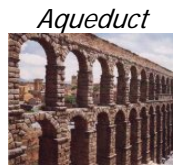


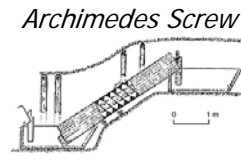
Grade 8 - Unit 4 – Mechanical Systems Concepts

Simple Machines

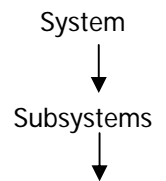
- ❖ change direction
- ❖ multiply force
- ❖ change speed
- ❖ transfer force



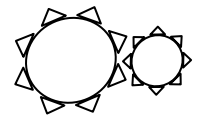
Machines from the Past



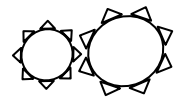
Complex Machines



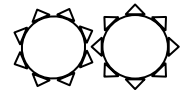
Gears



Reducing



Parallel

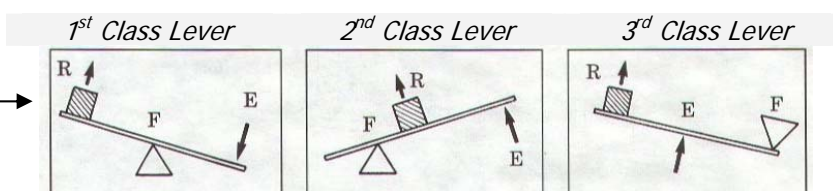
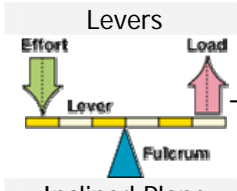


Linkage



Transmission

Mousetrap Vehicle



Inclined Plane (Ramp)



Wedge



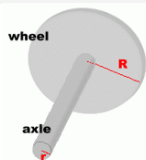
Screw



Pulley



Wheel and Axle



Work = Force x distance

Mechanical Advantage

Speed Ratio

MA = $\frac{\text{Output force}}{\text{Input force}}$

SR = $\frac{\text{Input distance}}{\text{Output distance}}$

Efficiency = $\frac{\text{MA}}{\text{SR}} \times 100$

Machine Efficiency

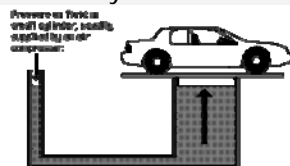
Efficiency = $\frac{\text{Work}_{\text{output}}}{\text{Work}_{\text{input}}} \times 100$

Pascal's Law

Pressure is transmitted equally in all directions throughout an enclosed fluid.

Pressure = Force / Area

Hydraulics



Pneumatics



$\frac{\text{Force of the small piston}}{\text{Area of the small piston}} = \frac{\text{Force of the large piston}}{\text{Area of the large piston}}$

Evaluation Criteria

Efficiency	Effectiveness	Function	Design	Cost	Improvement
Safety	Convenience	Esthetics	Packaging	Environmental Impact	

Societal and Technological Impact of Machines

Block and Tackle



Steam Engine



Bicycles



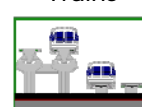
Egg Beater



Pop Can Tab



MagLev Trains



Robots

