



CBHC Grade Four Aviation Program



INTRODUCTION

At the Canadian Bushplane Heritage Centre we are passionate about our Northern Ontario heritage. We are also very excited about educating the public on our many historical aircraft exhibits as well as forests and forest firefighting exhibits. Our Education Program will allow you to engage your students and give them a personalized, relevant and exciting new take on the curriculum.

Our program is developed with teachers in mind and will allow you to build on curriculum expectations before and after the tour that all tie into the materials presented in the tour. We would love to partner with you to allow your students to discover and learn about their Northern Ontario heritage and the exciting life as a bushplane pilot or forest fire fighter. Our tour guides are retired educators, MNR workers and/or pilots who love working with kids and students. Our experts make the experience one you and your students will never forget!

Our Grade Four Tour Program focuses on the science and technology curriculum. We look at the bushplane and how it is designed, focusing on the pulleys and gears that are used in a bushplanes design that allows it to fly. Students will have a chance to climb inside, play, touch and even “fly” with their classmates in an old Saunders passenger aircraft. Students will also discover how bushplanes help fight forest fires and will get a chance to climb a fire tower to put out a forest fire on their own. We will ignite your student’s imaginations and interest. Your class will learn quickly that adventure takes off at the Canadian Bushplane Heritage Centre!

For more information and preparation lessons please visit us at:

www.bushplane.com/education/lessons/grade4

You may also speak to someone for more information or to book your school tour at

Toll Free: 1-877-287-4752

Local: 705-945-6242

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OVERVIEW OF CURRICULUM EXPECTATIONS

The following is a list of expectations from the grade four curriculum that will be met by following the Canadian Bushplane Heritage Centre Grade Four Tour Program.

Big Idea:
There are several types of forces that cause movement.

Overall Expectation:
Assess the impact of various forces on society and the environment.

Specific Expectation:
Assess the impact of pulley systems and gear systems on daily life.

How:

During the tour our experts will focus on how the pulley and gear systems work within our bushplanes.

Gears slow down propellers on an aircraft allowing it to work properly.

Controls are a system of pulleys.

Big Idea:
There are several types of forces that cause movement.

Forces cause objects to speed up, slow down or change direction through direct contact or through interaction at a distance.

Overall Expectation:
Investigate devices that use forces to create controlled movement.

Specific Expectation:
Use scientific inquiry/experimentation skills to investigate changes in force, distance, speed and direction in pulley and gear systems.

How:

Students will see visual aids to help explain how pulleys and gears are used in an aircraft and will have a chance to experiment with some controls as they sit in the cockpit of an aircraft.

Big Idea:
Forces cause objects to speed up, slow down or change direction through direct contact or through interaction at a distance.

Overall Expectation:
Demonstrate an understanding of how forces cause movement and changes in movement.

Specific Expectation:
Use appropriate science and technology vocabulary, including pulley, gear, force and speed, in oral and written communication.

How:

During the tour our experts will focus on how the pulley and gear systems work within our bushplanes. We will discuss the advancements of the pulley and gear system as we tour the bushplanes using proper terminology.

Big Idea:

Forces cause objects to speed up, slow down or change direction through direct contact or through interaction at a distance.

Overall Expectation:

Demonstrate an understanding of how forces cause movement and changes in movement.

Specific Expectation:

Describe the purposes of pulley systems and gear systems.

How:

Gears are used to slow down the propeller of an aircraft (change speed).

Pulleys are used to control various parts of the aircraft (change in force needed).

Pulleys are used in water bombers.

Review the pulley and gear system of the Bell helicopter.

Explain the use of mechanical advantage on aircraft.

Big Idea:

There are several types of forces that cause movement.

Forces cause objects to speed up, slow down or change direction through direct contact or through interaction at a distance.

Forces in nature, such as high winds or water can have a significant impact on humans and the environment and need to be regarded with respect.

Overall Expectation:

Demonstrate an understanding of how forces cause movement and changes in movement.

Specific Expectation:

Describe how rotary motion in one system or its components is transferred to another system or component in the same structure.

Describe how one type of motion can be transformed into another type of motion using pulleys or gears.

Distinguish between pulley systems and gear systems that increase force and those that increase speed.

Identify pulley systems and gear systems that are used in daily life and explain the purpose and basic operation of each.

Identify the input components that drive a mechanism and the output components that are driven by it.

How:

The transfer of motion between the engine of the aircraft and the propeller will be explained.

GRADE FOUR LESSONS

Associated lessons are encouraged before and the field trip. Many students may not have been to a museum and it is helpful to establish the rules of a museum as well as get them excited to come and experience all the fun adventures they are about to have. The following activities are all optional; our tours are developed to be stand-alone and pre or post lessons are not required to experience a field trip at the Canadian Bushplane Heritage Centre.

You can use one lesson or a combination of lessons to aid your students in their experience. All the resources for the activities are supplied and most of the suggested books may be lent out through our own library for up to one week. Some books are also noted to be in the Public Library for teachers to take out for longer periods of time.

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Lesson 1

POWERFUL PULLEY

This is a great way to show students how simple machines help to make work easier

Materials:

- Jump rope or clothesline
- 2 broom sticks or dowels
- Simple Machines Chart

Note:

Do this experiment as a whole class activity.

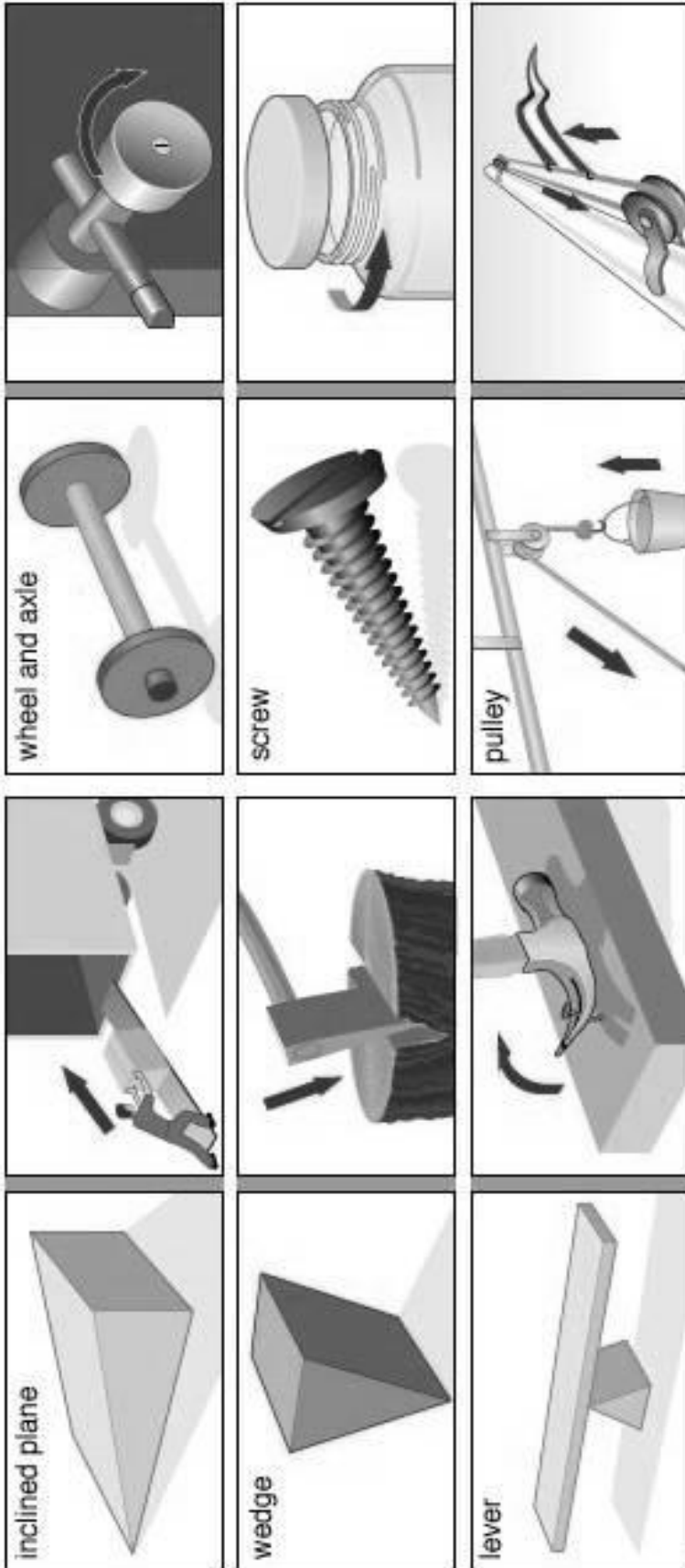
Procedure:

1. Explain to your students that you are going to try an activity to learn about simple machines. Ask them if they know what simple machines are.
2. Explain to your students that simple machines help make work easier for us and that they are found all around us and we use them all the time.
3. Tell the class that there are six types of simple machines. You may want to write them down on the board. The six simple machines are—the lever, inclined aircraft, wheel and axel, screw, pulley and wedge. Use the Simple Machines chart to provide examples for the students. Explain that gears are also used to help make work easier for us and are often found in bikes, gumball machines, windup toys and music boxes. Tell the students that you are going to be learning more about pulleys and gears.
4. Have two students come forward to help with the experiment. Ask the rest of the class to watch carefully so they can share their observations with the rest of the group.
5. Tie the string to one of the broom sticks and then have each student hold a broomstick and stand about a chair width apart from each other.
6. Take the string and weave it under and over each of the broomsticks about four times as indicated in the illustration.
7. Have another student come forward and pull on the string. The challenge is for the students holding the broomsticks to try to pull the broomsticks apart while the student holding the string should pull the string as hard as possible to try to pull the broomsticks together.
8. Have the class share their observations with the group about what happens during the experiment.
9. Have two other students come up and hold on to the broomsticks and try to pull them apart.
10. Have the class share their observations and what type of simple machine they think it is an example of.

Explanation:

By winding the rope around the broomsticks you created a double pulley system. This means that when the end of the rope was pulled on a small force was exerted but over a long distance, because of the length of rope that was used. The result is that the force created by pulling on the rope was greater than the force exerted by the students pulling on the broomsticks. This type of pulley system is used for loading ships, lifting and lowering boats, pianos and safes.

Simple Machines



Lesson 2

GREAT GEARS

Challenge your students to see if they can make their own moving gears.

Materials:

- Thick cardboard
- Scissors
- Sharpened pencil
- Brass fasteners

Note:

Arrange the students into groups to conduct this activity. You may also want to cut out the circles with teeth prior to the activity rather than having the students do it for themselves.

Procedure:

1. Explain to the students that they are going to work together to create their own gears.
2. Provide each group with some thick cardboard, scissors, a sharpened pencil and some brass fasteners.
3. Instruct the students to take a large piece of thick cardboard and set it aside as this is the sheet that they will be attaching the gears to.
4. Have the students take the other piece of thick cardboard and draw four circles, each exactly the same size and have them draw teeth all around the outside of the circles.
5. The next step is to cut out each of the circles and to punch a hole with the sharpened pencil in the middle of each.
6. Ask the students to cut out four small square pieces of cardboard.
7. Have the take a circle and attach it to the large piece of cardboard that they set aside at the beginning of the activity with a brass fastener. If necessary they may want to add one of the small pieces of cardboard to the backside of the piece of cardboard before attaching the brass fastener to make a better fit.
8. Have the students attach the other wheels, ensuring that the teeth of the second wheel match up with those in the first wheel.
9. When all of the wheels are attached have the students rotate the upper wheel and share their observations about what happens with the rest of the group.

Extension:

You can have the students create different sizes of wheels to see if there is a difference in the way that the gears work.

Explanation:

Gears, much like simple machines are used to make work easier. They are toothed wheels that are placed together to transmit motion and force. In any pair of gears the larger one will rotate more slowly than the smaller one, but will rotate with greater force. Typically gears are used to reverse the direction of rotation, to increase or decrease the speed of rotation, to move rotational motion to a different access or to keep the rotation of two axes synchronized.

Suggested Reading:

Pulleys and Gears, Angela Royston
Heinemann Library, 2001

- ❖ In this exciting series, students will learn how simple machines such as levers, springs and wheels power more complex machines that we use every day. Each title contains a project that allows the reader to make a machine using simple machines and household items. The text is reinforced with colorful photos, clearly-labeled diagrams, real-life examples and easy experiments that allow students to observe the scientific concepts behind the machines.

Pulleys and Gears, David Glover
Rigby Interactive Library, 1997

- ❖ The most complicated machines often rely on a few very simple principles of technology -- wheels, springs, screws, wedges and the like. Simple Machines explores these technologies by relating them to common machines in our everyday world -- from bedsprings to skateboards to zippers. The clear text is punctuated with colorful photos and illustrations as well as numerous Fact Files which offer primary readers fast facts and other pertinent information.