

Mechanisms and Control

Key Terms

- The Lever
 - First, Second and Third Class
- Mechanical Advantage

$$\text{MA} = \frac{\text{LOAD}}{\text{EFFORT}}$$

- Velocity Ratio

$$\text{VR} = \frac{\text{DISTANCE MOVED BY EFFORT}}{\text{DISTANCE MOVED BY LOAD}}$$

Key Terms

- Efficiency

$$\frac{\text{MA}}{\text{VR}}$$



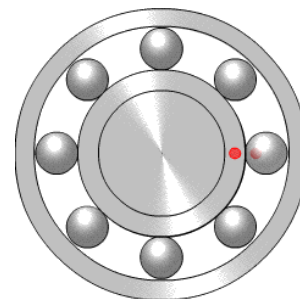
- Wheels and Axels
- Bearings
 - Rotational and Linear
- Cranks
 - Linkages

Key Terms

- Pulleys
 - Driver (effort) and Driven (load)
- Speed
 - Measured in RPM (Revolutions per minute)
- Inclined plane (wedge) (screw)
- Gears
 - Rack and pinion
 - Bevel
- Cams
 - Cam and follower

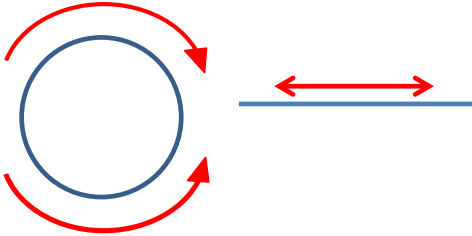
Key Terms

- Cable controls
 - Bowden cable
- Pneumatics
- Hydraulics
- Tools and their correct usage

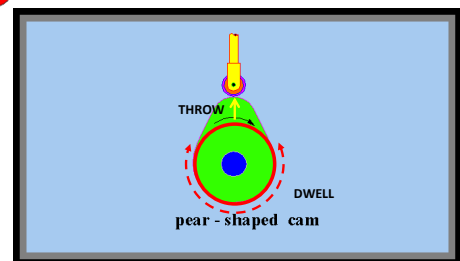
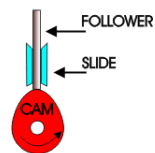


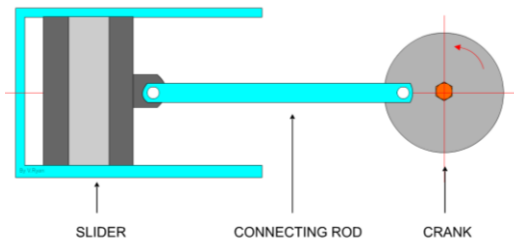
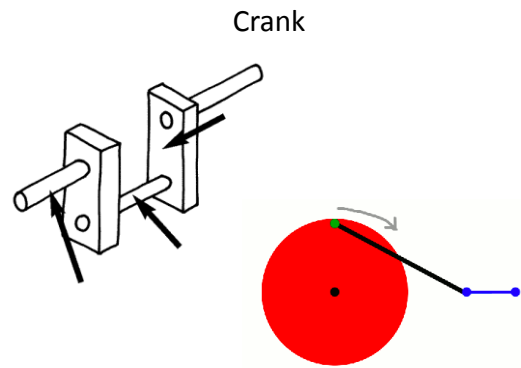
Bearings

- Rotational and Linear



- <http://www.strettonhandley.derbyshire.sch.uk/cams/camstext.html>



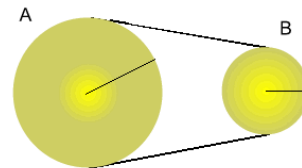
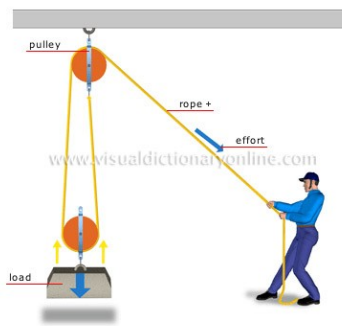


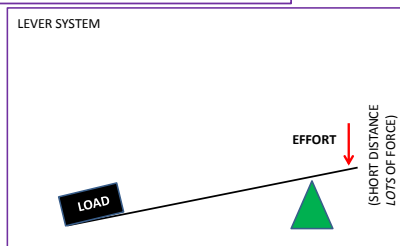
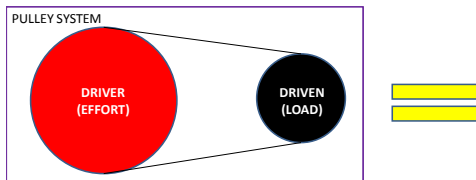
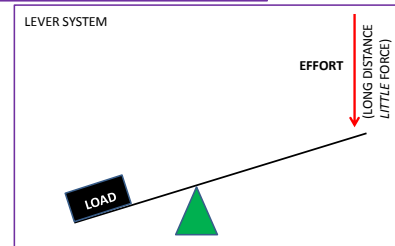
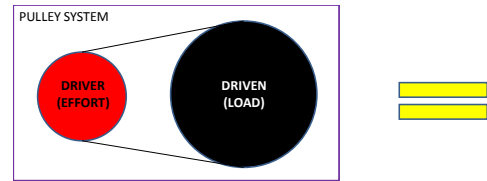
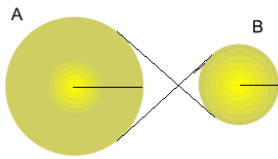
Crank

- Changes **Rotary Motion to Linear Motion**

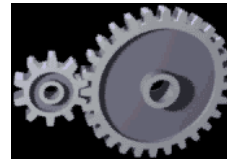
And Vice Versa

- A Crank is normally a **wheel** that has an **articulated linkage** attached to it.

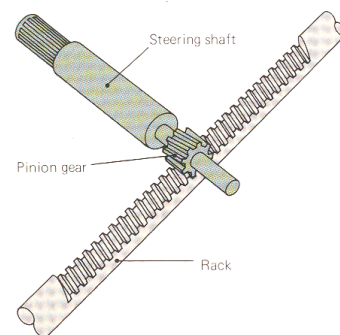
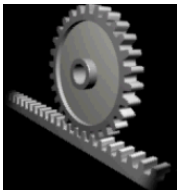




GEARS



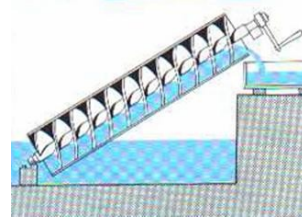
GEAR BOX



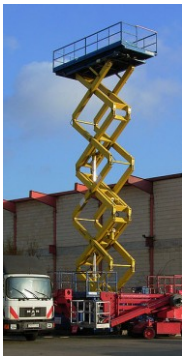


Screw / Inclined Plane

Archimedes Screw



Linkages



➤ Levers that **PIVOT** around a **fulcrum**



Linkages

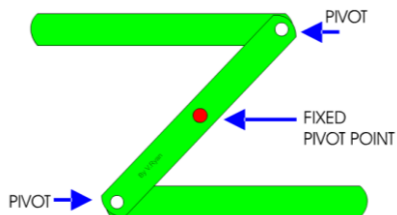
Designed to
transform an

Input Force and Movement

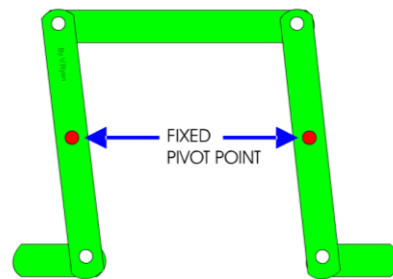
into an

Output Force and Movement

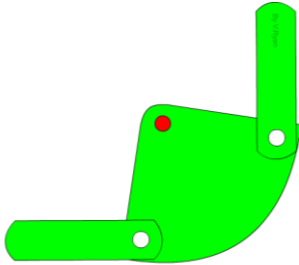
Reverse Motion Linkage



Parallel Motion Linkage



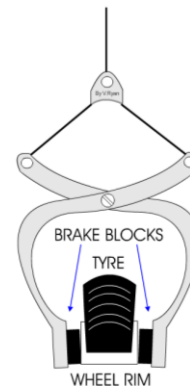
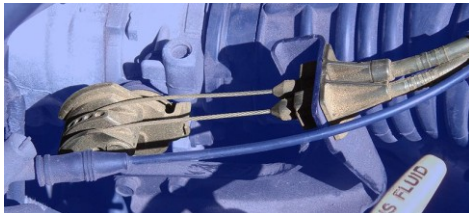
Bell Crank Linkage



Cable Controls

(Related to LINKAGES)

Bowden Cable



Pneumatics

AIR/GAS



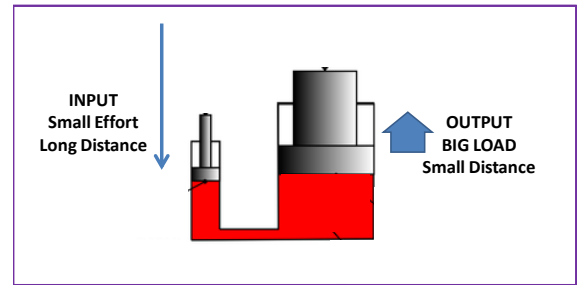
OPEN and *CLOSED* Systems

HYDRAULICS



LIQUIDS do not compress as easily as GASSES

HYDRAULICS



Working out Mechanical Advantage (MA)

$$MA = \frac{\text{LOAD}}{\text{EFFORT}}$$

NB:

- Load and effort must be the **same unit of measurement**
Either **Newtons or Kilograms**
- 1kg = 10N

Working out Velocity Ratio (VR)

$$VR = \frac{\text{DISTANCE MOVED BY EFFORT}}{\text{DISTANCE MOVED BY LOAD}}$$



NB:

Unit of measurement must always be the same
(m, cm, mm)