GRADE 3

GROWTH AND CHANGES IN PLANTS
TEACHER RESOURCE BOOKLET

TO THE TEACHER

Welcome! This resource guide has been designed to help you enrich your students' learning both in the classroom and at the Toronto Zoo. All activities included in this grade 3 booklet are aligned with the Understanding Life Systems strand of The Ontario Curriculum, Grades 1-8: Science and Technology, 2007. The pre-visit activities have been developed to help students gain a solid foundation about biodiversity before they visit the Zoo. This will allow students to have a better understanding of what they observing during their trip to the Toronto Zoo. The post-visit activities have been designed to help students to reflect on their Zoo experience and to make connections between their experiences and the curriculum. We hope that you will find the activities and information provided in this booklet to be valuable resources, supporting both your classroom teaching and your class' trip to the Toronto Zoo.

WHERE DOES IT FIT IN?

Strand: Life Systems

Topic: Growth and Changes in Plants

Specific Expectations Met:

Understanding Basic Concepts

♦ **3.1** describe the basic needs of plants, including air, water, light, warmth, and space
♦ **3.2** identify the major parts of plants, including root, stem, flower, stamen, pistil, leaf, seed, and fruit, and describe how each contributes to the plant's survival within the plant's environment
♦ **3.4** describe how most plants get energy to live directly from the sun and how plants help other living things to get energy from the sun
♦ **3.6** describe ways in which plants and animals depend on each other
♦ **3.8** identify examples of environmental conditions that may threaten plant and animal survival

Developing Investigation and Communication Skills

♦ **2.2** observe and compare the parts of a variety of plants
♦ **2.6** use appropriate science and technology vocabulary, including stem, leaf, root, pistil, stamen, flower, adaptation, and germination, in oral and written communication

Relating Science and Technology to Society and the Environment

♦ **1.1** assess the ways in which plants are important to humans and other living things, taking different points of view into consideration, and suggest ways in which humans can protect plants
♦ **1.2** assess the impact of different human activities on plants, and list personal action they can take to minimize the harmful effects and enhance good effects

PRE-WORKSHOP ACTIVITIES

1. PLANT NEEDS
(Adapted from the 'Lunch Box for Plants')

This activity introduces students to the basic needs of a plant. This exercise can be completed before your students attend our Grade 3 Workshop. There is a follow up activity entitled "Presenting Our Plants" found in the *Follow-Up Section* of this resource booklet that can be completed after your visit.

Materials
-3 seedlings per student (can be purchased at a local nursery; Tomato, Marigold, Nasturtium seeds are all examples that could be used)
-3 small cups (ask students to bring in containers from home so they we can reuse!)
-potting soil to fill 3 small cups per student
-gravel (as fine as possible)
-access to water
-masking tape and markers
-laptop with internet access
-projector and projection screen

Ask you students whether they think that plants can grow without soil; give the students a few minutes to respond. Tell the students that you are going to play a short video that highlights the basic needs to plants and ask them to pay attention, recording the needs that are discussed. Click on the following link to watch the youtube video titled "The Needs of a Plant (song for kids):" http://www.youtube.com/watch?v=OQT6piZOX7c&feature=related%22,,0,0

As a class, write down the five basic needs of a plant: water, soil, space, air, and light. While the students watch, model how to properly plant a seed; place potting soil into the container (approximately 2/5 full) and then place your seed into the container. Fill the remainder of the container with more potting soil (another 2/5 of the container). Using masking tape label it 'Good Soil.' Repeat this process with your second container, however replace the soil with gravel and label it 'Poor Soil.' In the third container, simply leave the seed in the bottom, without soil or gravel.

Allow time for the students to plant their own seeds; you may wish to group students to cut down on materials! Provide the students with the sheet titled "Let's Experiment" which is at the end of this booklet, and ask them to record their predictions at the top of the page. The students will record the height of their plants within the chart provided. On the final day they will draw a picture of their plants.

Tying It All Together
Mathematics Stand: Measurement
- estimate, measure, and record length, height, and distance, using standard units (i.e., centimetre)

How To Assess
❑ Student participated in initial discussion
❑ Student properly planted the seeds according to instructions
❑ Student is beginning to complete the 'Let's Experiment' sheet
❑ Student is accurately measuring plants

2. WE EAT PLANTS!
(Adapted from worksheets found at www.nourishinteractive.com)

Many animals satisfy their dietary needs by eating plants! Humans also consume plant matter; looking around the grocery store we can find fruits and vegetables (plants) in the produce section! Students often have trouble determining whether a food item is considered to be a fruit or vegetable. Bringing some tangible examples of fruits and vegetables into the classroom can help the students make the distinction. A vegetable is defined as the edible part of a plant, such as the buds of broccoli, root of a beet, or the leaf of spinach. A fruit typically derives from a flowering plant; it is edible and contains seeds.

After discussing vegetables and fruits, you may wish to have your students complete the worksheets titled "Shopping Cart Sorting" and "Is It A Fruit Or A Vegetable?" This activity will prepare your students for the 'How Many Plants Are in My Lunch?' exercise found in our *Follow-Up Activities* section. This is also an excellent time to review healthy eating habits with your students.

Tying It All Together
Health and Physical Education Strand: Healthy Living
- **C1.1** demonstrate an understanding of how the origins of food affect its nutritional value and environmental impact

Mathematics Strand: Data Management and Probability
- demonstrate an ability to organize objects into categories, by sorting and classifying objects

3. CARING ABOUT PLANTS

Encouraging our students to care and appreciate the environment is very important. An excellent, fictional read-aloud that can be used to foster environmental awareness within your students is *The Lorax* by Dr. Seuss. This cautionary tale warns students of the effects that an individual can have on the environment, while reassuring students that action can be taken to help the environment; there is always hope!

We suggest reading *The Lorax to your class.* (If you are interested in making text-to-text connections, *The Great Kapok Tree: A Tale of the Amazon Rainforest* by Lynne Cherry is worth checking out!) . After reading *The Lorax,* have the students create posters that promote the protection of trees. Depending on your class' exposure to creating posters, you may wish to model how to make an effective poster. Your posters may include a slogan, reasons why we need to protect trees, facts about trees, colourful pictures, and an appropriate use of the poster's space.

Tying It All Together
Language Strand: Media Literacy
- **1.1** identify the topic, purpose, and audience for media texts they plan to create

- **3.4** produce media texts for specific purposes and audiences, using a few simple media forms and appropriate conventions and techniques

The Arts Strand: Visual Arts
- **D1.1** create two-dimensional works of art that express personal feelings and ideas inspired by the environment

How To Assess
❑ Has the student included all of the necessary elements of a poster
❑ Has the student supported his or her poster's argument

4. VOCABULARY FLIPBOOK

When beginning a new unit of study, it is important to ensure that your students are familiar with new vocabulary. Creating a personalized vocabulary flipbook can be a fun exercise and allow students to learn new concepts in a more interesting way.


Materials
- coloured paper (approximately 5 pieces for each student)
- markers

Model how to make a flipbook to your students. Take 5 pieces of coloured paper and lay them on top of one another, with each sheet about ¾ of an inch below the last. Next, take hold of both ends of the paper stack and fold them upwards and together, ensuring that the tabs are an equal distance apart!

You may wish to have the vocabulary found at the end of this booklet on an overhead transparency or on the board for the students to see.

Once the students have made their flipbook, have them write the new terms on separate tabs, then open their flipbooks to write the appropriate definition for each term. Students may want to include pictures.
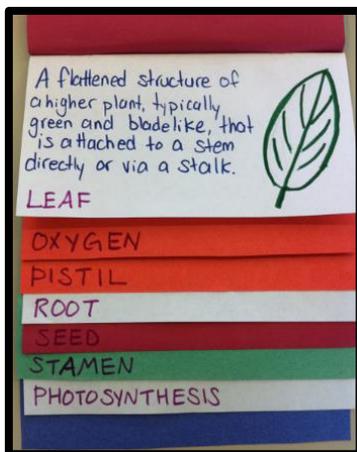
Tying It All Together
Language Strand: Oral Communication
-**1.2** demonstrate an understanding of appropriate listening behaviour by adapting active listening strategies to suit a wide variety of situations

Language Strand: Writing
- **3.1** spell familiar words correctly
- **3.3** confirm spellings and word meanings or word choice using a variety of resources appropriate for the purpose

FOLLOW-UP ACTIVITIES

1.   PRESENTING OUR PLANTS
(Adapted from the 'Lunch Box for Plants')

As a continuation of our 'Plant Needs' activity, found within our *Pre-Visit Activities* section, you may wish to have your students complete their 'Let's Experiment' observation sheet by drawing a picture of each of their plants and writing their conclusions at the bottom of the worksheet. Set aside time for each student to present their findings; you may wish to have them bring their three plant containers to the front of the class, summarize the heights of the plants which they recorded, and tell the class which plant grew the best and why they think that outcome occurred.
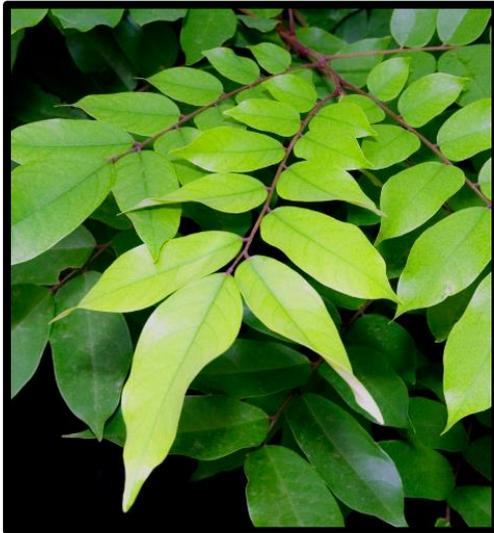
Tying It All Together
Language Strand: Oral Communication
- **1.1** identify a variety of purposes for speaking
- **2.3** communicate orally in a clear, coherent manner, presenting ideas, opinions, and information in a logical sequence
- **2.4** choose a variety of appropriate words and phrases, including descriptive words and some technical vocabulary, and a few elements of style to communicate their meaning accurately and engage the interest of their audience

How To Assess
❑   Student has accurately completed observation worksheet
❑   Student presents findings clearly to the class
❑   Student is able to explain why a particular seed grew better or worse than another

2.   EXAMINING THE LIFE CYCLE OF A PLANT
(Lessons have been accessed through exchange.smarttech.com)

Bringing technology into the classroom is a wonderful way to engage your students and teach new concepts in a fun and exciting format. The following activities have been accessed through the Smart Exchange website; membership to the site is free and provides teachers with access to hundreds of pre-planned lessons. Teachers can use the search engine to select a topic, grade, and subject area to narrow their search.

Materials
- SMART NOTEBOOK program (so that lesson plans will open)
- SMART Board (if you do not have access to a SMART Board, a projector and laptop will also work)
- Tennis ball (for students with fine motor difficulties, holding a tennis ball can help them move text on the board)
- Koosh ball for quiz activities

You can access the lesson plan titled 'Parts of a Plant' here:

http://exchange.smarttech.com/search.html?q=how+plants+grow+stephanie+kelly&region=en_US

This lesson would work well for students who have limited background knowledge; the lesson introduces the different parts of a plant, with a link to a website that contains a description for each plant part. Display a nice clearly labeled diagram for students to investigate. An interactive activity is also included where students point out the seed on several different plants and a list of vocabulary that can be clicked on for a more in depth description.

There is a blank template provided in the lesson for you to quickly and easily create your own match game. At the end of the lesson there is also a really fun idea on how students can make a cut out book that depicts the life cycle of a plant.

You can access the lesson plan titled 'How Plants Grow!' here:

http://exchange.smarttech.com/search.html?q=how+plants+grow&region=en_US

This lesson reviews the life cycle of a plant, which includes the stages of germination, and photosynthesis, etc. After the review there is an interactive and exciting quiz on the life cycle of a plant. Students come up and throw a Koosh ball at one of the buttons on the screen which asks them a question. They can then try to answer it and using their hand or a tennis ball, and slide the image on the screen to reveal the answer. This is a quick and easy way to evaluate which students understand the material and what areas you may need to review before moving onto new concepts.

Tying It All Together
Language Strand: *Oral Communication*
- **1.1** demonstrate an understanding of appropriate listening behaviour by using active listening strategies in order to contribute meaningfully and work constructively in groups
- **1.7** identify and explain the importance of significant ideas and information in oral texts
- **2.2** demonstrate an understanding of appropriate speaking behaviour in a variety of situations, including small- and large-group discussions

Language Strand: Reading
- **1.4** demonstrate understanding of a variety of texts by identifying important ideas and some supporting details
- **2.3** identify a variety of text features and explain how they help readers understand texts

Mathematics Strand: Data Management and Probability
- demonstrates an ability to organize objects into categories, by sorting and classifying objects using two or more attributes simultaneously

3.   HOW MANY PLANTS ARE IN MY LUNCH?

After having completed the pre-workshop activity "Shopping Cart Sorting" your students should have an established knowledge of the definitions of fruits and vegetables. Now it is time for them to investigate what plants they eat every day. Explain to students that for the next four days you   will be collecting data on how many fruits and vegetables students have in their lunches each   day. It may be helpful to send a letter home to parents explaining the lesson in advance so parents may pack at least one fruit and one vegetable in their child's lunch. Students can create simple T-charts with Fruit and Vegetable categories and use tallies to count the totals of each in their lunch. After four days

students can create vertical bar graphs with the data they have a collected. A template "How Many Plants Are In My Lunch?" has been attached at the end of the booklet to use.

Once individual bar graphs have been completed, ask students to partner up and compare each other's graphs. Have a class discussion on similarities, differences and observations that students made about their graphs. This activity could be extended by having students combine individual data to create a class bar graph representing the total fruits and vegetables consumed the past four days by the entire class.

Tying It All Together
Mathematics Strand: Data Management and Probability
- demonstrates an ability to organize objects into categories, by sorting and classifying objects using two or more attributes simultaneously
- collect data by conducting a simple survey about themselves, or content from another subject
- collect and organize categorical primary data and display the data in charts, tables and graphs, with appropriate title and labels
- read primary data presented in charts, tables, and graphs (including vertical and horizontal bar graphs, then describe the data using comparative language, and describe the shape of the data

4. RECIPE FOR PLANT FOOD
(Adapted from Teachers' Guide for Living Sunlight)

This is the perfect activity to be doing along side the "Presenting Our Plants" activity and functions as a fun way to review what plants need to survive. Students will be writing a recipe for plant food, beginning with the first step of sucking up water from the ground to the final step of producing leaves, fruit, etc. This activity works as a great introduction to procedural writing for students with little background knowledge in this form of writing. The ingredients and steps are listed for the students, they simply have to fill them in (see attached worksheet "Recipe for Plant Food").

Feeling Bold?
Extend this activity by creating a Plant Food Cookbook for each student! Staple 4 pieces of construction paper together and cut out the 8 steps above. Have students draw pictures to illustrate each of the steps. Don't forget to make a cover for your cookbook with a picture! Finally, use a glue stick to paste the words and pictures inside.

Tying It All Together
Language Strand: Writing
- **1.1** identify the topic, purpose, audience, and form for writing
- **2.1** write short texts using a variety of forms
- **3.3** confirm spellings and word meaning using several different types of resources

The Arts Strand: Visual Art
- **D1.1** create two-dimensional works of art that express ideas inspired by the environment
- **D1.3** use elements of design in art work to communicate ideas, messages and understandings

5.   CELEBRATING THE ENVIRONMENT

As you are nearing the end of your Growth and Changes in Plants unit, it is important to give your students the opportunity to consolidate their learning and focus on appreciating the environment. Your students have planted their own seeds, learned about the different parts of a plant, and discussed how humans and animals use plants; now, it is time to watch the movie version of *The Lorax*! Encourage your students bring their favourite 'plant' to eat as a snack during the show!

There are two versions of the book available on film:

The Lorax. 2012. Directed by Chris Renaud, Kyle Balda. Distributed by Universal Pictures. Starring Danny DeVito, Zac Efron, Taylor Swift.

The Lorax. 1972. Directed by Hawley Pratt. Produced by DePatie-Freleng Enterprises. Starring Eddie Albert, Bob Holt.

VOCABULARY LIST

carbon dioxide   A colourless gas with no smell. It is an important part of the air that we breathe.

fruit   The sweet and fleshy product of a tree or other plant that contains seed and can be eaten as food.

leaf   A flattened structure of the higher plant, typically green and blade-like, that is attached to a stem directly or via a stock. Leaves are the main organs of photosynthesis and transpiration.

oxygen   A colourless, odorless reactive gas, the life supporting component of the air.

photosynthesis   The process by which green plants and some other organisms use sunlight to make food from water and carbon dioxide.

pistil   The seed producing female reproductive organ of a flower.

root   The part of a plant that attaches it to the ground or a support, typically underground, conveying water and nourishment to the rest of the plant via numerous branches and fibres.

seed   A flowing plants unit of reproduction, capable of developing into another such plant.

stamen   The pollen producing male reproductive organ of a flower

vegetable   A plant or part of a plant that is used as food.

RESOURCE LIST

*S = student friendly site
*T = teacher friendly site

http://www.science.ca/ **(S&T)**
Excellent searchable, Canadian website with a wealth of information. Includes current science news and events, the opportunity to interview a Canadian Scientist, an area to post questions on specific topics, an activities resource, and a 'questions of the week' section posted by Canadian students.

http://exchange.smarttech.com **(T)**
The above hyperlink will take you to the Smart Exchange website where teachers can search and download lessons, using Smart Exchange (exchange.smarttech.com). Membership to the site is free. If you do not have access to a Smartboard; a laptop and projector will be effective as well.

Books

Brillinger, Rhea (lead writer) Lunch Box for Plants: Teacher's Guide. Produced by The Fertilizer Institute
of Ontario Inc., & Ontario Agri-Food Education, Inc. **(T)**
A great resource designed for teachers working through the Soils in the Environment strand of the Grade 3 Science curriculum. Provides hands-on, student-centered activities.

Seuss, Dr. 1971. The Lorax**.** United States: Random House. **(S&T)**
A cautionary tale about the effects that an individual can have on the environment.

Cherry, Lynne. 2001. The Great Kapok Tree: A Tale of the Amazon Rain Forest. Houghton Mifflin
Harcourt. **(S&T)**
Cherry combines illustrations that reveal a naturalist's reverence for beauty with a myth-like story that explains the ecological importance of saving the rainforests.

Films

The Lorax. 2012. Directed by Chris Renaud, Kyle Balda. Distributed by Universal Pictures. Starring
Danny DeVito, Zac Efron, Taylor Swift.
A computer-animated film that is based upon Dr. Seuss' *The Lorax.* A 12-year-old boy searches for a Truffula tree to impress the girl of his dreams. Along the way, he meets the Lorax. This film is rated PG.

The Lorax. 1972. Directed by Hawley Pratt. Produced by DePatie-Freleng Enterprises. Starring Eddie
Albert, Bob Holt.
An animated film that is based upon Dr. Seuss' *The Lorax.* This film adheres to the original text.

Smartboard Lessons

How Plants Grow
http://exchange.smarttech.com/details.html?id=34249658-9bb9-43f4-9832-52caade95b04

Parts of a Plant
http://exchange.smarttech.com/details.html?id=faa98cff-312d-4aed-80a1-6dcec849337c

Let's Experiment!

Record the height of each plant for 2 weeks. Before you plant your seeds, make some predictions about how your seeds will grow…

Which plant do you think will grow best?_____

_____

Why? _____

Plant A (drawing)	Plant B (drawing)	Plant C (drawing)
Good Soil- Water- Sunlight	Poor Soil–Water-Sunlight	No Soil-Water-Sunlight
Height of plants (cm)		
Day 1	Day 1	Day 1
Day 4	Day 4	Day 4
Day 7	Day 7	Day 7
Day 11	Day 11	Day 11
Day 14	Day 14	Day 14

The plant that grew best was _____

_____

I think it grew the best because_____

_____

The soil for plant A is good because_____

_____

The soil for plant B is poor because _____

_____

Shopping Cart Sorting!

Cut out the food items from the 'Is It A Fruit Or A Vegetable?' worksheet. Glue the food in the correct shopping cart; any food that doesn't fit can be glued on the back of this sheet!

Fruits

Vegetables

Is It A Fruit
Or A
Vegetable?

Cut out the food items below and glue them into the correct shopping cart on the worksheet titled 'Shopping Cart Sorting.' If any food items do not belong in the carts, glue that item on the back of the worksheet!
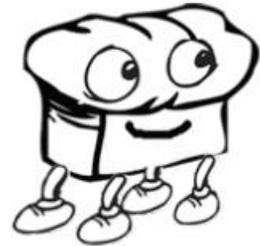
|		
Cheese	Apple	Bread
Onion	Celery	Grapes
Watermelon	Meat	Potato
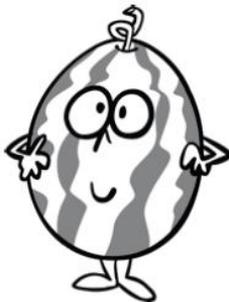
Shopping Cart Sorting! (Answer Key)

Cut out the food items from the 'Is It A Fruit Or A Vegetable?' worksheet. Glue the food by the correct shopping cart; any food that does not belong can be glued on the back of this sheet!

Fruits

Apple

Grapes

Watermelon

Onion

Potato
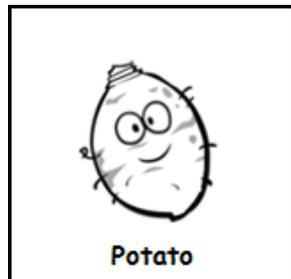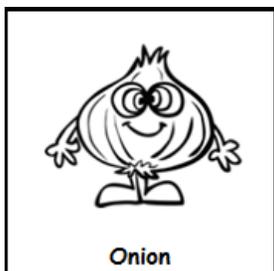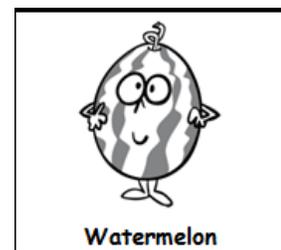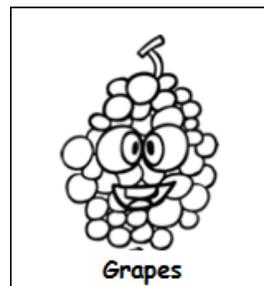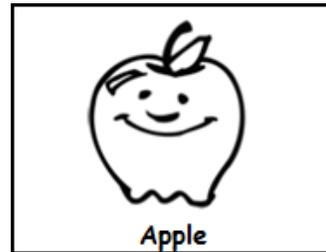
Vegetables

Note: The meat, bread, and cheese pictures would be glued on the back.

Celery

toronto ZOO

Name: _____   Date: _____

How Many Plants Are In My Lunch?

	Fruit	Vegetable
8		
7		
6		
5		
4		
3		
2		
1		

Name: _____

Recipe for Plant Food

What do plants eat? Plants make their own food, called sugar. Fill in words to help complete the recipe below.

Ingredients:
• Carbon dioxide from the air
• Water
• Sunlight

Instructions to plants:

1. Suck up _____ from the ground.

2. Catch _____ with your leaves.

3. Use _____ from the sun to mix things up.

4. Breathe in _____ from the air.

5. Breathe out _____ from the water.

6. Now use sunlight-energy, carbon dioxide water and minerals to make   _____.

7. Sugar is your _____!

8. Use sugar to make all your parts, like leaves, _____,   fruits and flowers.

food	energy	sugar	carbon dioxide
seeds	sunlight	water and minerals	oxygen

Name: _____

Recipe for Plant Food (Answer Key)

What do plants eat? Plants make their own food, called sugar. Fill in words to help complete the recipe below.

Ingredients:
• Carbon dioxide from the air
• Water
• Sunlight

Instructions to plants:

1. Suck up <u>water and minerals</u>   from the ground.

2. Catch <u>sunlight</u>   with your leaves.

3. Use   <u>energy</u>   from the sun to mix things up.

4. Breathe in   <u>carbon dioxide</u>   from the air.

5. Breathe out   <u>oxygen</u>   from the water.

6. Now use sunlight-energy, carbon dioxide, water and minerals to make   <u>sugar</u>.

7. Sugar is your <u>food</u> !

8. Use sugar to make all your parts, like leaves, <u>seeds</u> ,   fruits and flowers.

food	energy	sugar	carbon dioxide
seeds	sunlight	water and minerals	oxygen