

REVIEW

Unit 4 – Mechanical Systems

1.0 Machines are tools that help us do work

- ❖ A **machine** is a device that helps us do work
- ❖ Energy for machines to operate is provided by people, animals, electricity, fossil fuels
- ❖ Six simple machines: the **lever, inclined plane, wedge, screw, pulley** and **wheel and axle**
- ❖ **Complex machines** are made up of two or more simple machines
- ❖ **Gears, linkages** and **transmissions** connect subsystems and help to transmit the force in complex machines

2.0 Mechanical Advantage

- ❖ **Mechanical Advantage** is a measure of how much a machine can increase an applied force
- ❖ **Speed Ratio** – how speed is affected by a machine
- ❖ **Work** is done when a force acts on an object to make it **move**
- ❖ Machines help us do work by transferring energy
- ❖ **Efficiency** is a measure of how well a machine uses energy and can be calculated **quantitatively** (mechanical advantage divided by speed ratio multiplied by 100)
- ❖ **NO MACHINE can be 100% efficient** (because of friction)
- ❖ Hydraulic systems work because of **Pascal's Law** (Unit 1 – 3.0)

3.0 Science, Society and The environment

- ❖ Function (what it is supposed to do) and design (physical form that makes it useful) are two important aspects of mechanical devices
- ❖ Evaluation criteria: efficiency, effectiveness, impact on humans and the environment
- ❖ Efficiency described **qualitatively** – *efficiency is when a task is easier and quicker to do using a machine*
- ❖ Technology development is influenced by scientific knowledge, trial and error and changes in society and the environment