**Moving Efficiently / Friction and Mechanical Advantage**

**Friction Everywhere**

* Friction is the force that resists the movement of objects sliding over one another;
* Is the main cause of inefficiency in machines;
* As two parts rub together, they lose mechanical energy, which is transformed into thermal energy;
* Is also present when an object is moving through a fluid (gases and liquids).

**Reducing Friction**

* Friction releases heat that can damage parts;
* Reduce friction by reducing the surface area that are in contact;
* Ball bearings achieve this;
* Lubricants, such as oil, grease, and graphite are all slippery substances that are also used.

**Positive Effects of Friction**

* Friction can also be very useful;
* When we walk or run, the friction between our shoes and the ground gives us the “grip” to move;
* It provides the security that allows us to travel safely over different types of surfaces;
* Brakes on vehicles rely on friction to slow them down.

**Friction and Levers and Pulleys**

* With levers, friction is often low because the surfaces rubbing against each other at the fulcrum are small;
* Rope that moves over even the smoothest pulleys still generates some friction;
* This means that extra effort force must be used to overcome the friction between the rope and each pulley

**Conclusion**

* Keeping friction to a minimum is an important way of having a machine work efficiently;
* When designing and building a machine or any simple device, it’s impossible to predict exactly how much friction there will be between the moving surface without experimentation;
* The only way to find out is to actually measure the effort force needed to overcome the force of friction.