

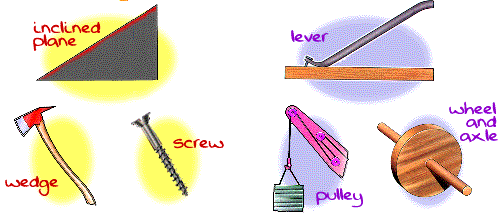


**Technology Exploration-I**

Module 1:

Introduction to Simple Machines





PREPARED BY

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Module 1: Introduction to Simple Machines

**Module Objectives**

After the completion of this module, students should be able to:

* identify the different mechanism in everyday life;
* differentiate between the types of motion and give examples;
* explain the general purpose of a machine and how it makes our lives easier;
* name the six different simple machines and state the purpose of each;
* give examples of the applications of simple machines;
* identify the six different simple machines from the given prototype

**Module Contents**

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| **1.1 Introduction to Technology** |
| Think for a moment what it might be like to live in the 18th century. Imagine that you could travel back in time and found yourself in a small Emirati village in the year 1855.  What doyou think you would find? How would you cook your food? Would you use fire, or an oven? How would you eat your food? How would you commute from one city to another? How would you send a message to your family to inform them that you would be late from school? Can you use your cell phone?  Most of the items you use today are a result of **technology**. Your cell phone, microwave oven, and washing machine are all the result of scientific inventions combined with engineering that have allowed people to invent products to make life easier for people.    Figure 1.1: Life today and in the past! |
| * + 1. **Class Activity 1**  1. Think about a piece of technology you use today such as a cell phone or a bicycle. List all the items needed to make thatproduct and also the material itis made from.   \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| **1.2 Mechanisms and Motion** |
| In our everyday life,we are surrounded by mechanisms that make our life easier. Simple things like door handles, light switches, parts of a bicycle and a car are only a few examples. In the past, in old machines such as steam engines, the mechanisms were easy to see. Today they are hidden behind panels and covers.  Mechanisms can be used to change the speed, direction or force needed to perform something. But mechanisms need energy and something or someone to operate them. They are concerned with motion and motion can be of four different types as follows:   * Linear motion: movement in a straight line. * Rotary motion: movement round and round in a circle. * Reciprocating motion: movement side to side, or up and down. * Oscillatory motion: back and forth swinging movement.   The figures below demonstrate examples of all the four different types:    Figure 1.2: Linear motion Figure 1.3: Rotary motion    Figure 1.4: Reciprocating motion Figure 1.5: Oscillatory motion  Motions can be changed from one form to another; various mechanisms are available to achieve this. For example, a clock mechanism can convert rotary motion into oscillating motion. |
| **1.2.1 Class Activity 2**  Name the product and the type of motion illustrated in each of the examples given below. Draw arrows to indicate the direction of motion.  Product A:    Product: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Type of motion:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Product B:    Product: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Type of motion:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Product C:    Product: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Type of motion:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| **1.3 Simple Machines** | | | | |
| Mechanisms are performed by **simple machines** that are simple tools used to make work easier. The furniture movers use a **ramp** to slide boxes into a truck. The gardeners use a hand **shovel** to help break through the weeds. The children use a **see-saw** to go up and down. The ramp, the shovel, and the see-saw shown in the figures 1.6, 1.7 and 1.8 respectively are examples of simple machines. | | | | |
| Figure 1.6: Ramp | | Figure 1.7: Shovel | | Figure 1.8: See-saw |
| A simple machine is a mechanical device that changes the **direction** or **magnitude** of a **force**. There are six classical simple machines as illustrated in figure 1.9: | | | | |
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| Figure 1.9: Six simple machines | | | | |

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| These simple machines can be used to build more complicated ones such as the car engine illustrated in Fig. 1.10. Such a machine that consists of two or more simple machines put together is called a **compound machine**  Figure 1.10: The car engine is built using many simple machines. |
| * + 1. **Class Activity 3**   Use the link below to participate in an online activity that will help you familiarize with the purpose of each of the simple machines.  <http://www.msichicago.org/fileadmin/Activities/Games/simple_machines/>  Help the robot ‘Twitch’ collect parts for his work at the museumwith the help of simple machines.    On completing the activity, answer the questions given below:   1. Simple Machine 1: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_     Why do we use this machine?  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  What is the example given in this activity?  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Write another example to demonstrate the application of this machine  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   1. Simple Machine 2: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_     Why do we use this machine?  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  What is the example given in this activity?  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Write another example to demonstrate the application of this machine  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   1. Simple Machine 3: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_     Why do we use this machine?  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  What is the example given in this activity?  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Write another example to demonstrate the application of this machine  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   1. Simple Machine 4: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_     Why do we use this machine?  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  What is the example given in this activity?  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Write another example to demonstrate the application of this machine  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

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| **1.4 Lab Activity** |
| **Objective:** To identify the **simple machines** in the given prototype of a ramp.  **Background Information:**  Ramps have been used since ancient times to help move heavy objects or large quantities ofmaterials from one level to another. Today, automobile transport services use ramp on their trucksto load multiple vehicles on one transport. These multi-vehicle transports use ramps for easy ofuse, safety and efficiency.  **Procedure:**   1. Observe the ramp closely, operate it and understand its function. 2. Identify the simple machines used in the ramp. 3. Write the name of the simple machine and explain why it has been used in the ramp. Use the table below to write your answers.      |  |  | | --- | --- | | Simple Machine | Purpose | |  |  | |  |  | |

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| **1.5 Assignment** |
| **Task1:**  The figure below shows a bicycle that is a compound machine.. Can label the simple machines in the bicycle?  Task 2:  Visit the following website to understand more about Simple and Compound machines.  [http](http://www.edheads.org/activities/simple-machines/frame_loader.htm)://www.edheads.org/activities/simple-machines/frame\_loader.htm  Task 3: Match the tool with the correct simple machine type:   |  |  |  | | --- | --- | --- | |  |  | Screw | |  | Lever | |  | Pulley | |  | Wheel and Axle | |  | Include plane | |  | Wedge | |

Task 4:

Go to the following website:

<http://www.bbc.co.uk/schools/gcsebitesize/design/systemscontrol/mechanismsrev8.shtml>

Realize how some mechanisms take one type of input motion, and output it as a different type of motion.

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| **Notes** |
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