



## Woolly Experiments

### Level: Grades 1 and 2 (Cycle 1)



How can you tell if a fibre is natural or made by humans? Can you tell if a fibre is wool, cotton or polyester? Students will have an opportunity to answer these questions by using their senses and conducting interesting experiments. In the barn, they will meet animals that are raised for the fibres they produce, and will discover the animals' needs, life cycles, and products. They will then conduct experiments comparing the properties of various fibres. Before they leave, students will study the effects of water, soap and friction on wool in a craft project they can take home.

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# AN ENRICHING PROGRAM

## Target grade levels

This program targets Grade 1 and Grade 2 students in Ontario and Cycle 1 students in Quebec.

## Duration

90 minutes

## Program dates

This program is offered year round.

## Learning objectives

- discover the characteristics and needs of sheep, goats and alpacas
- recognize physical and behavioural changes in sheep throughout their life cycle
- understand that sheep, goats and alpacas can provide us with milk, meat, by-products and fibres
- distinguish between natural fibres and those made by humans
- recognize the properties of various fibres
- learn how fibres, as material, can be made into objects

## Learning methods

- visit the Small Animal Barn and the Horse and Cattle Barn
- see and touch sheep, goats and an alpaca
- play a game observing the characteristics of sheep
- study the life cycle of sheep (Grade 2)
- examine and handle equipment used in sheep farming
- handle and classify fibre samples
- conduct experiments comparing the properties of wool, cotton and polyester
- make a piece of felt to take home



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## Curriculum links

### ONTARIO

#### Grade 1

##### Science and Technology

Understanding Life Systems: Needs and Characteristics of Living Things

Understanding Structures and Mechanisms: Materials, Objects and Everyday Structures

#### Grade 2

##### Science and Technology

Understanding Life Systems: Growth and Changes in Animals

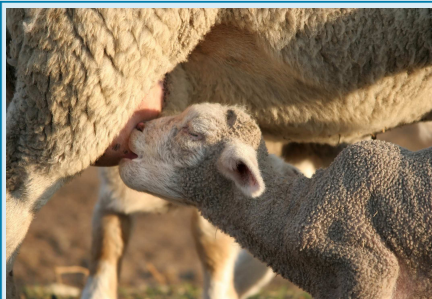
### QUEBEC

#### Elementary Cycle 1 (grades 1 and 2)

##### Mathematics, Science and Technology

Science and Technology

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



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## Fees, payment, and group size

For fees, please visit the **School Programs** section of our website at [cafmmuseum.techno-science.ca](http://cafmmuseum.techno-science.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 and Food 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!



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## Science and Technology

## LITTLE LAMB

Imagine that your class has been given a lamb. What would this lamb need to survive?

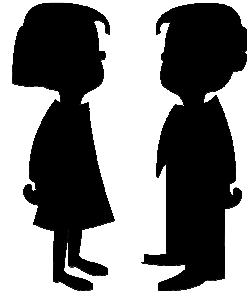
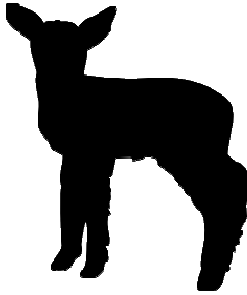
1. Ask your students to prepare a list of the lamb's essential needs. They can begin by filling in the blanks in the "My Friend the Lamb" activity sheet with words or drawings. Make sure they think about all aspects of caring for a lamb: sheltering it, feeding it, keeping its bedding clean, etc. Ensure that students understand that lambs are not pets, and that they require special care.
2. When students have identified what a lamb needs to survive, ask them to compare the needs of lambs and humans. Discuss the similarities and differences. For example, lambs and humans both need to be fed, but do they eat the same things?



Name: \_\_\_\_\_

Date: \_\_\_\_\_

## LITTLE LAMB



To survive, I need :

To survive, I need :

To survive, I need :

To survive, I need :

To survive, I need :

To survive, I need :

To survive, I need :

To survive, I need :

To survive, I need :

To survive, I need :



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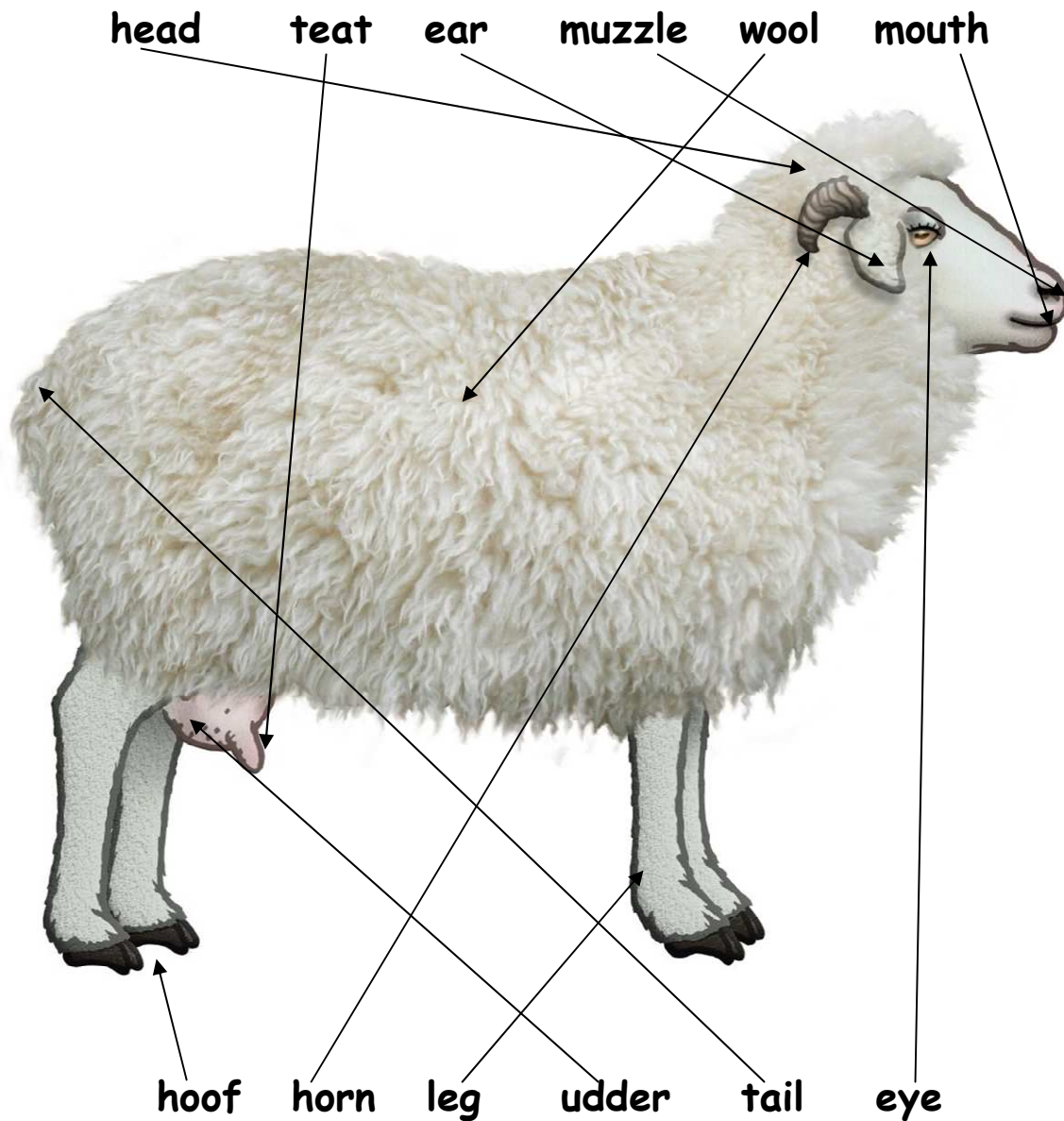


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## A EWE'S BODY

(Answers)

A ewe is a female sheep. Connect each word to the correct body part.



Name: \_\_\_\_\_

Date: \_\_\_\_\_

## A EWE'S BODY

A ewe is a female sheep. Connect each word to the correct body part.

head    teat    ear    muzzle    wool    mouth



hoof    horn    foot    udder    tail    eye



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# THE SHEEP FARMER'S TOOLBOX

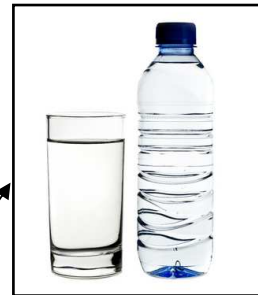
(Answers)

Link the items humans need to the corresponding items that sheep need.

## Sheep



## Humans





Name: \_\_\_\_\_

Date: \_\_\_\_\_

## THE SHEEP FARMER'S TOOLBOX

Link the items humans need to the corresponding items that sheep need.

### Sheep



### Humans



## Science and Technology

## A MAMMAL'S LIFE CYCLE

(Text in order)

Students read six paragraphs that describe the life cycle of a sheep. They then cut out the paragraphs, reread them and arrange them in the correct chronological order.

## THE LIFE OF A SHEEP

It's springtime. The snow is starting to melt. Every day is a little milder. A ewe gives birth to a lamb. She cleans the lamb with her tongue. Her lamb has a special scent. This scent helps the ewe recognize her lamb. Sometimes ewes have twins and even triplets!

Within an hour of being born, the lamb can stand up. It must find the ewe's two teats to drink milk. The ewe stays close to the lamb, because it's very small. She protects it, keeps it warm and makes sure it can drink whenever it's hungry.

When the lamb is a week old, it can venture farther away from the ewe. There are many other lambs in the flock. They like to play and explore together. After their adventures, each lamb returns to its mother.

It's hot! Summer has arrived. The lamb has grown a great deal. It's now called a sheep. It hardly drinks any milk at this stage, so the ewe produces less and less. The sheep now eats hay. It also likes to eat grass and grains, such as oats or corn.



The leaves are falling and it's getting cooler. Fall has come. The sheep is eight months old. It's now an adult! It is large and strong enough to look after itself. This adult sheep is male and so it's called a ram. An adult female is called a ewe.

For the ram to become a father, it must meet an adult ewe. The lamb grows in the ewe's womb. It takes five months for it to develop. Like its parents, the lamb will be born when winter is over.

## Other Suggestions

- Students can show that they have understood the text and learned the vocabulary by answering the questions on the Mammal's Life Cycle activity sheet.
- Students can create a poster about the life cycle of sheep, using their own drawings or finding images on the Internet to illustrate the stages. Using a large sheet of paper, they can arrange the pictures in a circle then write labels to identify each stage and draw arrows to connect them. See the *Bombyx mori* moth diagram under An Insect's Life Cycle below as an example.
- As a group, compare the life cycle of humans and sheep, identifying similarities and differences. (For example, a similarity: babies and lambs both drink their mothers' milk; a difference: humans' developmental stages are much longer than those of sheep.)
- Compare the life cycle of sheep with that of silkworms.



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Name: \_\_\_\_\_

Date: \_\_\_\_\_

## A MAMMAL'S LIFE CYCLE

This text describes the stages in the life cycle of a sheep, which is a mammal. However, the paragraphs are in the wrong order. Cut out the paragraphs (follow the dotted lines) and re-arrange them so that the stages are in the correct order.

### THE LIFE OF A SHEEP

The leaves are falling and it's getting cooler. Fall has come. The sheep is eight months old. It's now an adult! It is large and strong enough to look after itself. This adult sheep is male and so it's called a ram. An adult female is called a ewe.



Within an hour of being born, the lamb can stand up. It must find the ewe's two teats to drink milk. The ewe stays close to the lamb, because it's very small. She protects it, keeps it warm and makes sure it can drink whenever it's hungry.





It's hot! Summer has arrived. The lamb has grown a great deal. It's now called a sheep. It hardly drinks any milk at this stage, so the ewe produces less and less. The sheep now eats hay. It also likes to eat grass and grains, such as oats or corn.



For the ram to become a father, it must meet an adult ewe. The lamb grows in the ewe's womb. It takes five months for it to develop. Like its parents, the lamb will be born when winter is over.



When the lamb is a week old, it can venture farther away from the ewe. There are many other lambs in the flock. They like to play and explore together. After their adventures, each lamb returns to its mother.



Photo: Richard Lawrence

It's springtime. The snow is starting to melt. Every day is a little milder. A ewe gives birth to a lamb. She cleans the lamb with her tongue. Her lamb has a special scent. This scent helps the ewe recognize her lamb. Sometimes ewes have twins and even triplets!





## Science and Technology

## A MAMMAL'S LIFE CYCLE

(Answers)

Carefully reread The Life of a Sheep and answer the following questions.

1. In the text:

(a) seasons: *spring, summer, fall, winter*

(b) numbers: *two, eight, five*

2. Fill in the blanks below:

A **mother** sheep is called a ewe.

A **father** sheep is called a ram.

A **baby** sheep is called a lamb.

3. Circle the correct answer below:

What do lambs eat or drink when they are very young?

Hay

Grain

Milk

Grass

4. Fill in the blanks below:

What do sheep eat or drink when they become adults?

Hay, grain and grass.

5. Explain why lambs no longer need their mothers once summer is over.

*Lambs no longer need their mothers because they do not drink milk at this stage. They are now big enough to find their own food and to protect themselves.*

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## A MAMMAL'S LIFE CYCLE

Carefully reread The Life of a Sheep and answer the following questions.

1. In the text:

(a) Use a crayon to underline the seasons.

(b) Use a crayon of another colour to underline numbers.

2. Fill in the blanks below:

A **mother** sheep is called a \_\_\_\_\_.

A **father** sheep is called a \_\_\_\_\_.

A **baby** sheep is called a \_\_\_\_\_.

3. Circle the correct answer below:

What do lambs eat or drink when they are very young?

Hay

Grain

Milk

Grass

4. Fill in the blanks below:

What do sheep eat or drink when they become adults?

\_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.

5. Explain why lambs no longer need their mothers once summer is over.

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# AN INSECT'S LIFE CYCLE

## *Bombyx mori* Moth (silkworm)

The *Bombyx mori* is a moth. The female lays between 300 and 500 eggs on the leaves of the white mulberry tree. The eggs hatch 10 to 14 days later. We call the larvae, or caterpillars, of this moth "silkworms".

Silkworm caterpillars eat mulberry leaves for about one month. This is the longest stage in the insect's life cycle. To grow, the silkworms must moult, or shed their skin, four times. They will grow to 7.5 centimetres in length.

Each silkworm spins a cocoon of silk. It produces the silk using special organs in its mouth. Inside the cocoon, the larva transforms into a chrysalis.

The metamorphosis takes two weeks. The moth then emerges from the cocoon. A female must meet a male to be able to produce eggs. This last stage is very short. Because the adult moth has no mouth, it cannot eat and it dies within a few days.



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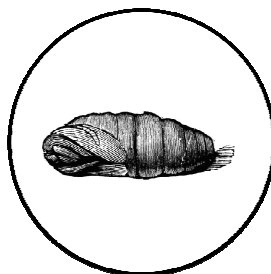
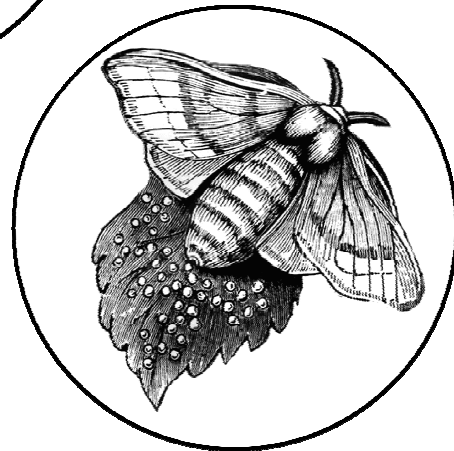
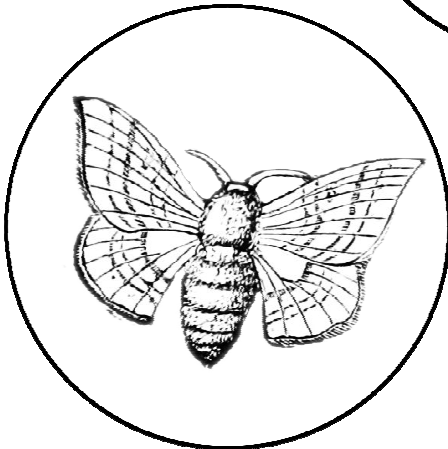
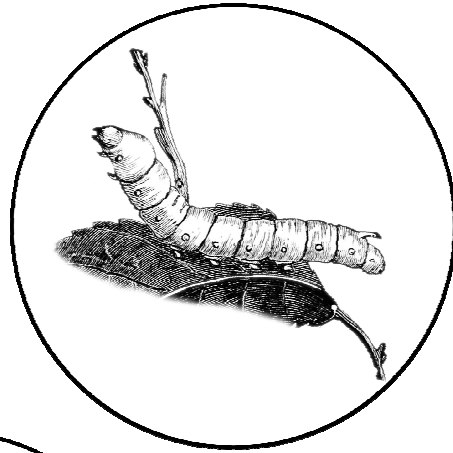
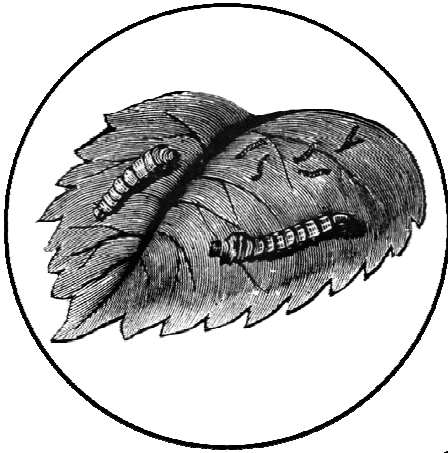
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## AN INSECT'S LIFE CYCLE

Rearrange the silkworm's life cycle. Cut out the pictures below and glue them in the correct place in the life cycle diagram.

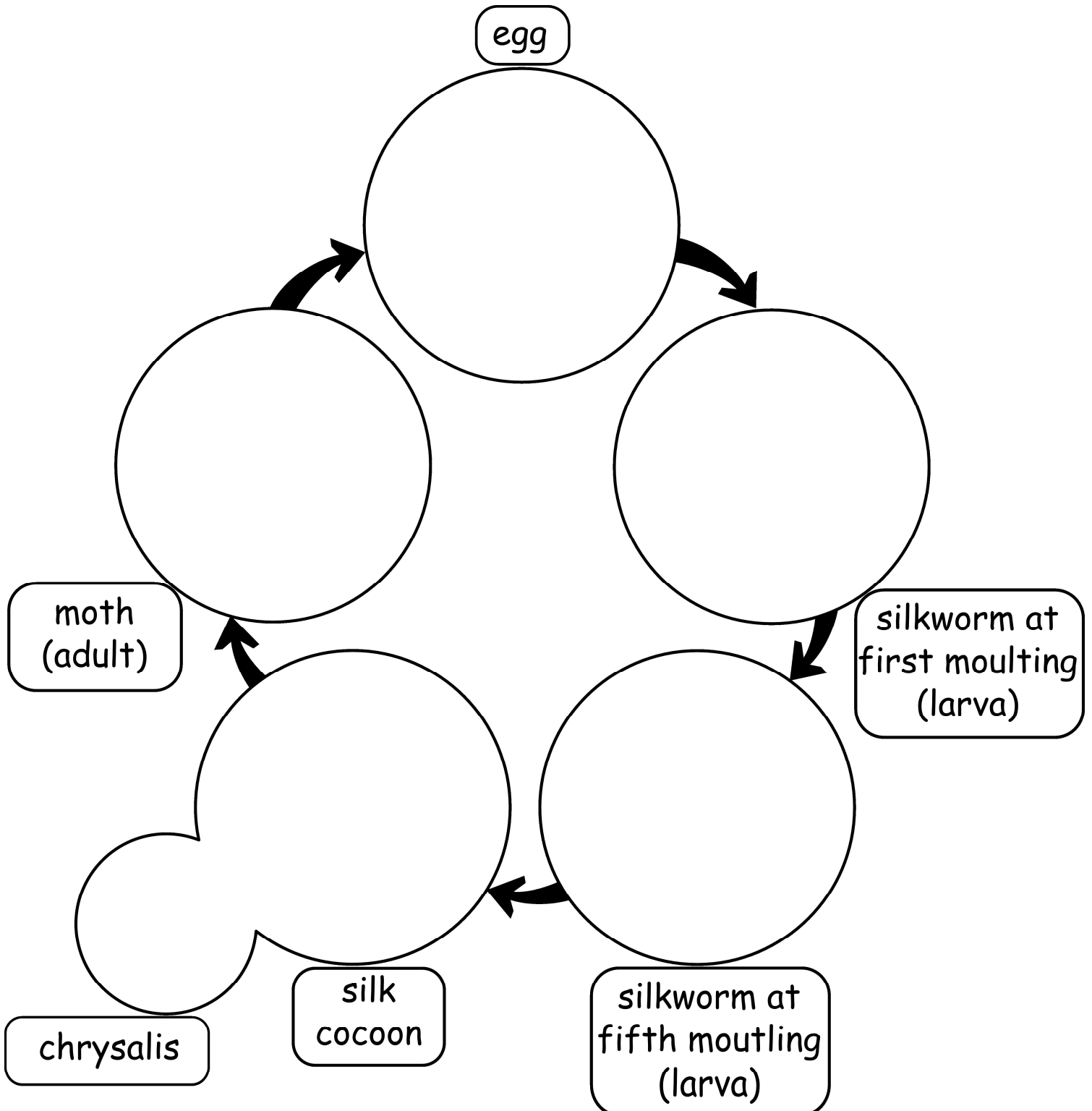


Name: \_\_\_\_\_

Date: \_\_\_\_\_

## AN INSECT'S LIFE CYCLE

*Bombyx Mori* Moth





## Science and Technology

## WHAT'S NATURAL?

(Answers)

**Circle** the items that are found in nature. Draw a **triangle** around the ones that are made by humans.

## Natural

skeleton  
feather  
honeycomb  
stone  
deer antlers  
shell  
stick  
nest

## Made by humans

steel beams  
plastic bag  
socks  
tire  
sweater  
house  
juice box  
vase

## Other Suggestions

- What's found in nature can be used as material. Ask the students to imagine that they are travelling on a ship that runs aground on a desert island. Using natural items they find there, the students have to build a house. Ask them to draw a picture or build a model of the structure they conjure up.
- Take the students into the schoolyard on a treasure hunt for natural materials.
- Ask the students to choose a manufactured article and to research the materials it is made of and how it was put together. The Internet offers many videos that explain the process of materials being made into articles.



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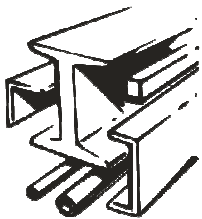
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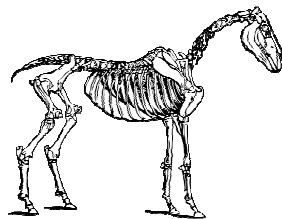
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## WHAT'S NATURAL?

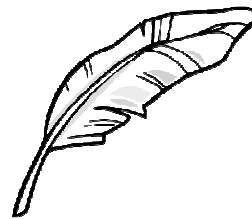
**Circle** the items that are found in nature. Draw a **triangle** around the ones that are made by humans.



steel beams



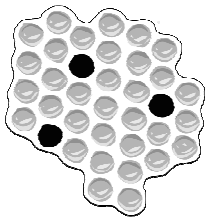
skeleton



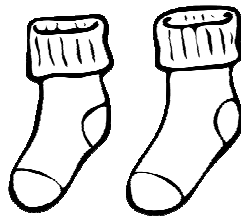
feather



plastic bag



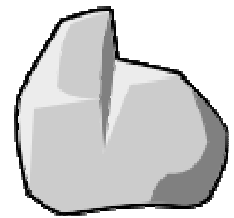
honeycomb



socks



tire



stone



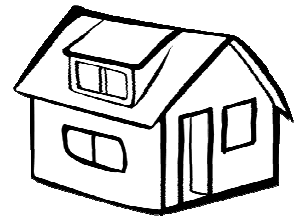
sweater



deer antlers



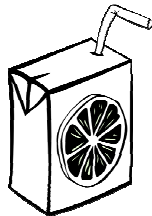
shell



house



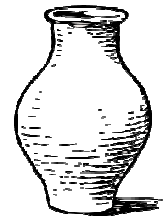
stick



juice box



nest



vase



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## Science and Technology

## EXPLORING PROPERTIES OF FIBRES

Fibres are an important material in manufacturing articles, but not all fibres have the same properties. In this experiment, students create a profile of the observable properties of the fibres that make up specific articles. In doing so, they will discover the vocabulary used to describe properties and learn to use their senses to gather data.

## Materials

Ask the students to help you by bringing to school various garments and other articles made from fibres, or use garments from the locker room and other articles at hand.

Examples could include an umbrella, mitts, a scarf, a fleece garment, a sweatshirt, socks, a baby blanket, a sports sweater, a towel, a hat, a bathing suit, a windbreaker, footwear, pyjamas, jeans, a tent, a kite, a chalkboard eraser, a carpet, a raincoat and nylon stockings.

## Instructions

1. Discuss with the students how garments and articles made from fabrics have different purposes (some absorb, repel or allow water to evaporate; some keep a person warm, cool or comfortable; others allow the wearer to stretch and move easily). Explain that a material must have certain properties if the article it is made into is to be functional.
2. Divide the students into small groups and give each group an article made from one or more fibres. Ask the students to use their sense of touch, vision, smell and hearing to examine the materials that make up the article. They should then answer the questions on the worksheet to create a profile of the properties of the fibre examined.



## Other Suggestions

- After this experiment, gather the articles and put them on view for all the students to see. In turn, each group describes the properties of the article it has examined, without naming the article. The other students try to guess the mystery article by looking at, handling and sorting all the articles on show.
- Ask the students to sort the articles by function and to compare the fibre properties of articles in the same category and in different categories. Ask them about any trends they observe.
- Read any labels on the articles to find out the names of the fibres used to make them. Using a bar chart, help the students identify which fibres are used most often.
- List some properties of fibres. Then ask students to present these properties to the class in the form of a collage of pictures cut out from catalogues, magazines and flyers and illustrating articles made from different fibres. For example, a student could use a picture of a bathing suit to represent elasticity or a baby blanket to represent softness.



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Name: \_\_\_\_\_

Date: \_\_\_\_\_

## EXPLORING PROPERTIES OF FIBRES

Name your article and its purpose (e.g., staying dry, keeping warm). Then use your senses to examine the material used to make your article. The questions below will help you identify certain properties of the material. Check the answer that best describes what you observe.

The article I'm examining is a(n) \_\_\_\_\_.

It's used for \_\_\_\_\_.

### 1. Flexibility



Does the material fold easily?

- ☐ **Yes,** the material is flexible.  
☐ **No,** the material is stiff.

### 2. Stretch



Can the material be stretched, and does it then regain its original shape?

- ☐ **Yes,** the material is stretchy.  
☐ **No,** the material is not stretchy.



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### 3. Water Repellency



Does the material repel water?

- ☐ **Yes,** the material is water repellent.
- ☐ **No,** the material is water absorbent.

### 4. Softness



Does the material feel pleasant to touch?

- ☐ **Yes,** the material is soft.
- ☐ **No,** the material is rough.

### 5. Transparency



Can light be seen through the material?

- ☐ **Yes,** the material is transparent.
- ☐ **No,** the material blocks the light.



## RESULTS: FIBRE PROPERTIES

Use this chart to record the data you have gathered. Circle the words that correspond to your answers to the questions.

	The material is ...	
1. Flexibility	flexible	stiff
2. Stretch	stretchy	not stretchy
3. Transparency	transparent	not see through
4. Water Repellency	water repellent	water absorbent
5. Softness	soft	rough



## Language

## WHAT AM I?

## (Answers)

When we observe various fibres under a microscope, we can see that they look different.  
Read the clues and look carefully at the pictures below to solve these riddles.

1. I grow on a sheep's skin, which has to be sheared every year.

My surface scales repel water but my core absorbs water.

The scales make me scratchy to touch.

I am **wool**.

2. I'm a type of plastic, often made from recycled bottles.

Once melted, the plastic comes out of tiny holes in a machine, like long, thin strands of spaghetti.

I retain water on my surface, but I cannot absorb water.

I am **polyester**.

3. I grow in long, thin wavy tubes on the surface of a plant's seeds.

When the plant dies, these tubes become empty, flat cavities. That's where I can store a lot of water.

I am **cotton**.

4. I'm manufactured from chemicals and the crushed parts of a plant.

Many tiny fibres are combined in the process.

I can absorb lots of water.

I am **bamboo**.



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Name: \_\_\_\_\_ Date: \_\_\_\_\_

## WHAT AM I?

When we examine various fibres under a microscope, we can see that they look different. Read the clues and look carefully at the pictures below to solve these riddles.

1. I grow on a sheep's skin, which has to be sheared every year.

My surface scales repel water but my core absorbs water.

The scales make me scratchy to touch.

I am \_\_\_\_\_.

2. I'm made from a type of plastic that is often produced from recycled bottles.

Once melted, the plastic comes out of tiny holes in a machine, like long, thin strands of spaghetti.

I retain water on my surface, but I cannot absorb water.

I am \_\_\_\_\_.



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3. I grow in long, thin wavy tubes on the surface of a plant's seeds.

When the plant dies, these tubes become empty, flat cavities. That's where I can store a lot of water.

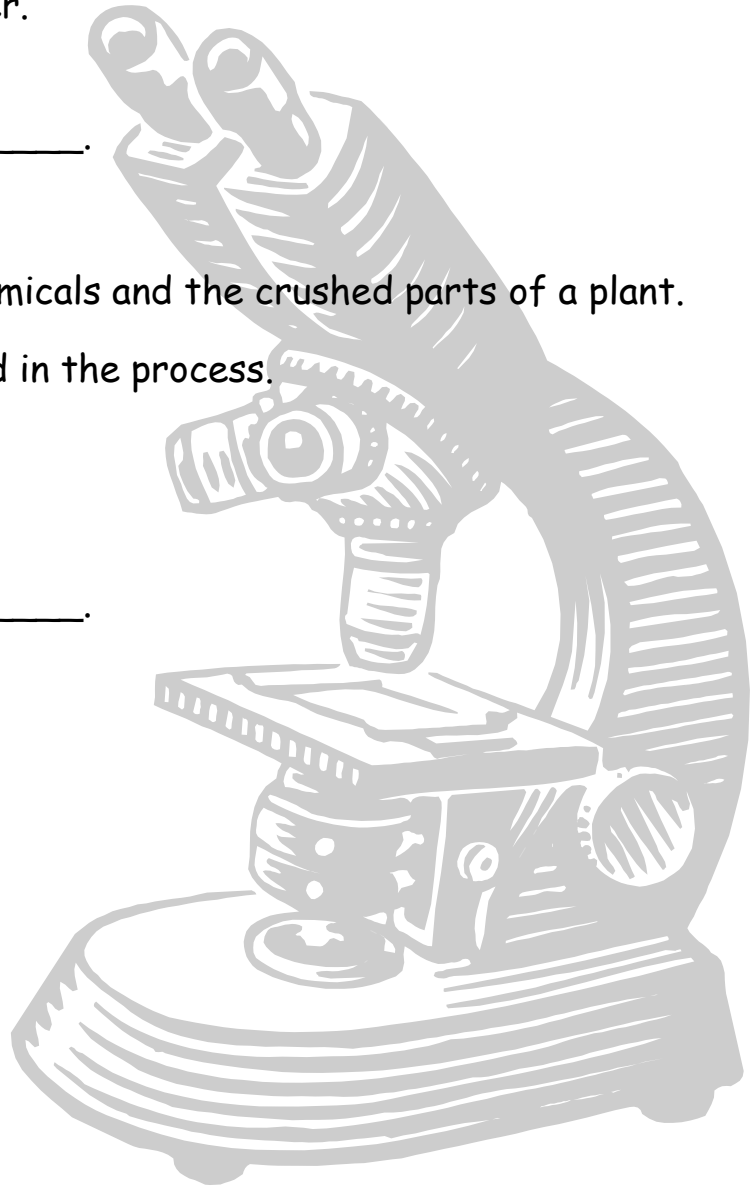
I am \_\_\_\_\_.

4. I'm made by humans from chemicals and the crushed parts of a plant.

Many tiny fibres are combined in the process.

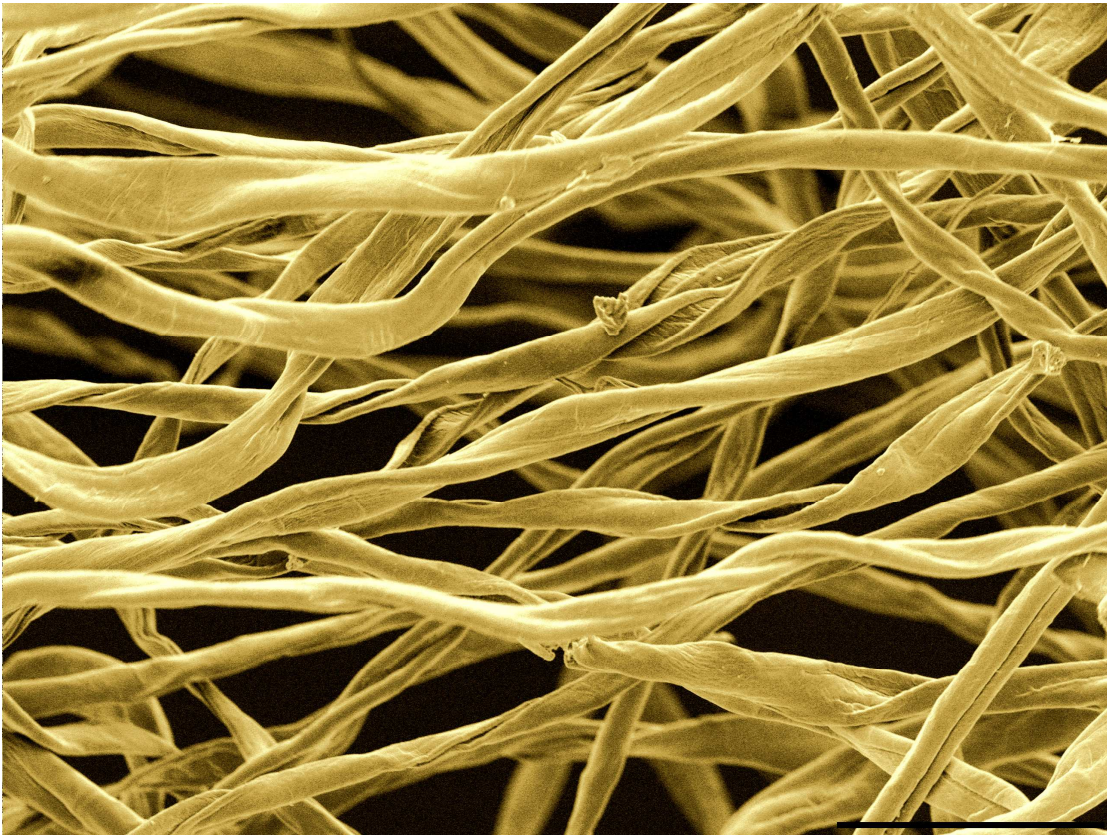
I can absorb lots of water.

I am \_\_\_\_\_.

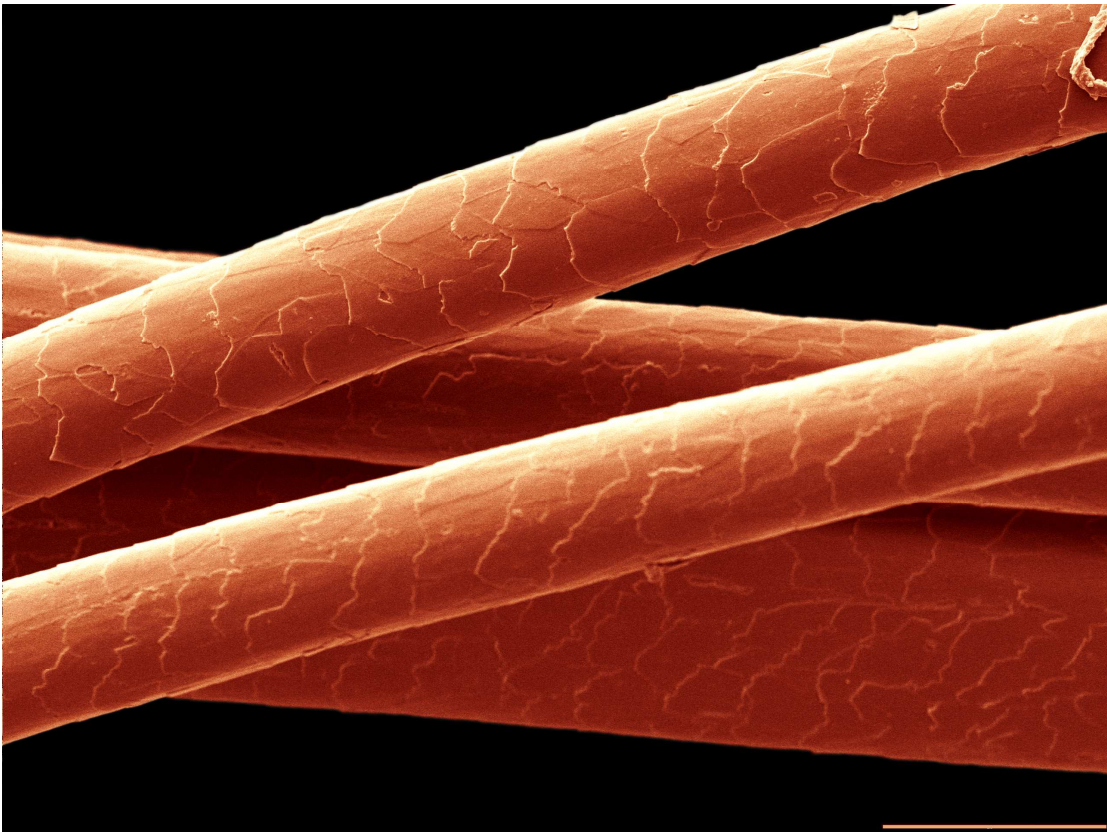




**COTTON**

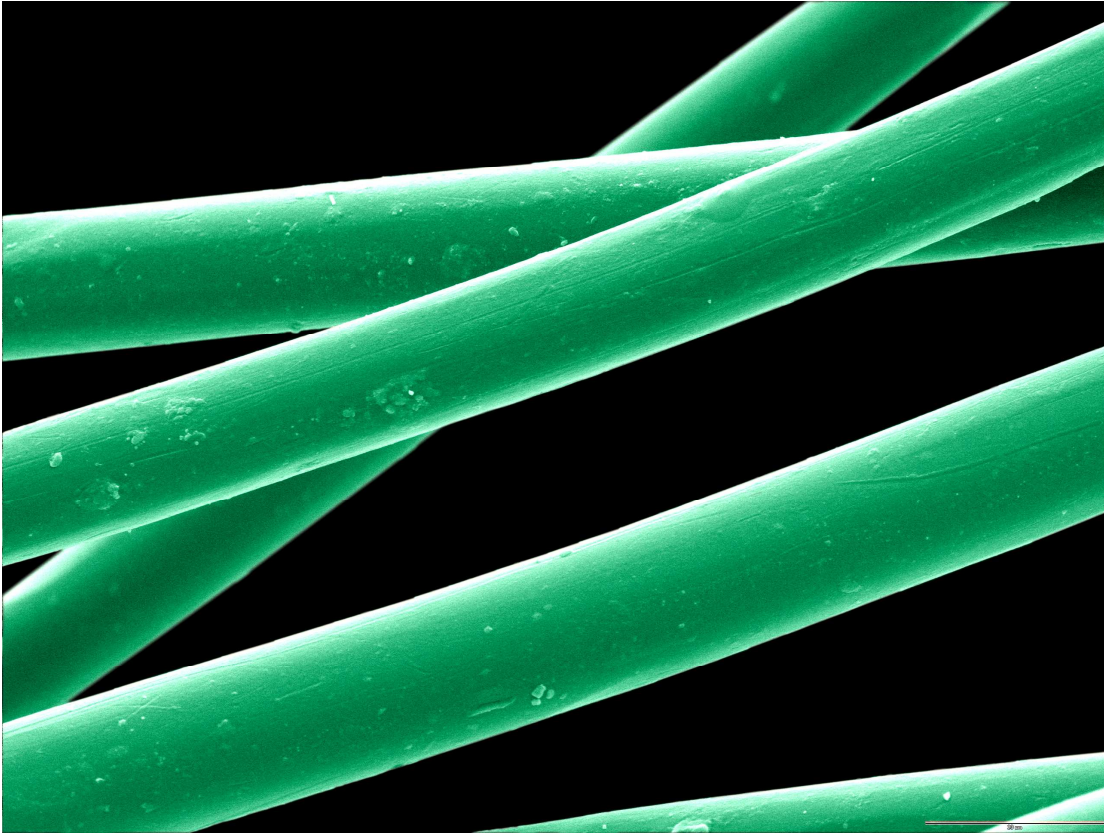


**WOOL**

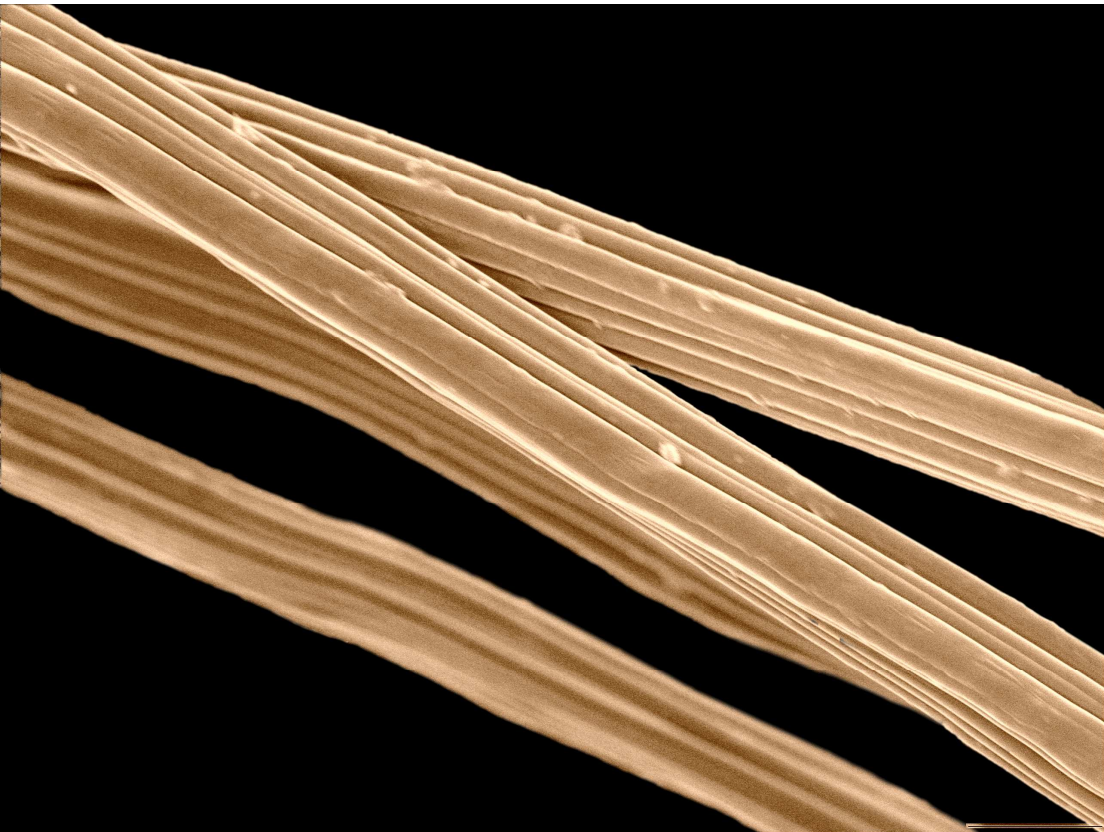




## POLYESTER



## BAMBOO



## Language

## WORD SEARCH

(Answers)

Shear  
 Weave  
 Angora  
 Thread  
 Polyester  
 Synthetic  
 Fleece  
 Natural  
 Silk  
 Alpaca  
 Cotton  
 Fibre  
 Sheep  
 Bamboo  
 Oil



Use the leftover letters to complete the following sentence:

The silkworm's **COCOON** is made from one single **FILAMENT** which can measure up to 1,500 meters. You would need about 1,000 cocoons to make one silk shirt.



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Name: \_\_\_\_\_

Date: \_\_\_\_\_

## WORD SEARCH

Shear  
Weave  
Angora  
Thread  
Polyester  
Synthetic  
Fleece  
Natural  
Silk  
Alpaca  
Cotton  
Fibre  
Sheep  
Bamboo  
Oil

P	S	H	E	A	R	C	O	S	B
O	Y	C	W	E	A	V	E	H	A
L	N	O	N	O	L	C	F	E	M
Y	T	F	A	N	P	O	F	E	B
E	H	L	T	S	A	T	I	P	O
S	E	E	U	I	C	T	B	F	O
T	T	E	R	L	A	O	R	I	I
E	I	C	A	K	L	N	E	A	L
R	C	E	L	A	N	G	O	R	A
M	E	T	H	R	E	A	D	N	T

Use the leftover letters to complete the following sentence:

The silkworm's \_\_\_\_\_ is made from one single \_\_\_\_\_, which can measure up to 1,500 meters. You would need about 1,000 cocoons to make one silk shirt.



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## Language

## WORD SCRAMBLE

(Answers)

Rearrange the letters to discover some sheep products and by-products.

limk      **milk**harlete      **leather**olow      **wool**ehesec      **cheese**onlilan      **lanolin**arnemu      **manure**tema      **meat**



Name: \_\_\_\_\_ Date: \_\_\_\_\_

## WORD SCRAMBLE

Rearrange the letters to discover some sheep products and by-products.

limk

\_\_\_\_\_



harlete

\_\_\_\_\_



olow

\_\_\_\_\_



ehesec

\_\_\_\_\_



onlilan

\_\_\_\_\_



arnemu

\_\_\_\_\_



tema

\_\_\_\_\_



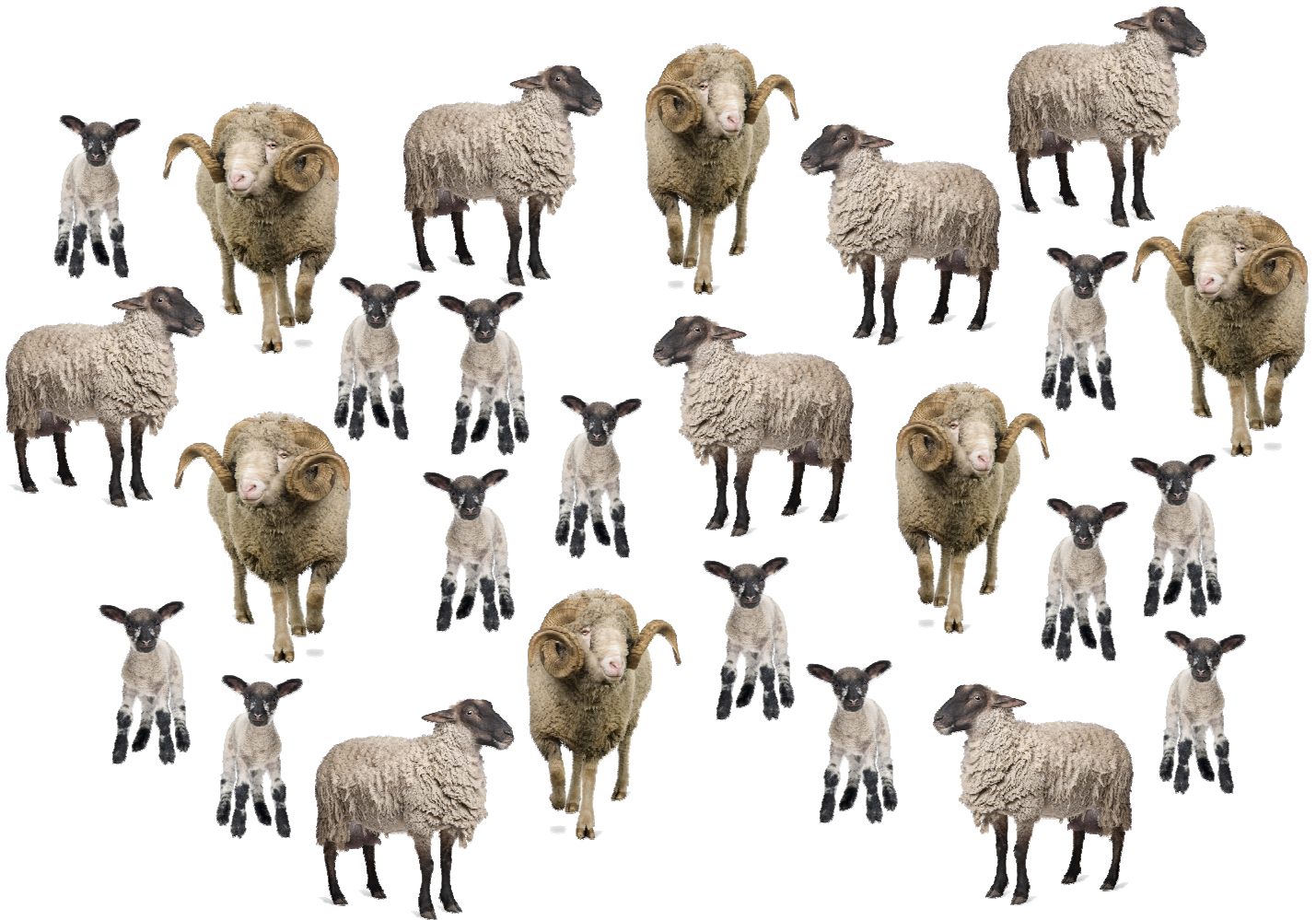
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Name: \_\_\_\_\_ Date: \_\_\_\_\_

## COUNT THE SHEEP



How many lambs are there?

\_\_\_\_\_

How many rams are there?

\_\_\_\_\_

How many ewes are there?

\_\_\_\_\_

How many sheep are there altogether? \_\_\_\_\_



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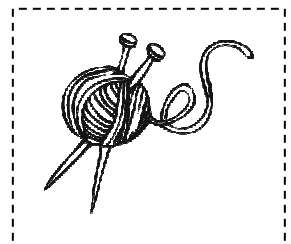
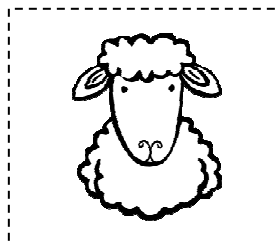
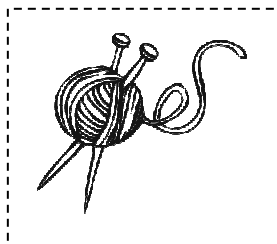
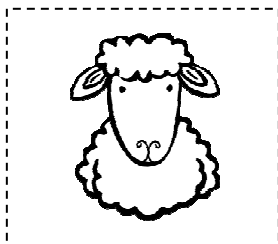
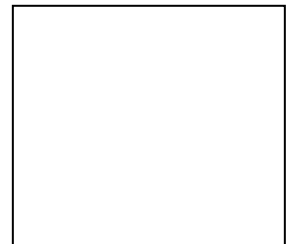
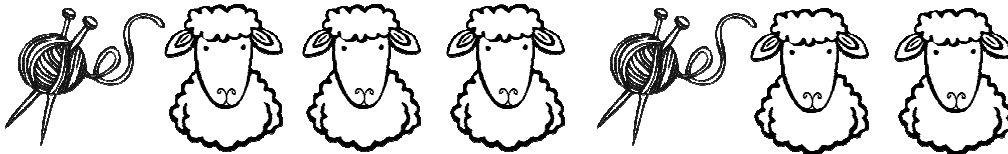
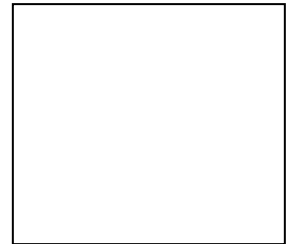
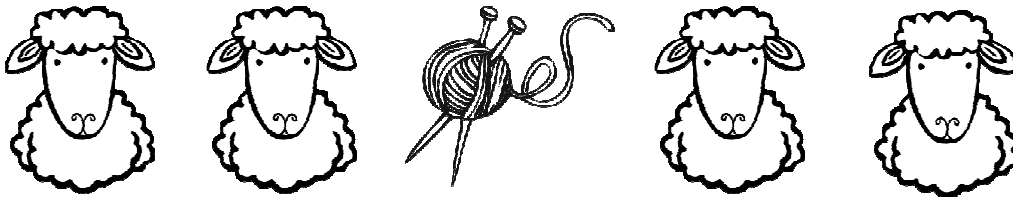
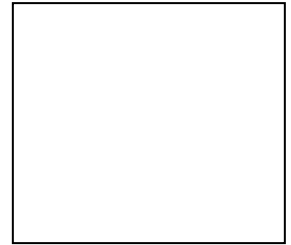
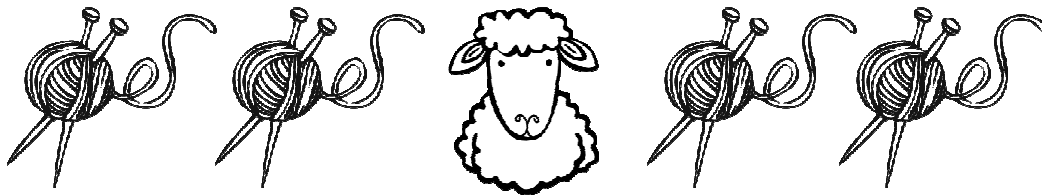
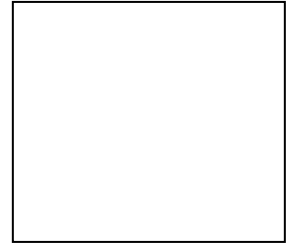
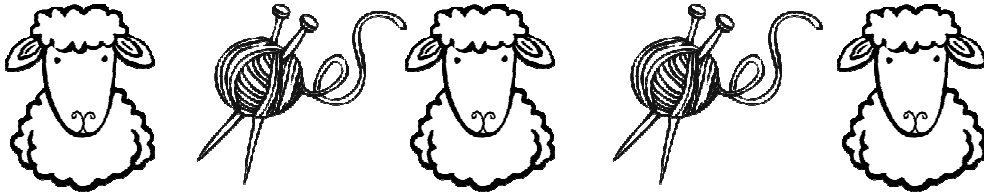


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Name: \_\_\_\_\_ Date: \_\_\_\_\_

## COMPLETE THE SERIES

Cut out the pictures at the bottom of the page and glue them in the correct box so that each series is complete.



Name: \_\_\_\_\_

Date: \_\_\_\_\_

# FLEECE FOR SALE

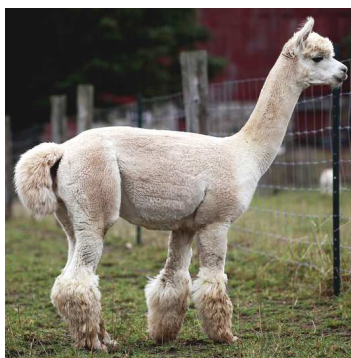
A farmer sells fibre from three different animals. Draw coins to show how much money the farmer receives for each fleece sold.



**Sheep: \$1.35**



**Angora goat:**  
**\$2.70**



**Alpaca: \$9.15**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

## IN THE SHEEPFOLD

Solve these math problems by using objects to represent the sheep. In each box, write your answer *and* include an illustration that shows how you reached the answer.

1. There are four pens in the sheepfold. Each pen contains three sheep. How many sheep are there in total? Remember to show how you reached your answer.



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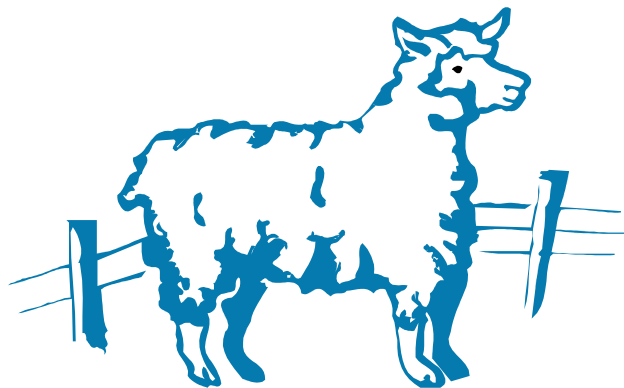


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2. Among the sheep, there are five lambs and one ram. How many ewes are there? Remember to show how you reached your answer.

A large rectangular area defined by a dotted line, intended for the student to show their work.



Name: \_\_\_\_\_

Date: \_\_\_\_\_

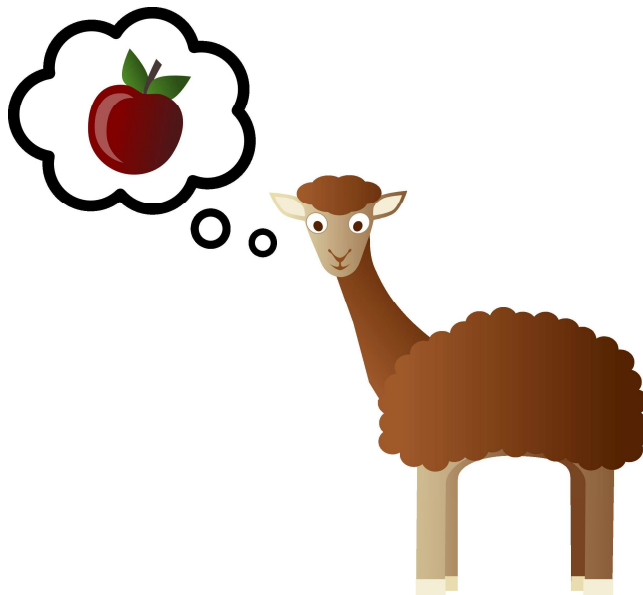
## AN ALPACA WITH AN APPETITE

Jules is an alpaca with an appetite. Today is his lucky day! A strong gust of wind has blown the barn door open. Now Jules can go and eat all the apples that have fallen from the tree.

1. On the map of the farmyard, show one route that Jules can follow to get to the apple tree.

### Rules of the game

- X marks the starting point.
- There is more than one possible route.
- Jules always moves in a straight line, never diagonally.
- Jules has to go around obstacles.
- The route uses the middle of the boxes, not the lines between the boxes.



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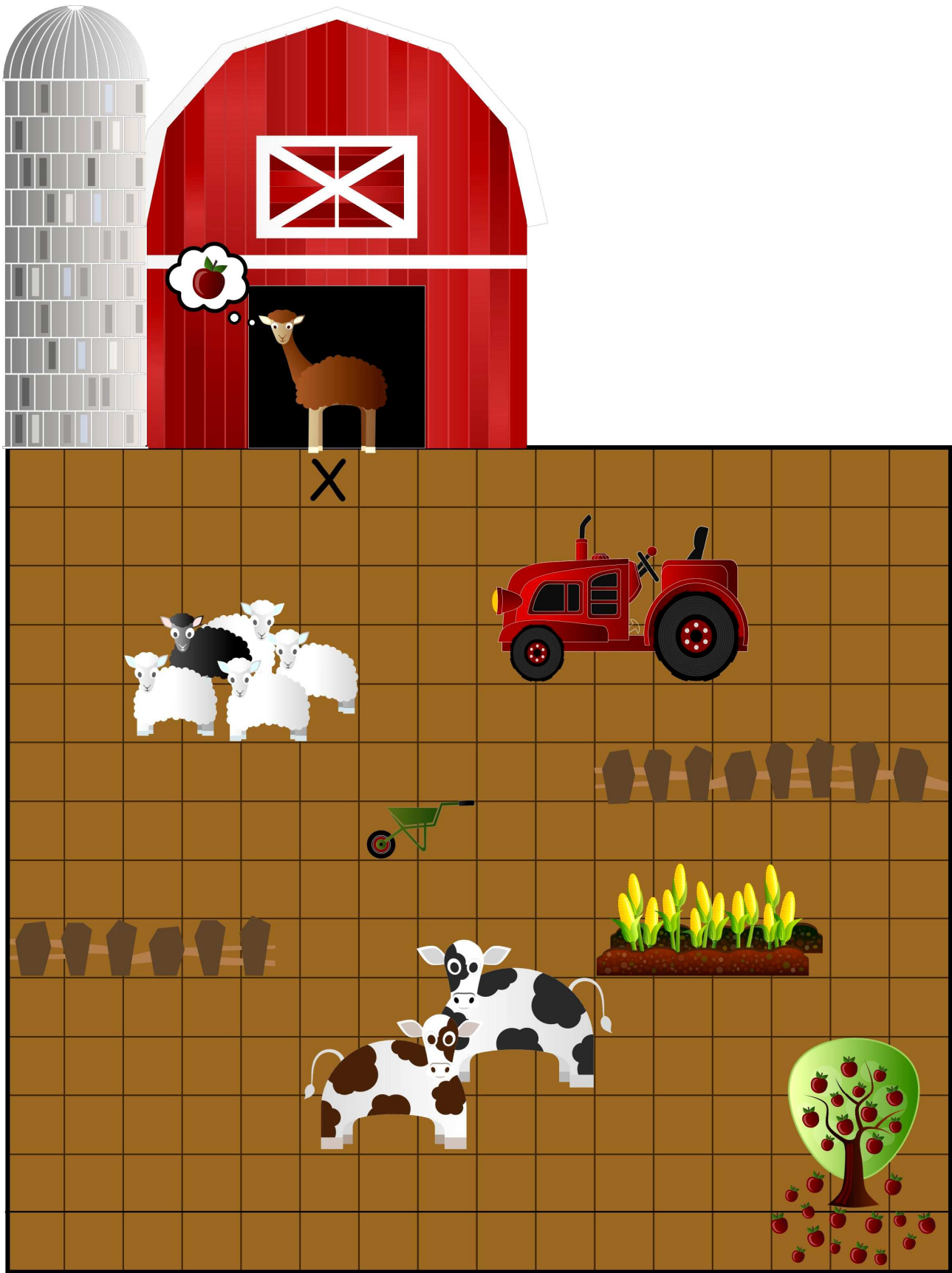
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2. In the table below, fill in the number of steps (**one box = one step**) and the direction (**up, down, right and left**) Jules follows to get to the apple tree.

To get from the barn to the apple tree, Jules follows this route:

1. \_\_\_\_\_ step or steps \_\_\_\_\_.
2. \_\_\_\_\_ step or steps \_\_\_\_\_.
3. \_\_\_\_\_ step or steps \_\_\_\_\_.
4. \_\_\_\_\_ step or steps \_\_\_\_\_.
5. \_\_\_\_\_ step or steps \_\_\_\_\_.
6. \_\_\_\_\_ step or steps \_\_\_\_\_.
7. \_\_\_\_\_ step or steps \_\_\_\_\_.
8. \_\_\_\_\_ step or steps \_\_\_\_\_.
9. \_\_\_\_\_ step or steps \_\_\_\_\_.
10. \_\_\_\_\_ step or steps \_\_\_\_\_.





## Arts

## WEAVING STUDENTS

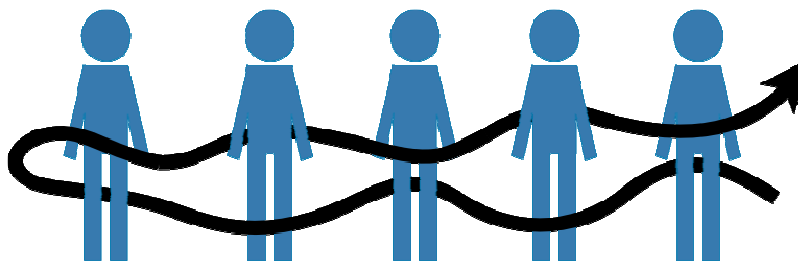
This exercise illustrates the process of weaving strands of fibre into fabric. The art of weaving has played an important part in the history of civilisation.

## Materials

- Roll of toilet paper or crepe paper
- Magnifying glasses

## Instructions

1. Ask the students to examine samples of woven fabric, such as burlap, using a magnifying glass, then ask them to describe what they observe. Explain that, in manufacturing fabric, fibres are first twisted together to form strands, and the strands are then woven into cloth. In weaving, horizontal (or weft) strands cross vertical (or warp) strands in a sequence.
2. Invite the students to make themselves part of a weaving as a means of understanding how the process works. Ask between five and ten students to stand next to each other in a line, with a little space between them, and to keep still. Instruct the first student in the line to hold the end of the paper strip and not to let go of it.
3. Unroll the paper strip behind the first student, in front of the second student, behind the third student and so on, until you reach the last student in the line. Take the strip around the last student, and then return to the starting point, continuing to unroll the strip between the students.
4. Repeat the process a few times so that the students can see that they are now held together by the paper strip. Explain that they form what is known as the warp and the paper strip forms the weft.



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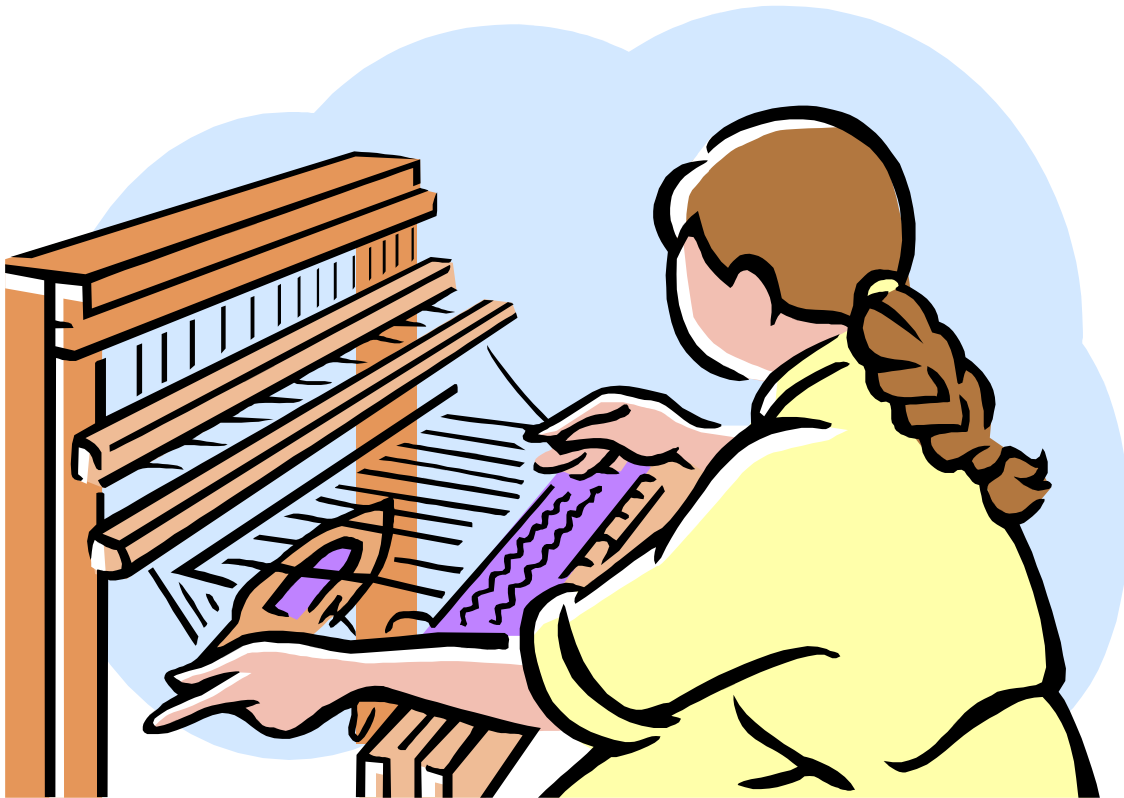


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## Other Suggestions

- In small groups, the students can practise making themselves into weavings using toilet paper or crepe paper strips. Organize a race to see which group can weave themselves fastest.
- On the Internet, research weaving techniques and tools used now and in the past (for example, finger weaving and the use of the backstrap loom, vertical loom and industrial loom).



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## Arts

## FINGER WEAVING ACTIVITY

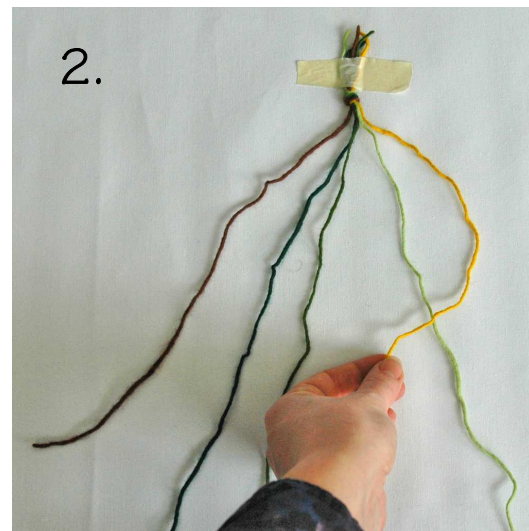
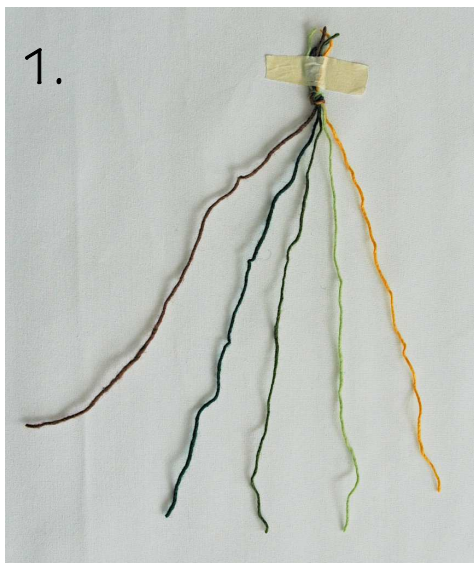
Weaving is one of the oldest methods of producing textiles. First Nations developed finger-weaving techniques hundreds of years ago, to make the articles they needed. It's an art form still practised today. In this activity, students learn finger weaving by making a bracelet. Before they begin, read the short overview that explains the importance of finger weaving in Canada's history.

## Materials

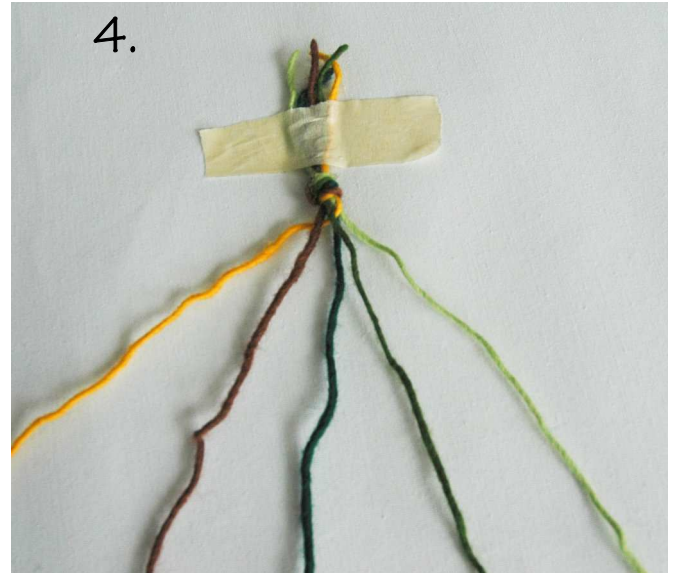
- Wool yarn in five different colours, cut to the length of the forearm
- Sticky tape

## Instructions

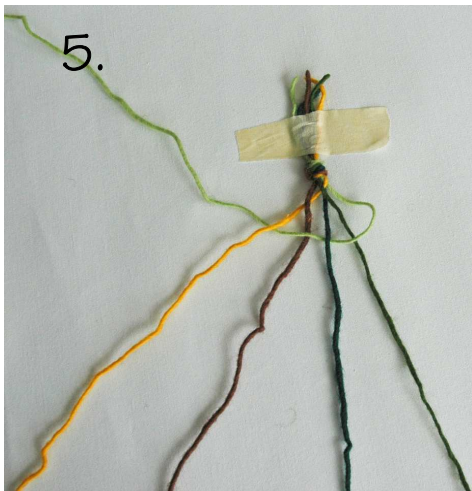
1. Tie one end of all the strands together. Use sticky tape to attach the knot to the work surface. Separate the strands and note the order of the colours. Follow this order throughout the activity. If necessary, attach the free ends of the strands to the work surface to keep them in order.
2. Take the first strand on the right (yellow) and pass it **over** the strand immediately to its left (lime green).



3. Continue to weave, passing the yellow strand **under** the next strand (forest green). Alternate weaving over and under until you reach the last strand on the left.
4. With the ends of the strands attached to the work surface, it is easy to adjust the tension of the weft (horizontal) strand by pulling it gently upward and to the left. Attach this strand to the work surface.



5. Begin the process again, using the strand that is now the first strand on the right (lime green).
6. Continue in the same way until the bracelet is long enough to be tied around the wrist. Tie a knot in the strands so that the weaving cannot come undone.



## FINGER WEAVING

First Nations in North America have been finger weaving for a long time. They used this form of weaving to make objects such as belts. The belts could be used to pull toboggans and to carry heavy or bulky loads.

Before the arrival of Europeans, First Nations were Canada's only inhabitants. They would hunt and gather all that they needed. Sometimes they grew plants, such as corn, but they did not raise farm animals. There were no sheep to give them wool so they used fibres from plants, as well as tendons and skins of wild animals for weaving.

When European settlers arrived in Canada, they began to trade goods and exchange knowledge with the First Nations. One exchange was wool blankets for beaver pelts. The First Nations would unravel the blankets to obtain wool yarn, which they found to be very useful. They also discovered that articles made from wool were more water-resistant, more supple and more durable than those woven from their usual materials.

For their part, the French quickly learned the art of finger weaving and began making what we know as *ceintures fléchées*, or arrowhead sashes. Men wore these long, colourful sashes around the waist to keep their coats or shirts closed when the weather was very cold. *Coueurs des bois* and *Voyageurs* also wore arrowhead sashes. They needed to lift heavy bales of fur, and the sashes kept them from injuring their stomachs and backs. They also kept them warm, since they were made of wool. And the sashes stayed dry and lightweight, even in snow.



Today, arrowhead sashes are a very important cultural symbol for the Métis in western Canada. In eastern Canada they represent, more broadly, French-Canadian, Acadian and First Nations cultures. There are still many artisans who make traditional sashes using finger weaving. And Quebec City's Bonhomme Carnaval is proud to show off his arrowhead sash!



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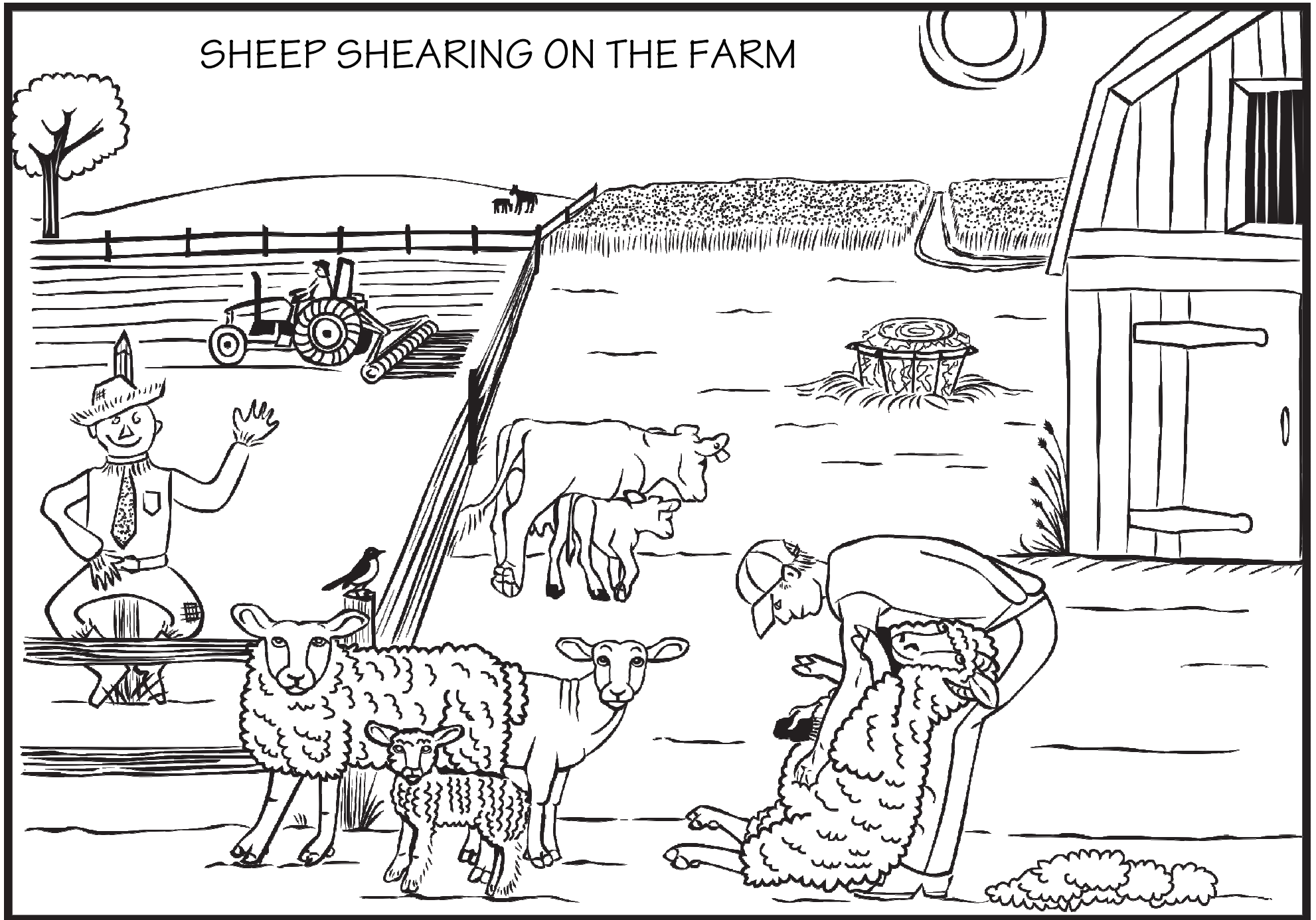
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Name: \_\_\_\_\_

Date: \_\_\_\_\_

## SHEEP SHEARING ON THE FARM



## ADDITIONAL INFORMATION

### **What is a material?**

A material is a substance of natural or artificial origin that has specific properties and is used to make objects. Wool is a material of natural origin: it consists of sheep's hair.

### **What is an object?**

An object is something that is designed, processed, or manufactured to serve a specific function. An object is made of one or more materials. For example, a mitten made of wool is an object.

An object can also be something more complex, made by combining two or more objects. A sweater that is made from knitted wool yarn and has a zipper and buttons is an example of a more complex object.

### **A material can also be an object**

When a material is used to serve a specific function, it becomes an object. For example, felted wool used as a blanket is an object. Felted wool cut up and sewn into slippers also demonstrates how a material is transformed into an object.

## **Wool...**

### **resists static electricity**

Because wool fibres absorb the moisture in the air, they build up very little static electricity. So wool clothing clings less to the body, and has less tendency to cause sparks, or attract lint or dust, than clothing made from other types of fibres.

### **is flame resistant**

The presence of water and keratin (the protein that is the main component of wool fibre) make wool a naturally flame-resistant fibre. Wool must reach a higher temperature than most other fibres in order for it to burn. When it does burn, wool combusts slowly and generates little heat. A wool blanket is an effective way to extinguish a flame.

### **is elastic**

Because of its shape and structure, wool fibre is elastic. Each fibre is made up of long chains of amino acids (proteins) that are naturally coil-shaped. Like a coil, wool clothes that are stretched or compressed resume their initial shape when the pressure is released. This property also keeps wool clothing from creasing.

### **resists odour**

Because it is not conducive to the growth of odour-causing bacteria, wool does not retain odours. Unlike a cotton or polyester sweater, a wool sweater will not smell unpleasant after a weekend of hiking or camping.

**absorbs dye**

Wool fibres have tiny microscopic pores that enable them to absorb not only moisture from the air, but dye, too. Wool can be dyed every imaginable colour, making it a favourite fibre for making colourful clothing. The colour of the wool changes very little over time. Unlike cotton, it does not fade when washed or when exposed to sunlight.

**Natural, Synthetic or Artificial?**

There are two main categories of fibres: fibres of natural origin (natural fibres) and fibres of chemical origin (chemical fibres). Natural fibres, such as cotton, silk and linen, are fibres we find in nature; they are produced by plants and animals. Chemical fibres are those we manufacture, using chemical processes to transform natural substances. Chemical fibres have two main subdivisions: synthetic fibres and artificial fibres.

Nylon, polyester and acrylic are synthetic chemical fibres. They are made from fossil fuels (oil and coal). First, these raw materials need to be transformed into plastics. Then, to manufacture the fibres, the plastic is heated to form a thick paste, which is then put through an extruder. An extruder resembles a garlic-press. This machine pushes out thin threads, which are then cooled, stretched and processed further. Nowadays, most polyester is made from recycled plastic bottles.

Artificial chemical fibres, such as rayon, bamboo and corn fibre, are formed like synthetic fibres. However, the raw material used is cellulose, which is extracted from the plant material. The cellulose is chemically transformed into a paste. Tiny fibres are formed by the extruding process. These are then put in an acidic solution to harden. Milk fibre is another artificial fibre which is formed by extrusion. In this case, a protein called casein is isolated from milk and is transformed into a paste. This fibre is soft, hypoallergenic and absorbent.

Chemical fibres are less expensive than natural fibres, and can imitate expensive natural fibres like silk. But synthetic fibres are not biodegradable and do not have the same properties as the natural fibres they imitate.



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## FUN FACTS

- For years fishermen around the world have worn wool garments to keep themselves warm during cold days and nights at sea!
- A long time ago, until the 1940s, bathing suits were made from wool! However, because wool is so absorbent, it is difficult to swim in a woolen suit because it becomes heavy when wet. Wool is so absorbent it has even been used to trap oil after environmental disasters such as an oil spill.
- Baseballs are filled with wool. It takes 137 metres of wool to fill a baseball!
- A sheep grows an average of 3.6 kilograms of wool each year.
- If the fleece of one sheep was spun into a single length of yarn, the strand would reach from Ottawa to Montreal — over 200 kilometres!
- Australia produces the most wool, while China is the top consumer of raw wool in the world.
- Scientists have found 34,000 year old twisted wild flax fibres in soil samples taken from a cave in the country of Georgia. These are the earliest evidence of humans using fibres as materials.
- Humans have been practicing agriculture for about 11 000 years. Sheep were among the first animals to be domesticated. In a cave in the country of Georgia, scientists found evidence of humans spinning wild flax or linen fibres as far back as 34,000 years ago.
- Humans have been engaged in agriculture for approximately 11,000 years. Sheep were among the first animals to be domesticated.



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## GLOSSARY

<b>alpaca</b> (noun)	domesticated South American ruminant mammal of the <i>Camelidae</i> family, raised for its long, woolly <i>fleece</i>
<b>article</b> (noun)	solid object, considered as a whole and manufactured for a specific purpose
<b>artificial</b> (adjective)	made by human skill as opposed to by nature, an imitation
<b>billy goat</b> (noun)	male goat
<b>bleat</b>	sheep's cry (n.); to make a sound like a sheep (v.)
<b>breed</b> (noun)	subdivision of an animal species (for example, the poodle is a breed of dog)
<b>buck</b> (noun)	male goat
<b>by-product</b> (noun)	product derived from another product (wool is a by-product of sheep raised for mutton)
<b>carnivore</b> (noun)	organism that eats only flesh (meat)
<b>chrysalis</b> (noun)	pupa of moths and butterflies that is inactive and enclosed in a firm casing from which the adult eventually emerges
<b>cria</b> (noun)	baby alpaca
<b>doe</b> (noun)	female goat
<b>dye</b> (noun)	colour with a colouring agent that results in a predetermined colour
<b>electric shears</b> (noun)	equipment used to shear sheep
<b>ewe</b> (noun)	female sheep
<b>fibre</b> (noun)	long, fine element of natural origin or made by humans
<b>fleece</b> (noun)	coat of sheep's wool removed by shearing
<b>flock</b> (noun)	group of sheep
<b>goat</b> (noun)	leaping and climbing ruminant mammal of the <i>Caprinae</i> family, raised for its milk, meat and sometimes for its <i>fleece</i>
<b>grass</b> (noun)	grasses that livestock eat in the pasture

<b>guard animal</b> (noun)	animal whose job it is to protect a flock of sheep from predators
<b>hair</b> (noun)	threadlike (long and fine) outgrowth on the skin of mammals
<b>hand shears</b> (noun)	large scissors used to cut sheep's wool
<b>hay</b> (noun)	crops (grasses or legumes) that are cut, dried, and stored for use as food for livestock
<b>herbivore</b> (noun)	organism that eats only plants
<b>herding dog</b> (noun)	dog that protects a flock of sheep or keeps it together
<b>herdsperson</b> (noun)	person who feeds, cares for, and manages animals
<b>horn</b> (noun)	hard, often pointed outgrowth on the head of many ruminant mammals
<b>larva</b> (noun)	form of insects when they hatch from the egg
<b>lamb</b> (noun)	baby sheep
<b>mammal</b> (noun)	class of vertebrate animals that feed their babies milk
<b>material</b> (noun)	anything that serves as raw or crude matter to be used or developed, substance used to make articles
<b>meat</b> (noun)	animal flesh
<b>milk</b> (noun)	fluid secreted through the mammary glands of female mammals to feed their young
<b>moult</b> (verb)	in animals, to renew skin, feathers or fur as a result of growth, age or environmental conditions
<b>nanny goat</b> (noun)	female goat
<b>natural</b> (adjective)	existing in or formed by nature
<b>nutritious</b> (adjective)	containing an abundance of nutrients
<b>oats</b> (noun)	cereal plant whose seeds (grains) are used to feed livestock and humans
<b>object</b> (noun)	anything that is visible or tangible and is relatively stable in form
<b>omnivore</b> (noun)	organism that eats both plants and meat
<b>pasture</b> (noun)	where livestock eat plants growing on the land



<b>predator</b> (noun)	animal that eats prey (other animals)
<b>prey</b> (noun)	living thing that an animal preys upon in order to eat it
<b>property</b> (noun)	characteristic of a thing that distinguishes it from other things; particularity
<b>pupa</b> (noun)	inactive form of insects of the <i>Lepidoptera</i> order: stage between the caterpillar and the adult butterfly
<b>ram</b> (noun)	male sheep
<b>ruminant</b> (noun)	mammal having a stomach that is divided into several compartments
<b>scent</b> (noun)	a distinctive smell (in the case of sheep, enables the animals to recognize each other)
<b>shear</b> (verb)	to shave a sheep to remove its wool
<b>sheep</b> (noun)	thick-haired ruminant mammal of the ovine species, raised for its wool, flesh, hide, and sometimes its milk
<b>sheep barn</b> (noun)	building that houses sheep
<b>shepherd</b> (noun)	person who watches over and tends to a flock of sheep
<b>spin</b> (verb)	to twist fibres to form a thread
<b>strand</b> (noun)	small bit of spun wool
<b>straw</b> (noun)	grain stalks used as bedding for farm animals
<b>synthetic</b> (adjective)	produced by synthesis, that is, the preparation of a chemical compound from its constituent elements

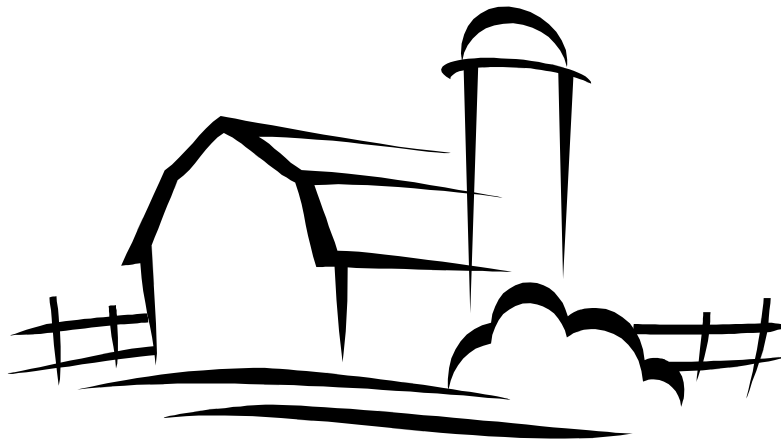


## ADDITIONAL RESOURCES

For additional activities on farm animals, agricultural plants and nutrition, please visit the Museum's website, at [cafmuseum.techno-science.ca](http://cafmuseum.techno-science.ca). The Educational Activity Kits can be found in the Educational Programs section. They are free and available in both official languages. They contain a variety of activities related to science and technology, language, mathematics, social studies, as well as health and physical education.

## Acknowledgements

Photos of fibres under scanning electron microscope produced in collaboration with Milosav Kaláb, Ph.D, Honorary research associate at the Eastern Cereal and Oilseed Research Centre (ECORC), Agriculture and Agri-food Canada, in Ottawa, Ontario – do not reproduce without permission.



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