RRB ALP CBT II Basic Sciences & Engineering Notes on Simple Machines

Railways RRB ALP Computer Based Test for Stage II will be conducted on 19th November 2018. If you are preparing for the upcoming ALP CBT-II, then it is necessary that you are familiar with the **ALP CBT** II Basic Sciences Part 1. Read this article to gear up your preparation. Also, watch the video to clear your doubts on ALP CBT II Basic Sciences & Simple Machines.

ALP CBT II Basic Sciences - Introduction

A machine is a tool containing one or more parts that use energy to perform an intended action. Machines are usually powered by mechanical, chemical, thermal, or electrical means, and are often motorized. Historically, a power tool also required moving parts to classify as a machine. However, the advent of electronics has led to the development of power tools without moving parts that are considered machines.

ALP CBT II Basic Sciences - Simple Machine

- Simple machine is a device with few or no moving parts that are used to modify motion and force in order to perform work.
- Simple machines have only one or two parts, they don't have motors and they make work easier for people by changing the direction or the size of a force applied to it.
- A hammer is a machine. Work is done on the handle, which in turn does work on the head of the mail, which does work on a nail.
- There are a simple machine and complex machine. Lever, punching machine, crowbar, bottle opener, etc. are examples of the simple machine while motorcycle, truck, car, etc. are some examples of the complex machine.

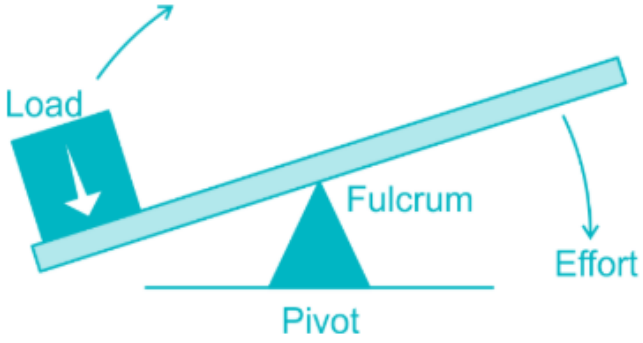
Six Types of Simple Machines

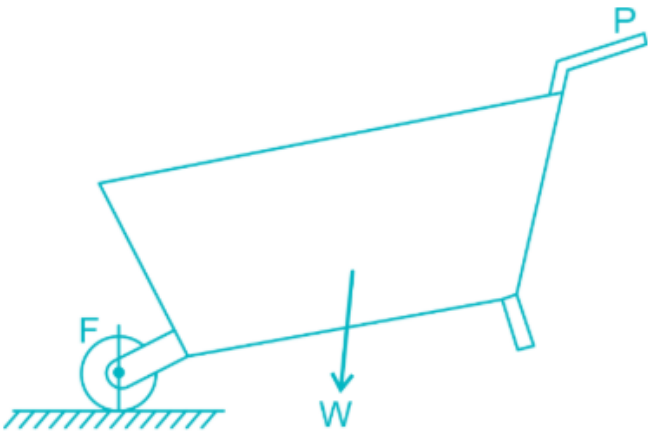
1. **Levers**
2. **Screw Jack**

3. **Wheel and axle**
4. **Pulleys**
5. **Inclined plane**
6. **Wedge**

Lever

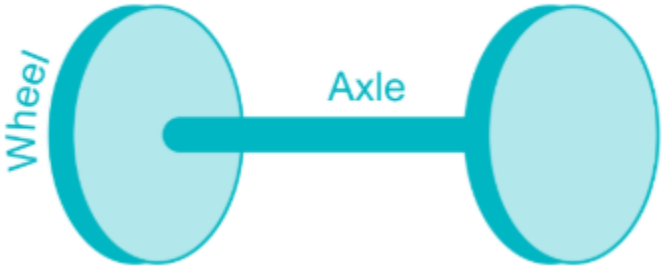
- Lever is a type of simple machine that is used to lift the heavy loads. It is a rigid bar that moves about a fixed point, fulcrum.
- Example: Cutting plier, A pair of scissors, Crowbar, Beam balance, Hand pump.
- It consists of three parts: Effort, Fulcrum and Load.
- The distance of the load from the fulcrum is called the load arm. The distance of the effort from the fulcrum is called the effort arm.





Wheel and Axle

- A wheel and axle is a wheel with a rod in it that is called an axle and it is used to lift, move loads or rotate through the central power.
- Examples of a wheel & axle can be found on any bicycle tire as well as a simple rolling pin.



Screw

- A screw is an inclined plane wrapped around a nail. It consists of circular edges called thread.
- The effort is applied to the head of the screw.
- Example: Screw, Jackscrew, etc.

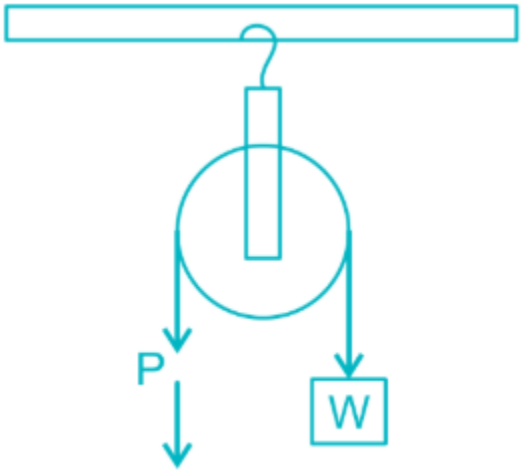
Pulley

A pulley is a simple machine used for lifting goods. It consists of small wheel made of metal or wood with a groove cut on its circumference. A light rope passes over the grooved rim. It can rotate about an axle passing through its center. The axle of the pulley is supported on a frame known as the block. The load is attached to one end of the rope

which passes over the pulley and the effort is applied at the other end. The effort applied is equal to the load to be lifted.

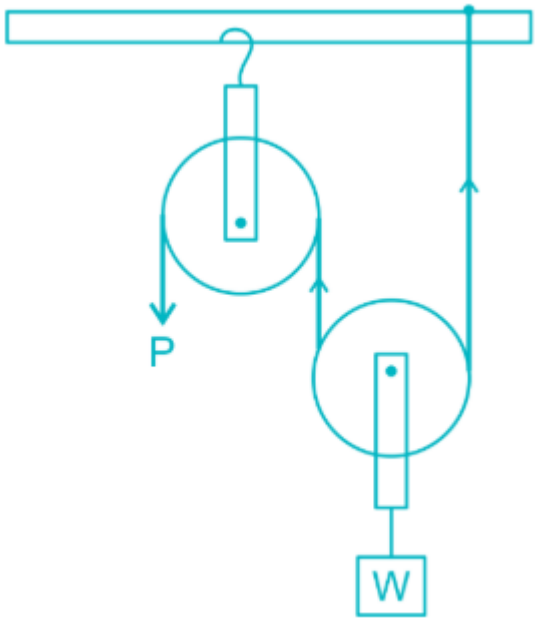
Types of pulley

1. **Fixed pulley:** If the block of a pulley if fixed, then it is called fixed pulley. The load is attached to one end of the rope and effort is applied at the other end.



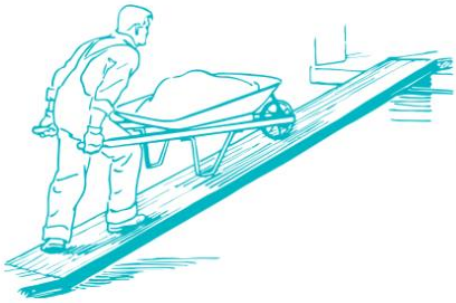
2. **Movable pulley:** If the block of a pulley is movable, then it is called movable pulley. In a movable pulley, one end of the rope is attached to a fixed support and other ends first

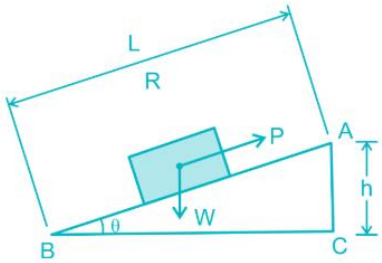
pass through the movable pulley and then fixed pulley.



Inclined Plane

- It is a sloping surface or a wooden plank. It multiplies the applied effort. A sloping surface is called an inclined plane, from the following figure.
- BC – Horizontal plane, BA – Inclined plane
  - The angle between the inclined and horizontal plane is known as the angle of inclination





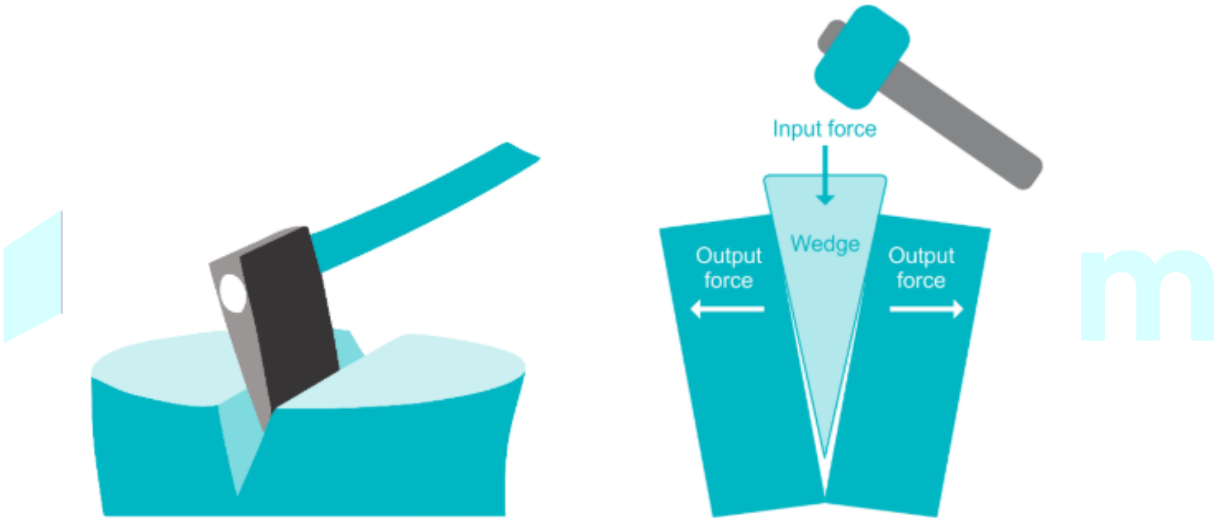
- By applying a suitable effort, a load can be raised up the slope or lowered down the slope of the plane.
- E.g.: Ladder, an escalator, a staircase

The principle of Inclined Plane

- The inclined plane is a slope. It is a basic mechanical device to lift a body to a certain height with less effort.
- To lift a body to a certain height, we have to apply a force on the body. Now in an inclined plane only pushing force parallel to the inclined plane is used.

Wedge

- A wedge is a triangular shaped tool. Wedge consists of two or more sloping surfaces with one end sharp or pointed edge while the other one is a blunt edge.
- Examples: Axe, knife, nail, sickle, etc.



Example 1: Match the following:

List I (Simple Machine)	List II (Definition)
A. Lever	1. Something that reduces the friction of moving something
B. Inclined plane	2. Something that can hold things together or lift an object
C. Wedge	3. Flat surface that is higher on one end than the other
D. Screw	4. Something that uses a rope and can change the direction of a force
E. Wheel and axle	5. Something similar to a see-saw that can lift an object
F. Pulley	6. Something that can split an object apart

1) A – 5, B – 3, C – 6, D – 2, E – 1, F – 4

2) A – 3, B – 5, C – 6, D – 2, E – 4, F – 1

3) A – 5, B – 6, C – 3, D – 1, E – 2, F – 4

4) A – 3, B – 5, C – 4, D – 2, E – 1, F – 6

Ans: 1

Example 2: Which of these is not an example of an inclined plane

1) Ladder

2) Stairs

3) Driveway

4) Wall

Ans: 4

Example 3: Which is not a type of simple machine?

1) Spring

2) Screw

3) Wedge

4) Pulley

Ans: 1

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