



1.0 *Machines are tools that help humans do work*

- Key Concepts
- systems and subsystems
 - transmission of force and motion
 - simple machines

What is a machine designed to do?

How did ancient machines pave the way for improvements?

What is a simple machine?

Describe the different types of simple machines and give examples of each type

Machine	Description	Illustration	Examples
lever			
inclined plane			
wedge			
screw			
pulley			
wheel and axle			



Illustrate and give examples of the three classes of levers.

Lever Type	Illustration	Examples
1 st Class		
2 nd Class		
3 rd Class		

Simple machines can be used to obtain 4 different effects! Briefly describe each effect.

1 _____

2 _____

3 _____

4 _____

Identify the different machines that make a bicycle





What are the functions of **linkages**?

What are the functions of **transmissions**?

What are **gears** used for in mechanical devices?

Illustrate the following types of **gear trains** and briefly explain what they would be used for.

Parallel Gears	Multiplying Gears	Reducing Gears
Uses		
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2.0 An understanding of mechanical advantage and work helps to determine the efficiency of machines.

- Key Concepts
- mechanical advantage, speed ratios and force ratios
 - mechanical advantage and hydraulics
 - measurement of work in joules

What is **mechanical advantage**?

How do you calculate **mechanical advantage**?

What is **speed ratio**?

How do you calculate **speed ratio**?

What is the **disadvantage of a force advantage** in a machine?

What machine has a **mechanical advantage of less than 1** – why would it be useful?



Describe the difference between **real mechanical advantage** and speed ratio.

What effect does **friction** have on a machine?

How is the **efficiency** of a machine calculated?

What is the **scientific definition of work**?

How is **work** calculated?

Why is **work done with a machine** is **the same** as **work done without a machine**?

How does **friction** affect the equality between **work input and work output** in real situations?



What is a **hydraulic system**?

How does it work?

What does **Pascal's Law** state in relation to fluids in an enclosed system?

How is **mechanical advantage** determined in hydraulic systems?

Illustrate and Calculate the mechanical advantage of a sample hydraulic lift:

Input piston has an area of 1.5m^2 - **Output piston** has an area of 30m^2
Force applied on the **Input piston** is 25N - How much of a load can be lifted?

What is the **mechanical advantage** of this hydraulic system?








3.0 Science, society, and the environment are all important in the development of mechanical devices and other technologies.

- Key Concepts
- design and function
 - social and environmental impacts

What criteria are usually used to evaluate a mechanical device?

Describe the evolution of the pop can opener which lead to improvements in design.

Can Opener Design	Advantage (What improvement it made)	Disadvantage (Reason for Redesign)
<p>Hammer and Chisel</p>  <p>1800's</p>		
<p>Church Key</p>  <p>1950's</p>		
<p>Removable Pull Tab</p>  <p>1963</p>		
<p>Push Button Tabs</p>  <p>Mid 1970's</p>		
<p>Non-removable Pull Tab</p>  <p>1980</p>		

Efficiency described **qualitatively** – *efficiency is when a task is easier and quicker to do using a machine*


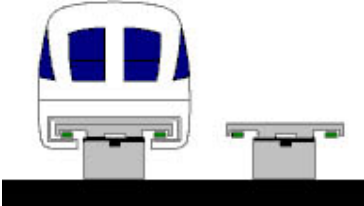

**Your new and Improved
Pop Can Design**



Technology develops through change!

Technology development is influenced by scientific knowledge, trial and error and changes in society and the environment

Describe how each of the following results in new technologies being developed.

Invention	
<p>Windshield wiper blade</p> 	
Advances in Science	
<p>Magnetic Levitation Trains</p> 	
Changes in Society	
<p>Robots</p> 	
Changes in the environment	
<p>Oil Spill Skimmer</p> 