

Simple Machines: Museums as Maker Space

**Location**: Human History Gallery
**Intended grade level:** 5-7 (recommended grade 5) but adaptations are available for younger grades **Duration:** 90 minutes

**Objective**: This tour is designed to introduce students to the diversity of simple machines that can be found within the gallery. By the end of the tour, students are expected to be able to identify the 6 basic simple machines, their uses, and where they can be found within the gallery. Students are also expected to be able to make connections between what they have seen in the gallery and what can be found in their own classrooms and homes.

# Welcome to the Museum: 5 minutes

# Introduction: 10 minutes

*What is a simple machine? Can you name all six kinds?*

Many classes, especially if they are grade 5 classes, will have covered some of this basic material. In that case, this can be used as a ‘show what you know” type of activity, as well as review for the students. If they are comfortable with the concept, have students volunteer examples of simple machines.

If students have not covered simple machines, go over the following definitions. Be sure to use physical examples, objects from the handling collection (provided). If time allows, ask students to think of examples of some simple machines that can be found in their classroom, or in the room they are currently in.

**Pulley:** A pulley is a simple machine that uses grooved wheels and a rope to raise, lower, or move a load.

**Lever:** A lever is a stiff bar that rests on a support called a fulcrum which lifts or moves loads.  *Important note: The lever is the basis of nearly every aspect of the musculoskeletal system.*

**Wedge:** A wedge is an object with at least one slanting side, ending in a sharp edge, which cuts material apart.

**Wheel and Axle:** A wheel with a rod, called an axle, through its center, lifts or moves loads.

**Inclined Plane:** An inclined plane is a slanting surface connecting a lower level to a higher level.

**Screw:** A screw is an inclined plane wrapped around a pole which holds things together or lifts materials.

**Sorting Activity:** Have two table set up, one with the names of each simple machine on it and one with the 6 objects from the handling collection. Have the class work together to sort the objects into the categories of simple machines. (if they need more guidance they can be broken up into 6 groups) There will be pictures of each object provided so that they can put it in multiple places if they are unsure of where the machine should go.

Extension material (grade 5 and up): *What is a compound machine (a machine/device made up of two or more simple machines). Can you give an example of one? (bicycle = made up of levers, wheels and axles, pulleys and screws) a fun and short activity could be having the kids say what part of a bicycle responds to which simple machine.*

Wheel and axle = the wheels

Pulley = the gear chain and shifters

Lever = the handle bars which are used to turn the bike

Screws = used to hold the wheels of the bike on the frame

**Assessment FOR Learning:** Are all students engaged? Are they communicating and working togeather as a team or group?

**Orientation: 10 minutes**

In order to orient groups to the gallery, guides will give a quick orientation tour. Important points to note are meeting places and bathrooms. It is advised that you use the freight elevator and ask students how they think it is run? Are there any simple machines involved? (*Yes! A Pulley!)*

# Exploration: 10 minutes

Students will be given time to explore the exhibit. This exploration will take place on the 3rd floor in the human history gallery. Depending on the age of the group, parent or teacher volunteers may keep small groups to move with.

Students can just enjoy these 15 minutes to explore and inquire. They do not necessarily need to be thinking about simple machines at this point. *However, if they are making their own connections that’s awesome!*

# Second Exploration: 20 minutes

Students will be divided into 6 groups, and each group is assigned a specific type of simple machine. Every group will be given a different type of simple machine. Be sure to encourage them to look at the First Peoples gallery for evidence of simple machines as well.

**Activity:** their groups, students are given a piece of paper and a pencil. For the 20 minute exploration, students are asked to go around the human history galleries to find as many examples of their assigned simple machine as possible. They are asked to keep track because afterwards we will use that information in our discussion.

OR

**Alternate Activity**: Students are given a piece of paper and pencil. They are asked to find a simple machine (exp. wheel and axle) and draw it. Describe its possible function. What other functions that can think of, what is it made of, what else could it be made of? If they could design their own, how would they change the design they see in front of them.

**Assessment FOR Learning:** Are students correctly identifying their simple machine? Do they clearing understand what its defining characteristics are? Are they able to search for and find these characteristics in objects on their own or in a group of their peers, without adult intervention?

# Discussion and conclusion: 40 minutes Students regroup at the designated meeting place for discussion and a follow-up activity

**Discussion (10 minutes)**

Guiding questions will be used to prompt discussion. Students will be given the opportunity to share their learning and ask further questions.

1. Firstly, each group can share some of the simple machines they found, they can share their list.
2. What simple machine did they find a lot of in the galleries? Which ones did they find little of? Why do they think that is?
3. Where there any simple machines which were often found together in the same machine? What is it called when you have two or more simple machines working together?

**Historical Perspectives**

1. Did you see use or evidence of simple machines the First Peoples gallery? Which machines? What do you think they were used for?

**Continuity and Change**

1. How did these simple machines make life easier for the people who used them? How do simple machines make your life easier today?
2. What other important/interesting information did they gather that they would like to share?
3. What questions might they still have around simple machines in the gallery?

\**Note: It is not necessary to get through all the questions, they are simply suggestions or guidelines.\**

**Hands on Activity (30 minutes)**Students construct a simple machine! This suggestion can also be used/built upon back in the classroom to enhance what students learnt at the museum!

It is suggested to make these machines in the gallery, using the open landing up above the farming exhibit, which is right in front of the forestry exhibit.

Students create their own simple machines! Students are given time and materials to create a simple machine, in the groups they were originally put in. However, hey can build any sort of simple machine they like. Students are encouraged to take inspiration form one of the BC industries they saw in the exhibit. They are constructed to go around and look for information and draw a diagram/template of their simple machine before they begin constructing it physically. So first the students must go and sketch the objects, and then they can come back and make them.

If they want to construct a compound machine, that should be fine but limit it to only 2 simple machines combined to make their compound machine.

**Question for students: What can you design that adds to the stories which already exist within the museum? Logging, mining, canning, farming, fishing.**

Questions for them to keep in mind when constructing their simple machine:

*What is the purpose of this machine? What problem does it solve?*

Materials can include card board, toilet paper tubes, and rope. There will also be scissors, glue, and tape provided.

Save time at the end so that each group can present its simple machine and answers the above italicized questions. Other student groups are encouraged to ask each other questions about the role of the simple machine and its construction.

\**Note: It is not important that the machine actually works. It is however important that they can describe its function and that said function matches the structure of the machine.\**

**Assessment AS Learning:** *Peer Assessment:*Have the students respond to each other’s machines. Is it a simple or compound machine? Does its function make sense? Is its function in accordance with its design?

**Optional Final Activity:** a take on dragons den. Each group must pitch their simple machine at the volunteers or “judges. There is only enough money in the Museum budget to make one new acquisition for a machine that helps tell the story of B.C.’s past. All the students are the designers who must pitch their ideas and try to convince the judges. The judges/volunteers can use the guiding questions to help them determine whether candidates have excelled and met criteria.

*What is the purpose of this machine? What problem does it solve?*

Prior to Your Visit\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

This tour does not require preparation prior to your visit. However, some optional suggestions are provided below to prepare your students and enhance the tour experience.

**Ask Some Preliminary Questions**

These questions can help students prepare for the visit by encouraging them to think about the topic of simple machines.

* *What is the concept of ‘work’ in relation to simple machines?* Work is moving a mass and/or object over a distance.
* *What is the concept of ‘force’ in relation to simple machines?* Force is a push or pull on an object resulting from an interaction with another object.
* *How are simple machines and force related?* All simple machines transfer force, either by changing the strength or direction of the force. Simple machines use force more efficiently to make work easier.
* *How do simple machines transform energy?* How is the input energy different from the output energy?

**Visit the Learning Portal**

The Royal B.C. Museum Learning Portal has many resources and themes for you to explore. In particular, the ‘Simple Machines’ playlist may be helpful in preparing for your tour to the Museum.

http://learning.royalbcmuseum.bc.ca/author/bruyereharkergmail-com/

Curricular Connections\_\_\_\_\_\_\_\_\_\_\_

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| Core Competencies | **Art** | **Science** |
| Communication * I communicate confidently in organized forms that show my attention to my audience and purpose

Creative Thinking* I get new ideas or reinterpret others’ ideas in ways that have an impact on my peers.

Critical Thinking* I can evaluate and use well-chosen evidence to develop interpretations; identify alternatives, perspectives, and implications; and make judgements. I can examine and adjust my thinking.
 | **Big Ideas*** Artists experiment in a variety of ways to discover new possibilities and perspectives (Gr. 5)
* Artists experiment in a variety of ways to discover new possibilities (Gr. 4)
* Through art making, one’s sense of identity and community continually evolve (Gr. 7)
 | **Big Ideas*** Machines are devices that transfer force and energy (Gr. 5)

**Curricular Competencies****Questioning and Predicting*** Make observations in familiar or unfamiliar contexts (Gr. 5-6)
* Make predictions based on prior knowledge (Gr. 3)

**Planning and Conducting*** Explore and pose questions that lead to investigations (Gr. 5-6)

**Processing and analyzing data and information*** Demonstrate an openness to new ideas and consideration of alternatives (Gr. 5-6)
* Experience and interpret the local environment (Gr. 4)

**Applying and Innovating*** Transfer and apply learning to new situations (4-7)
* Co-operatively design projects (4-7)

**Communicating*** Communicate ideas, explanations, and processes in a variety of ways (5-6)

**Concepts and Content*** Machines; constructed and found in nature (Gr. 5)
* Devices that transform energy (Gr. 4)
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