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Getting Ready to Read: Extending Vocabulary (Creating a Word Wall)

Grade 8 Science and Technology

Students are required to learn, on average, over 2 000 words each year in various subject areas. Those who have trouble learning new words will struggle with increasingly complex tasks that they encounter in the middle and senior school years. A *word wall* is a wall, chalkboard or bulletin board listing key words that will appear in a new unit of study, printed on card stock and taped or pinned to the wall/board. The word wall is usually organized alphabetically.

Purpose

- ☐ Identify unfamiliar vocabulary and create a visible reference in the classroom for words that will appear often in a topic or unit of study

Payoff

Students will:

- ☐ practise skimming and scanning an assigned reading before dealing with the content in an intensive way. Students will then have some familiarity with the location and with various elements of the text.
- ☐ develop some sense of the meaning of key words before actually reading the words in context.
- ☐ improve comprehension and spelling because key words remain posted in the classroom.

Tips and Resources

- ☐ **Word Anticipation Guide:** A Word Anticipation Guide allows students to use prediction skills based on context when learning new vocabulary. As students are asked to predict word meaning, they are also asked to confirm their predictions by conferencing with a partner and looking the word up using another source. Consider using the Word Anticipation Guide template found in Student Resources.
- ☐ **Word Splash Activity:** The Word Splash is a visually appealing, random arrangement of key words from the Word Wall around a specific topic. Students could examine the words and write a paragraph predicting the main idea of the unit. Refer to the Student Resources for a sample Splash.
- ☐ **Word Development Guide:** The language of science includes special terms that are recognized as belonging to primarily specific fields, as well as words that in the context of science are used in new or distinctive ways. Introducing vocabulary carelessly or too soon may result in an ample vocabulary, but only cosmetic understanding of terms for students. To facilitate learning by engaging more of the brain to enhance retention, two senses - writing words and drawing images - are used. Refer to the Student Resources for a Word Development Guide template.
- ☐ **Word Connections:** Word wall words can be mapped to show connections and relationships. Refer to Student Resources for a Word Connections template and a sample Grade 8 model. The teacher should field-test the word selection prior to instruction, as this activity is not applicable to all word wall words.
- ☐ **Word Wall Games:** Refer to Teacher Resources for strategies how to use Word Walls.
- ☐ **Word Wall Words:** Refer to Teacher Resources for strand specific words and definitions.
- ☐ There are classroom environments (particularly secondary) where bulletin board or blackboard space is at a premium. Some classrooms are also used for multiple subjects. This may make the development and maintenance of a word wall challenging. Consider the purchase of a portable word wall from commercial suppliers (~\$35). Words are written on cards, and placed in see-through pockets of the word wall chart. These charts can be temporarily fastened to a blackboard or bulletin board, and rolled up/taken down each class. Be sure to write the words large enough so students at the back of the room can see them clearly. Do not laminate cards, as glare can result. Alternately, use a display board (similar to those used in Science Fair projects), and attach strips of Velcro to each panel of the board. Attach Velcro also to each word card.
- ☐ Students can create graphic organizers/visual words from the word wall to facilitate understanding. *Smart Ideas* is Ministry-licensed software that could be used for this purpose. Alternately, students could use online sources to collect graphics to represent and further clarify word wall words.
- ☐ To align instructional strategies, and assessment and evaluation, be sure to include word wall words in evaluation. Scaffold concept maps and Power notes using word wall words as a beginning. Consider use of cloze activities (fill in the blank), using word wall words, for evaluation purposes. As the unit and year progresses, have students develop sentences and information paragraphs using word wall words.

Further Support

- ☐ The use of colour is very helpful to visual learners. Example: Teacher generated word wall words could be one colour, student suggestions could be another colour or all words from one unit could be in the same colour, with cross strand or other unit words in another colour. Use different colours for different concepts (e.g. use blue for water words, orange for energy words, green for plant words, etc.)
- ☐ Use the Internet to find free software to produce use of word match, word search, crossword puzzles and vocabulary

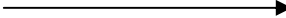
Getting Ready to Read: Extending Vocabulary (Creating a Word Wall)

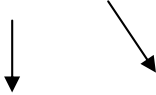
Grade 8 Science and Technology

What teachers do	What students do
<p>Before</p> <ul style="list-style-type: none"> • Before class, preview the text for key vocabulary. • Prepare strips of card stock (approximately 4" x 10") for words. • Divide students into groups of 3. • Provide stick-on notes, markers, and masking tape or pins for each group of students. • Explain to students that together the class will find key vocabulary in the assigned text, and will help each other to understand and spell the key vocabulary by creating a "word wall" in the classroom that they can refer to for the duration of that particular topic. • Distribute Student Resource, Skimming and Scanning to Preview Text, and read and clarify the techniques with students. 	<ul style="list-style-type: none"> • With their group, find an appropriate space where they can talk face-to-face and write down the words. • Find the chapter or get a copy of the assigned text. • Follow along on the handout as the teacher reviews skimming and scanning.
<p>During</p> <ul style="list-style-type: none"> • Ask students to skim the text to get a general sense of what is in it and where it is located. • Engage students in some general discussion of the topic, making a few brief notes on the board about big ideas. • Direct the students to independently scan the text for unfamiliar words. • Ask students to create a personal list of 10 unfamiliar words. • Direct the students to small groups and ask the groups to compare personal lists and create a group master list. • Distribute eight pieces of card stock (approx. 4" x 10"), markers and pieces of masking tape to each group. 	<ul style="list-style-type: none"> • Skim the text, looking at illustrations and subtitles to get a general idea of the topic of the text. • Scan the text for words they do not know, marking them with stick-on notes (optional) and then making a personal list of the words. • Compare personal lists. Choose the words for a group master list. • In each group, print the key vocabulary words in large letters on card stock and tape or pin them to the blackboard or bulletin board, preferably alphabetically.
<p>After</p> <ul style="list-style-type: none"> • Lead some discussion of the words and ask students to speculate on their meaning. If appropriate, describe prefixes and suffixes that are unique or common to the subject area. • Ask each group to look up the meaning of their words and then to explain the meaning to the rest of the class. 	<ul style="list-style-type: none"> • Use the glossary in the textbook dictionary(ies) to find the meaning of the words. • Present their words to the rest of the class. • Add the meaning of the words to the cards in smaller letters.

Notes

Skimming and Scanning to Preview Text

Skimming	
What is it?	When you SKIM, you read quickly to get the main idea of a paragraph, page, chapter, or article, and a few (but not all) of the details.
Why do I skim?	Skimming allows you to read quickly to get a general sense of a text so that you can decide whether it has useful information for you. You may also skim to get a key idea. After skimming a piece, you might decide that you want or need to read it in greater depth.
How do I skim? Read in this direction. 	<ol style="list-style-type: none"> 1. Read the first few paragraphs, two or three middle paragraphs, and the final two or three paragraphs of a piece, trying to get a basic understanding of the information. 2. Some people prefer to skim by reading the first and last sentence of each paragraph, that is, the topic sentences and concluding sentences. 3. If there are pictures, diagrams, or charts, a quick glance at them and their captions may help you to understand the main idea or point of view in the text such as “Cycle of Life”, “AIDS”, “Physical Fitness” or “Healthy Eating”. 4. Remember: you do not have to read every word when you skim. 5. Generally, move your eyes horizontally (and quickly) when you skim.

Scanning	
What is it?	When you SCAN you move your eyes quickly down a page or list to find one specific detail.
Why do I scan?	Scanning allows you to quickly locate a single fact, date, name, or word in a text without trying to read or understand the rest of the piece. You may need that fact or word later to respond to a question or to add a specific detail to something you are writing.
How do I scan? Read in this direction. 	<ol style="list-style-type: none"> 1. Knowing your text well is important. Make a prediction about where in a chapter you may find the word, name, fact, term or date. 2. Note how the information is arranged on a page. Will headings, diagrams, or boxed or highlighted items guide you? Is information arranged alphabetically or numerically as it might be in a glossary, nutrition guide or sequentially as in a sport rule book? 3. Move your eyes vertically or diagonally down the page, letting them dart quickly from side to side and keeping in mind the exact type of information that you want. Look for other closely associated words that might steer you towards the detail for which you are looking. 4. Aim for 100% accuracy!



Student/Teacher Resource

Word Connections Template

Word Connections

A mind map shows how all of the words for a concept are connected or related.

Title:

1. Title the mind map.

2. Use the following words to complete the mind map.

3. Put each word on the mind map.

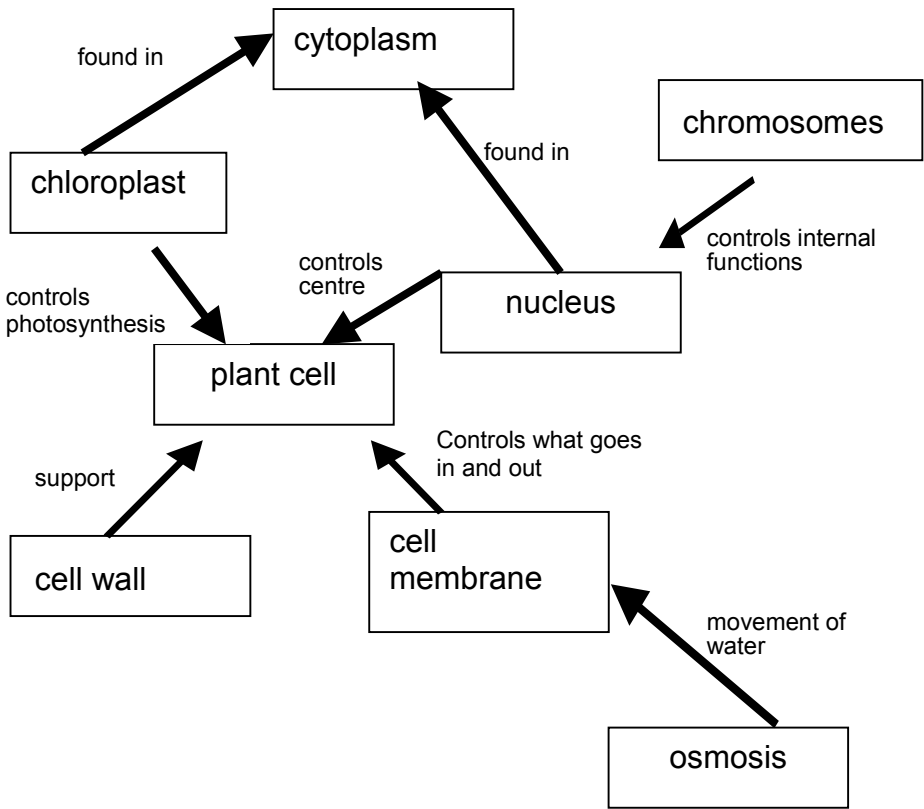
4. Draw arrows to show the relationship between the words. Each arrow must be labeled to show how the words are connected or related.

Word Connections Sample – Grade 8

Word Connections

A mind map shows how all of the words for a concept are connected or related.

Title: Plant Cell



1. Title the mind map.

2. Use the following words to complete the mind map.

- plant cell
- cytoplasm
- nucleus
- chromosomes
- chloroplast
- cell membrane
- cell wall
- osmosis

3. Put each word on the mind map.

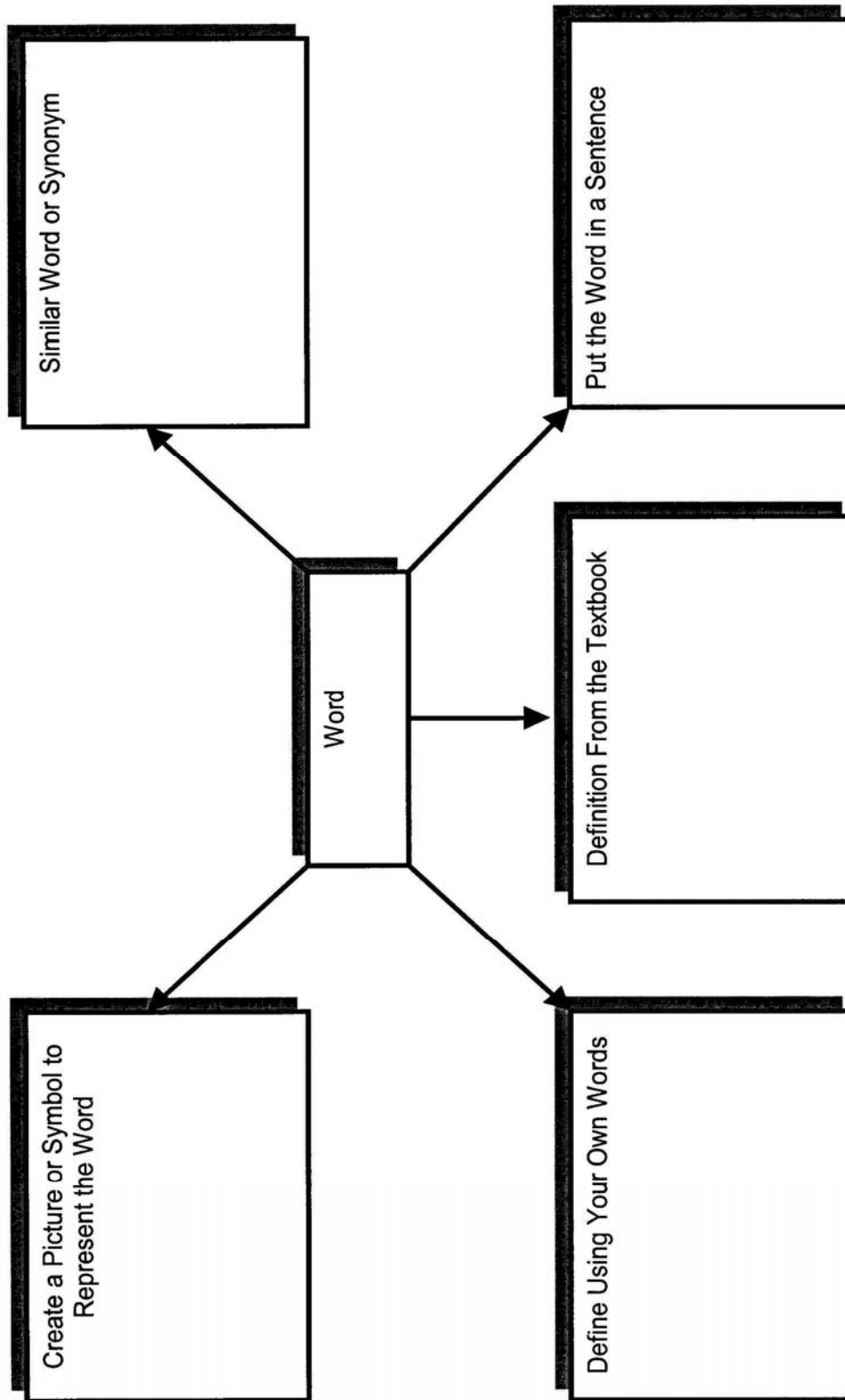
plant cell

4. Draw arrows to show the relationship between the words. Each arrow must be labeled to show how the words are connected or related.

control centre



Word Development Guide



Teacher Resource

Word Splash Activity



This word splash is a random arrangement of key words around the topic we will be studying. Examine the words and write a paragraph predicting the main idea of the unit. Your prediction must be supported. Use your textbook or a dictionary if you do not know the meaning of some of the words.



Word Wall for Science and Technology: Grade 8, Earth and Space

Water Systems

atmosphere	climate	continental divide
ecosystems	fresh water	geological features
glacier	groundwater	Great Lakes
marine	ocean currents	polar ice caps
precipitation	salinity	salt water
sustainability	tides	water cycle
water table	watershed	

Word Cards with Definitions

atmosphere - the mixture of gases surrounding the Earth that is held down by a force of gravity

fresh water - water that contains a low concentration of dissolved salts

marine - relating to the water or to the ocean, such as marine life or marine environments

Teacher Resource

Earth and Space (Grade 8) - Definitions

atmosphere - the mixture of gases surrounding the Earth that is held down by the force of gravity

climate - monthly and yearly conditions such as temperature, precipitation, and wind common to a region over a period of time

continental divide - the ridge of land running north-south across North or South America that separates waters flowing into the Pacific Ocean from those flowing into the Atlantic Ocean

ecosystems - systems of interactions between living organisms and their non-living environment

fresh water - water that contains a low concentration of dissolved salts

geological features - features on the Earth's surface or Ocean bottom such as mountains

glacier - a large mass of ice and snow that slowly flows over land

groundwater - water that soaks into the ground and is held in the cracks in underground rocks and spaces between grains of soil

Great Lakes - the five large lakes on the border between Ontario and the United States, including Lake Ontario, Erie, Huron, Michigan, and Superior

marine - relating to water or to the ocean, such as marine life or marine environments

ocean currents - large, regular movements of water in the ocean such as the Gulf Stream

polar ice-caps - large glacier caps of ice covering the north and south poles of the Earth

precipitation - water that has gathered in the clouds and falls to earth as rain, hail, sleet, or snow

salinity - the concentration or amount of dissolved salts in water

salt water - water that contains a high concentration of dissolved salts, such as ocean water

sustainability - the ability to meet the needs of the present generation without compromising the ability of future generations to meet their needs

tides - the rising and falling of the ocean level due to the different gravitational pulls of the sun and the moon

water cycle - the movement of water through different states of matter

water table - the level below the earth's surface at which the ground becomes saturated with water.

watershed - an area surrounded by high land in which all water runs to a common destination such as a river



Word Wall for Science and Technology: Grade 8, Life Systems

Cells, Tissues, Organs and System

cell membrane	cell reproduction	cell specialization
cell wall	chloroplast	chromosomes
cytoplasm	diffusion	magnification
micro-organism	multi-cellular	nucleus
organ system	organism	organelles
osmosis	selectively	permeable membrane
tissue	unicellular	

Word Cards with Definitions

chloroplast - a green organelle, found in most plants, that controls photosynthesis	organism - a life form that exists by the characteristics of living things	osmosis - movement of water particles across a membrane
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Teacher Resource

Life Systems (Grade 8) – Definitions

cell membrane – outer layer that controls what goes in and out of a cell

cell reproduction – how a cell makes more copies of itself (mitosis)

cell specialization – when cells change shape and form to do special jobs

cell wall – a rigid outer layer, found only in plants, to support the cell

chloroplast – a green organelle, found in most plants, that controls photosynthesis

chromosomes – genetic (thread-like) structures in the nucleus

cytoplasm – a jelly-like fluid that holds the organelles in place inside the cell membrane

diffusion – movement of particles from an area of high concentration to an area of lower concentration

magnification – how much larger something appears to be when seen through the 2 lenses of a microscope (calculation = eye piece x objective)

micro-organism – living things that can only be seen with a microscope

multi-cellular – describes an organism with many cells

nucleus – the control centre of all activities inside the cell

organ system – a group of organs that work together within an organism

organism – a life form that exists by the characteristics of living things

organelles – structures within a cell that have specific functions

osmosis – movement of water particles across a membrane

selectively permeable membrane – controls by size what particles can pass through it

tissue – similar cells that function together to do a job

unicellular – describes an organism made of only one cell



Word Wall for Science and Technology: Grade 8, Energy and Control

Energy and Control

additive	concave	convex
diffuse	electromagnetic radiation	focus
lens	luminous	non-luminous
normal	opaque	plane
ray	real image	refraction
regular	subtractive	translucent
transparent	virtual image	visible spectrum

Word Cards with Definitions

concave - a mirror or lens that curves inward near the centre

convex - a mirror or lens that curves outward near the centre

plane - a flat surface

Teacher Resource

Energy and Control (Grade 8) - Definitions

additive - the process of adding colours of light together to produce new colours

concave - an mirror or lens that curves inward near the center

convex - a mirror or lens that curves outward near the center

diffuse - when light reflects off an irregularly shaped surface resulting in light going in many different directions

electromagnetic radiation - all types of radiation produced by moving electric charges, such as light, infrared, ultraviolet, X-rays, microwaves, and radio waves

focus - this is the name of the spot where parallel rays of light are brought together to a common point by a lens or a mirror

incident - light that falls on an object

lens- a transparent optical device with curved sides that is used to bring light rays together, or to spread them apart

luminous - a body that produces its own light (ie. a burning match is luminous)

non-luminous - a body that can only be seen by reflected light; it does not produce its own light (ie. a textbook is non-luminous)

normal - the line that is at right angles (ie. 90°) to a surface

opaque - a material that does not transmit any incident light; all of the light falling on this material is either absorbed and/or reflected

plane - a flat surface

ray - a pencil-thin beam of light

real image - an image in which light is actually arriving at the image location

refraction - the bending of light as it passes from one material to another

regular - when light reflects off a flat surface resulting in the reflected light all going in the same direction

Energy and Control (Grade 8) – Definitions (continued)

subtractive - the process of absorbing or taking away colours from light in order to produce new colours

translucent - a material that transmits some incident light; the remaining light falling on this material is either absorbed and/or reflected

transparent - a material that transmits all light falling on it

virtual image - an image in which light is not actually arriving at the image location

visible spectrum - the range of colours that are visible to the human eye (ie. “ROY G BIV” - red, orange, yellow, green, blue, indigo, violet)



Teacher Resource

Word Wall for Science and Technology: Grade 8, Matter and Materials

Fluids

Archimedes' Principle	Bernoulli's Principle	buoyant force
compression	density	fair test
flow rate	fluid	fluid mechanics
gas	hydraulic devices	hydraulics
hydrometer	incompressibility	liquid
particle theory	pneumatic devices	pneumatics
pressure	viscosity	

Word Cards with Definitions

flow rate - how fast a fluid moves through a tube

gas - physical state of matter where a substance has no definite shape or volume

hydrometer - an instrument used to measure the density of liquids

Matter and Materials (Grade 8) - Definitions

Archimedes' Principle - the buoyant force on an object is equal to the weight of the fluid that the object displaces

Bernoulli's Principle - a law that states that, for a fluid that is flowing steadily, its pressure is low when its velocity is high and its pressure is high when its velocity is low.

buoyant force - the upward force on objects submerged in fluids. [For some objects it can be sufficient to overcome completely the force of gravity and cause the object to float.]

compression - the reduction of the volume of an object under external pressure

density - the mass per unit volume of a substance (density = mass/volume)

fair test - investigation carried out under strictly controlled conditions to ensure accuracy and reliability of results.

flow rate - how fast a fluid moves through a tube

fluid - any matter that has no fixed shape, can flow, and takes the shape of its container. Both liquids and gases are fluids.

fluid mechanics - the study of the science of fluids

gas - physical state of matter where a substance has no definite shape or volume

hydraulic devices - devices that transmit forces through pressure changes in liquids

hydraulics - systems that use the pressure of liquids to function [the study of pressure in liquids]

hydrometer - an instrument used to measure the density of liquids

incompressibility - the property of some substances that can't be compressed under pressure

liquid - a fluid that takes the shape and fills the volume of its container

particle theory - a theory used to explain heat and pressure that suggests that all matter is made of tiny moving particles too small to be seen

pneumatic devices - devices that transmit forces through pressure changes in gases

pneumatics - systems that use the pressure of gases to function [the study of pressure in gases]

pressure - the force acting perpendicular to a unit area (pressure = force/area)

viscosity - the physical property of a liquid that limits its ability to flow



Teacher Resource

Word Wall for Science and Technology: Grade 8, Structures and Mechanisms

Mechanical Efficiency

block and tackle	efficiency	effort force
force	friction	fulcrum
gear	gear ratio	hydraulic
lever	linkage	load force
machine	mechanical advantage	mechanism
piston	pneumatic	pressure
pulley	velocity ratio	wheel and axle

Word Cards with Definitions

force - a push or a pull

gear - a toothed wheel that is used to speed up or slow down motion

linkage - two or more levers linked together

Structures and Mechanisms (Grade 8) – Definitions

block and tackle - a system of pulleys and ropes that is used for lifting heavy objects

efficiency - it is a measure of how much useful work we are getting out of our machine (it is also the percentage ratio of the mechanical advantage to the velocity ratio)

effort force - it is the force that is being put out or applied in order to lift an object

force - a push or pull

friction - it is the force that resists motion as a result of two surfaces coming into contact with one another

fulcrum - the point around which a rigid object pivots or rotates

gear - a toothed wheel that is used to speed up or slow down motion

gear ratio - it is the ratio of the number of teeth in gears in a two gear system; the number of teeth in the gear on which force is being exerted comes first in the ratio

hydraulic - a system in which an enclosed liquid is used to transmit force

lever - a machine which consists of a rigid material that pivots around a point (the fulcrum)

linkage - it is two or more levers linked together

load force - it is the force exerted by the object that we are trying to lift (the load)

machine - any mechanical device that makes work easier for us

mechanical advantage - it is the ratio of the load force to the effort force

mechanism - a system of parts working together in a machine that changes an input motion and force into a desired output motion and force

piston - a metal cylinder that slides up and down inside a tube as a result of an applied force

pneumatic - a system in which an enclosed gas is used to transmit force

pressure - it is defined as force per unit area (ie. Force/Area)



Structures and Mechanisms (Grade 8) – Definitions (continued)

pulley - a machine that is a wheel and axle mechanism that is used to change the direction of the force or motion

velocity - includes both the magnitude or speed of the object as well as the direction the object is moving in

velocity ratio - it is the ratio of the distance moved by the effort force to the distance moved by the load force

wheel and axle - it is a machine that consists of a large diameter disk (the wheel) which is attached to a shaft (axle) that also turns as the wheel rotates

Word Wall Games

Be a Mind Reader Game: Word Walls can be used to play motivating games. This game can be played individually or in teams. The teacher thinks of a word wall word and gives five clues to that word. Your clues could include parts of the definition, synonyms or how it is used. Students number their papers as usual from 1 to 5 and try to “read the teacher’s mind”. By the time the teacher gives the fifth clue, everyone in the class should guess the word and have it written down on their papers.

Word Jar Game: Place all word wall cards in a jar. Students break into 2 teams. Teams alternately send members to the jar to select a word and state its definition. Award 2 points for each correct team definition. The opposing team can earn 1 point if they can correctly define the word if the original team fails to correctly define the word.

Word Mixer Game: Play a “mixer” game with the students. Some students will receive word wall words. The remaining half of the class receives the definitions. Students move around the room trying to find their partner. Variation: Some words may have more than one meaning, hence there may be more than two students partnering.

Word Mimes Game (especially suitable for Earth and Space): Students are divided into two teams. Students select a word from the word wall, and attempt to act out the meaning of the word.

Word Game: Teacher determines the number of words to focus upon from the Word Wall. Students make a grid of 8 squares (e.g., a 4 x 2 matrix, similar to a bingo card) on a blank sheet of paper. Each square must be large enough for words to be written. There are two options for filling in the grid:

Option 1 - A student begins the game by calling out a word from the word wall. Classmates respond by writing the word in any space on their grid. Some teachers have students spell them as they write them, to ensure accuracy. The student who gave the first word calls on another classmate to select a second word, which all students again write in a space on their grid. As students select words from the wall and write them in their grids, the teacher writes the same words on a piece of paper and places them in a pile. This process continues until the students have all the spaces on their grids filled. Then, the teacher begins to draw words from the pile. Students mark or stamp the words in the same way (e.g., with a checkmark) until someone marks all words in a straight or diagonal line as in bingo and calls, “Wordo”.

Option 2 - Instead of having all students add the same words to their grids, have students fill in their grids with any words from the wall, so that everyone has different words on their cards. Then, either the teacher calls words from the wall until a winner is declared, or students call out a word from their card, that is marked by other students that have included the same word on their own cards.

Reading Different Text Forms: Reading Informational Texts

Grade 8 Science and Technology (Mechanical Efficiency)

Informational text forms are written to communicate information about a specific subject, topic, event or process. These texts use subject specific vocabulary, organizational patterns and diagrams to express ideas clearly and make them easier to read. Providing students with an approach to reading informational texts helps them to become more effective readers

Purpose

- Become familiar with the elements and organization of informational texts used in the text example
- Explore a process for reading informational texts, using a range of strategies for before, during and after reading.

Payoff

Students will:

- become more efficient at “mining” the text for information
- practise reading strategies using the organizational patterns and diagrams to assist and consolidate understanding

Tips and Resources

- Some of the features of informational texts are headings, subheadings, introductions, and diagrams. These work together to draw readers into the text at different levels. For example, the diagram after each text section provides a visual to help students consolidate their understanding.
- Many informational texts are divided into sections that add meaning, by description or definition. For example, the sections each describe or define the classes of levers.
- Many informational texts use visual elements (such as typeface, size of type, and diagrams) to emphasize important words and concepts. Different texts use these features in different ways to effectively present information.
- How you read informational text will depend on your purpose for reading. If you want to find specific information in a textbook, you might examine the headings and subheadings, and then skim through the section looking for key words and phrases related to the topic (i.e. Third class of lever). Once you have located the appropriate section, a closer reading will help you to find the information and supporting details.
- See Student/Teacher Resource, *Tips for Reading Information Texts*.
- See Teacher Resource, *Questions to Guide Reading: Levers*.
- See Student/Teacher Resource, *Levers*.

Further Support

- See strategies for *before reading*, such as **Previewing a Text**, and **Analysing the Features of a Text** in *Think Literacy: Cross-Curricular Approaches, Grades 7 – 12*. Refer to these to support and reinforce the ideas described here.
- See **Think/Pair/Share** in *Think Literacy: Cross-Curricular Approaches, Grades 7 – 12*.

Reading Different Text Forms: Reading Informational Texts

Grade 8 Science and Technology (Mechanical Efficiency)

Notes

What teachers do

Before

Before reading, help students to connect new content and ideas to their prior knowledge by encouraging them to think about what they already know about the topic or the type of reading material (see Student/Teacher Resource, *Levers*). For example:

- Ask students to **brainstorm** related ideas, concepts and vocabulary, **recall** previous experiences and feelings related to the subject, recall what they have learned about the topic, or **list questions** the might have about the topic.
- Provide students with related experiences, discussion topics, readings, or background information to **increase background knowledge**.
- Pose questions to students before they read, to help them **determine a purpose** for reading.
- Invite students to ask questions about the content.
- Model (using a “think aloud”) how to **predict** the content based on the features of text, specialized vocabulary, illustrations, introductory information or personal experiences. **Skim, scan** and **sample** the text to make informed predictions.
- **Identify** and pre-teach unfamiliar vocabulary and concepts that appear in the text.

During

During reading, help students to connect the information and ideas in the text to what they already know as they monitor their understanding. (*Monitoring their understanding* means recognizing when confusion occurs and identifying strategies that help to regain meaning.) For example:

- Have students describe and model the different reading strategies they might use, such as **predicting, questioning, activating prior knowledge, inferring, monitoring, adjusting, rereading, and decoding**.
- Model (using “think aloud”) strategies for pausing and thinking about the text. Encourage students to **chunk** the text, **read, pause, think, and ask questions** or **make notes** about the section of text.
- Demonstrate how to **use a graphic organizer** to **categorize** and select main ideas, important details, and questions as you read. For example, comparison charts, T-charts, or Venn diagrams can help students to identify the ideas being compared and how they are similar and different.
- Invite students to **visualize** the concepts as they read. Have partners share and compare the visualizations.
- Provide students with **focus** questions, such as the following:
 - What are the main ideas?
 - How has the writer organized them?
 - How does the writer support the main ideas?
 - What is the writer’s viewpoint?
 - Is this a useful source of information?

After

After reading, help students to **consolidate** and **extend** their understanding of the content. For example:

- Ask partners to **restate** or **paraphrase** what they have read, and **note similarities and differences** in the retelling.
- Model how to **summarize** the reading selection (using a “think aloud”) by identifying the essence of the text, choosing the most important information, and organizing the information to convey the **key ideas** of the selection.
- Have students suggest possible diagrams or **graphic organizers** to illustrate connections among the topics, main ideas, supporting details, and prior knowledge.
- Review the process that students used for reading informational text. See Student Resource, *Tips for Reading Informational Texts*.

Tips for Reading Informational Texts

Before Reading

- Set a purpose for reading. Ask yourself why you are reading this particular text.
- Look over the text to see which elements appear (such as headings, subheadings, illustrations, captions, and more).
- Examine the titles, headings, and subheadings, and scan for words that stand out.
- Look for words and phrases that might give you clues about how the information is organized.
- Read any overviews, summaries or questions. In a shorter piece, read the opening and concluding sentences or paragraphs.
- Examine each illustration and read the titles or captions.
- Recall what you already know about the topic.
- Record some questions you might have about the topic.

During Reading

- Divide the reading task into smaller chunks (chunking the text into paragraphs, chunking sections by sub-headings, etc.). Read a chunk, pause and think about what you read, and write a brief one-sentence summary or brief point-form notes to help you remember important and interesting information.
- Read quickly, then slowly. Skim the sections you think will support your purpose for reading. When you find specific information you want, slow down and read it word by word. You may need to reread the passage several times.
- Read the selection and jot down thoughts, responses to your questions and new questions that occur to you.

After Reading

- Read the selection again to confirm the main idea and supporting details.
- Make connections to what you already know about the topic. How does the information you have read add to or alter what you knew about the topic?
- Record your thinking about the text. For example, write a summary, complete a graphic organizer, create a sketch, or orally retell to yourself or a friend.






Teacher Resource

Questions to Guide Reading: Levers

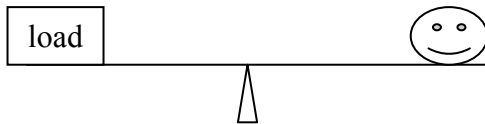
Questions to ask	Possible answers
<p>Before</p> <ul style="list-style-type: none"> • Look at the headings, bold print and italicized words to predict what this passage will be about. • How is the information organized? • What do you already know about levers? 	<ul style="list-style-type: none"> • Classes or types of levers, the bold words give us information about the parts and the italicized word gives a location of a part in relationship to the other • It is organized into paragraphs, diagrams or sections by class of lever. • Answers may vary.
<p>During</p> <ul style="list-style-type: none"> • What is the main idea in the first paragraph? • Read the next section, how does the diagram help you to understand the text above it? • Continue to read slowly and look at the diagram for understanding. Copy the diagram for each type of lever and label. You may write dot jot or point-form notes and include an example from the text or of your own. 	<ul style="list-style-type: none"> • The type of lever will be determined by the location of the fulcrum with reference to the load and effort. • It is a visual representation. • Students read and make dot jot (point form) notes at their own pace.
<p>After</p> <ul style="list-style-type: none"> • Think/pair/share with a partner to tell, in your own words, the difference between each type of lever. • Are there any questions about the three types of levers and how they work? • Create a chart to share the examples of each class of lever in the body. 	<ul style="list-style-type: none"> • Students paraphrase as they discuss to check their understanding of the classes of levers. • Questions may vary. • Students apply the knowledge they have gained from the reading and check their understanding. Some possible examples: first class-neck nodding head forward; second class-standing on tip toes; third class-elbow and arm lifting weights.

Levers

A lever is a simple machine that makes work easier. A lever has an arm that rotates around a fixed point. This fixed point is called a **fulcrum** . The location of the fulcrum in relationship to the **load**  that is being moved and the **effort**  that is causing the movement determines the type of lever.

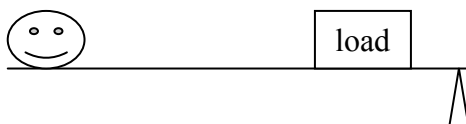
First class levers

With a first class lever the **fulcrum** or pivot point is *between* the **effort** and the **load**. A playground teeter-totter or see-saw is an example of a first class lever. One end will lift up as far as the other end is pushed down. If the load and the effort are uneven then changing the distance of the load from the fulcrum will change the effort needed to lift the load. Two children who are unequal in size can play on a teeter-totter by adjusting where they sit on the arm of the lever.



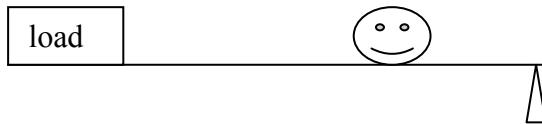
Second class levers

With a second-class lever the **load** is located *between* the **effort** and the **fulcrum**. A wheelbarrow is an example of a second -class lever. The handles of the wheelbarrow are the arms of the lever. The effort is exerted on these handles in an upward direction. The wheel acts as the fulcrum or pivot point for this type of lever.



Third class levers

With a third class lever the **effort** is exerted *between* the **load** and the **fulcrum**. Sweeping with a broom, shooting a puck with a hockey stick or using a fishing pole are all examples of third class levers. The force is applied in the direction that you want to move the load. A third class lever requires a greater force on the lever but the movement is very fast.



Where are your personal levers?

Our own bodies can provide examples of the three types of levers. Give an example of where in your body you can find a first, second and third class lever.

Reading Different Text Forms: Reading Informational Texts

Grade 8 Science and Technology (Optics)

Informational text forms are written to communicate information about a specific subject, topic, event or process. These texts use subject specific vocabulary, and organizational patterns to express ideas clearly and make them easier to read. Providing students with an approach to reading informational texts helps them to become more effective readers

Purpose

- Become familiar with the elements and organization of informational texts used in the text example
- Explore a process for reading informational texts, using a range of strategies for before, during and after reading.

Payoff

Students will:

- become more efficient at “mining” the text for information
- practise reading strategies using the organizational patterns to assist in understanding

Tips and Resources

- Some of the features of informational texts are headings, subheadings, introductions, and diagrams or flow charts. These work together to draw readers into the text at different levels. For example, the flow chart after each text section provides a visual to help students consolidate their understanding.
- Many informational texts are divided into sections that add meaning by description or definition. For example, the sections each describe or define a source of light.
- Many informational texts use visual elements (such as typeface, size of type, and flow charts) to emphasize important words and concepts. Different texts use these features in different ways to effectively present information.
- How you read informational text will depend on your purpose for reading. If you want to find specific information in a textbook, you might examine the headings and subheadings, and then skim through the section looking for key words and phrases related to the topic (i.e. Phosphorescence). Once you have located the appropriate section, a closer reading will help you to find the information and supporting details.
- See Student Resource, *Tips for Reading Informational Text*.
- See Teacher Resource, *Questions to Guide Reading: What is Light?*
- See Student/Teacher Resource, *What is Light and What are the Sources for Visible Light?*

Further Support

- See strategies for *before reading*, such as **Previewing a Text**, and **Analysing the Features of a Text** in *Think Literacy: Cross-Curricular Approaches, Grades 7 – 12*. Refer to these to support and reinforce the ideas described here.

Reading Different Text Forms: Reading Informational Texts

Grade 8 Science and Technology (Optics)

What teachers do

Before

Before reading, help students to connect new content and ideas to their prior knowledge by encouraging them to think about what they already know about the topic or the type of reading material (see Student/Teacher Resource, *What is Light? What are the Sources of Visible Light?*). For example:

- Ask students to **brainstorm** related ideas, concepts and vocabulary, **recall** previous experiences and feelings related to the subject, recall what they have learned about the topic, or **list questions** the might have about the topic.
- Provide students with related experiences, discussion topics, readings, or background information to **increase background knowledge**.
- Pose questions to students before they read, to help them **determine a purpose** for reading.
- Invite students to ask questions about the content.
- Model (using a “think aloud”) how to **predict** the content based on the features of text, specialized vocabulary, illustrations, introductory information or personal experiences. **Skim, scan** and **sample** the text to make informed predictions.
- **Identify** and pre-teach unfamiliar vocabulary and concepts that appear in the text.

During

During reading, help students to connect the information and ideas in the text to what they already know as they monitor their understanding. (*Monitoring their understanding* means recognizing when confusion occurs and identifying strategies that help to regain meaning.) For example:

- Have students describe and model the different reading strategies they might use, such as **predicting, questioning, activating prior knowledge, inferring, monitoring, adjusting, rereading, and decoding**.
- Model (using “think aloud”) strategies for pausing and thinking about the text. Encourage students to **chunk** the text, **read, pause, think, and ask questions** or **make notes** about the section of text.
- Demonstrate how to **use a graphic organizer** to **categorize** and select main ideas, important details, and questions as you read. For example, comparison charts, T-charts, or Venn diagrams can help students to identify the ideas being compared and how they are similar and different.
- Invite students to **visualize** the concepts as they read. Have partners share and compare the visualizations.
- Provide students with **focus** questions, such as the following:
 - What are the main ideas?
 - How has the writer organized them?
 - How does the writer support the main ideas?
 - What is the writer’s viewpoint?
 - Is this a useful source of information?

After

After reading, help students to **consolidate** and **extend** their understanding of the content. For example:

- Ask partners to **restate** or **paraphrase** what they have read, and **note similarities and differences** in the retelling.
- Model how to **summarize** the reading selection (using a “think aloud”) by identifying the essence of the text, choosing the most important information, and organizing the information to convey the **key ideas** of the selection.
- Have students suggest possible diagrams or **graphic organizers** to illustrate connections among the topics, main ideas, supporting details, and prior knowledge.
- Review the process that students used for reading informational text. See Student Resource, *Tips for Reading Informational Texts*.

Notes

Tips for Reading Informational Texts

Before Reading

- Set a purpose for reading. Ask yourself why you are reading this particular text.
- Look over the text to see which elements appear (such as headings, subheadings, illustrations, captions, and more).
- Examine the titles, headings, and subheadings, and scan for words that stand out.
- Look for words and phrases that might give you clues about how the information is organized.
- Read any overviews, summaries or questions. In a shorter piece, read the opening and concluding sentences or paragraphs.
- Examine each illustration and read the titles or captions.
- Recall what you already know about the topic.
- Record some questions you might have about the topic.

During Reading

- Divide the reading task into smaller chunks (chunking the text into paragraphs, chunking sections by sub-headings, etc.). Read a chunk, pause and think about what you read, and write a brief one-sentence summary or brief point-form notes to help you remember important and interesting information.
- Read quickly, then slowly. Skim the sections you think will support your purpose for reading. When you find specific information you want, slow down and read it word by word. You may need to reread the passage several times.
- Read the selection and jot down thoughts, responses to your questions and new questions that occur to you.

After Reading

- Read the selection again to confirm the main idea and supporting details.
- Make connections to what you already know about the topic. How does the information you have read add to or alter what you knew about the topic?
- Record your thinking about and responses to the text. For example, write a summary, complete a graphic organizer, create a sketch, or orally retell to yourself or a friend.



Questions to Guide Reading: What is Light?

Questions to ask	Possible answers
<p>Before</p> <ul style="list-style-type: none"> Why are we going to read this particular section? 	<ul style="list-style-type: none"> We want to know about light. We want to know about the different types and how they occur. Note: Answers will vary with prior knowledge and experiences.
<p>During</p> <ul style="list-style-type: none"> Read the first section of the passage. What is the main idea? What information do the bold headings give you? Read aloud the section on Incandescent sources. In your own words how is light produced? Look at the flow chart in this section. What is a flow chart? How do we read it? In your own words explain what is happening; refer to the text above it. Continue to read each section slowly and relate it to the flow chart. 	<ul style="list-style-type: none"> Light is energy. Natural and artificial light sources are chemical, electric, nuclear and thermal energy. The bold headings identify the sources of visible light and tell us where to look to find more information. Incandescent light is produced when an object is heated to a high temperature. A flow chart shows how something changes or the process. You read it by following the direction of the arrows. This flow chart tells us that electrical energy (light bulbs), chemical energy (fire), or thermal energy (sun) can produce a lot of heat energy, which in turn is converted to visible light energy. Students read for detail and refer to the flow chart to follow the process.
<p>After</p> <ul style="list-style-type: none"> What are the main ideas from each section? Give an example of each from your own experience. Students may use t-chart as an organizer for this information, with source of light and example as the headings. 	<ul style="list-style-type: none"> Students identify each source of light in their own words followed by an example using a simple t-chart as an organizer.

What is Light? What are the Sources of Visible Light?

What is Light?

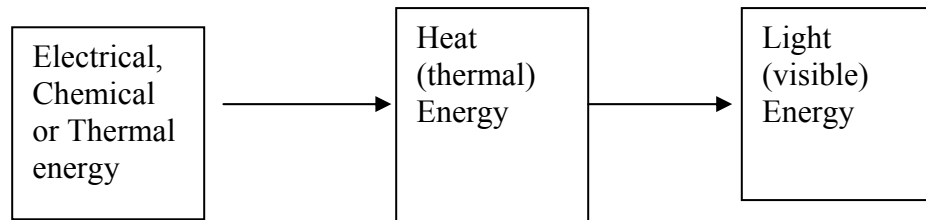
Light is an energy form that you can detect with your eyes. Light energy comes from other forms of energy such as *chemical* energy, *electric* energy, *nuclear* energy and *thermal* energy.

What are the Sources of Visible Light?

Light can come from both natural and artificial sources.

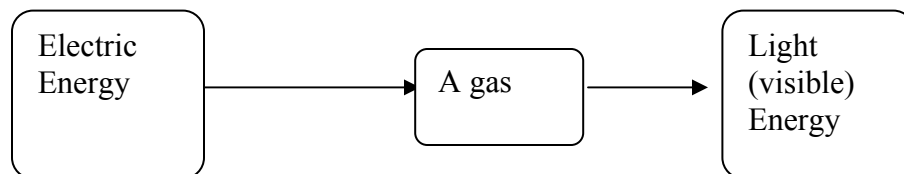
Incandescence

An object heated to a very high temperature will emit (give off) *incandescent* light. Examples of incandescent light are light bulbs, the sun, fire, or molten metal.



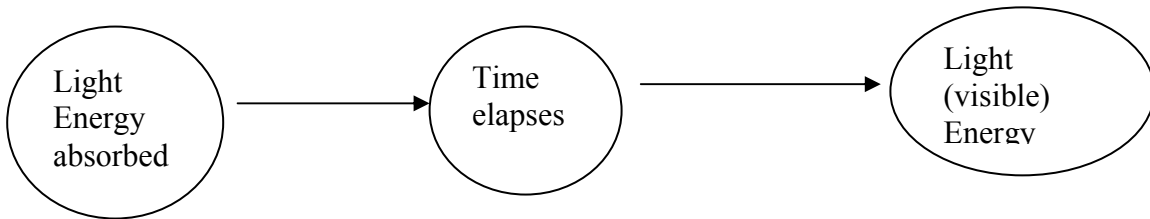
Electrical Discharge

Electrical discharges passing through a gas can emit light. A good example of this is in a thunderstorm. An electrical discharge passes through the Earth’s atmosphere creating light in the form of lightning. “Neon lights” are colourful electric signs that make use of this property.



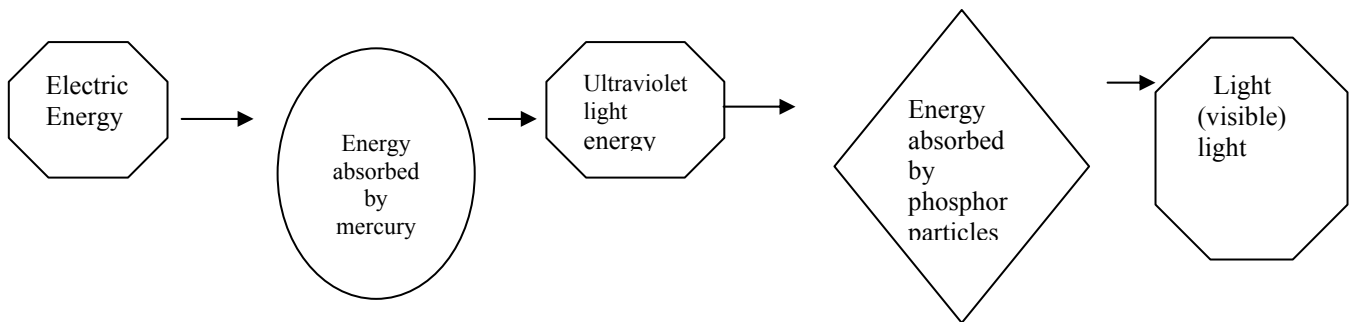
Phosphorescence

Materials called phosphors will absorb energy and then release it later. Glow-in-the-Dark fabric is a product that shows this property. Watch or clock dials that are visible in the dark demonstrate phosphorescence. These light sources can also be radioactive.



Fluorescence

Fluorescent sources of light absorb energy and then release it rather than storing it for later use as with phosphorescent sources. Fluorescent light bulbs found in many classrooms and offices are an example of this source of light.



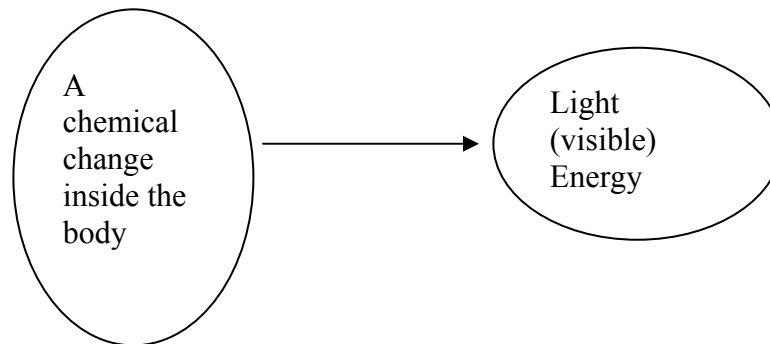
Chemiluminescence

This type of light source is the result of a chemical reaction. Generally, there is no increase in heat with chemiluminescence. Emergency glow sticks are an example of chemiluminescence. Two different chemicals are enclosed in a tube. When the tube is bent, to break the barrier between the two chemicals they meet and the reaction between the two chemicals gives off light energy.



Bioluminescence

This is the process used by many living creatures to emit light. A chemical reaction takes place inside the body of the organism to give off light energy. Fireflies and many deep-sea fish demonstrate bioluminescence.



Visible light, which is the light you are able to see, comes to us from many sources. The transfer of energy can be simple or complex. There are several possible sources for visible light these include **incandescence**, **electric discharge**, **phosphorescence**, **fluorescence**, **chemiluminescence** and **bioluminescence**.

Reading Different Text Forms: Reading Graphical Texts (Table)**Grade 8 Science and Technology (Cells, Tissues, Organs and Systems)**

Graphical text forms (such as diagrams, photographs, graphs, charts, and tables) are intended to communicate information in a concise format and illustrate how one piece of information is related to another.

Purpose

- Become familiar with the elements and features of graphical texts.
- Explore a process for reading graphical texts, using a range of strategies for before, during and after reading.

Payoff

Students will:

- become more efficient at “mining” graphical texts for information and meaning.
- practise essential reading strategies and apply them to different course-related materials.

Tips and Resources

Sometimes a complicated idea or concept can be communicated more easily through a chart. Many informational texts include graphics to supplement the main ideas and provide clues to the important - print features (such as typeface and size of type, titles, headings, subheadings, italics, labels and captions)

- design features (such as colour, shape, line, placement, and focal point).

- organizational patterns (such as sequential, categorical, and explanatory).

- Each graphical text uses these elements and features in different ways to effectively present information in a condensed format. For example, a chart or table may illustrate key information and show how pieces of information relate to each other. A table uses columns and rows to organize the information and may include a title that describes the main idea or subject, and a caption to explain the purpose of the table. The information in a table can be read horizontally and vertically. Tables are often used to help the reader quickly grasp key information (such as number patterns).
- Many of the strategies for reading informational and literacy texts can also be used effectively to read graphical texts.
- See Student Resource, *Tips for Reading Graphical Text*.
- See Student Resource, *The Parts and Purposes of Plant and Animal Cells*.
- See Teacher Resource, *Questions to Guide Reading: The Parts and Purposes of Plants and Animal Cells*.

Further Support

- See strategy **Reading Graphical Texts**, *Think Literacy: Cross-Curricular Approaches, Grades 7 – 12*.

Reading Different Text Forms: Reading Graphical Texts (Table)

Grade 8 Science and Technology (Cells, Tissues, Organs and Systems)

What teachers do

Before

Before reading, help students to connect new content and ideas to their prior knowledge by encouraging them to think about what they already know about the topic or the type of graphical text (See Student Resource, *The Parts and Purposes of Plant and Animal Cells*). For example:

- Ask students to **brainstorm** related ideas, concepts and vocabulary, **recall** previous experiences and feelings related to the subject, recall what they have learned about the topic, or **list questions** the might have about the topic.
- Provide students with related experiences, discussion topics, readings, or background information to **increase background knowledge**.
- Pose questions to students before they read, to help them **determine a purpose** for reading.
- Invite students to ask questions about the graphic’s purpose and the information in it.
- Model (using a “think aloud”) how to **predict** the content based on the features of graphic, specialized language, related written information, or personal experiences. **Skim, scan** and **sample** the text to make informed predictions.
- **Identify** and pre-teach unfamiliar vocabulary and concepts that appear in the text.

During

During reading, help students to connect the information and ideas in the graphical text to what they already know as they monitor their understanding. (“*Monitoring their understanding*,” means recognizing when confusion occurs and identifying strategies that help to regain meaning.) For example:

- Have students describe and model the different reading strategies they might use, such as predicting, questioning, **activating prior knowledge**, **inferring**, **reading slowly**, and **rereading**.
- Model (using “think aloud”) strategies for pausing and thinking about the text. Encourage students to examine parts of the text, **read, pause, think**, and **ask questions** or **make notes** about how this information relates to other parts of the text.
- Demonstrate how to paraphrase the information presented. For example, use the sentence stem “This means...”.
- Invite students to **organize** the information in a different way. Ask students to share and compare their interpretations.
- Provide students with **focus** questions, such as the following:
 - What is the purpose of this graphic?
 - What information is provided?
 - Is all important information included? What information is missing?
 - How is the information organized?
 - How does this information relate to what you already know about the topic?
 - Is this a useful source of information?

After

After reading, help students to **consolidate** and **extend** their understanding of the content. For example:

- Ask partners to **restate** or **paraphrase** what they have read, and **note similarities and differences** in the rephrasing.
- Model (using a “think aloud”) how to **make connections** between prior knowledge and what the text is saying.
- Have students suggest possible ways to **check the accuracy and reliability** of the information presented.
- Review the process that students used for reading graphical texts, including strategies for before, during and after reading. See Student Resource, *Tips for Reading Graphical Texts*.

Notes

Tips for Reading Graphical Texts

Before Reading

- Set a purpose for reading. Ask yourself why you are reading this particular text.
- Look over the text to determine what type it is and which elements are used.
- Examine the titles, headings, captions and images. Start with the title. The title tells you what the graphic is about. The captions may also use words and phrases from the text to show how the graphic is related to the information in the written text (e.g., “Figure 1.6”).
- Recall what you already know about the topic or subject.
- Record some questions you might have about the information presented.

During Reading

- Read all the labels and examine how they are related to the graphic. Each label has a purpose. The most important labels may be in capital letters, bold type, or a larger font.
- Follow the arrows and lines. They may be used to show movement or direction, or connect to the things they name.
- Look for the use of colour or symbols to emphasize important words and information. Some graphical texts have a legend or a key to explain the meaning of specific symbols and colours.
- Study the image carefully. See if you recognize the details in the image. Read the text near the picture to find an explanation of the information in the graphic. Use the figure number or title and key words to find and read the related information in the written text.
- Identify the relationships among the visuals and information presented.

After Reading

- Interpret the information conveyed in any of the graphics (e.g., diagrams, charts, graphs, maps). Ask yourself why this information might be important.
- Rephrase information orally or in writing. Imagine that you are explaining the graphic to someone who has not read it.
- Create your own graphical text (e.g., graph, map, diagram, table, flow chart) to represent the important information.



Questions to Guide Reading: The Parts and Purposes of Plant and Animal Cells

Questions to ask	Possible answers
<p>Before</p> <ul style="list-style-type: none"> • What type of graphic is this? • What is the purpose of this table? How do you know? • Why did the author choose this type of graphic? 	<ul style="list-style-type: none"> • It is a table. • It organizes the information for us and helps us to compare the parts and purposes of plant and animal cells. The title and headings of the column tell us the purpose. • There is a lot of information and it gives us a quick visual comparison and guide to the parts and their purpose for both cell types.
<p>During</p> <ul style="list-style-type: none"> • How can you read this table? • Preview the instructions below the table. 	<ul style="list-style-type: none"> • Look up the cell part column and read down to the part you are interested in and then read across to its purpose. You can look down the plant or animal column if you are only interested in what parts each one has or has not. You can just look at the cell part and purpose if that is all that interests you. • Students paraphrase to ensure understanding. Students will need to know the location and shape or size of the cell part to complete a diagram.
<p>After</p> <ul style="list-style-type: none"> • How does this visual help you understanding of the ideas in this topic? • What patterns do you see? Why are there differences? 	<ul style="list-style-type: none"> • Answers will vary. Students should recognize that plant and animal cells share many of the same features. • Plant cells have all of the parts listed on the table. Only plants have chloroplasts, which are a necessity for photosynthesis. Animal cells do not have chloroplasts and only some have a cell wall.

The Parts and Purposes of Plant and Animal Cells

Cell Part	Plant Cells	Animal Cells	Purpose
Cell Membrane	*	*	Surrounds and protects the contents of the cell.
Cell Wall	*	Some	Usually found in plants and unicellular organisms. They are thicker than membranes. Provide support for the cell.
Nucleus	*	*	Controls all the cell activities.
Vacuoles	*	*	Storage locations for food, waste and other substances that the cell can't use immediately.
Endoplasmic Reticulum	*	*	A membrane that is used to transport materials within the cell or to the outside of the cell.
Mitochondria	*	*	The energy producing part of the cell.
Cytoplasm	*	*	Distributes food and oxygen throughout the cell, supports other parts inside the cell. The liquid inside the cell.
Chloroplasts	*	NO	Photosynthesis takes part in the chloroplasts. They are only found in green plants and a few unicellular organisms.

Plant and animal cells have many similarities and a few differences.

Use the table above to identify features found in both plant and animal cells and their purposes. What further information do you require to be able to draw a diagram of a plant cell and of an animal cell?



Reading Different Text Forms: Reading Graphical Texts (Diagram)**Grade 8 Science and Technology (Water Systems)**

Graphical text forms (such as diagrams, photographs, graphs, charts, and tables) are intended to communicate information in a concise format and illustrate how one piece of information is related to another.

Purpose

- Become familiar with the elements and features of graphical texts.
- Explore a process for reading graphical texts, using a range of strategies for before, during and after reading.

Payoff

Students will:

- become more efficient at “mining” graphical texts for information and meaning.
- practise essential reading strategies and apply them to different course-related materials.

Tips and Resources

- Sometimes a complicated idea or concept can be communicated more easily through a chart. Many informational texts include graphics to supplement the main ideas and provide clues to the important concepts in the text. Some of the features of graphical texts include:
 - print features (such as typeface and size of type, titles, headings, subheadings, italics, labels and captions)
 - design features (such as colour, shape, line, placement, and focal point).
 - organizational patterns (such as sequential, categorical, and explanatory).
- Each graphical text uses these elements and features in different ways to effectively present information in a condensed format. For example, a chart or table may illustrate key information and show how pieces of information relate to each other. A table uses columns and rows to organize the information and may include a title that describes the main idea or subject, and a caption to explain the purpose of the table. The information in a table can be read horizontally and vertically. Tables are often used to help the reader quickly grasp key information (such as number patterns).
- Many of the strategies for reading informational and literacy texts can also be used effectively to read graphical texts.
- See Student Resource, *Tips for Reading Graphical Text*.
- See Student Resource/Teacher Resource, *Lake Effect Snow*.
- See Teacher Resource, *Questions to Guide Reading: Lake Effect Snow*.

Further Support

- See **Reading Graphical Texts**, *Think Literacy: Cross-Curricular Approaches, Grades 7 – 12*.
- See **Think/Pair/Share**, *Think Literacy: Cross-Curricular Approaches, Grades 7 – 12*.

Reading Different Text Forms: Reading Graphical Texts (Diagram)

Grade 8 Science and Technology (Water Systems)

What teachers do

Before

Before reading, help students to connect new content and ideas to their prior knowledge by encouraging them to think about what they already know about the topic or the type of graphical text. For example:

- Ask students to **brainstorm** related ideas, concepts and vocabulary, **recall** previous experiences and feelings related to the subject, recall what they have learned about the topic, or **list questions** they might have about the topic.
- Provide students with related experiences, discussion topics, readings, or background information to **increase background knowledge**.
- Pose questions to students before they read, to help them **determine a purpose** for reading.
- Invite students to ask questions about the graphic's purpose and the information in it.
- Model (using a "think aloud") how to **predict** the content based on the features of graphic, specialized language, related written information, or personal experiences. **Skim, scan** and **sample** the text to make informed predictions.
- **Identify** and pre-teach unfamiliar vocabulary and concepts that appear in the text.

During

During reading, help students to connect the information and ideas in the graphical text to what they already know as they monitor their understanding. (*"Monitoring their understanding,"* means recognizing when confusion occurs and identifying strategies that help to regain meaning.) For example:

- Have students describe and model the different reading strategies they might use, such as predicting, questioning, **activating prior knowledge, inferring, reading slowly,** and **rereading**.
- Model (using "think aloud") strategies for pausing and thinking about the text. Encourage students to examine parts of the text, **read, pause, think,** and **ask questions** or **make notes** about how this information relates to other parts of the text.
- Demonstrate how to paraphrase the information presented. For example, use the sentence stem "This means...".
- Invite students to **organize** the information in a different way. Ask students to share and compare their interpretations.
- Provide students with **focus** questions, such as the following:
 - What is the purpose of this graphic?
 - What information is provided?
 - Is all of the important information included? What information is missing?
 - How is the information organized?
 - How does this information relate to what you already know about the topic?
 - Is this a useful source of information?

After

After reading, help students to **consolidate** and **extend** their understanding of the content. For example:

- Ask partners to **restate** or **paraphrase** what they have read, and **note similarities and differences** in the rephrasing.
- Model (using a "think aloud") how to **make connections** between prior knowledge and what the text is saying.
- Have students suggest possible ways to **check the accuracy and reliability** of the information presented.
- Review the process that students used for reading graphical texts, including strategies for before, during and after reading. See Student Resource, *Tips for Reading Graphical Texts*.

Notes

Tips for Reading Graphical Texts

Before Reading

- Set a purpose for reading. Ask yourself why you are reading this particular text.
- Look over the text to determine what type it is and which elements are used.
- Examine the titles, headings, captions and images. Start with the title. The title tells you what the graphic is about. The captions may also use words and phrases from the text to show how the graphic is related to the information in the written text (e.g., “Figure 1.6”).
- Recall what you already know about the topic or subject.
- Record some questions you might have about the information presented.

During Reading

- Read all the labels and examine how they are related to the graphic. Each label has a purpose. The most important labels may be in capital letters, bold type, or a larger font.
- Follow the arrows and lines. They may be used to show movement or direction, or connect to the things they name.
- Look for the use of colour or symbols to emphasize important words and information. Some graphical texts have a legend or a key to explain the meaning of specific symbols and colours.
- Study the image carefully. See if you recognize the details in the image. Read the text near the picture to find an explanation of the information in the graphic. Use the figure number or title and key words to find and read the related information in the written text.
- Identify the relationships among the visuals and information presented.

After Reading

- Interpret the information conveyed in any of the graphics (e.g., diagrams, charts, graphs, maps). Ask yourself why this information might be important.
- Rephrase information orally or in writing. Imagine that you are explaining the graphic to someone who has not read it.
- Create your own graphical text (e.g., graph, map, diagram, table, flow chart) to represent the important information.



Questions to Guide Reading: Lake Effect Snow

Questions to ask	Possible answers
<p>Before</p> <ul style="list-style-type: none"> • Why are we going to read this particular section? • What do we know about the topic? • Why are there words in italics? • Where would you find the meaning of the words in italics? 	<ul style="list-style-type: none"> • We want to know about lake effect snow as it relates to our experiences. • Answers may vary since different areas of the province have varying degrees of lake effect snow. • These are important words to our understanding of the process. • Words with their meanings are found in the glossary at the back of the book or in a dictionary.
<p>During</p> <ul style="list-style-type: none"> • Read the first line of the first paragraph. On a map locate the Great Lakes and your present location in relation to the closest lake. • Read the first paragraph slowly for detail. • With your finger, follow the diagram as you reread each sentence in the first paragraph. Think/Pair/Share to follow the process. • Have a student paraphrase, “reading aloud”, the process of lake effect snow as everyone follows the diagram. • Read the next paragraph slowly for detail. • What are the important points? How did the organization of the text help you? 	<ul style="list-style-type: none"> • Answers will vary. • Students read the first paragraph slowly for detail. • Students reread and talk about the process with a partner. • A student or students will use their own words to explain lake effect snow using the diagram. • Students read for detail. • Students list the 3 points. The bullets help to organize the information so that you can see that there are 3 different factors or important points.
<p>After</p> <ul style="list-style-type: none"> • Would you describe your snowfall in an average year as light, moderate or heavy? • Using the information in the second paragraph to explain any lake effect snow pattern in your location. • Choose 3 cities on any of the Great Lakes (ensure that there is a variety of choice). Predict their snowfall using the information from the reading passage. Give reasons. 	<ul style="list-style-type: none"> • Students should reach a consensus according to their location. • Students apply the information from the second paragraph to explain the pattern based on their location. • Students should use the factors affecting intensity and the diagram in their explanation.

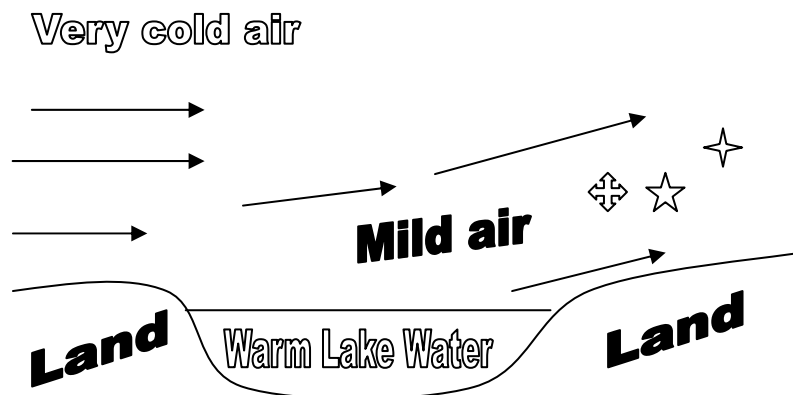
Lake Effect Snow

In the winter **cold winds** from the Northwest blow over the Great Lakes. As these winds travel over the open water they pick up **moisture** and heat from the water. Only twice in recent memory has Lake Ontario frozen over completely, in 1934 and in 1976. The reason that Lake Ontario and the other Great Lakes rarely freeze over is that they are very deep. Since these large bodies of water rarely freeze over completely there is almost always open water for the wind to blow over. When the moist laden winds reach land again they drop the excess moisture in the form of snow. This snowfall is known as **lake effect snow**.

The **intensity** of lake effect snow depends on several factors:

- the **difference in temperature** between the air passing over the lake and the temperature of the lake surface
- the **distance that the air travels** over the water surface
- the **wind speed** will affect how far inland the snow is carried.

Lake Effect Snow



Reading Different Text Forms: Following Instructions

Grade 8 Science and Technology (Fluids)

Students are expected to read and follow instructions in Science and Technology or Science especially for experiments. This strategy asks students to examine different types of instructions, their features and elements, and how the features, language and organizational patterns can be used to help the reader understand and complete a task.

Purpose

- Provide students with strategies for reading, interpreting and following instructions to complete a specific task.
- Learn how instructions are organized.

Payoff

Students will:

- identify purpose for reading instructions.
- develop a process for reading and following instructions.

Tips and Resources

- Instructions give detailed step-by-step information about a process or procedure (e.g., directions, recipes, experiments, manuals, tests). They are sometimes called procedures or how-tos. Most instructions use organizational patterns, language, and features (charts, bold or italic type, headings, numbers, lists) to help the reader identify the task and the best way to complete it; however, some instructions are complicated without any features to help the reader determine the sequence of steps.
- Student/Teacher Resource, *Investigation: Making a Hydrometer*
- Teacher Resource, *Questions to Guide Reading: Making a Hydrometer*

Further Support

- Provide students with a list of typical signal words and task prompts and suggestions/strategies for responding to them (e.g. place, fill, mark, repeat, record).
- Provide students with flow charts, diagrams and timelines to help track successful completion of oral or written instructions.
- Create a class framework for reading instructions such as:
 - preview.
 - highlight and annotate.
 - think aloud and visualize.
 - reread.
 - go step-by-step.
 - read the diagrams or charts.
 - ask questions.
- See **Following Instructions**, *Think Literacy: Cross-Curricular Approaches, Grades 7–12*.

Reading Different Text Forms: Following Instructions

Grade 8 Science and Technology (Fluids)

What teachers do
Before

- Select a set of instructions typical for science, science and technology related to a current topic or process.
- Ask students to **recall** an important occasion, when they had to follow a set of instructions (e.g., an exam, making a table, fixing a bike, installing software). Discuss what was challenging and easy about following the instructions.
- Ask students to **recall** what they know about effective instructions.
- Make a list of the elements and features of instructions with the class.
- Make copies of another set of instructions and cut them into slips of paper with a step on each slip (unnumbered). Place one set of jumbled instructions in as many envelopes as there are groups or pairs. Provide partners or small groups with an envelope, and ask students to **recreate** the instructions and discuss the decisions they made. Identify the strategies they used to determine the task and the sequence.
- Provide students with a copy of the selected instructions. Model for students how to **preview** the instructions (e.g., looking at title, organization, some of the signal words [sequence of steps an process verbs], graphics, illustrations, summary, materials list).

During

- Model reading the introductory material (see Student/Teacher Resource, *Investigation: Making a Hydrometer*) and the first 2 or 3 steps aloud, noting the **signal words** and what they tell the reader to do.
- Ask students to continue reading the instructions to **identify** the task to be completed. Suggest that students imagine themselves completing the instructions.
- Ask small groups to **discuss** the **strategies** they used to read the instructions and determine what they were expected to do.

After

- **Clarify** any confusing sections of the instructions. Use a flow chart to **outline** the steps, if necessary.
- Have students individually or in pairs **complete** the instructions. **Compare** the completed tasks.
- Discuss how students figured out what to do.
- **Identify** confusing or challenging parts and suggest additional strategies.

Notes



Questions for Guiding Reading : Making a Hydrometer

What teachers do	What students do
Before <ul style="list-style-type: none">• Review the elements of an experiment.• Review the meaning of the words density, solute, solvent and solution.• Provide the students with a copy of the experiment and model how to preview the instructions.• Drawing on students' prior knowledge, what is a hydrometer and where might they have seen it in use?	<ul style="list-style-type: none">• Students identify the elements such as the problem, hypothesis, materials, procedure, observation, conclusion and application.• Students identify the title and the problem. Students note the set up of the experiment (e.g., headings, numbers or steps, bulleted items, chart for observations).• A hydrometer is used to measure density of liquids. Answers may vary for its uses.
During <ul style="list-style-type: none">• Read the instructions aloud with the students, noting the signal words—place, fill, add, repeat, and mark.• Using think/pair/share strategy, students paraphrase to identify the task to be completed and what they are expected to do.	<ul style="list-style-type: none">• Students note the signals, highlight or underline, and clarify what they tell the reader to do.• Students use their own words to clarify the instructions in the experiment. Students may create a diagram to assist in visualizing the steps.
After <p>Q. Are there any sections of the instructions that are unclear or confusing?</p> <ul style="list-style-type: none">• Have students complete the experiment and questions individually or in pairs.• Compare the completed tasks, record observations and answer questions. Use the application questions to encourage students to make connections to their experiences or predict further uses of a hydrometer.	<p>A. Students may create a diagram to assist in visualizing the steps.</p> <ul style="list-style-type: none">• Think/pair/share or small problem solving groups may be used as a strategy.• Note hydrometers are used to measure the density of liquids. They are used in the brewing industry and in the food preparation industry to determine sugar concentrations. A hydrometer can be used to determine the difference in density between light and regular cooking oils.



Student/Teacher Resource

Investigation: Making a Hydrometer

Problem:

Can you make a homemade hydrometer?

Apparatus and Materials:

- a new *unsharpened pencil* with an eraser
- a small piece of modelling clay
- at least four test tubes or tall flasks of the same size and shape
- permanent markers, various colours
- water
- salt or sugar

Procedure:

1. Prepare three different solutions of salt and water or sugar and water (**solution #1** 5mL salt or sugar/100mL water, **solution #2** 20mL salt or sugar/100mL water, and **solution #3** 40mL salt or sugar/ 100mL water. Shake well to dissolve). Label the solutions #1, #2 and #3
2. Using permanent marker, place marks at 1 cm intervals the complete length of the pencil starting at the eraser end.
3. Place a small piece of modelling clay around the non-eraser end of the pencil.
4. Fill test tube or flask 2/3 full of water (at least 10 cm)
5. Place the end of the pencil with the clay into the test tube or flask.
6. Adjust the piece of clay so that the pencil stands upright in the water (may need to remove some clay, add some clay or distribute the piece more evenly around the end of the pencil).
7. With a permanent marker, mark the water level on the pencil.
8. Fill a second test tube or flask to the same depth with solution #1. Place the pencil/hydrometer into the test tube or flask and mark the solution level on the pencil.
9. Repeat step #8 with solution # 2.
10. Repeat step #8 with solution #3.



Investigation: Making a Hydrometer (continued)

Observations:

Complete the chart with your observations.

Water with salt or sugar	Water level
Water only	
5 mL salt or sugar (solution #1)	
20 mL salt or sugar (solution #2)	
40 mL salt or sugar (solution #3)	

Conclusions and Applications:

1. As the density of the liquid increases how does the position of the homemade hydrometer change?
2. If the salt or sugar solutions had been mixed prior to the lesson and left for you to use but not labelled how would you distinguish between the solutions?
3. What would happen if the liquid in the test tube were less dense than water?
4. How could the food preparation industry use this information?