

## Design and Technology M2 Midterm short

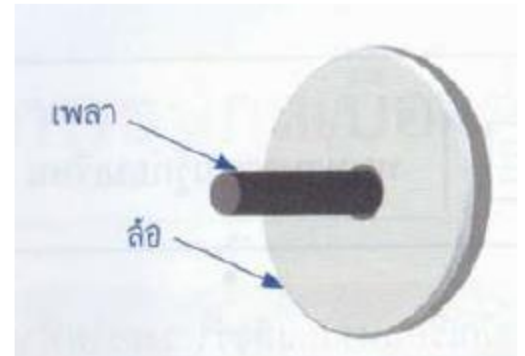
### 1. Mechanism

**Mechanism** is a device that transforms input forces and movements into a desired set of output forces and movement. The mechanism in appliances always needs to be controlled. Because of that we often hear words **mechanism and controls** used together. For example, cars and bicycles require mechanism to move and we also have controls that control the speed and movement according to the user.

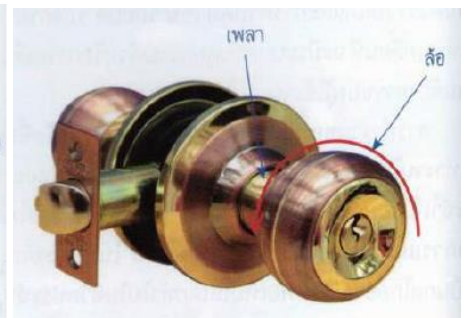
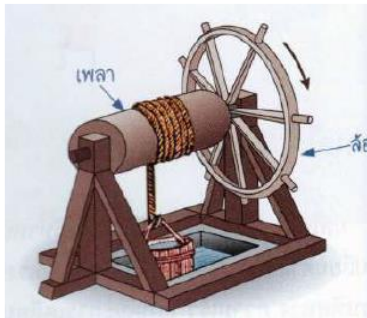
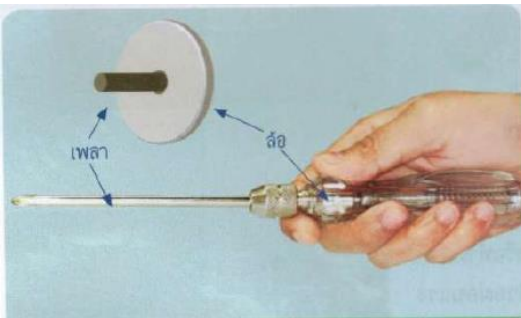
The **wheel and axle** are a machine consisting of a wheel attached to a smaller axle so that these two parts rotate together in which a force is transferred from one to another.

We can use this mechanism in two ways:

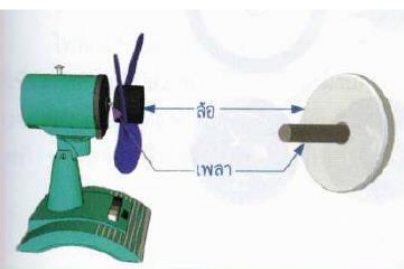
- Spinning the wheel to make the axle rotate
- Spinning the axle to make the wheel rotate



**Spinning the wheel** will make the axle rotate which will give us more force. This type of mechanism we use in things like screwdriver, can opener, hand drill, door knob...



**Rotating the axle** will also rotate the wheel. In this principle we apply force to the axle and with that force we start spinning the wheel. Some of the examples can be fan, car wheels, electrical drill.



### 2. Electricity

**Electricity** is a form of energy which is involved in the movement of electrons and protons which can be converted to other forms of energy such as light, heat, sound, movement.... Example:

Light → Light bulb

Heat → Iron

Image and sound → TV

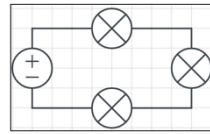
Movement → motor

**Electronics** is in control of electric current. It controls the quantity and direction of current movement as needed. In electrical appliances we have an **electrical circuit** that consists out of connected electrical equipment. Each circuit works in a different way, depending on its functions.

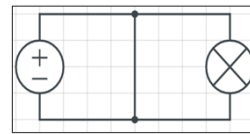
An **electric circuit** is the conductive path for flow of current or electricity.

An electric circuit has:

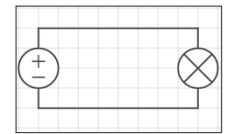
- Device that gives electrical energy
- Devices that use electrical energy
- Connecting wires or transmission lines



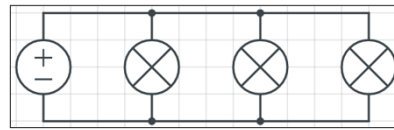
Series Circuit



Short Circuit



Closed Circuit



Parallel Circuit



Open Circuit

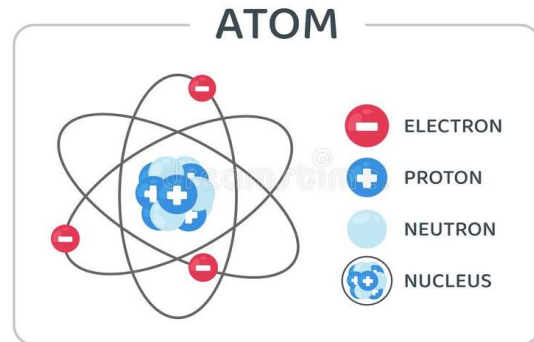
An **atom** is the smallest component of an element and the building blocks of all matter

An atom consists out of electrons, protons and neutrons

**Electrons** are negatively charged particles

**Protons** are positively charged particles

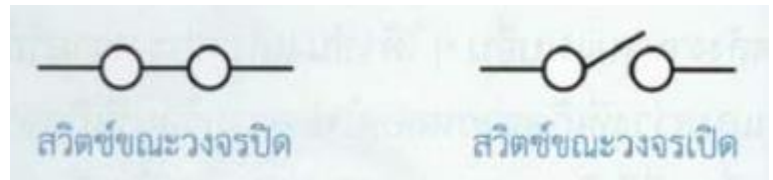
**Neutrons** are particles without a charge



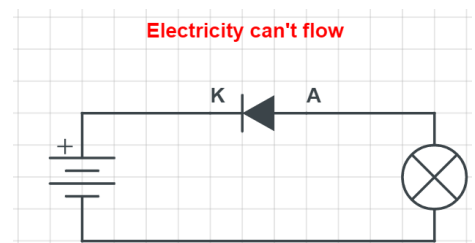
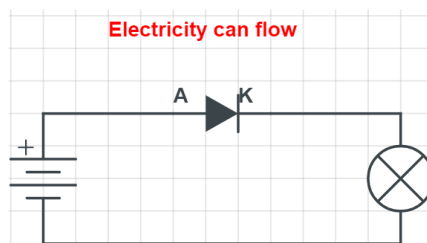
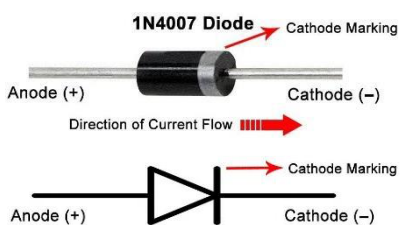
**Electronic components** are basic elements that are used to design electrical and electronic circuits. They have a minimum of two terminals which are used to connect to the circuit. We divide them into 3 groups:

- **Active components** – used to amplify electrical signals to generate electric power
- **Passive components** – it can only receive energy, which it can either dissipate, absorb or store
- **Electromechanical components** – they use electrical signal to make some mechanical changes

An **electrical switch** is an electrical component that can disconnect or connect the flow of electricity in the circuit. When the switch is **opened** then there is **no** electricity, but when the switch is **closed** then there **is** electricity.



**Diodes** allow electric current to flow only in a single direction. Each diode has two terminals known as anode and cathode.



**LED (Light Emitting Diode)** is an electric component that emits light when electricity flows through it.

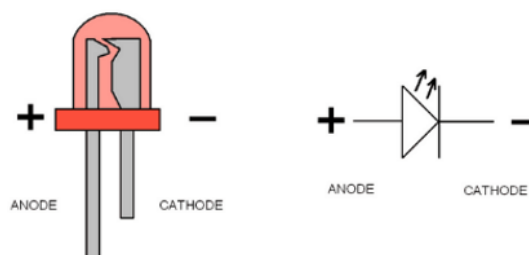




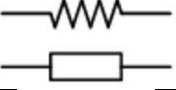

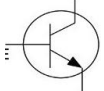
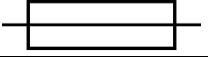
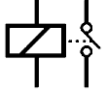


Image	Name	Description
	Resistor	Resistor is an electric component that reduces the electric current.
	Electric bell	An <b>electrical bell</b> makes sound when there is electricity flowing through it.
	Electric motor	An <b>electric motor</b> is an electric machine that converts electrical energy into mechanical energy.

Name	Symbol	Description
Switch		Device that is used to break a circuit and disturb the flow of electrons
Resistor		The device resists the flow of current
Capacitor		Can store electric charge temporarily
Transistor		Base can control current flow in the two other terminals
Fuse		Help preserve components from overloading with excessive current
Relay		These electromechanical switches shut power on or off