Educational Activity Kit

Bread Science

Grades 1 and 3 (Cycles 1 and 2)

How do we cultivate wheat? What are a scythe, a flail, and a winnowing basket, and what is each used for? Through storytelling, students discover how wheat is grown, how it is harvested, and the steps for baking bread. They grind wheat into flour, knead dough to stretch the gluten chains, and then watch the ways dough changes when it is cooked. And of course, there is fresh bread to taste!

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An Enriching Program

Target grade level
This program targets Grade 1 and 3 students in Ontario, Cycle 1 and 2 students in Québec.

Duration
2 hours

Program dates
This program is offered weekdays from September to June.

Learning objectives
- learn how to grow and harvest wheat (past and present)
- discover the types of energy that can be used to grind wheat
- learn about the ingredients that go into a loaf of bread
- understand how yeast transforms dough into leavened bread
- understand how the ingredients work together to make bread
- understand how dough changes as it cooks

Learning methods
- listening to the Little Red Hen or to The Three Farmers’ story.
- separating wheat kernels from the chaff and straw
- examining different grinding devices and mills
- examining wheat kernels before and after being crushed
- helping the educator mix, knead, and shape dough
- participating in a co-operative game simulating the interactions between bread ingredients
- eating freshly baked homemade bread

Curriculum Links

<table>
<thead>
<tr>
<th>ONTARIO</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grade 1</strong></td>
</tr>
<tr>
<td>Science and Technology</td>
</tr>
<tr>
<td>Understanding Life Systems – Needs and Characteristics of Living Things</td>
</tr>
<tr>
<td>Understanding Matter and Energy – Energy in Our Lives</td>
</tr>
<tr>
<td>Understanding Structures and Mechanisms – Materials, Objects, and Everyday Structures</td>
</tr>
<tr>
<td><strong>Grade 3</strong></td>
</tr>
<tr>
<td>Science and Technology</td>
</tr>
<tr>
<td>Understanding Life Systems – Growth and Changes in Plants</td>
</tr>
<tr>
<td><strong>Social Studies</strong></td>
</tr>
<tr>
<td>Heritage And Citizenship – Early Settlements in Upper Canada</td>
</tr>
</tbody>
</table>
Cycle 1 (Grades 1 and 2) Primary
Mathematics, Science and Technology

- **Competency** To explore the world of science and technology

**Fees, payment, and group size**
For fees, please visit the School Programs section of our website at [www.agriculture.technomuses.ca](http://www.agriculture.technomuses.ca) or call 613 991-3044 or 1 866 442-4416. Payment may be made in advance or on arrival, by cash, debit card, cheque (made payable to the Canada Agriculture Museum), or by credit card (VISA or MasterCard). Maximum group size for this program is 20 students. There are cancellation fees – please consult the Important Information section for more details.

**If you have any questions, please do not hesitate to contact us at 613 991-3053.**

We look forward to seeing you at the Museum!
IMPORTANT INFORMATION

For teachers planning a visit to the Museum...

This information will help you to plan your visit to the Canada Agriculture Museum with complete confidence. If you have any questions after reviewing this information, please contact the reservations office by telephone at 613-991-3053, or ask the Museum Educator who will be in touch with you to help plan your visit and answer any questions about the schedule and special student needs. Make sure to communicate any necessary information to parents, accompanying adults, and school bus drivers.

Student supervision

Teachers and accompanying adults are encouraged to participate and assist with programs. Please remember, the Museum is also a demonstration farm, complete with the miracle of new life and the potential hazards of large animals and working machinery. A Museum Educator will escort you throughout your program, however, supervision by teachers and accompanying adults is essential to creating a safe and fun atmosphere. The Museum requires the following student-adult ratios.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>K to Grade 8 (Secondary II)</td>
<td>6:1</td>
</tr>
<tr>
<td>Grade 9 (Secondary III) and up</td>
<td>10:1</td>
</tr>
</tbody>
</table>

Teachers and accompanying adults are expected to remain with their students at all times.

Recommended clothing

Depending on the program, activities may take place indoors or outdoors, but in all cases participants will be walking through the Museum grounds, which is a working farm. Please come prepared with appropriate outerwear and footwear for weather and farm conditions. In summer, ask students to bring sunscreen, hat, and sunglasses. In case of rain or snow, be prepared with coats, warm clothing, boots, hats, and gloves. Some activities take place in unheated buildings — please consult the “Special Information” included in the An Enriching Program section to confirm if these conditions apply to your program.
Lunchroom facilities

Advance reservations for lunchroom facilities (free) are essential between mid-October and mid-May. If you indicate a requirement for a lunchroom when you reserve your program, a place will be set aside for your group to have a snack or lunch, where students may leave their lunch boxes upon arrival. Between mid-May and mid-October, groups may eat their lunch at sheltered outdoor picnic tables. Please note that there are no food services available at the Museum.

Name tags

Before visiting the Museum, please give each of your students a name tag to wear indicating their first name. This helps your Museum Educator to more quickly establish a good rapport with the group.

Exhibitions

The Animal Barns are open year round. From March 1 to October 31, exhibitions are open on the second level of the Dairy Barn. You are invited to visit them before or after your program.

Free preview visit

Teachers are encouraged to visit the Museum before bringing their students. For a free preview visit, simply present proof of your teaching status at the Museum entrance.

Changes to reservations

To change the time or date of your program, reserve lunchroom facilities, choose another program, or add participants to the group, please telephone 613-991-3053. If you must cancel a program please give us as much advance notice as possible by calling the above telephone number. Please note that a cancellation fee of $36 per program will be charged for cancellations made less than 48 hours before the scheduled start time of the program. In the case of school bus cancellation due to inclement weather, this fee will not apply if a school reschedules the cancelled program within the same school year. For a program cancelled with more than 48 hours notice, a $20 administration fee will apply, unless the program is rescheduled within the same school year. If you arrive late, the program will be shortened so that those groups scheduled to follow your visit will not be inconvenienced.

Allergens may be present throughout the Museum’s indoor and outdoor facilities.
Where to find us

The Canada Agriculture Museum is located on Prince of Wales Drive, on the Central Experimental Farm, in Ottawa. School buses must drop off and pick up students in the Museum’s parking lot located on Prince of Wales Drive, south of the traffic circle and north of Baseline Road. All buses must use this entrance. Parking is free.

On arrival

After all students are off the bus, please proceed to the Admission Booth where a Museum host will meet you, and help you finalize payment if this has not already been done. Please have your confirmation letter with you. You will also be met by the Museum Educator who will accompany you throughout your program, starting at the appointed hour.
Senses

Next to each picture, write down which sense the picture describes and explain with words or a drawing how you would use that sense if you were making bread.
Basic Needs

Like us, the wheat plant is alive. It needs to eat, drink and breathe to grow and to be healthy. The wheat plant is also very different from us. For example, it has no eyes and no ears. Explain how you and the wheat plant are different by completing the sentences below.

Wheat Plant

I use the energy from the sun to make my own food.

I breathe through tiny holes on my leaves.

I can't move around.

I absorb water through my roots.

I live outside in a field.

I am both a boy and a girl.

Me

I eat______________________

_________________________.

I breathe through my

_________________________.

I move by __________________

__________________________

I drink water through my

_________________________.

I live in__________________________

I am a ____________________
The Life Cycle of a Wheat Plant

In this activity, students study the life cycle of a wheat plant while making a booklet.

Materials

- appendix B
- colouring pencils
- scissors
- coloured construction paper

Instructions

1. Give each student a copy of Appendix B, “The Life Cycle of a Wheat Plant” booklet activity. Have them colour the images and cut them out along the dotted lines.

2. Ask students to look carefully at the images and to put them in the right order.

3. Distribute the construction paper. Ask students to cut their sheet in two—they will use each half as a cover for their booklet.

4. Staple the images together, with one construction paper sheet at the front, the other at the back. Your students can draw a wheat plant on the front sheet and write the booklet’s title: *The Life Cycle of a Wheat Plant*.

Other Activities

1. Go to a natural food store or bulk store and buy wheat kernels. Have each student plant a few seeds in a plastic or Styrofoam cup. Have the class observe and compare the growth of the wheat plants. They can follow the plant’s life cycle with their booklet.

2. For advanced students, cover the text under the images before photocopying the pages. Under each image, have the students write down which part of the wheat’s life cycle is represented.
Parts of a Wheat Plant

Use the words at the bottom of the page to fill in the blank lines.

spike  stalk    leaf   kernel
    germ   roots   bran
Yeast is a Living Thing

Yeast is a living thing that grows, takes in food, makes waste and reproduces. Use the suggested activities below to teach your students about the basic needs of yeast.

Suggested Activities

- Make bread dough using the recipe of Baba Luba’s Brown Bread (appendix A). As you prepare the water, sugar and yeast mixture, go over the basic needs of living things with your students. Yeast needs a warm environment to grow. It needs water and food (white sugar in this case) to survive. Have the students smell the gases produced by the yeast (its waste). The yeast metabolises the sugar into alcohol (ethanol – that evaporates when baked) and carbon dioxide. Observe what happens to the dough over the course of a day. The carbon dioxide will get trapped inside the dough, allowing it to rise.

- Bake the dough. Cut the freshly baked bread into slices and distribute them to the students. Have them look for air pockets – holes produced by the gas trapped inside the dough.

- Discuss how the yeast works. Take half of the dough and put it in a cold area, and place the other half in a warm area. Measure the amount each rises at specific timed intervals. In a warm environment, yeast is more active and therefore, the dough rises faster. In a cold environment, the dough rises slowly as a result of low yeast activity.

- In a small bottle, mix a teaspoon of yeast with warm water and sugar. Place a balloon over the neck of the bottle. The balloon will inflate as the yeast metabolizes (eats) the sugar and produces waste – carbon dioxide.

Additional information

Baking yeast (*Saccharomyces cerevisiae*) is a single-cell organism that belongs to the Fungi Kingdom. It is normally purchased as active dry yeast in the form of small granules. The yeast will lie dormant until it is rehydrated. As yeast feeds on the fermentable sugars in bread, not only does it produce the gas that allows the dough to rise, but it is also responsible for giving it its distinctive flavour.
Pioneer Chores
(Answers)

When early settlers wanted bread to eat, it took much more work than it
does for us now. Today, we can simply go to the grocery store and buy all
the bread we want. For the pioneers, however, there were many chores to
do before they could enjoy bread with their meals. Look at the list of
chores below and decide who would have done each of the chores in a
pioneer household — father, mother or maybe even their children.

1) Plough the fields: *Men or boys 12 years or older.* This chore required
much physical strength and endurance to keep the plough in the soil. One
also had to know how to lead a team of horses or oxen.

2) Plant the wheat seeds: *Men or boys 8 years or older.*

3) Cut the wheat plants: *Men or boys 12 years or older.* This chore
required much physical strength and endurance. One had to be old
enough to manipulate the sharp scythe with safety.

4) Tie the wheat plants in bundles: *Women, girls and boys under 12.* As
men and older boys cut the wheat, women, girls and boys under 12 would
tie bundles of wheat plants with straw.

5) Bring the wheat bundles back to the farm: *Men and boys.* Leading a
team of horses or oxen was normally done by men and boys.

6) Beat the wheat plants with a flail to separate the grains from the
rest of the plant: *Men and boys 12 years or older.* This chore required
much physical strength and endurance. The men and boys would whip the
seeds heads with one end of the flail. The beating not only removed the wheat seeds from the plant, but also from the chaff.

7) Winnow the wheat to separate the seeds from the chaff: Men and women. On a windy day, they would place the seeds and the chaff in large wooden baskets and throw them into the air. The wind would carry away the chaff. The seeds, being heavier, would fall back into the winnowing basket. One had to have long arms and be strong to lift the basket and catch the falling seeds.

8) Transport the wheat seeds to the flour mill and have the miller grind them into flour: Normally, only men would perform that chore. Not only did they have to carry heavy bags of wheat, but they also had to negotiate with the miller the cost of grinding the wheat into flour.

9) Prepare the dough and bake bread: Women and girls.
When early settlers wanted bread to eat, it took much more work than it does for us now. Today, we can simply go to the grocery store and buy all the bread we want. For the pioneers, however, there were many chores to do before they could enjoy bread with their meals. Look at the list of chores below and decide who would have done each of the chores in a pioneer household — father, mother or maybe even their children.

<table>
<thead>
<tr>
<th>Chore</th>
<th>Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Plough the fields.</td>
<td>Father</td>
</tr>
<tr>
<td></td>
<td>Mother</td>
</tr>
<tr>
<td></td>
<td>Children</td>
</tr>
<tr>
<td>2) Plant the wheat seeds.</td>
<td>Father</td>
</tr>
<tr>
<td></td>
<td>Mother</td>
</tr>
<tr>
<td></td>
<td>Children</td>
</tr>
<tr>
<td>3) Cut the wheat plants.</td>
<td>Father</td>
</tr>
<tr>
<td></td>
<td>Mother</td>
</tr>
<tr>
<td></td>
<td>Children</td>
</tr>
</tbody>
</table>
4) Tie the wheat plants in bundles.

5) Bring the wheat bundles back to the farm.

6) Beat the wheat plants with a flail to separate the grains from the rest of the plant.

7) Winnow the wheat to separate the seeds from the chaff.
<table>
<thead>
<tr>
<th>Step</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8)</td>
<td>Transport the wheat seeds to the flour mill and have the miller grind them into flour.</td>
</tr>
<tr>
<td>9)</td>
<td>Prepare the dough and bake bread.</td>
</tr>
</tbody>
</table>
Word Search

The words listed below are hidden in the Word Search Puzzle. Some are written across and some go down. Can you find all of them?

BAKE
BREAD
CUT
DOUGH

FLAIL
KNEAD
MILL

SEED
SUN
WATER
WHEAT
YEAST

Use the leftover letters to complete the sentence.

I like to ___ ___ ___ fresh bread.
**Word Search**
(answers)

<table>
<thead>
<tr>
<th>B K F D O U G H</th>
</tr>
</thead>
<tbody>
<tr>
<td>R N L W H E A T</td>
</tr>
<tr>
<td>E E A C M I L L</td>
</tr>
<tr>
<td>A A I U B A K E</td>
</tr>
<tr>
<td>D D L T S E E D</td>
</tr>
<tr>
<td>Y E A S T E A T</td>
</tr>
<tr>
<td>W A T E R S U N</td>
</tr>
</tbody>
</table>

The words listed below are hidden in the Word Search Puzzle. Some are written across and some go down. Can you find all of them?

- BAKE
- BREAD
- CUT
- DOUGH
- FLAIL
- KNEAD
- MILL
- SEED
- SUN
- WATER
- WHEAT
- YEAST

Use the leftover letters to complete the sentence.

I like to **E A T** fresh bread.
Word Scramble

Write the letters in the proper order.

k e b a __ __ __ __

d r e a b __ __ __ __ __

m r e g __ __ __ __

e a t w h __ __ __ __ __ __

r a n b __ __ __ __

f o u r l __ __ __ __ __
Word Scramble
(Answers)

Write the letters in the proper order.

k e b a  b a k e

d r e a b  b r e a d

m r e g  g e r m

e a t w h  w h e a t

r a n b  b r a n

f o u r l  f l o u r
My Favourite Bread

Draw a picture of your favourite bread and colour it. Write a short text that describes how you like to eat it (with jam, cheese, etc.).

My favourite bread is __________________________________________

I like to eat it ________________________________________________

________________________________________________________________

________________________________________________________________

________________________________________________________________

________________________________________________________________

________________________________________________________________

________________________________________________________________.
Connect the Dots

Complete the image by connecting the dots in the ascending order and colour it in.
Add the Slices of Bread

3 + 2 = 5

____ + ______ = ______

____ + ______ = ______

____ + ______ = ______

____ + ______ = ______
Bread Mathematics

1 loaf of bread = 15 slices of bread.

Now that you know how many slices of bread are in one loaf, solve the following problems.

1. If you eat 8 slices out of a loaf of bread, how many slices are left?

2. If you put 3 loaves of bread together, how many slices of bread will you have in total?
3. If you eat 1 slice out of a loaf of bread for breakfast, 2 for lunch and 1 as a snack before bed, how many slices are left in the loaf?

4. You must share a loaf of bread between 3 friends. How many slices of bread will each get?
Colour the Little Red Hen
Hooray for Wheat!
Wheat Harvest Time!
Help the Little Red Hen

Using art as a medium, this activity reminds students of the many steps involved in making bread.

Materials:

- cardboard
- The Little Red Hen comic strip
- colouring pencils or crayons
- glue
- scissors

Instructions:

1. Have the students help out the Little Red Hen. She no longer remembers how to make bread. Ask them to colour the comic strip, cut out the squares and glue them back in order on the cardboard.

2. Under each image, have the students write down what the Little Red Hen is doing.

3. Check their answers and review the steps for making bread with the class.
The Little Red Hen Comic Strip
Play Dough

With this activity students will gain a better understanding of why play dough is so malleable and so much fun! The following recipe can be made easily, and the dough has a good shelf life.

Suggested Activities

- Have students fashion loaves of bread in traditional shapes and make a display for your classroom.
- Have students fashion and paint holiday decorations, such as a cornucopia of fruit and vegetables for Thanksgiving, jack-o'-lanterns for Halloween, or baby animals to celebrate Spring!
- Let students' imaginations run wild with play dough at a play station in the classroom. Set up an art gallery to display their creations.

Play Dough (Cornstarch Clay)

Ingredients

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Ingredient</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 ml</td>
<td>salt</td>
<td>2 cups</td>
</tr>
<tr>
<td>325 ml</td>
<td>water</td>
<td>1 ⅓ cups</td>
</tr>
<tr>
<td>250 ml</td>
<td>cornstarch</td>
<td>1 cup</td>
</tr>
</tbody>
</table>

Put salt and half of the water (160 ml) in a pot and bring to a boil. In a bowl, mix cornstarch with remaining water and mix well. Blend the cornstarch mixture into the salt water and knead into clay. Knead until dough is smooth and pliable. Work quickly so that the dough does not cool down. Makes about 750 ml. Sculptures can be air dried and then painted. Store unused clay in an airtight container in the refrigerator.
“Stained Glass” Candle Holders

These candle holders are quite lovely and can be completed within a half hour.

Materials:
- Clear glass container (jar, small glass)
- Tissue paper in assorted colors
- 250 ml (1 cup) of all purpose flour
- 1.5 litres (6 cups) of water
- Paint brushes
- Votive or tea candle, depending on size of container

Process:
- Create starchy glue by dissolving 250 ml (1 cup) of flour into about 1.5 litres (6 cups) of water. Stir well. Pour in small containers.
- Tear the tissue paper and/or pictures into small (1") pieces.
- Paint the glass container with starchy glue.
- Apply the tissue paper to the container with your fingers, overlapping to create different colored effects.
- Once the container is covered, repaint the glass container with starchy glue over all the pieces.
- Allow the container to dry overnight on an aluminum foil covered tray.
- Place the candle in the container.

You can change the effect of these containers by changing the colour of the tissue paper you use; for example, red and white paper for Valentine’s Day, or have students find out their Mom’s favourite colour and make her a candle holder for Mother’s Day.
### Baba Luba's Brown Bread

<table>
<thead>
<tr>
<th>15 ml</th>
<th>yeast</th>
<th>1 pkg or 1 tbsp</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 ml</td>
<td>sugar</td>
<td>2 tsp</td>
</tr>
<tr>
<td>50 ml</td>
<td>warm water</td>
<td>¼ cup</td>
</tr>
<tr>
<td>500 ml</td>
<td>warm water</td>
<td>2 cups</td>
</tr>
<tr>
<td>50 ml</td>
<td>vegetable oil</td>
<td>¼ cup</td>
</tr>
<tr>
<td>50 ml</td>
<td>molasses</td>
<td>¼ cup</td>
</tr>
<tr>
<td>5 ml</td>
<td>salt</td>
<td>1 tsp</td>
</tr>
<tr>
<td>1.5 litres</td>
<td>whole wheat flour</td>
<td>6 cups</td>
</tr>
</tbody>
</table>

In small bowl, add yeast and sugar to 50 ml (¼ cup) of warm water and let stand for 5 minutes.

In a large bowl, mix 500 ml (2 cups) of warm water with the oil, molasses, and salt. When yeast is frothy, stir and add to molasses mixture. Stir well.

Add flour, one cup at a time until blended. Turn dough out onto floured board. Knead until it feels just right (about 10 minutes). Put back in bowl and let rise in a warm place. When doubled in size (1 hour or so), punch down and form into two loaves. Place in well greased bread pans. Cover with cloth and let rise for 45 minutes or so.

Bake at 175°C (350 °F) for 45 minutes in a regular oven, a bit less in a convection oven.

Yield: 2 loaves
Appendix B   The Life Cycle of a Wheat Plant

The soil is warm and moist. The germ sprouts and begins to grow tiny roots and a small stem. It uses the energy stored inside the seed to grow.

The wheat plant has dried up. It is now yellow and crisp. The seeds are now ready to harvest.
It's spring time.
The wheat seed is planted into the soil.

The seedling grows. Its roots absorb water and nutrients from the soil.
The roots also anchor the plant in the soil.
The wheat plant has three leaves. It can make its own food through photosynthesis. It uses its leaves to transform the energy from the sun into sugar.

The wheat plant makes flowers. The flowers are difficult to see and don't have beautiful petals. The wind transports the pollen (the male seeds) to the female part of the flower (the pistil).
The flowers were fertilized and seeds are developing inside the seed head. The pointy beard and husk protect the seeds from predators.

A second stem, called tiller, starts growing. It too will produce a seed head.