



Long Range Grade 4 Science and Technology Plan

Term 2: Matter and Materials – Materials That Transmit, Reflect or Absorb Light or Sound

Specific Expectations

Understanding Basic Concepts

- recognize and describe how different materials affect light (e.g., water and prisms bend light as it passes through them; mirrors and polished metals reflect light);
- classify materials as transparent (e.g., glass, clear acrylic), translucent (e.g., frosted glass, white plastic shopping bags, tissue paper), or opaque (e.g., wood);
- demonstrate how opaque materials absorb light and thereby cast shadows;
- investigate, through explorations, ways in which different properties of materials, including their shape, affect the nature of sound (e.g., compare the sound produced by striking solid and hollow materials);
- identify and describe, using their observations, physical changes in a material that can alter the sound it makes (e.g., the differences in sound when a loose rubber band and a stretched rubber band are plucked);
- identify, using their observations, a variety of materials through which sound can travel (e.g., by ringing bells under water; by sending messages along a string).

Developing Skills of Inquiry, Design and Communication

- design and make instruments for a specific purpose or function (e.g., make magnifiers from a glass jar half filled with water; make drums from boxes or margarine containers with lids);
- formulate questions about and identify problems related to the ways in which materials transmit, reflect, or absorb sound or light, and explore possible answers or solutions (e.g., predict and verify the size, shape, and location of shadows from a given light source, or the types of materials that will make ringing sounds when struck);
- plan investigations for some of these answers and solutions, identifying variables that need to be held constant to ensure a fair test and identifying criteria for assessing solutions;

- use appropriate vocabulary, including correct science and technology terminology, in describing their investigations, explorations, and observations (e.g., use terms such as *translucent*, *opaque*, *reflection*, *absorption*, and *conductivity* to describe properties of materials in relation to light and sound);
- compile data gathered through investigation in order to record and present results, using tally charts, tables, and labelled graphs produced by hand or with a computer (e.g., create a table to show the types of sounds made by hollow objects, such as a coffee can full of air, and by solid objects, such as a coffee can filled with sand);
- communicate the procedures and results of investigations for specific purposes and to specific audiences, using oral presentations, written notes and descriptions, drawings, and charts (e.g., create a shade chart of a selected colour; make a spinning colour wheel to demonstrate how “white” light is composed of all the colours).

Relating Science and Technology to the World Outside the School

- classify materials that transmit, absorb, or reflect energy as natural or human-made (e.g., wood, metal, clay, plastic, fabric);
- identify transparent, translucent, and opaque materials used in objects in the immediate environment, and evaluate whether the ability of these materials to transmit, reflect, or absorb light enhances the objects’ usefulness (e.g., usefulness of translucent white plastic shopping bags versus opaque paper shopping bags; use of coloured glass to preserve food or drink from light);
- describe, using their observations, how substances employed in finishing processes can alter a material’s ability to transmit, absorb, or reflect light or sound (e.g., how choice of paint can affect the reflective ability of the surface to be painted);
- describe and demonstrate, using different materials, ways of mixing colours to create new colours (e.g., by overlapping coloured acetates; by mixing paints);
- compare the intensity of light passing through different materials, and identify how the differences might determine the uses of these materials;
- identify different types of light observed in the immediate environment (e.g., neon lights, rainbows, flashlights) and compare them (e.g., with respect to colour, intensity);
- compare materials in terms of the sounds that they can be made to produce (e.g., by plucking a rubber band, beating a drum, tapping glasses filled to different levels with water, shaking a jar of macaroni, blowing air past a blade of grass placed between the thumbs);
- investigate objects in the home and community that are designed and made to produce sounds (e.g., doorbells, sirens, telephones, radios, stereos, smoke detectors, security system alarms);

- describe some ways in which materials that absorb sound are used (e.g., in concert halls, adjacent movie theatres, ear plugs, highway sound barriers);
- describe practices that ensure their safety and that of others (e.g., use of ear plugs in situations involving excessive noise; use of reflective or fluorescent materials on clothes at night).