**Mechanical Advantage**

**Definition**

A measure of how much force is increased by a tool or simple machine

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Description automatically generated**Characteristics**

* Expressed as a ratio
* A mechanical advantage greater than 1 means the machine increases force.
* It involves reducing effort by spreading work over a longer distance.
* Commonly observed in levers, pulleys, gears, and inclined planes.

**Examples**

* Using a lever to lift a heavy rock with minimal effort.
* A block and tackle pulley system that requires less force to hoist a load.
* An inclined plane allowing heavy objects to be moved upwards with less force.
* A wrench used to turn a stubborn bolt.

**Non-Examples**

* Machines or tools that do not reduce effort (e.g., flat board, hammer hitting directly).
* Systems with no force multiplication (e.g., a ruler used as a straight edge).
* Devices that rely solely on electronic power rather than mechanical advantage (e.g., electric drill).

**Simple Machines**

**Definition**

Devices that make work easier by changing the force's direction or magnitude, typically requiring only one movement to operate.

**Characteristics**

* Reduce the effort needed to perform work.
* Operate without electrical power.
* Include basic components like levers, pulleys, wheels, and axles.
* Exploit principles of mechanical advantage.

**Examples**

* Lever (e.g., seesaw, crowbar)
* Pulley (e.g., flagpole system)
* Inclined Plane (e.g., ramp)
* Wheel and Axle (e.g., rolling cart)
* Screw (e.g., jar lid)
* Wedge (e.g., axe, knife)

**Non-Examples**

* Complex machines (e.g., cars, washing machines)
* Electronic devices (e.g., smartphone, computer)
* Objects without mechanical functions (e.g., a ball)

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