

# 5 Change Matters

## The Ontario Curriculum Grades 1–8: Science and Technology, 2007 (Revised)

Code	Specific Expectations
Relating Science and Technology to Society and the Environment	
1.1	evaluate the environmental impacts of processes that change one product into another product through physical or chemical changes

## The Ontario Curriculum Grades 1–8: Language, 2006 (Revised) — Media Literacy

Code	Specific Expectations	Teacher Prompts
1.1	identify the purpose and audience for a variety of media texts ( <i>e.g. this video is designed to be informative and appeal to Red Green fans</i> )	Who is this video intended for? Why would that audience be interested in the ‘serious’ message of the video?
1.2	use overt and implied messages to draw inferences and construct meaning in media texts ( <i>e.g. overt message in an advertisement showing the product’s user surrounded by friends: This product is so good that you and your friends will all like it; implied messages: Using this product will make you popular; not using it may make you an outsider; popularity is based on having the right things</i> )	What are the overt and implied messages conveyed by this video? Is the implied message more powerful than the overt message? Why or why not?
2.1	describe in detail the main elements of some media forms ( <i>e.g., television talk show: host, studio audience, guests, commercial breaks; news broadcast: news anchor, reporters, video clips, commercial breaks, television sitcom: standard set, regular cast, visiting actors, laugh track, plot problem, happy ending</i> )	What did you expect to see when you heard you were watching a Red Green show? Was it what you were expecting? What elements did you see in this informational video (a host who moves through the process; an introduction outside the plant; detailed close-ups of the manufacturing process; humour)

## Opening Scenario

Almost all of your students will have used duct tape. They may even call it Duck Tape – because the tape is waterproof. “Like water off a duck’s back.” duct tape was originally used to keep moisture out of ammunition cases during World War II.

They will probably be able to tell you about their experiences and how they have used duct tape in a variety of ways. Perhaps your students have heard of Red Green, Mr. Duct Tape himself and star of “The Red Green Show”. This very funny show can still be seen in reruns on the Comedy Channel, a variety of PBS stations and CBC. In our video segment, a more serious show, Red Green takes us through a 3M factory to show us how duct tape is manufactured. There are three major components:

1. Cotton mesh. Cotton mesh forms the backbone of duct tape. It provides **tensile strength** and allows the tape to be torn in both directions.
2. Polyethylene coating. The cotton fabric is coated with polyethylene, a plastic material that protects it from moisture and abrasion. This plastic coating is **flexible** and allows the tape to **adhere** better to irregular surfaces. The polyethylene is melted and applied to the fabric in a preliminary coating operation. The coated fabric is then stored on rolls until the manufacturer is ready to apply the adhesive.
3. Adhesive compound. The adhesive used in duct tape is unique for two reasons. First, the adhesive is made with rubber compounds that ensure **long-term bonding**. Second, the adhesive is applied to the surface in a much thicker coating than those used on cellophane or masking tapes. This helps to increase the **adhesive properties** of the tape.

## Big Ideas

- Physical change refers to the fact that a substance can be changed from one form to another.
- Chemical change implies the formation of a new substance.
- The properties of materials determine their use and may have an effect on society and the environment.

In this Unit, the Big Ideas have been further developed to include the following:

- Processes used to make everyday products have an impact on society and the environment

## Media Viewing Strategies

1. Before viewing the video, discuss the following with the students to help determine their prior knowledge about the subject content of the media text:
  - What is duct tape and what is it used for?
  - In how many different ways have members of the class used duct tape? ■
  - Who is Red Green and why was he chosen to talk about duct tape?
2. Help students focus on the video as they view it by asking the following questions:
  - As you watch the video, listen and look for the different materials needed to make duct tape. Also take note of where the materials come from.

### Note

You may wish to start this discussion off with an unusual personal example or two.

- How many different stages are needed for completion of the final product?
  - As you watch each stage of production, ask yourself if there are environmental issues that need to be considered. (e.g., How is the rubber produced? Are there concerns about the distance it travels to Canada?)
  - Ask yourself how energy is involved at every stage of the process (including the energy needed to get materials to the factory).
3. Show the video **Duct Tape Virtuoso** to your students.
  4. Hand out a copy of the video scripts provided in the appendices to students who may require ESL/ELD help.

### Note

If you have this resource, several pictures of products throughout the STAR program's Student Journal for Grade 5: *Matter*, GTK Press, would enhance discussion of the following activities.

### Whip Around Strategy

adapted from *A Guide to Effective Literacy Instruction: Grades 4 to 6 (2006), Volume One, p.155* – do a sweep around the classroom, pausing in front of different students indicating whose turn it is to give a response; allow students to pass.

## Thinking and Investigation

In this Investigation, students will study how physical and chemical changes are involved in changing one product into another. They will also examine the environmental and social impacts of producing a new product. This includes studying the product during its life cycle. As future consumers, students will gain insight into products that are safe and those that are potentially harmful. By buying or not buying a product based on their investigation, students can have an influence on manufacturers' decisions in the making of products. Students will share their findings in Role-Play, taking on the perspectives of various sales people of different products (see Appendix 2). ■

Students should:

1. Using a Whip Around strategy, have students identify products they commonly use. This could include food and non-food products. ■
2. Have each group choose one and research the product through literature and the Internet.
3. Include the physical or chemical changes involved during the manufacturing process as raw materials are converted to the final product.
4. Examine the life cycle of the product (from birth to death to end of use) and the impact of the product during this cycle on the environment and society.
5. Make an informed group decision to buy or not to buy the product.
6. Use a chart with headings such as, Product, Manufacturing Process, Life Cycle, Buy or Not to Buy, to summarize their findings. (See example on the next page.)

Product	Manufacturing Process	Life Cycle	Buy or Not to Buy
Sandpaper	Backing sheet, glue, abrasive material. All changes physical.	Manufactured — used — discarded in the garbage.	Buy in limited amounts to reduce disposal in landfill.

- Present their group findings to the rest of the class acting as if they were the sales people for the product and make a convincing sales pitch, using Role-Play (see Appendix 2).

## Differentiated Learning

### ESL/ELD/Remedial

- Bring in samples of duct tape and other manufactured products. Label the products and display in a prominent location.
- Consider making a flow chart organizer showing the manufacturing process for different products before introducing the Investigation.
- Pair students with a partner of the same first language if possible, when the task involves discussion and completing the organizer.
- Consider pairing students in the Role-Play. Match students carefully so that one student will be able to support the other.

### Enrichment/Extension

- Encourage students to look at other products having a similar life cycle or similar products from different manufacturers.
- Encourage students to take on different roles within a company. For example, how might the sales person's role differ from that of the person assigned to the environmental impact role?

## Assessment and Evaluation

- During the Investigation, students will learn one or more of the following:
  - Manufactured products are made up of a variety of materials.
  - The materials will be brought together using physical or chemical changes.
  - Every product has a life cycle.
  - At each stage, manufacturing and the following product life cycle, there will be an environmental and societal impact.
  - Knowing about a product can help us make an informed decision about whether to buy it.

2. Choose applicable Rubrics from Appendices 5-8 with the above to assess students' knowledge and skills
3. Use Appendix 10 to assess their Sales People Role-Play.

## Tell Me More – Duct Tape and Pasta – What's the Connection?

**Literacy Strategy: Mapping;** adapted from *A Guide to Effective Literacy Instruction: Grades 4 to 6 (2006), Volume One, pp. 136.*

### Literacy Strategy: Mapping

#### Background information

Developing and displaying ideas graphically is a strategy that students can use to help organize their thinking and to see the sequence or connections within a given topic.

#### Before Reading

1. Review the steps necessary for the production of duct tape with the class.
2. Either individually or as a group, have the students create a map of the process in as much detail as they can remember. They can use a timeline approach or create their own map. (for more information on types of mapping see Appendix 14)

**Timeline: to show a chronology or sequence:**



3. Quickly review another common product that the class researched for the Thinking and Investigation and map it out using another type of map.

#### During Reading

1. Students read 'Duct Tape and Pasta' individually, thinking of ways they can map out the steps or components necessary to produce pasta.
2. In pairs, students go over the reading again, this time creating together a map that best displays the production of pasta. (You may wish to display a variety of mapping methods throughout the class.)

#### After Reading

1. Have the students share their maps with the entire class. Compare the different maps created, determining why each one effectively describes the pasta production.
2. Discuss how the creation of the maps helps students solidify the understanding of the reading.

## Differentiated Learning

### ESL/ELD/Remedial

- Pair students when completing the map organizer if they are having trouble making connections or having difficulties with the language.
- Have the students make a drawing for unfamiliar vocabulary words. Add drawings to the Word Wall.
- Have the students go on a Word Hunt through the text, highlighting or recording those words with which they are unfamiliar. Add these words to the Word Wall.
- Introduce students to a timeline organizer by having them complete a timeline of their own lives or a day at school.

### Enrichment/Extension

- Have the students complete a Compare and Contrast chart for the production methods they have studied. Which products are produced with the most environmentally sustainable methods?
- Encourage students to continue their research using the resources listed in Appendix 19.
- Students might be interested in checking out other famous April Fool hoaxes. Why were they successful?