulary in exploratory and play-based learning at learning centres or other independent work activities in the classroom?
- Does the student describe their water explorations and discoveries to the class or small group?
- Does the student contribute to sharing time by describing what they did and learned during centre time or independent work time?
- Does the student represent science ideas through drawing, modelling with clay, or other media? Does the student contribute to small-group and class discussions, making suggestions for additions to class charts and other group recording devices?
- Does the student use writing, drawing, and other means to record ideas about water explorations in her/his science log or notebook?
- As the student investigates water by causing disturbances, such as making ripples and plops, note the level of self-control and perseverance the student attains.
- Note the student's level of involvement in attempting the various types of investigation and the student's involvement in creating new ways to investigate movement of water. Focus on observations and vocabulary. Ask questions about what they observe/notice: i.e., "tell me what you see."
- Continue to note the student's growing vocabulary for water related concepts (e.g., ripples, splash, patterns, circles, waves, wavy).
- As students investigate buoyancy, notice the kinds of questions they ask and the tests of buoyancy they create. The expectation for investigation is that the student will think of tests to try to satisfy personal curiosity. The teacher can ask each student to describe what they are trying to do or find out. Notice how students try to manipulate materials.
- When students begin building and testing their own boats, ask them to explain how they built their boats and what they expect to happen when they float them. Students will enjoy trying to float other objects in their boats. Note each student's engagement and level of perseverance with these challenges.
- Collections of floaters and sinkers can include corks, lids, plastic boxes and bottles, twigs, acorns, balsa wood, eggshells, ice, a hollow rubber ball, a toy boat, keys, paper clips, stones, Plasticine, centicubes, coins, large and small metal washers, and screws of various sizes. A collection of things that absorb can include paper towel, bread, clay flower pots, cloth, cotton balls, egg cartons, and sponges.
- As the students explore absorption with the various collections of materials, the teacher can ask questions such as the following: How does the wet piece feel when you touch it? Squeeze it? Does it feel the same as this dry piece? Does the wet part look different from the dry part? What happened

to the paper when you soaked it? Which materials let the water through? Which materials can the water not get through?

- Ask students to record in their science logs or some other format which materials they have decided make useful household absorbers. They might draw, paint, or paste actual samples of absorbent materials. Note whether or not the student can select the best materials for absorbing spills, based on their investigations.

Learners will compare living things through the senses

Background

The detailed investigation of various living things provides learners with an opportunity to ask questions and explore the world around them using their senses. Learners will build their descriptive vocabulary and practice their skill of observation. Learners will observe living things to note their appearance, behaviours, similarities and differences. Learners will use these observations to classify living things. The investigation of living things also provides an introduction to data collection and the representation of data for others to interpret. Learners will observe various living things as they change over time.

Indicators

- Investigate living and nonliving things (CZ, COM, CT)
- Investigate change in living things (CZ, COM, CT)
- Classify Living things (COM, CI, CT)

Concepts (and Guiding Questions)

Living vs nonliving things

- How can I learn about living things using my senses?
- How can I tell if something is living or not?
- How are living things the same? How are they different?

Plants and animals change over time

- How does a plant/animal change over time?
- How are young animals similar to adult animals? How are they different?
- How can I record changes in living things for others to interpret?

Classification using single attributes

- How can I use my senses to gather evidence to classify living things?
- How can I describe sights, smells, textures and sounds found in nature?
- How can I classify living things in more than one way?

Skills

Compare

Make observations; identify obvious similarities and differences; reflect on the findings

Investigate

Ask a simple question; locate 2-3 obvious details to support an answer; communicate findings.

Classify

Identify attributes and select basic criteria for groupings; sort based on the selected criteria and reflect on the grouping; incorporate a new item in a group, begin to offer a reason for the choice.

Elaborations—Strategies for Learning and Teaching

With careful observations, students use their senses to investigate the diverse characteristics of a variety of local plants and animals. The world of living things will provide rich opportunities for grade primary

students to use language to describe their observations, to ask questions about the world around them, and to use a variety of investigations and sources to answer their own questions.

Young students may also be keenly interested in forms of life that they may not have experience with, such as whales, crabs, or extinct forms of life such as dinosaurs. The primary science program begins with exploration of common organisms but can expand to capitalize on the students' interests in the unusual and the "larger than life." Students could look for spiders and spider webs. Teachers could plant a bulb in the fall and bring it out when it comes up in the spring.

Throughout the grade primary science program, students are encouraged to make careful observations using the senses. During experiences with living things, note the student's use of senses to observe. Investigations with living things will provide many opportunities for sorting objects and representations of living things such as photos, drawings, and models. As the student sorts collections of living things or their representations, note how the student carries out this activity—this is the beginning stage of classification which is a key skill in science.

A walk outside

To begin observations of living things, the teacher can take the students on a walk outside the building, asking them to notice everything they think is alive. This walk can be repeated at different times of the year to notice the changes in living things at different seasons. Students can stop to observe and describe what they see, hear, touch, and smell.

Learners can observe living and non-living things

The walk can be varied by asking the students to look up and notice everything they can above them. Next, they can look downwards to observe. Students can close their eyes and listen for sounds of living things. Are bird sounds different in winter and summer?

The teacher and students can create a variety of formats for the class record of the observations and should continually add additional vocabulary to the class sense charts. Teachers could put observation records and photos away so that students can recall what happened for each part of the year.

Hula hoop observations

On the school grounds or in another location, provide each pair or small group of children with a hula hoop. The students select a patch of ground, put down the hula hoop and observe everything they can that is living within the circle. Students can list things, count things, or draw what they observe. If the area will not be harmed by such an activity, the students can take samples of some of the living things they observe within their circle back to the classroom where they can sort and make displays.

Spider/caterpillar

Collect some spiders and provide a house for them. Students can observe and feel spiders while looking at them in a natural habitat. Deciding what to feed them can be a group discussion. Observations of spiders can include what they do, their body parts, and their webs.

Students can magnify and draw the spiders and the webs. Use of language to describe the web, the spider, and its life can extend the students' vocabulary. A journal or diary with pictures about the spider can help understandings. Students could do the same task with a caterpillar.

Making collections and classification

The teacher can initiate the collection-making activity by making and representing one or two interesting collections such as a leaf or seed collection or a collection of insects in jars. Students can make observations of the items in a collection, find common characteristics, and identify differences. Students may then want to make their own collections of non-living things such as rocks or cards. Students can use their collections to sort and classify according to characteristics they identify. They could make presentations to the class, showing their collections, describing the characteristics that are important to them, and answering questions of classmates. Students could look at the characteristics of living things. In a group discussion, students could sort their collections into two groups: living and non-living.

Observing plants in the classroom

The teacher can create a display of a variety of plants (e.g., cactus, flowering plant, vegetable, a cutting with roots in a clear container, or a small tree). Students can observe these samples closely to discover how they are alike or different (e.g., size, colour, number of leaves). Students can select a favourite plant and draw as many details as possible. Each student can communicate to the class why the plant is their favourite, using the pictures as a visual aid.

Visiting pets

Teachers can create a schedule for pets to visit the classroom. The pet owner makes a brief presentation about the pet, and then the class makes and records observations. Students observe characteristics such as teeth, wings, number of legs, colour, skin covering, how it breathes, how it eats, and how it moves. Records can be made using charts and photos of each visiting pet. For the visiting pets activity, teachers and students can create a common format for recording observations of each pet.

Growing a seed

Students can plant radish seeds in containers, and each student can predict the day when their plant will appear. Students can create illustrations or diagrams to demonstrate the growth of their seeds and, with the support of older students, class helpers, or the teacher, record observations every few days. By using their senses, students can observe, record, and build language around the growth of their seeds. Students will learn more about plants in the grade 3 science program.

Changes in living things

Learners can make observations over the course of the school year to investigate how living things change over time. Learners can record observations of a tree at various times of year to note what aspects change and which ones remain the same. Learners can observe changes that occur in seeds as they grow and note changes that happen in their bodies as they grow.

Tasks for instruction and/or assessment

- Is the student extending vocabulary to describe observations? Does the student continue to refer to the class sense charts and to add new descriptive words to the chart?
- Can the students explain their rules for sorting? Can the students find alternative/different ways to sort the same items in a collection?
- Write and draw about your spider or caterpillar. How do you observe it?
- What plants that are available for food in the fall, winter, spring, do you like? Create a collage for each part of the year.

- Draw and label the things you found after/during an outdoor exploration or a classroom exploration.
- What does a leaf feel like when it is green? What does a leaf feel like when it is brown and ready to fall off a tree? How does it feel to stand in the sun in the fall? winter? summer? spring?
- How did you sort the things you found in your circle? Draw and label the things you found.
- Students should experience a variety of ways to record their observations. During living things investigations, note how the student contributes to group recording and how they makes recordings independently.
- Does the student contribute to class discussions, adding items to be recorded on charts, class books, and so on?
- Does the student participate in recording observations through modelling, role play, drawing, or writing in small-group settings?
- Does the student's science log show evidence of growth in ability to record observations through drawing and beginning writing?
- Complete the following:
 - I know it is slippery because ...
 - I think like a scientist because I ...

Learners will investigate materials through the senses.

Background

Through an investigation of various materials, learners will make observations to note appearance, characteristics, similarities and differences. Learners will use these observations to classify materials. Learners will also explore how properties of materials may change. Learners will be challenged to make predictions based on evidence gathered through observations made using the senses. Learners will be asked to use descriptive vocabulary to explain their observations and their thinking. Learners will also build on their understanding of cause and effect and continue the exploration of control of variables.

Indicators

- Investigate properties of materials (COM, CT, TF)
- Investigate classification of materials (COM, CT, TF)
- Investigate change in materials (COM, CT, TF)

Concepts (and Guiding Questions)

Properties of materials

- How can I learn about various materials and their properties using my senses?
- How can I determine the most suitable materials for building?

Properties of materials change

- How can I change the properties of a material?
- How can I restore the original properties of a material following a change?

Classification using single attributes

- How can I determine attributes that can be used to classify materials?
- How can I classify materials in more than one way?

Skills

Investigate

Ask a simple question; locate 2-3 obvious details to support an answer; communicate findings.

Elaborations—Strategies for Learning and Teaching

Teachers may wish to organize the observing experiences as whole-class activities or as learning-centre activities. A balance and range of organizational styles will provide students with the most appropriate experiences.

Take advantage of any opportunity to ask students to describe what they see. When passing out manipulatives such as interlocking cubes and pattern blocks, ask the students to describe what they see when they examine the objects. Add new words to the sight chart (see below). This procedure should be followed whenever manipulatives are used in art time, mathematics, health, or social studies. This type of focusing should take only a few moments at the beginning of the session and will demonstrate the connections among various learning experiences while building observation skills and language.

Students will notice the most common aspects of objects or materials that can be best perceived through the sense of sight. These include colour, shape, size, lustre, phase (solid, liquid, gas), and viscosity. While it is not expected that students will articulate these categories as properties of the material, the experiences will build the foundation for work with properties of the materials in later grades.

Teachers should be encouraging growth in qualitative observations and the use of vocabulary that is qualitative. Students may use terms such as “nice,” “gross,” and “yucky” and should be helped to move to more precise descriptions such as shaped like a “cube,” “fuzzy,” “brown,” and “yellow spots.”

Students should be encouraged to make quantitative observations using non-standard measures and by comparing to common objects: for example, “as big as a baseball,” “as long as a new pencil,” “as heavy as my lunch box.” From time to time, students should make their own record of observations by drawing what they see; completing a teacher-made record sheet; replicating an object in Plasticine, and so on.

Sight

Getting started—make a sight chart

Begin by creating a sense chart for sight. A long, narrow chart allows for gradual addition of the students’ growing vocabulary of sight words and phrases. This chart should be posted in an area of the classroom that will be visible at all times to the students and that provides enough space to add other rectangular charts for the other senses as each new sense becomes the focus of classroom exploration.

Whole-class observations

Teachers can begin the focus on observing through sight by inviting students to describe what they see when an object (fruit, vegetable, classroom manipulative) is displayed at class meeting time. The teacher can record the students’ descriptions on chart paper and review all the features of the object that can be perceived by sight alone. This process might be repeated a few times before students are asked to make observations in groups and on their own. Students may want to bring interesting objects from home or suggest other classroom objects for observation time.

Go on a sight walk

Take students to familiar areas of the school and ask them to look around carefully to see everything there is to see in this place. A teacher, student helper, or volunteer might record the list of items the students can see. Are the students surprised at how many things they can see when they take some time and really look around?

Colour walk

A challenging colour walk or colour search can be created using colour chips from a hardware store paint display. Provide each student or pair of students with a small number of colour chips and ask them to find something in the classroom or other designated environment that matches each colour chip.

Look up, look down

Take the students outdoors or try this right in the classroom. Ask them to look up and tell each other everything they can see. What details do they notice? What colours? Any surprises? Students might draw a diagram/picture of the things they noticed when looking upward. If the experience is conducted outdoors on a day with distinctive clouds against a blue sky, provide students with cotton batting or felt scraps to create a visual representation of the clouds they observed outdoors. On another day, ask the students to look down and carefully note everything they can see below them.

Play “I spy” in the classroom, around the building, or outdoors

Students can take turns selecting a mystery object that can be seen by everyone in the class and describing the object with a few sight clues. For example, “I spy with my little eye something that is round, as big as a cookie, and blue.” Other students look around for specific objects and make guesses.

This might be a good warm-up to class meeting time, science time, or waiting time such as line-up for movement through the building to some event or class. Provide the clues from time to time to extend the difficulty level and ensure that all students are challenged.

See-through or not?

Gather a collection of objects that are transparent—such as plastic bottles, plastic bags, lenses, see-through containers, and plastic wrap—and objects that let light through but cannot be seen through. Ask students to try looking through each object. What can they see? Ask them to put the objects into groups: good for looking through and not so good for looking through. On another occasion, invite students to observe through the objects and materials that can be seen through. What do they see?

Looking through magnifiers

Ask students to look at objects or materials carefully and tell the class or each other what they see. Then provide students with plastic magnifiers, and ask them to look at the same objects and materials again. What do they see now? Add new details to their original list of descriptive features. Students may need help using the magnifier effectively; teachers can model the use of the magnifier when working with students.

Home connections

During the week or two in which the class is focusing on observing through sight, the teacher can send invitations home for the family to do some of the observing with the student. A home record might include an invitation such as “I use my eyes to see many different things. Here are some of the colours of objects in my home.” Student and family members or caregivers draw and colour objects of different colours chosen by the student.

Another home invitation might ask parents/caregivers to select one area of the home in which to notice and list all the objects and materials that can be seen.

Collections of objects

Ask students to look at a collection of objects carefully and tell the class or each other what they see. Then ask them to place the objects in a pattern and tell what the pattern is. When students are working with a collection of objects that vary in a particular property such as length, heaviness, or texture, notice whether the student is able to place the objects in a serial order according to that property. For example, can the student order a set of twigs from the shortest to longest?

Sound

Getting started—make a sound chart

Begin by creating a hearing chart and posting it beside the charts for the other senses. Introduce observing through the sense of hearing through a whole-class experience with the sound containers collection.

Throughout the hearing explorations, record the students’ growing vocabulary of words that describe sound. As students explore various ways to make sounds with the materials and collections available in the classroom, observe the ways each student approaches the materials, tries things, shares discoveries, perseveres with further exploration, or moves on to some other activity.

Sound containers

A useful classroom collection for sound explorations is a set of opaque plastic containers each filled with a different object or substance that will make a sound when the container is shaken. Some suggestions for contents include sand, gravel, small spherical rocks such as pea gravel, different types of dried beans and seeds, cotton balls, marshmallows, an eraser, small plastic toys, small metal objects such as washers, bolts, and keys. This collection can be used on many occasions, in both self-selected and teacher-directed activity. Questions to accompany this collection are, What does it sound like? Which ones sound the same?

Which container makes the loudest sound? Which container makes the softest sound? Which containers hold many objects? Which containers hold only one object? Which containers hold a few objects? The goal here is to describe the mystery sound, not to guess what is inside each container.

Scrapers and clappers

A second sound collection might include materials and objects that make interesting or distinctive sounds when scraped or clapped against one another. Materials might include sandpaper, combs, corrugated cardboard or plastic, tinfoil pie plates, tin pie plates and pot covers, wooden shapes, rocks, and plastic items. Once again, the goal here is to engage students in observing and describing sounds they can create with the collection. Students might be asked, What does the sound remind you of? What other things make similar sounds? Which scrapers or clappers make the loudest sound? Which make the quietest sound?

Sorting sounds

Using a variety of sound makers from the various materials available in the classroom, invite students to sort the sound makers into any number of groups. Discuss with the students their rules for sorting and encourage them to try another sort, perhaps by ordering the sound makers from quietest to loudest or lowest to highest. Students can leave a favourite set-up to present at sharing time and explain their rule to the rest of the class.

The mystery sound box

Use a drum stick, pointer, or pencil to tap a mystery object inside a cardboard box that has been designed as the mystery sound box. Objects that may be used on successive occasions include a glass or bottle, drum, tin can, xylophone, or another musical instrument. The experiences can be extended by making other sounds inside the mystery box, such as shaking a bottle of marbles or beans, rubbing two materials together, or starting a mechanical toy. Students can be invited to bring a mystery object from home to present to the class inside the mystery sound box. During these brief experiences with the mystery sounds, the students are asked to describe the sound. While the students will enjoy guessing the source of the sound, the teacher should ask for some description of the sound along with the identification process.

Listening to mystery sounds

Using a recording of sounds, ask the students to identify possible sources. Once introduced, this can become a learning centre activity where students listen to a recording and identify sounds from a set of pictures or where students listen and draw the possible source of the sound. The experience might be extended by inviting students and their families to prepare a tape recording of a mystery sound for the student to present as a challenge to the class at sharing time.

Sounds around you

Walk in the hallway of the building with a tape recorder and record a few interesting sounds. Invite students to listen, describe, and identify the sounds. Have students work in groups of two or three with a parent volunteer, older student, or other educator to record sounds at different times in the school day and in different locations around the school and grounds. Invite each group to present its recording and lead a discussion about its sounds.

Describing sound differences

As a whole-class activity or in learning centres, ask the students to explore sounds with xylophones, water bottle scales, toy pianos, or small electronic keyboards. Ask the students to make high sounds and low sounds and present their sound patterns to the rest of the class.

Suggest additional words and phrases for the hearing sense chart that describe the different tones, pitches, and volumes they observe.

Conversations about sound

Initiate a class discussion regarding the ways sound is important to people. Note the growing understanding that sound is important for communication, safety, entertainment, and pleasure. Note the student's ability to identify uses of sounds by people and perhaps by other living things.

Smell

Getting started—make a smell chart

Begin by creating a chart for the sense of smell. As the students explore with the sense of smell, add descriptive words and phrases to the chart. Post this chart beside the class sight chart. Involve the students in the ongoing development of the chart to help their vocabulary grow. Use the smell chart to represent and enhance the students' growing vocabulary for smell observations. Teachers should demonstrate how to smell. This proper procedure should show students how to waft the odour towards them in order to smell it.

Whole-class smell experiences

As an initial whole-class experience, the teacher can show an object or material with a distinctive aroma at the class meeting time and ask students to describe what they can smell. Teach the children an appropriate technique for smelling unfamiliar objects or substances. One technique is to hold the object away from the face and body and use a hand to wave the air above the object towards the face. Students may need to practise this procedure in a guided situation and can be invited throughout the smell experiences to discuss reasons why such a procedure is necessary. The reasons will be more obvious when the students are observing through smell substances that are powdery or liquid.

Hide a smell

Another whole-class smell exploration can be created by hiding an object such as cut and peeled onion or garlic somewhere in the classroom. As students begin to notice the smell, invite them to become smell detectives and describe and suggest hiding places. Extend the experience by asking students if they know of animals that use smell to find objects. Share books, films, or other media presentations about the ways animals use the sense of smell.

Smell preferences

Ask the students to share smells that they like and smells that they don't like. This can be done as a class activity with the teacher recording. The teachers can select a few of the substances that are common to many students and ask students to contribute their opinions of smell preferences to a class pictograph. Class graphs might be organized around ideas such as, "Smells I like most are baking cookies, oranges, and hot chocolate. Smells I don't like are fish, vegetables cooking, and paint."

Smell jars

Use baby food containers or film canisters to make a set of smell jars. Put a few drops of a highly-scented liquid on a cotton ball and place the cotton ball in the jar or canister. Liquids might include detergent, vinegar, oil of cloves, peppermint flavouring, and vanilla, lemon, and almond extract. Since some of the liquids may be coloured and may colour the cotton ball, wrap the baby food containers in construction paper or use dark film canisters. Invite students to conduct a variety of explorations with the smell jars. They can smell each using the waving technique and describe what they smell in terms of "This smells like ..." They might group the jars in categories such as "Smells I like and smells I don't like" or "Smells like food and doesn't smell like food." Remember to add new words and phrases to the smell chart with each new experience.

Match the smell

After students have enjoyed open-ended explorations with the smell jars, invite them to match a set of the mystery jars with the bottles of liquids used to scent the cotton balls.

Smelly or not?

To help students learn to distinguish between substances that have an odour and those that do not, ask them to name objects around the classroom or at home that do not seem to have a smell. Students can do a smell search finding all the things that have an odour and those that do not seem to have an odour. Students can be asked to sort collections of objects by the following rule: things that have an odour, things that don't have an odour, and things that sometimes have an odour.

Smells in different places

Ask students to think about different locations and the smells that they have experienced in those locations. The teacher should provide a large photo or picture of each location to help the students visualize and remember past experiences. Take advantage of any class trips away from the school to ask the students what they can smell. The teacher could summarize the information shared by the students as a class book, recording words and phrases about the remembered smells under the photo or drawing of the location. Some common locations include the playground, a farm, a downtown city area, the beach, the forest, the playground, the swimming pool, a shopping centre, or a bus.

Home connections

Bring a smell from home. Ask families to help the students select an object or substance from home that can safely be brought to school. Have the students bring their mystery smell in a paper bag or plastic container to share at class meeting time or to put in a learning centre. Without looking into the bag or container, the students describe the smell and then try to identify the object or substance.

Ask parents/caregivers to discuss the smells in the various rooms and locations around the house. They might complete a home smell walk record sheet with their child that records a walk around their home and smells they encounter.

Smells are important

Initiate a class discussion regarding the ways in which smells are important to people. Note the growing understanding that smelling is important for enjoying foods, for protection and safety, and for learning. Talk about how people use their ability to smell to know about their environment.

Taste

Getting started—make a taste chart

Begin by creating a taste chart and posting this chart beside the charts for the other senses. Add the students' growing vocabulary for taste observations throughout and after the focused classroom tasting experiences. During the initial experience, the teacher should help the students discover the four basic tastes—sweet, sour, salt, and bitter. Students are not expected to know these types.

Favourite tastes

Introduce observing through taste by inviting students to discuss favourite foods and what makes these foods popular. Ask students what makes something taste good to them. During this whole-class time, the teacher can provide each student with small samples of interesting-tasting edibles and have students describe the taste. A challenge with this sense will be broadening the students' vocabulary for describing taste. Common descriptions may be good, yucky, awful, sweet, and sour. Other ways students can be taught to describe tastes is to compare the taste to some other familiar taste such as, "This tastes as sweet as a sugar cube; this tastes like lemons."

Tasting party

This is a fun way to introduce the explorations using taste. Introduce new foods that many children may not have tried before. The tasting party can make connections to other curriculum areas such as social studies and health. When tasting a variety of new foods, students can be asked to give their opinions as to likes and dislikes as well as favourite tastes. These opinions could be graphed using concrete graphs, represented by having the students form the graphs with their own bodies by lining up beside their favourite dish and then by contributing to picture graphs.

Mystery jars

To distinguish between liquids that look similar but have different tastes, create a set of taste jars using pill vials or baby food containers; four jars for each pair or small group of students. Teachers have found that strawberry boxes are a convenient storage unit for the four containers of liquids. One jar should contain tap or spring water, a second should contain a sugar solution (try three teaspoons of sugar to every 200 mL of water), another might have several drops of concentrated lemon juice mixed with the water, and the final jar should contain water with a few drops of peppermint extract. Number each bottle for ease of identification of the liquids.

Distribute the sets of jars on separate tables. Ask the students to taste each liquid in turn by using a cotton swab dipped in the liquid. In their groups, children tell each other what taste they notice in each jar. Ask students to make a group-recording chart to show the tastes by the number of the bottle.

Identifying objects and substances by taste

Have students do some taste testing while they are blindfolded. Ask each student to taste different foods or drinks while blindfolded and attempt to identify the unknown food or drink.

Sweetness scale

To help students distinguish between similar tastes, create a collection of edibles that are all sweet. Ask students to taste and answer questions such as, Which substance is sweetest? Is fruit more sweet or less sweet than the peppermint? Working in groups, the students can place the food samples in order of sweetness from least sweet to most sweet. This experience could also be conducted with a variety of salty foods or sour foods. After the explorations, discuss the experience with the students. Did they notice that some people have different opinions about which substance is most sweet, most salty, most sour? Discuss that taste can be different for different people.

Four tastes

Once students have had experiences with sweet, salty, sour, and bitter tastes, ask them to name foods or substances that they have experienced in each category. The class might keep a list under each of the four tastes. This is a good opportunity to connect with the health curriculum by discussing healthful eating and how taste affects what people eat.

Tasting and chewing

Have blindfolded students lick pieces of fruit and see if the fruit can be identified. After trying to observe with just a touch of the tongue, the student may chew the fruit. Does chewing a piece of fruit make it easier to identify?

Snack table

Create other tasting and chewing experiences for a learning centre throughout the day. Ask the student to wear a blindfold and have a partner pass the samples one at a time. The student begins by touching the sample to the tongue. Can they identify the food with just a touch of the tongue? If not, the student should chew the sample and see if they can identify it after chewing. Samples might include three or four different types of crackers, different kinds of cereal, and different kinds of apples or other fruit.

Touch

Getting started—make a touch chart

Begin by creating a touch chart. Throughout the unit add the students' growing vocabulary to the touch chart. Is there evidence of a growing vocabulary for different kinds of textures such as soft, silky, furry, velvety, smooth, even, bumpy, flat, wet, moist, damp, dry, crisp, firm, flabby, feathery, woolly, spongy, sticky, prickly, glassy, gritty, gummy, cold, cool, chilly, hot, warm, slippery, slimy, greasy, oily, rough, jagged, pointed, and sharp?

The sense of touch can be thought of as including a few quite distinct perceptions, including temperature, pressure, and pain. The sense of pressure against the skin is the way we perceive both texture and weight. These aspects of touch can be perceived through the skin.

Other perceptions that we commonly categorize as touching really involve more of our body's systems than just the skin. For example, the hardness of an object is perceived through a combination of sensing through the skin and an integrated awareness by the brain about how much pressure the muscles are putting on the object and how the object feels in response to that pressure. We have a body sense in our muscles and joints that tells us how much pressure is being exerted and the position of our bones as we encounter the object.

In grade primary, it is sufficient that the students recognize an object's hardness or softness, its smoothness or fuzziness, etc., by touching with their skin. The observations that students will make in this unit will focus on texture, weight (as heavy as ..., as light as ...), and temperature (as hot as ..., as cold as ...).

Whole-class introductory experiences

As the students explore with their sense of touch, add words and phrases to the touch chart that describe their perceptions. Some touch words that may be suggested include smooth, flat, wet, moist, damp, dry, crisp, firm, flabby, gummy, sticky, woolly, spongy, velvety, furry, silky, soft, cold, cool, chilly, hot, warm, sleek, slippery, slimy, greasy, oily, rough, bumpy, jagged, pointed, and sharp. Provide experiences with a wide variety of objects and materials to ensure that students have the opportunity to use the kind of vocabulary suggested here.

Texture collection

Gather a variety of objects and materials with distinctive textures. The collection can be stored and displayed in a variety of ways. With the students, teachers can make class touch books, bags of individual objects or materials, often called "feelie bags," or shoe box collections. Have students explore objects with their eyes closed or wearing blindfolds.

Record the descriptions of the different textures on the touch chart. Extend the vocabulary by introducing new words that are appropriate to the objects in the collections.

Texture rubbings

Students can use crayons and bond paper to create rubbings of some of the objects in the texture collection. These rubbings will contribute to the students' understanding of the different textures and can serve as a record of all the different textures being explored. The rubbings might be collected as a class book or assembled as an individual record for each student.

Feeling temperature

Students can observe the temperature of a material or object through the sense of touch. Provide a variety of different substances and materials at a variety of different temperatures such as water, ice, ice packs, hot packs (warmed only), and metal objects. Ask students to place some objects in direct sunlight and others in dark places around the classroom. Can they change the temperature of a material by where they place it in the classroom? Ask students to place several objects in order from coolest to warmest, creating concrete graphs with the objects/materials.

Combining Senses

After the students have had experiences exploring their worlds using one sense at a time, the science program should continue to provide opportunities for focused observing. Discussing observations should be the beginning of each new experience. Students' questions about scientific phenomena will often come from their observing experiences. Careful observations will help students focus their own science work and lead them to investigate puzzles or questions that have occurred to them during observing.

Collections and classification

The senses can be used for observing, describing, sorting, and exploring. The grade primary science and math programs include a variety of collections that can be added to the classroom from time to time,

either in learning centres or as manipulative materials for whole-class exploration. Students should be asked to observe using their five senses and describe their observations as they begin work with each new collection.

Small particles collection

Create a collection of materials, such as flour, salt, pool sand, fine white beach sand, coarse sand, aquarium gravel, sugar, cinnamon, sawdust, rice, barley, cereal, and oatmeal. Place these materials in clear plastic bags and provide hand lenses for the students to use as they examine the different materials. Ask the students to describe what they notice about each material by looking, touching from outside the bag, and shaking to listen. Students can record their observations by finding words and phrases on the class sense charts. On cards at the science centre, ask students to match appropriate cards to materials or simply use the cards as a reference for their own recording.

Provide jars or plastic containers of the same substances that are contained in bags for students to pour out in small amounts to observe by touching and smelling. Another activity is to ask students to match bags with jars using only one or two senses.

As work with this collection continues, students can sort the various bags of substances according to categories that make sense to them. Teachers can suggest ways of sorting such as serial ordering. Teachers can provide sorting mats and label cards to encourage more and different kinds of sorting.

Liquid collections

Create sets of clear liquids such as water, white corn syrup, sugar water, water with a small amount of vinegar, and water with a small amount of clear food flavouring such as almond extract. Clear plastic containers with easily removed lids would be best. Ask students to make sight observations from outside the containers. Then students can pour small amounts of each liquid into paper ketchup cups to continue observing through smell and touch. Depending on the nature of the collection, the teacher will let the students know if tasting is appropriate. Students can record observations and make comparisons among different clear liquids.

Seeds collection

Create a collection of different types of seeds, storing each type in small, clear plastic bags. Invite students to observe using senses, to draw and colour what they see, and then to sort and make patterns with the second collection.

Exploring with magnets collection

Create a collection of many objects and materials that the students can use to explore magnets. Students can experiment with the magnets to determine which materials in the collection are attracted and which are not attracted. Ask students to observe the different materials and objects. How are they the same and how are they different? What do you feel when the magnets are pulled apart? How are the senses of touch and sight used here? Use the magnet on one side of a piece of paper to pull a toy across the other side of the paper.

Mystery box, mystery sock, or mystery bag

Continue to use the mystery object activity to engage the students in using their senses in a focused way. As the students gain experience, they should use three or more senses to make guesses or ask questions about the mystery object.

Changes in properties of materials

Learners can explore how the various properties of materials can change. How does a material feel when it is wet? Dry? What happens when I crumple up a piece of aluminum foil? Can I restore the original properties or is it changed forever? Are there some properties that can not change?

Tasks for Instruction and/or Assessment

- Note the student's growth in making observations and in developing vocabulary to express sense observations.
- Do the student's contributions indicate a growing attention to detail and accuracy in observing? Does the student use accurate vocabulary for properties such as colour, shape, relative position of objects, size, and texture?
- Is the student able to compare objects or materials to other objects and materials when describing size and other characteristics?
- Note the student's growing attention to detail when making a record of observations.
- Do the student's recordings demonstrate an interest in accuracy of detail and inventiveness in ways to represent observations?

Sight

- Present the student with an unfamiliar object or material to observe using only sight. What characteristics does the students describe? Does the student give some details for colour, shape, size, and comparison to other objects or materials?
- Note how the students are using the magnifiers. Watch to see if the students are trying different ways to hold the magnifiers.
- Are they trying different distances from the eye?
- Are they trying different distances from the object being observed?

Teacher Note: While mastery of a particular technique is not required, students' handling of the magnifier should indicate their understanding that it is a tool to enhance their ability to make observations by sight.

- Can students describe how an object looks different when seen through a magnifier compared to how it looks without the magnifier?

Sound

- Provide the student with a collection of objects that vary in a particular property. Note if the student is able to order the set and explain the order.
- Does the student offer "sounds like a ..." comparison when the class is playing the mystery sound box game or the recorded sounds challenge? Does the student recognize and name loud sounds, quiet sounds, high sounds, and low sounds?
- Is there evidence of the students' vocabulary related to sounds growing to include words such as quiet, soft, faint, noisy, piercing, shrill, high, low, bass, and deep?
- Is there evidence of a growing vocabulary for different kinds of sounds such as buzz, drone, hum, mumble, mutter, murmur, talk, whisper, chatter, cry, wail, whimper, whine, groan, moan, laugh, giggle, scream, squeal, shriek, yell, shout, roar, cheer, bang, boom, crash, clang, hiss, cluck, honk, peep, quack, and tweet?

- Explore various sounds. Ask questions such as, What do you hear when a car backs up? What sound does a fire engine make? Other sounds to explore may be a police siren, a truck backing up, a whistle at a pool, a buzzer on a microwave, a clock ticking, a fog horn, a bell, a smoke alarm, a horn, and a phone ringing.
- Does the student demonstrate to the class or small group by sharing a mystery sound, describing a mystery sound, comparing a mystery sound to other familiar sounds, offering an opinion as to loud/quiet, high/low, “sounds like a ...”?
- Does the student contribute to sharing time by describing what they did and learned about during centre time or independent work time?

Smell

- Demonstrate and extend the vocabulary students use to make observations. In group discussion time and in individual conversations, note the types of words and phrases the student is using to describe different smells. Some examples are as follows:
- Does the student offer “smells like ...” comparisons when the class is investigating the smells of particular objects or substances?
- Does the student differentiate between smells that they consider good smells and those that they consider to be bad smells?
- Is there evidence of increasing vocabulary to describe smells beyond the typical terms such as good, bad, nice, and yucky?
- Does the student begin to use vocabulary such as sweet, spicy, sour, sharp, musty, spoiled, or rotten to describe different smells?
- As students observe by smelling the materials and collections available in the classroom, observe the ways each student approaches the materials, tries things, shares discoveries, perseveres with further exploration, or moves on to some other activity.
- Does the student represent ideas through drawing, modelling, making posters, or other media?
- Observe students as they smell. Is the student able to use the proper procedure when smelling both known and unknown substances (wafting, sniffing)?
- Does the student understand that judging a smell to be good or bad is often a personal preference and what may seem to be a bad smell to some people may not be a bad smell to others?

Taste

- Demonstrate and extend the vocabulary students use to make observations. In group discussion time and in individual conversations, note the types of words and phrases students use to describe different tastes.
- Does the student offer “tastes like ...” comparisons when the class is exploring objects and substances?
- Is there evidence of increasing vocabulary to describe tastes? Is there evidence of a growing vocabulary for different kinds of tastes such as sweet, sour, salt, and bitter?
- In group discussion time and in individual conversations, note the types of words and phrases the student is using to describe different tastes.
- Do students make comparisons to familiar tastes, with statements such as “tastes like peppermint?” Are they beginning to use bitter, sour, sweet, and salty to describe a variety of different substances?

- Is the student developing motor coordination and organization skills necessary to manipulate the materials and containers used in the tasting experiences?
- Ask students to place samples of substances in order of sweetness, sourness, or other taste attribute. In this way students can create concrete graphs showing substances from least sweet to most sweet or least sour to most sour. Can the student make distinctions in the intensity of a particular taste and then serial order the substances according to these distinctions?

Touch

- Demonstrate and extend the vocabulary the students use to make observations. In group discussion time and in individual conversations, note the types of words and phrases the student is using to describe different textures.
- Does the student offer “feels like ...” comparisons when the class is exploring objects and substances through touch?
- Is there evidence of a growing vocabulary to describe textures?
- Does the student contribute to small-group and class discussions, making suggestions for additions to the touch chart and other group recording devices?
- Have the children organize materials in sequence from the smoothest to the roughest. Examples might include sandpaper, wax paper, construction paper, aluminum foil, wool, Styrofoam balls, plastic, and popsicle sticks.
- Can the student create a concrete graph of objects or materials using attributes observed through the sense of touch, such as softest to hardest, coolest to warmest, roughest to smoothest?
- Does the student demonstrate to the class or small group by sharing observations about textures, presenting texture representations such as rubbings, posters, and collections?

Combining senses

- While the students are observing the particle collections, note the following types of things:
 - Does the student attempt to make observations using as many senses as possible with a particular substance or object?
 - Does the student understand and follow class routines for tasting and smelling unfamiliar substances?
 - Does the student use words and phrases from the class sense charts to assist in recording substances?
 - Does the student contribute additional words and phrases for the class sense charts throughout the year?
 - When conversing with students during science time, ask questions such as the following:
 - What can you tell me about the substance in this bag?
 - What does the substance feel like? look like? sound like when you shake it?
 - How are these substances the same? How are they different?
 - Which materials do you like touching the most? Which material don't you like to feel? Why?
 - What could you use this material for?
 - Which materials would you use to build a castle? Why do you think so?
 - Which materials would pour easily? Which materials would be hard to pour? Give evidence to support your answer. How could you find out which of these substances are easiest to pour? Hardest to pour?

- As the students continue to make observations each time they approach a new task or experience, they should be finding a variety of ways to record their observations in class and personal formats. The students' drawings and beginning writing should show growth in attention to details observed.
- Create a sense box. Use vocabulary that students have developed to describe an object from the box. Use words other than the object. Sample objects might include a Styrofoam ball, watch, tennis ball, fruit (orange), a piece of silk, crayon, chalk, party hat, pattern block, rock, container of sand, pine cone, or bean bag.

Learners will test movement of objects.

Background

With this outcome, learners will observe, describe, and discuss a variety of moving things, including themselves. Learners will ask big questions about how things move and the different types of movement. Using ramps, learners will explore ideas of cause and effect and experiment with the various ways they are able to affect the movement of objects. Learners will be challenged to make and test predictions of how objects will move based on observational evidence of properties of objects. Learners will also explore the sense of balance within themselves and explore ways to balance objects in their environment

Indicators

- Investigate types of movement (COM, PCD, CT)
- Test properties of objects that affect sliding and rolling (COM, CI, CT, TF)
- Test properties of ramps that affect movement (COM, CI, CT, TF)
- Investigate balance (COM, CT, TF)

Concepts (and Guiding Questions)

Types of movement

- How do various animals move?
- How can I move like various animals?
- Properties of objects determine movement
- How can I determine attributes that affect the movement of an object?
- How can I predict how an object will move?
- Properties of ramps impact movement
- How can I change the way an object moves down a ramp (faster, farther, etc.)?
- How can I design a fair test to assess my ramp?
- How can I determine whether different surfaces affect the way an object travels down a ramp?
- Balance
- How do balanced objects compare?
- How can I determine an effective base of an object for balance?

Skills

Test

Formulate a testable question; Hypothesize a reasonable result; Identify possible variables and begin to intentionally control variables; Design and conduct a simple experiment; Collect and begin to record evidence using the senses; Draw a simple conclusion based on evidence; Communicate findings; Predict the results of a similar experiment and justify the prediction; Evaluate limitations and improvements

Investigate

Ask a simple question; locate 2-3 obvious details to support an answer; communicate findings.

Elaborations—Strategies for Learning and Teaching

Explorations with ramps provide many opportunities for students to observe, describe their observations, and record their observations. Students can be asked to contribute to class discussions and class records

as well as to make records such as diagrams on their own. At times, students should be asked to explore with any combination of materials while at other times the teacher should select particular materials and objects to focus the explorations. Teachers should ensure that all students have an opportunity to use the blocks.

Brainstorming about ramps

Begin the unit with a brainstorming discussion about ramps. Talk about ramps that students might see in life such as wheelchair ramps, parking garage ramps, and school ramps. Ask the students what they know about ramps and where they see examples of ramps at home, at school, and in the community. Encourage students to think of questions they would like to ask about ramps and what they would like to find out. Keep this initial brainstorm brief, retaining the chart for future use as the class continues to explore with ramps. As a class or in small groups, students should be encouraged to add new observations and to check information offered in the original brainstorming session. From time to time students will notice something in the brainstorm that they want to change or correct.

As the explorations begin, the teacher can ask students to share the questions they are investigating by saying things like, “What are you working on?” “What are you trying to do?” The teacher should begin a list of questions that students are investigating. Once this list is begun, the class should revisit the list of questions every day or so. Note whether or not the students are able to express their explorations in terms of a question.

“Messing about” with ramps

Invite students to use materials from the unit collection and from around the classroom to build and explore their own ramps. Ask the students to draw their ramp before the end of the session and to save this diagram for the next time they are working with ramps. The next time students work with the materials, challenge them to build the same ramps using their diagrams. The goal here is not accurate replication of any particular ramp. The experience should provide students an opportunity to consider their diagrams and how useful they are in setting up the ramp. Teachers can ask students what makes a good diagram and what they might put in the next diagram. Teachers should use visual imagery whenever possible. Students might describe their ramps to another student.

Focusing ramp investigations

Students can use blocks and boards to build ramps and explore how objects roll down ramps. As students invent ramps and test different objects as rollers, teachers can focus the investigations by asking students to describe their activities. Teachers can collate a number of things students want to try and challenge everyone to try things with the ramps. Students should observe how their material rolls, what sound it makes, and the way it falls.

Ramp investigations can include the following:

- Which objects roll down the ramp well? Which objects don’t roll? Which objects don’t roll well or tend to roll off the ramp?
- How can you make the car, ball, or can roll more quickly? More slowly?
- Compare distances that different objects will roll after they come off the ramp.
- How can you make the ball, car, or can go further after it comes off the ramp?
- Observe objects of different weights and sizes as they roll down and off the ramp.

Classifying rollers and sliders

After the students have had several opportunities to investigate with ramps of their own design and a variety of objects from the class collection, ask them to identify objects that roll down the ramp and objects that slide down the ramp. Students may predict what they think will happen before they do it. Students may sort objects into rollers, sliders, and both rollers and sliders. Ask students about objects they believe can be both rollers and sliders. What must they do to an object to change it from a roller to a slider or from a slider to a roller?

A Venn diagram might be used for communicating the students' sort. As students conduct this classifying activity, ask them what they can observe through sight, sound, and touch. Ask how they are using their senses to observe what is happening with the ramps, rollers, and sliders. How do they know it will slide down the ramp? Will the ride be smooth? slippery?

Investigating different ramp surfaces

Teachers can provide a collection of materials to place on the ramps, such as towels, plastic, carpeting, corrugated cardboard, sandpaper, fabric, and liquid soap. The student can place different materials on the ramp and try rolling familiar objects down the ramp. The student can predict how fast the object will move and then record in a diagram what happened. Which material allowed the fastest roll? The slowest roll?

Which material changed the pattern of the rolling?

Build a class ramp

Ask the students to use their ramp diagrams to build the ramps again. Invite them to build the best ramps they can. Ask them if they want to make any adjustments to the ramps represented by their diagrams.

Invite them to select some rollers and/or sliders to test their ramps.

Invite them to adjust their ramps until they have built their best ramps. Ask them to describe why these are their best ramps. Record criteria for "best ramp" on class chart and challenge students to demonstrate their "best ramps" to each other.

Jumping, rolling, and moving ourselves

Students can observe each other making different kinds of movements at different speeds and in different patterns. They can think about their own movements. An instructor (for example, karate or Tai Chi) might be invited to demonstrate movement or a video might be used.

Teachers can integrate these experiences with physical education, providing time for discussion and recording as a class. After an experience in the gymnasium or on the school grounds, students can share observations of their own and others' movements. Teachers can record on chart paper or in some other format the students' observations from the personal movement experiences. Students can be invited to relate knowledge about the movements of other living things, such as birds flying or trees swaying in the wind, and of inanimate objects such as planes and tractors.

Explorations with balancing will provide many opportunities for students to observe phenomena around them. Initial experiences should focus on the students' observations of everyday objects "in balance" and quickly move to explorations of their own bodies "in balance." By playing games such as Frozen Tag, students will observe and discuss the sense of balance in their own bodies. Throughout balancing

investigations students will have the opportunity to develop fine-motor coordination and to make observations by describing what happens when they create balanced systems.

Brainstorm balancing

Teachers can begin the balancing investigations by conducting a class brainstorm of balancing. Ask the students what the word balancing means to them, where they see examples of balancing, and when they have to balance something. Students will probably suggest examples of balancing such as riding a bicycle, playing on teeter-totters, skipping, doing cartwheels, handstands, and spinning.

Play frozen tag or balance statues

Create a game or experience where students try different types of balancing with their bodies. Try directions, such as, “Can you stand on one foot and one hand?” “Stand on one foot.” “Stand on one foot with your hands above your head.” “Stand on one foot with your arms stretched out from your sides.” “Which way was easier for you?” “Which way was harder for you?” Ask students to observe the sense of balance in themselves and in others. After the activity invite the students to share their observations: what did it feel like to balance their bodies in different ways. Teachers might create a class record of the body-balancing experiences. This might include standing on one foot, hands in the air, bending forward, and so on.

Look for things “in balance”

Once the students have experienced, observed, and discussed balancing with their own bodies, the teacher can ask the students to look for objects in the classroom and on the school grounds that are “in balance.” Students may identify items such as tables, chairs, easels, chart stands, cars, playground equipment, and even the school building. Ask the students to identify the parts of the object or structure that seem to keep it in balance. For tables and chairs students may identify the legs as important in keeping the object “in balance.” Cars are standing on their wheels; the walls of the school are holding the building up.

Building with blocks

Students can use their experiences with blocks to make observations and to extend the language they have to express what they are observing, trying, and discovering. The teacher can use these experiences to foster an awareness of positional relationships such as under, over, around, and beside. These experiences can be used to promote comparative language with questions such as, How high is the tower you built? What other things in the room are about as high as your tower? Which tower do you think is the highest? The shortest? Which tower has more blocks? Which tower has the fewest blocks?

Making balances

Challenge the students to balance an object on some part of their bodies. Can they balance an object like a pencil or a ruler on a finger? Can they balance a book or a beanbag on an outstretched foot? Provide time for the students to use balancing collections (large and small found objects such as paper rolls, wooden or plastic blocks, toys, Styrofoam blocks, plastic jars, cardboard boxes) to find many ways to balance objects on some part of their bodies.

Tasks for Instruction and/or Assessment

- Does the student contribute ideas to the class discussion in small groups or with the teacher? Does the student listen to other students, building on their contributions?

- Teachers should create a collection of materials and objects to have on hand for ramp explorations. Many materials can be gathered around the school and the community. The collection may include wood for ramps and blocks; heavy cardboard, plastic, and Styrofoam for ramps; a variety of balls, paper cylinders, toy vehicles, straws, spools, film cases, paper clips, pencils, wooden building blocks, Duplo building blocks, and geometric solids. Throughout the investigation students, parents, and teachers can continue to add to the collection.
- Is there evidence of a growing vocabulary to describe the observations and the relative positions of things in motion?
- Does the student create their own investigations of things in motion using the materials available in the classroom?
- Does the student create and communicate questions or puzzles to solve through investigations?
- Does the student engage with other students to create investigations?
- After students have categorized objects as rollers, sliders, or both, ask them to make a group chart of their sorting.
- Notice how the students draw the arrangement of objects. Are they able to represent the objects so others can perceive them? Can they describe the sort from their diagram a day or so later?
- Can the students describe what they are investigating with their materials, along with what they found out?
- As the students build, test, and demonstrate “best ramps,” notice if they discuss the concept of fairness when comparing two different ramps.
- Are they beginning to notice that in order to compare two ramps these ramps should be similar in construction, height, and length? Are they able to identify and then adjust factors that contribute to a fair comparison of two or more ramps?
- The class may play movement games such as Do the Hokey Pokey, Frozen Tag, or Bear Hunt to further demonstrate awareness of body movements.
- Ask students to demonstrate a movement that they see around them in nature. Which senses do they use? Other students could use vocabulary to describe the movement and then guess what was represented.
- During the initial brainstorm notice the student’s use of vocabulary to describe balance phenomena in the classroom, school ground, and community.
- Can the student describe what it feels like to balance in different ways?
- As the student tries different body balance positions notice whether or not they can identify the base of their body balance.
- Can the student identify objects in the classroom and school grounds that are balanced such as tables, chairs, people, easels, cars, swing sets, and climbing structures?
- Can the student describe the parts of the object that seem to be holding it up or keeping it balanced? Does the student refer to these parts of the object as its base? For example, can the student tell that the four legs of the table help to keep it in balance much as our legs help to keep us in balance? Does the student recognize the base of various objects?
- Can the student balance their body in a variety of different ways, following simple directions such as:
 - balance on one foot
 - balance on one foot and one hand
 - Play Frozen Tag or Balance Statues

- When building with blocks, does the student build a reliable base to support the structure? Can the student identify and describe the base that holds the structure in balance?

Appendix A

Experiences for Investigating Sand and Water through the Senses

Activity 1: Let's Explore!

Assessment	A record of students' observations during this investigation time should include comparisons, questions asked about sand (I wonder if ...? I wonder how ...? I wonder why ...?, I wonder what would happen ...?), and use of vocabulary introduced during more structured investigations.
Question	In what ways can you mould sand? How easily does the sand pour? Can you do anything to help?
Materials	Sand table Plastic containers of different sizes and shapes Sieves Scoops, shovels, and rakes Toy dump trucks Ramps/chutes Seashells and other items to make imprints in sand
Procedure	Students should have time to freely explore the properties of sand such as how it pours, takes shapes, moulds, flows, and so on. Students can create sand sculptures using damp sand. Students can design and create castles using containers and moulds.

Activity 2: Let It Pour

Assessment	What characteristics of sand make it easy to pour? What evidence is there that the sand pours?
Question	How does the sand pour? Does using your hands make a difference in the pouring? Do tools help the sand pour in different ways? What observations can you make about sand as it pours?
Materials	Dry, clean sand Sieves Funnels Plastic pan
Procedure	Connections to the senses should be made as students experience pouring dry sand. Students can use their hands and other implements to make patterns in the sand. A comparison could be made to Japanese garden designs. To extend this activity, students could try pouring sand through sieves of various dimensions to compare with each other and with pouring through their hands. A further extension could be made by using sands of different coarseness to compare textures, looks, and sounds made.

Activity 3: Wet Sand

Assessment	What evidence do you have to support your observations? What inferences can you make?
Question	What does sand feel like? Pour like? Sound like? Does wet sand and dry sand pour the same? Feel the same?
Materials	Shallow plastic pans 250-ml milk containers Shells and other small, patterned objects Resealable plastic bags
Procedure	Allow students to make comparisons and to observe using several senses. Teachers should generate a three-columned chart to compare the properties of dry, damp and wet sand, such as ease of pouring, feel, sounds made, and ability to hold a shape. Comparison to occurrences in nature allows students to make real- world connections. In addition to these activities, students can investigate how much water is needed to make the sand hold its shape by adding different amounts of water to sand and creating a moulded or sculpted shape.
Extension	There are several art activities involving sculpting, moulding, and patterns that would fit with this activity. Teachers can investigate sand castle and sculpture events on the Internet to show students how other artists use sand as a sculpture medium. Students can create a plaster cast of their hand print. Shells or other small items can be used to make prints that can also be cast in plaster.

Activity 4: Exploring Dry Sand

Assessment	Students are able to use fine motor skills to change the flow of sand as it is released from their hands. Students are able to communicate through oral language what they observed.
Question	What happens to the sand as it is released from your fingers/hand? What types of patterns does the sand make on a flat surface? How does the sand move? What does the sand feel like?
Materials	Sand and water tables Buckets Glue Paper Flat surface Sand
Procedure	Invite students to talk about experiences they have had with sand: where they have had these experiences, with whom, and what they like or don't like about sand. Have students explore dry sand, working in groups of two or three. Have them feel the sand and describe how it feels. Have students pour sand from their hands using various methods (pouring as a funnel, small amounts, large amounts, between their fingers). Have them describe what happens to the sand as it falls. Have students try to build a hill by pouring the sand with their hands. Have students spread sand over a flat surface. Discuss with the students the words that they used to describe their experiences. Build a list of vocabulary words and post it in the classroom. Have students draw a picture. Have them put glue along the outline of the picture. Then have them pour sand over the glue. After the glue has dried have the students pour off the excess sand.

Activity 5: Wet and Dry Sand

Assessment	<p>Students are able to distinguish between wet and dry sand.</p> <p>Students are able to communicate through oral language what they observed.</p> <p>Students are able to work co-operatively.</p> <p>Students are able to use a balance to observe the difference between wet and dry sand.</p>
Question	<p>What did you notice about the wet sand compared to the dry sand?</p> <p>What did you notice about the heaviness of the wet sand compared to the dry sand?</p>
Materials	<p>Sand and water tables or buckets</p> <p>Dry sand</p> <p>Wet sand</p> <p>Balances</p> <p>Shovels or cups for transferring sand</p>
Procedure	<p>Have students describe their experience with sand at the beach. Provide two containers of sand and two balances for each group of two to four students. Have the students feel the wet sand and the dry sand. Ask them to describe any differences they noticed. Write their observations on the board or on chart paper.</p> <p>Have the students fill one side of the balance with wet sand and the other with dry sand. What do they notice happened to the balance? Was one side heavier than the other? If so, which one? How could you tell? Ask students to discuss what they observed and what they thought caused it to happen. What made the sand heavier? Does it matter if sand is packed down? What could you do with wet sand that you couldn't do with dry sand? This type of discussion will lend itself to further activities using wet sand.</p>

Activity 6: Piling and Tilting

- Assessment** Students will be able to observe, illustrate, and discuss investigations using sand to make various forms.
Students will be able to discuss what happens to sand when it is tilted and moved from side to side.
Students will be able to distinguish the difference in results when using wet and dry sand as they do the activities.
- Question** What happened to the dry sand as you tried to pour more on top of the mound it made?
How did the wet sand react differently from the dry sand?
- Materials** Sand
Objects to pour sand
Sand table
Trays
Containers to hold sand
Water
Buckets or bowls
- Procedure** Have students work in groups. Give students sand and containers to pour it with. Have students pour dry sand from a container into a bucket or bowl. Have them describe what happened to the sand. Then have them pour more sand on the pile. Have them describe and illustrate what happened. Do the same using wet sand, and have students discuss and record the differences between using wet and dry sand. Discuss with students experiences they have had at a beach, and relate those experiences to the activity they just completed. Is it easier or harder to make a castle with wet or dry sand? Have students spread dry sand over the bottom of a tray. Have them tilt the tray and discuss what happened to the sand. Do the same activity using wet sand. Have students discuss the differences between the wet and dry sand. Discuss with students the concept of movement of sand along a beach. Do you think having rocks, shells, or grass on a seashore helps to keep the sand in place? As an art activity, students could draw or create a sandy beach scene.

Activity 7: The Difference in Sand

- Assessment** Students will be able to observe, illustrate, and discuss investigations using different types of sand.
Students will be able to distinguish between different types of sand using various senses.
Students will be able to use a magnifier to make observations about the different types of sand.
- Question** What differences did you notice in the sand by using the sense of touch?
How did the magnifier help you to observe the sand more clearly?
- Materials** Various types of sand (beach sand, sand for roads, sand to mix with cement)
Buckets or bowls
Magnifiers or bug viewers
- Procedure** Have students work in groups. Give students containers with different types of sand. Have students feel the different types of sand and describe the similarities and differences they notice. Have students observe the sand with and without a magnifier and have them describe the differences.
Have students put sand in plastic containers and shake the containers to see if they hear any differences between the different types of sand.
An extension to this activity would be for students to do a crayon rub of the different types of sand and see if they notice any differences.
Students could also illustrate where the different sands are used or come from (e.g., beach sand, sand for roads, sand to mix with cement). They could then put glue on the outline of the picture and glue sand to it.

Activity 8: Water, Water Everywhere

Assessment	A record of observations of the growth of concepts from questions would be a way to measure growth as students use the water table to practise and expand on teacher-led activities in this appendix.
Question	What do you notice about water?
Materials	Water table Plastic containers in various shapes Plastic containers with spouts Cloths for wiping spills Collection of objects that float and sink Items to make boats (aluminum foil, milk cartons, plastic containers, plasticine)
Procedure	At a water table, students should have an opportunity to play with pouring water into different containers experience the floating and sinking of various articles, use boats and cargo, and develop vocabulary for concepts such as “capacity.”

Activity 9: It's Pouring

Assessment	The ability of students to predict what will happen as various substances are poured and how they are similar to and different from water will indicate comfort with the concept of how water behaves when poured.
Question	How is water like rice? Sand? Cereal? How is it different? (See analysis) What is different about the levels of the solids and water when poured?
Materials	Plastic containers of various shapes and sizes Plastic graduated cylinders Plastic measuring cups Rice Sand Cereals such as rice and round oat cereals Pie plates Pea gravel or marbles Soil
Procedure	Beginning with the solids, teachers could instruct students to pour a substance, then discuss the questions in the analysis section. Moving from the soil, students should be directed to pour water and compare and contrast its pouring with the previous substances. A teacher-built compare/contrast chart would help students to organize their thoughts. Students could compare the levelling of water with the formation of hills in solids as these substances are poured.
Analysis	How did the test substance pour? Use sight, hearing, and touch words to describe your observations. Use the same senses to describe how water poured. Which of the solids pours most like water? Describe some of the differences between the substances and the way they behave when poured.

Activity 10: Waves, Ripples, and Bubbles

Assessment	A series of drawings showing waves and ripples will show that students have observed differences in ways to cause disturbance in water.
Question	In what ways can water be disturbed?
Materials	Dish pans Water Straws Collection of light, large objects Collection of small, heavy objects Paper and pencil
Procedure	<p>Pour the water into dish pans. Observe how the water moves. Let it move until it becomes completely still. Describe the differences between the moving and the still water.</p> <p>Students can observe what happens when a finger is moved across the water. A V-shaped ripple should occur. They could make connections to the real world (boats or ducks moving through the water, for example). Students could try dropping large, light objects (a plastic yogurt container, for example) and small, heavy objects (a marble, for example) to observe differences in water disturbance.</p> <p>Students could blow on the water with a straw and make observations. Connections to nature may be that this is what happens when the wind blows. Draw pictures to show how water can be disturbed.</p>

Activity 11: A Drop in the Bucket

Assessment	Links that students make between their observations and what happens in nature would be an indication that concepts are being understood.
Question	How can you make water drop and move on paper towel and other surfaces? What do the surfaces look like after the water is dropped? Where do the water samples go when dropped on surfaces? How do the water drops move on the surfaces?
Materials	Construction paper Blotting paper Paper towel Cardboard Fabrics (silk, leather) Sandpaper Waxed paper Samples of wood Petroleum jelly Eye dropper Large paint brush Straws Toothpicks Stir sticks Felt Pots of sand (250 mL milk cartons with the lids cut off work well)
Procedure	Students should experience dropping and moving water on various surfaces. Students should talk about their observations of the ways in which water behaves on each surface. Students can then test what happens to the sand in pots as water drops on it in different ways. The links that students make between their observations and what happens in nature should be noted as an indication that concepts are forming.
Extension	Students can wet paper, then observe the behaviour of diluted paints on this wet paper. Links can be made to absorption of water and how water moves.

Activity 12: Floating and Sinking

Assessment	Contributions to the class chart on floaters and sinkers can be used as indications of whether students are beginning to understand the concept of floating and sinking.
Question	Using the sorting rings, how do the given materials sort as “floaters” and “not floaters?” What words describe how the objects float? What ways can you use to show how water moves? What ways can you show how water makes sound?
Materials	Collection of articles that float and sink Materials (Styrofoam, Plasticine, plastics, wood, milk cartons) from which to shape boats Sorting rings
Procedure	Students will ask questions and then test their questions. Teachers should look for indications that concepts of floating and sinking are being formed. A chart of student predictions about what will sink and what will float can be made before students begin experimenting. After experiencing floating and sinking articles, students can contribute to a class chart of their observations. Students could create dance routines to illustrate any of the following concepts: <ul style="list-style-type: none">▪ water flowing in small streams, larger streams, rivers of various sizes▪ waves landing on a beach▪ stormy/calm water Students could use musical instruments (ones they create or commercial ones) to create the sounds water might make as it flows, drips, crashes, rains, etc. Sturdy glasses filled at different heights can be used to create musical sounds. Students could be introduced to other musicians who produce this type of music. The keywords “water with music” produced some examples in an Internet search.

Activity 13: I Can Float or Not

- Assessment** Students are able to observe the difference between sinking and floating.
Students are able to decide which type of container holds more cargo than another.
Students are able to record their observations through illustration.
- Question** Did the shape of the container make a difference in how much cargo it could hold?
What was the most cargo that a container could hold?
- Materials** Various types of containers that float
Centicubes or other standard materials for cargo
Buckets or containers to hold water
Water
- Procedure** Have students work in groups. Give students buckets with water and a variety of containers that float. Have students try the various containers in water to see if they float. Then have them add cargo to see which one will hold the most. As the children are doing this activity, discussions should take place around the shape of the container, how heavy it is, how deep it is, and how wide it is and the relationships these have on the amount of cargo the containers hold.
An extension to this would be for students to add movement to the water to see the impact it has on the floating of the containers and the amount of cargo they can hold. This activity can be related to the “real” world with discussions around objects that float (e.g., boats, canoes, and rafts).

Activity 14: Soak It Up

Assessment	Being able to sort objects into those that absorb and those that repel water would indicate that students are beginning to understand the concepts of absorbing and repelling water.
Question	Which objects absorb or repel water? Which objects do not?
Materials	A collection of objects that float or sink
Procedure	Using a variety of materials, students could decide which objects absorb and which objects repel water. Discussing the meaning of these words will help students to understand them. Create a chart of absorbent and repellent materials. Allow students to share their observations and contribute to the chart as they work through the activities.
Extension	Students can drop water from various objects onto coloured construction paper to make patterns. Using spray bottles or squirt tops will produce different patterns than dropping. An extension of this activity is to use diluted paint to develop splatter patterns on paper. Students can blow diluted paint across paper to produce designs. This activity can be used to reinforce the concept of water disturbance

Appendix B

Experiences for comparing living things through the senses

Activity 15: Log Hotel

- Assessment** Observe children as they observe the log. Are they actually actively engaging in observations or are they recording the observations of others?
Do the children use vocabulary from classroom tools such as the senses charts, word walls, brainstorm charts, illustrations, etc.?
Observe how the children present their findings—does it accurately represent what they observed on, around, and in the rotting log?
Note how students record their observations. Are they able to select from a variety of media to represent their observations of the items in the collection?
- Question** What did you observe in the log?
How does a log become a home for living things?
How do living things depend on the log to survive?
- Materials** Paper
Pencils
Clipboards
Colouring tools
Outdoor location with two or three rotting logs to observe
Clay, toothpicks, cardboard, and other materials that could be used to make models
- Procedure** Brainstorm with the children prior to beginning the activity so that a starting point is determined. Do the children understand the word “rotting?” Ask them, What purposes could a rotting log have? What might you expect to find in or around a rotten log? Share your reasons. What might you not find in a rotten log? Share your reasons.
Move out into the area with the logs. Divide the children into groups so that all have an opportunity to closely observe the log and its contents. What do the children observe? Are the items living or non-living? What can they see living on, in, and under the log?
From a list of choices provided by the teacher, the children select a method for recording their observations. These choices reflect the various learning styles of the class and the many ways to “show what you know” (for example, through art, drama, models, journals, and oral communication).
- Wrap-up** Did the observations match the predictions? Perhaps suggest some reasons why they did or didn’t. Additional questions for discussion could be as follows:
What makes you think the log is dying or rotting?
Would living things tend to live in the log or eat the log?
What do you think is inside the log?
What does the log look like?
What does the log feel like?
Did you see any living things living under the bark?
What is a hotel?
What did you find inside the log?

Activity 16: Observe a Leaf

Assessment	Students are able to observe and describe a leaf using their senses.
Question	What differences did you observe in the leaves you saw and collected?
Materials	Fresh leaves collected by the students
Procedure	<p>Students could be taken on a class nature walk to observe and collect leaves. Develop a senses chart while discussing observations of leaves.</p> <p>Students look at their leaves and describe the shape and size, the edge (smooth, jagged); the colour; thickness; the veins inside the leaf; the stem; markings, if any; the smell; the texture of top and bottom of the leaf; the degree of transparency; and the brightness of its colour when held up to the light, while indicating which sense they use for each observation.</p> <p>Discussions could revolve around the following questions:</p> <ul style="list-style-type: none">▪ Are all leaves the same?▪ How many points are on the leaves?▪ What did the leaves have in common?▪ Did different sizes of the same kind of leaf have the same number of points?▪ How do the leaves look, feel, and smell?▪ Do leaves have a front and back?
Extension	<p>Students can sort the leaves by shape, colour, size, texture, and smell.</p> <p>Students can look for similarities between the leaves.</p> <p>Students can describe a leaf while others guess which leaf it is.</p> <p>Students sort the leaves (e.g., maple leaves, birch leaves) and arrange them by size from small to large.</p> <p>Students can make leaf rubbings in different colours, cut out the leaves, and make a pattern with the class.</p> <p>The teacher can assemble a few very colourful leaves (in fall colours) and seal them by ironing between two sheets of wax paper under a cloth. Hang them by the window.</p>

Activity 17: Living and Non-Living

- Assessment** Students can describe observations using senses.
Using the vocabulary, students are able to classify living and non-living things.
- Question** How were you able to tell what is a living and non-living thing?
What differences did you observe?
- Materials** Plastic bags
2 hoops or pieces of yarn of different colours or sorting rings
Magnifying lenses or bug viewers
A wide variety of living and non-living things
- Procedure** Take students outdoors and have them observe a variety of living things.
Discuss as a class what a living thing is. Then have the students go outside and observe non-living things. Discuss as a class what makes something a non-living thing. Discuss and develop a senses chart by asking students what senses they used to decide what is living or non-living. Sort things into groups of living and non-living things.

Activity 18: Sorting Rings Observations

- Assessment** Observe students as they explore the sorting ring community. Are they able to use their senses and sense words to describe what they observe?
Students are able to accurately record their observations in some format.
Students are able to select from a variety of ways to represent ideas, actions, and experiences, and use these methods to communicate with others.
Students use oral or written language and representations to compare their findings to their predictions and to the findings of other students.
Students are able to explain their rule for sorting.
- Question** What living things were you able to find?
What differences did you observe in the number of living things you found and the location of the observation area (e.g., grassy area compared to asphalt area)?
- Materials** Sorting rings
Sorting rings paper
Clipboards
Pencils
Colouring tools
Bug viewers
Clay, toothpicks, and other materials that can be used to make models
- Procedure** Before heading outside, spend some time with the class brainstorming and discussing living things and what kinds of living things you may find inside and outside. What living things might you find in the classroom? In the sky? In the garden? On the playground?
On the school grounds or another outdoor location, divide the students into small groups and give each group a sorting ring. Have students place their sorting ring over a patch of ground. Students observe and record the living things that they observe. Observations can be recorded in many ways—pictures, words, tallies, picture graphs, etc. What did they see? How many ants, leaves, flowers, etc. were in their ring community? Did they find creatures/items that matched their predictions? Did they encounter any surprises?
- Analysis** Compare observations with predictions of what the students thought they would see (from earlier class discussion). Students can show what they learned and observed through artwork, drama, nature logs, and picture graphs.
If there are any items that the students can bring back into class without harming them, they can work together to sort and classify these items. Have them explain why they sorted items in a particular way and challenge them to find a second way to sort their objects. Did you find any items that should not be in your ring community? Bring forward a discussion on a healthy environment needed for living things to grow and thrive. How can we protect the environment for living things?

Activity 19: What's Your Rule?

Assessment	Observe if students can explain their sorting rules and the rules of their peers. Observe if students can use vocabulary from senses charts when discussing and sorting seeds.
Question	What was your sorting rule? What did you learn about seeds?
Materials	Collection of seeds from trees, plants, flowers, fruits and vegetables (e.g., acorns, pine cones, elm seeds, corn, sunflower seeds) Paper plates Sorting rings
Procedure	Divide students into pairs or small groups. Give each group a paper plate with a variety of seeds. Give the students an opportunity to explore the seeds and discuss the seeds using their senses. Have students sort seeds and share their sorting rules. Prompt by asking, "Can you show me another way to sort your seeds?" Students can then move to another group and try to guess that group's sorting rule. What are seeds used for? What are some ways seeds move? Where do seeds come from?

Appendix C

Experiences for investigating materials through the Senses

Activity 20: Where Did the Colour Go?

- Assessment** Students are able to describe what they observed when viewing objects using different transparent colours.
Students are able to describe their observations.
Students are able to select a variety of materials to carry out their observations.
- Question** What words did the students use to describe what they observed?
What did they notice changed when looking at objects with their colour viewers?
- Materials** Food colouring
Rectangular or square transparent plastic containers with lids
Water
Optional: colour filters
Coloured cellophane name-tag holders (without pins)
Note: *There are a variety of materials to choose from.*
- Procedure** Place a few drops of food colouring in the plastic container. Add water and put the lid on the container. Have the students look through the sides of the container. Invite the children to move about the classroom or outside using their new looking glasses. Challenge them to look at a variety of different coloured objects. Have them draw what they observed with and without the looking glasses. Ask the students to describe what happened. What caused some objects to seem to disappear? How could this affect which clothes to wear at night so that automobile drivers will see you? Animals often use camouflage to hide from their enemies. Can you think of any animals that do this? Discuss these questions with your students.

Activity 21: See-Through or Not

- Assessment** Students should develop an understanding of the concepts “being able to see through” and “not being able to see through.”
- Question** What did you notice were the differences between objects in relation to being able to see through them or not?
How did you sort your objects?
- Materials** Objects that can be seen through and objects that cannot—plastic pop bottles, clear plastic bags, pop cans, paper, wax paper, paper towel rolls, plastic wrap, aluminum foil, plastic tubs and lids
Attribute hoops/sorting rings
- Procedure** Ask children what they think the concepts “see-through” and “not being able to see through” mean. Put their responses on chart paper or on the board.
Divide the students into groups. Give each group a variety of materials and ask them to see if they can see through them or not. Have them sort the objects using the sorting rings. During the activity ask groups to tell their sorting rule.
As a whole group, ask students to share the variety of sorting rules they used. Bring in the terms **opaque** and **transparent**. They could be used along with pictures to illustrate their meaning.
Have students discuss things they can and cannot see through in the world around them. Take them on a walk around the building.

Activity 22: Let's Look at Leaves, Feathers, and Shells

Assessment	<p>Note the student's ability to use the magnifier. Do they:</p> <ul style="list-style-type: none">▪ vary the distance from the eye?▪ vary the distance from the object?▪ use the correct technique used to hold the magnifier? <p>Is the student able to describe and draw the differences seen when using a magnifier compared to not using one?</p>
Question	<p>What happened to the size of the leaf when you looked at it through the hand lens? Were the colours the same or different? What did you notice about the leaf when you looked at it with the hand lens compared to looking at it with only your eyes?</p>
Materials	<p>Plastic hand-held magnifiers or lenses from the bug viewers Leaves, shells, or feathers Plain paper Crayons</p>
Procedure	<p>Invite students to go outside with you and collect leaves that have fallen from trees. Have them look at a leaf without a magnifier. Have them describe and draw what they see.</p> <p>Provide magnifiers and have students look at the leaf again. Ask students what they can see now. What have they noticed has changed?</p> <p>Have them draw the leaf as they observed it using a magnifier. You may wish to do the same activity using feathers and/or shells.</p> <p>Discussions could be carried out around questions that include the following:</p> <ul style="list-style-type: none">▪ What differences did you notice when looking at the spots and lines on the leaves with the hand lens?▪ What other objects could you observe with the magnifiers?▪ Were the leaves different shapes?▪ Who might need to use a magnifier?▪ Can you think of when it might be useful to have a magnifier?▪ What might a scientist use a magnifier for?
Extension	<p>Have students do a leaf rubbing using crayons and plain paper. Invite students to explore the classroom looking at small things in a new way using a magnifier. Ask students what they can learn by using a magnifier. Make a class list of things they would like to view using a magnifier.</p>

Activity 23: The Mystery Sound Box

- Assessment** Students are able to describe the sounds made in the mystery box.
Students are able to use their previous knowledge to guess what the object is that made the sound.
- Question** Where have you heard this sound before?
What sound did you hear?
Can you think of a good word to describe the sound the object made?
What vocabulary did the students use to describe the sounds the objects made?
- Materials** Materials that make various sounds:
- wind-up toy
 - tin can
 - drum
 - glass bottle
 - plastic bottle
 - two objects that can be rubbed together
- Procedure** Make a mystery sound box out of cardboard. Make a hole in it where you can hide your object and put your hand to the object to make a sound. You may wish to use a tissue box. This activity could also be done using a puppet theatre where the sound is made behind the curtains.
Make sounds using various objects. Ask students to describe each sound and what they think it is. Descriptive words could be added to the sound vocabulary chart. Students could be given the opportunity to choose an object and to talk about the sounds it makes.

Activity 24: Smell Jars

- Assessment** Observe the student's ability to observe and communicate their experiences with others and to use personal observations when asked to describe characteristics of materials.
- Question** How do you react to different smells?
- Materials** Baby food containers or film canisters to make smell jars
Cotton balls
Scented liquids (detergent, vinegar, cloves, peppermint flavouring, vanilla, lemon, or almond extract, etc.)
- Procedure** This activity can be done as part of a centres approach to learning or in groups. The number of smell jars required depends on how the activity is set up. Since some of the liquids may be coloured and may colour the cotton ball, wrap the baby food containers in construction paper or use dark film canisters. Invite students to conduct a variety of explorations with smell jars.
They can smell each using the waving technique and describe what they smell in terms of "This smells like ..." They might group the jars in categories such as "smells I like and smells I don't like" or "smells like food and doesn't smell like food."
Remember to add new phrases and words to the smell chart.

Activity 25: Sweet Treats

Assessment Students are able to make observations using the senses of sight, touch, taste.

Question What words did students use to describe the taste of the raisins and grapes?

Materials
Fresh grapes
Raisins

Procedure Ask the students, Who has tasted a grape and or raisin before? How many people like grapes and/or raisins? Make a graph to show the students' responses. Have each student taste a grape and a raisin. Have students describe the taste of each. Write students' responses on chart paper. Ask students what they know about grapes and raisins. Bring forth the concept that grapes and raisins are the same fruit. Compare how they changed based on the five senses. Further discussions could be based around the following questions:

- What do they look like, feel like, and smell like?
- What would have to happen to change a grape into a raisin?
- How do the grapes and raisins look the same?
- How do they differ in taste, appearance, texture, smell, and size?
- Which is sweeter, grapes or raisins?

Cut a raisin and a grape in half. What do they look like? How are they the same? How are they different? Which one contains more water?

How could we find out? Students could be given the opportunity to let grapes dry out and observe what happens to them.

Activity 26: How Does It Feel?

- Assessment** Students are able to describe objects according to their texture.
- Question** How could you tell what an object was by its texture?
In what ways does our sense of touch help us?
- Materials** Cardboard boxes with a cut out hole (see picture example)
Everyday objects with different textures such as a ball, an eraser, a pinecone, or a shell
- Procedure** Let students take turns reaching into the box to identify the object. You could use a tissue box. They should keep their guesses to themselves.
Ask students to describe what the object feels like and, when asked, what the object might be.
Remove the object for everyone to see. Review words students used to describe the object. Were they good choices to help someone else guess? Repeat the activity until everyone has had a turn.
Have students take their objects and discuss with them what other things might have the same texture. Make a list on the board. Discuss with the students why the texture of an object is an important way to describe or identify it.

Activity 27: Sorting with Our Senses

Assessment	Students are able to sort a variety of items using their senses. Students are able to communicate their reason for how they sorted their items and what sense or senses they used.
Question	What sorting rule did you use? What senses did you use to sort the objects?
Materials	A variety of materials such as screws, pasta in various colours and shapes, and paint chips or crayons to match the pasta Sorting rings
Procedure	This activity is just one of many that could be used to have children use a variety of their senses. From these activities, children should have a better understanding of how we depend on a variety of our senses to do things. Give the students a container of objects and have them sort them using their senses. Review with them the senses they could use. Have several groups use the same items and see how they sort them. Ask, What senses did you use to sort your items? Are there other ways you might have sorted them using another sense? Have students share their collections with the whole class and have them explain what they did and the sense(s) they used.

Activity 28: Size It Up

- Assessment** Students are able to compare objects according to height.
Students are able to compare objects according to size.
Students are able to compare objects according to how heavy they are.
- Question** What were some different ways you sorted the objects?
What senses did you use to sort them?
What attributes did you use?
- Materials** Cardboard tubes of various sizes
Objects with various weights/mass (such as cotton balls, pennies, or cereal)
Balls of various sizes
2 l pop bottles
Pencils of various lengths
Boxes of various sizes
Egg timer
Science journal
Painted sunglasses, blindfolds, Halloween masks, or hands to cover eyes
- Procedure** In advance, cut cardboard tubes into different lengths. Place objects of various weights (mass) in margarine containers. Fill 2 L pop bottles with different amounts of water.
Organize six stations:
Station 1: Cardboard tubes numbered from shortest to tallest.
Station 2: Balls numbered from smallest to largest.
Station 3: Margarine containers numbered from lightest to heaviest.
Station 4: Pencils numbered from smallest to largest.
Station 5: Boxes numbered from smallest to largest.
Station 6: Pop bottles numbered from lightest to heaviest.
Students are placed in pairs. One student has their eyes covered and is asked to compare one set of objects according to height, size, or weight (mass). The other student records the number sequence in either the science journal or on a recording sheet.
Students discuss their sorting pattern and the sense(s) that they used.
Roles are then reversed.

Activity 29: Walking through Our Senses

- Assessment** Students are able to describe what they see, hear, smell, and feel.
- Question** What senses did you use to describe your walk?
How did you feel about the world around you?
- Materials** Activity sheet (optional)
Clipboards
- Procedure** Discuss changes that occur in the fall. Take the students on a fall walk to explore their environment. Have them record their findings on the activity sheet or in their science journals. Have them bring back to the classroom items they find (leaves, pine cones). Have them describe the articles using their senses.
In the classroom, develop a fall word chart using the words the students used. Have students draw their favourite fall object that they saw. Have them label a display with some of the objects they have brought in. Students can record their observations in their science notebooks.

Activity 30: Using Our Senses

Assessment	Students are able to sort objects based on their colour. Students are able to sort objects based on how they feel.
Question	What sense did you use to sort the objects by colour? How were you able to sort the objects using the sense of touch?
Materials	Sealable plastic bags Clear plastic bottles Sand (white, dark), flour, salt, cinnamon, sawdust, rice (brown), cornmeal, oatmeal Hand magnifiers Pan balances Attribute hoops/sorting rings
Procedure	<p>Create a collection of materials such as flour, salt, sand, sugar, cinnamon, sawdust, rice, barley, and oatmeal. Place each item in a small sealable plastic bag. Make another set in clear plastic bottles. Discuss with students words they have used while exploring with their senses. Point to the words around the room or make a new list of words. Give students hand magnifiers to examine the different materials. Have them describe the materials by looking, touching from the outside of the bag, and shaking the bag to listen. Depending on the development of the students, have them record words or phrases by using words from the class senses chart. Have cards with various sense words on them and have students match the materials to them. Have the students sort the materials according to colour and texture.</p> <p>Place the same materials in plastic containers (each plastic container should be filled to the same level). Have students match the materials based on how they look. Have them explain what they did and how they made their decision. Have them sort the plastic containers from heaviest to lightest (you may wish to use balances to compare them).</p> <p>Discuss with students what senses they used. Have them guess each material. Discuss with students where they would see these materials, where/how they are used, and where they came from. Show pictures of the item labelled with where it came from, how it is used, or the package it came in.</p>

Activity 31: Seed Collection

- Assessment** Students are able to use a variety of senses to distinguish the different characteristics of seeds.
Students are able to sort the seeds into different groups and explain their sorting rules by using a variety of senses.
- Question** What senses did you use to describe the seeds?
How were you able to sort the seeds by using your senses?
What similarities did you notice in the seeds when you observed them?
What differences did you notice in the seeds when you observed them?
Where have you seen seeds before?
- Materials** Various types of seeds (acorns, pinecones, chestnuts, seeds from apples and oranges, vegetable or flower seeds, etc.)
Attribute hoops/sorting rings
- Procedure** Place a variety of seeds on paper plates or in plastic containers. Have students take turns describing the seeds—how they look, feel, and smell. Have students sort the seeds by allowing them to use their own sorting rules. Ask them to explain their rules. Ask students if there is more than one way to sort the seeds. Give them opportunities to use a variety of sorting methods and senses. Another option is to give the sorting rule and see if students are able to sort the seeds according to the instructions. Invite them to draw and describe how seeds feel, smell, and look in their science journal.

Appendix D

Experiences for testing the movement of objects

Activity 32: “Messing About” with Ramps

Assessment	<p>Students are able to contribute to class discussions in small groups or with the teacher.</p> <p>Students listen to each other and build on their contributions.</p> <p>Students are able to build a ramp using blocks and boards.</p> <p>Students are able to make a diagram of their ramp to use in another lesson.</p>
Question	<p>How can you build a ramp using blocks and boards?</p> <p>What did the ramp you made look like?</p> <p>How can we find out if these ramps will work?</p>
Materials	<p>Blocks of wood to build ramps</p> <p>Boards for ramps</p>
Procedure	<p>In this activity students are given the opportunity to explore building ramps. Students should work in groups and try to build a variety of ramps. Students should make an illustration of the final ramp they built or the one they liked the most. Students should be made aware that they will be using this diagram to build their ramp for another activity.</p> <p>Discussions could take place around the different ways children used the materials to make ramps. Which ramp is the tallest? Which ramp is the shortest?</p>

Activity 33: Using Our Ramps

- Assessment** Students are able to develop an understanding of how various objects react when going down a ramp.
Students work co-operatively.
Students are able to recreate their ramps from drawings they made in another lesson.
- Question** What did you notice happened to the objects as they went down the ramp?
Were there any differences in the movement of the objects? If so, what?
- Materials** Ramps
Blocks
A variety of materials that will roll and slide on the ramp (blocks of wood, toy cars, paper towel rolls, unifix cubes, small boxes of cereal)
- Procedure** In the first part of this activity students are to reconstruct their ramps from the previous lesson. The second part of this lesson will be for students to explore a variety of materials and how they react to going down a ramp. Students should work in groups. This activity may have to be done in the hall or the gym depending on the room available within the classroom. Discussions should take place around how the objects move. The next lesson will focus on the terms “sliders” and “rollers.”

Activity 34: Sliders and Rollers

- Assessment** Students have an understanding of the terms “sliders” and “rollers.”
Students work co-operatively.
Students are able to sort their objects into sliders and rollers.
Students are able to give examples of where rollers and objects that slide are used in the world around them.
- Question** Can you make an object roll and slide?
What is the difference between an object that slides and one that rolls?
Where are objects that slide or roll used in the world around you?
- Materials** Ramps
Blocks
A variety of materials that will roll and slide on the ramp (blocks of wood, toy cars, paper towel rolls, unifix cubes, small boxes of cereal)
Attribute hoops/sorting rings
- Procedure** This activity may need to be done over more than one science period. Discuss with students the terms “slide” and “roll.” Ask them what they think they mean and to give examples of things that slide and roll. Take the children to the gym and have them demonstrate rolling and sliding with their bodies.
Have students set up their ramps and, using the objects from the previous lesson, discover which are sliders and which are rollers. Have them sort them using their sorting rings. Discussions could take place around why some objects roll better than others and why some objects slide better than others. What makes an object roll? What makes an object slide? The activity sheet provided could be used for students to record their observations. This could be done by illustration or in words.

Activity 35: Further Investigations with Sliders and Rollers

Assessment	Students are able to distinguish different properties of objects and how they relate to sliding or rolling.
Question	Which objects roll down the ramp well? Which objects do not roll? Which objects slide? Which objects do not roll well or tend to roll off the ramp? How can you make the car, ball, or can roll more quickly? More slowly?
Materials	Ramps Blocks A variety of materials that will roll and slide on the ramp (blocks of wood, toy cars, paper towel rolls, unifix cubes, small boxes of cereal)
Procedure	This activity will be a continuation of investigating how objects move on ramps. The activity should revolve around the questions listed above. Compare distances that different objects will roll after they come off the ramp. How can you make the ball, car, or can go further after it comes off the ramp? Observe objects of different weights and sizes as they roll down and off the ramp. Have students orally share their observations. Record any questions they have as inquiry for new experiments. Have students orally share their observations. Record any questions they have as inquiry for new experiments.

Activity 36: A Fair Test

Assessment	Students are able to design and recognize a fair test.
Question	What is a fair test?
Materials	Ramps Blocks Toy cars
Procedure	<p>This activity is designed to develop the concept of a fair test. Students select a roller that they think will roll the greatest distance in a straight line. Students are then given an opportunity to test their rollers against one another (use an open space, hallway, or gym). Guide the students to identify the criteria for a fair test.</p> <p>Ask students to set up their ramp and test their rollers, on signal. Students will build their ramps randomly about the room. Allow them to do this without interfering. Have a student stand where the roller stops. When students try to identify the best roller, they will realize that in order for this to be a fair test all the ramps will need to face the same direction.</p> <p>Have students build their ramps so that they are all facing the same direction. Repeat the test. Students will recognize that in order for this to be a fair test all ramps need the same starting point or line.</p> <p>Have students build their ramps facing the same direction and on the same start line. Repeat the test. Students will realize that the ramps need the same height in order for this to be a fair test.</p> <p>Build ramps the same height, facing the same direction with the same starting point. Repeat the test. Students will identify the best rollers. It is important for students to understand that retesting is necessary in order to get the best evidence.</p> <p>Have students develop a working definition of a fair test. Students could be given the opportunity to do other fair tests using different ramps, sliders, and rollers.</p>

Activity 37: Ramp Surfaces

- Assessment** Students are able to contribute to class discussions in small groups or with the teacher.
Students listen to each other and build on their contributions.
Students are able to solve problems that arise as the activity is taking place.
Students are able to make decisions based on individual or group work.
Students are able to predict what will happen to an object on different surfaces.
- Question** Using the materials, how does the object move along the ramp?
Does the surface of the ramp change the speed and distance the object travels?
How does the surface of the ramp change the speed and distance the object travels?
- Materials** Ramps
Blocks
Materials to change the ramp surface (towels, plastic, ramps made of different materials)
Objects that slide or roll from previous activities
- Procedure** Discuss with the children what the word “surface” means. Discuss with them different types of surfaces. Ask, Do you think how quickly an object moves has to do with the surface of a ramp? Have the children build their ramps. It might be suggested to students that they build a fairly high ramp (or they can discover this on their own). Have them use ramps of the same length, various surfaces, and the same height to see how their objects slide.
Have the students discuss the results of their experiments. Groups should share their ideas. Have a discussion with students on how we as a society use various surfaces for safety.

Activity 38: Balance and Building

Assessment Students are able to build towers that are balanced.

Question How do you know that your tower/building is balanced?
What would happen to your tower/building if it were not balanced?

Materials Blocks
Lego/dacta
Straws and connectors
Dominoes

Procedure In this activity, have students build objects that are balanced. Students could be challenged to see who can build the tallest tower. Students could be given the opportunity to illustrate their building/tower and have another group of students build it by following their illustration. Directions could be given by the teacher about the type of tower to be built, and students could be assessed on their ability to follow directions.

A digital camera could be used to take a picture of a tower, and students could try to build it.