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SURVIVAL SCIENCE

LESSONS 6B



ISRAEL'S MANIFEST DESTINY

HOLDS STRATEGIC LANDS

CLAIMS ONE TRUE GOD, not multiple deities/gods as most other nations

TEACHES GOD'S COMMANDMENTS

GOVERNS BY HIS LAWS AND STATUTES

IS THE NATION CHOSEN TO BRING THE
SAVIOR OF THE WORLD TO LIFE,
AND TO BRING HIS WORD TO LIGHT

THE HEBREW
NATION
NEEDED A
SAVIOR THEY
COULD
SHARE WITH
THE WORLD



AND, ISRAEL NEEDED PATHWAYS TO SHARE

- READERS
- WRITERS & SCRIBES
- INTELLECTUAL AWARENESS
- PAPER – PARCHMENT, PAPYRUS,
MEDIUMS TO WRITE ON
- PEACE AND PROTECTION
- ROADWAYS
- TEACHERS & DISCIPLES

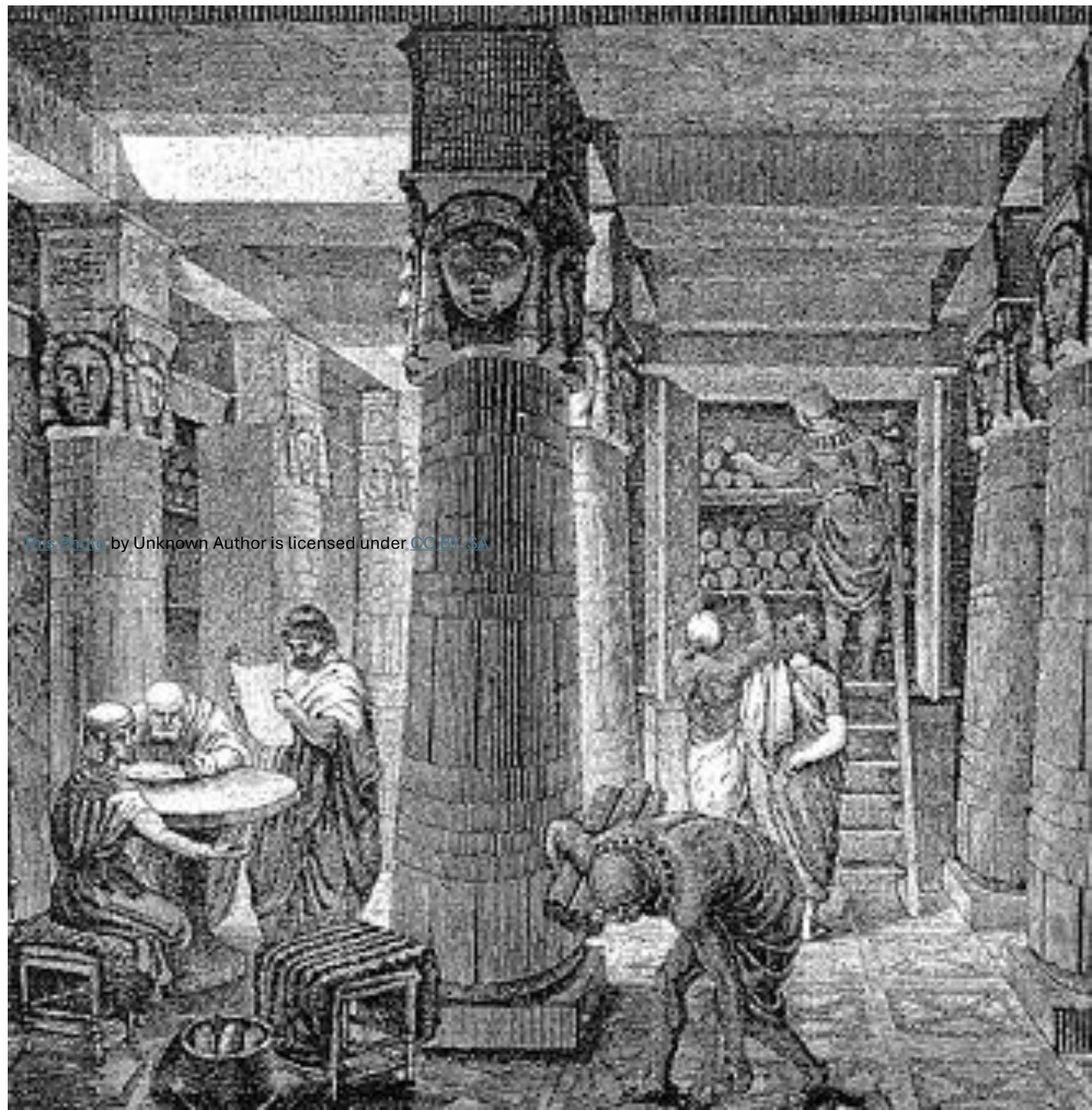


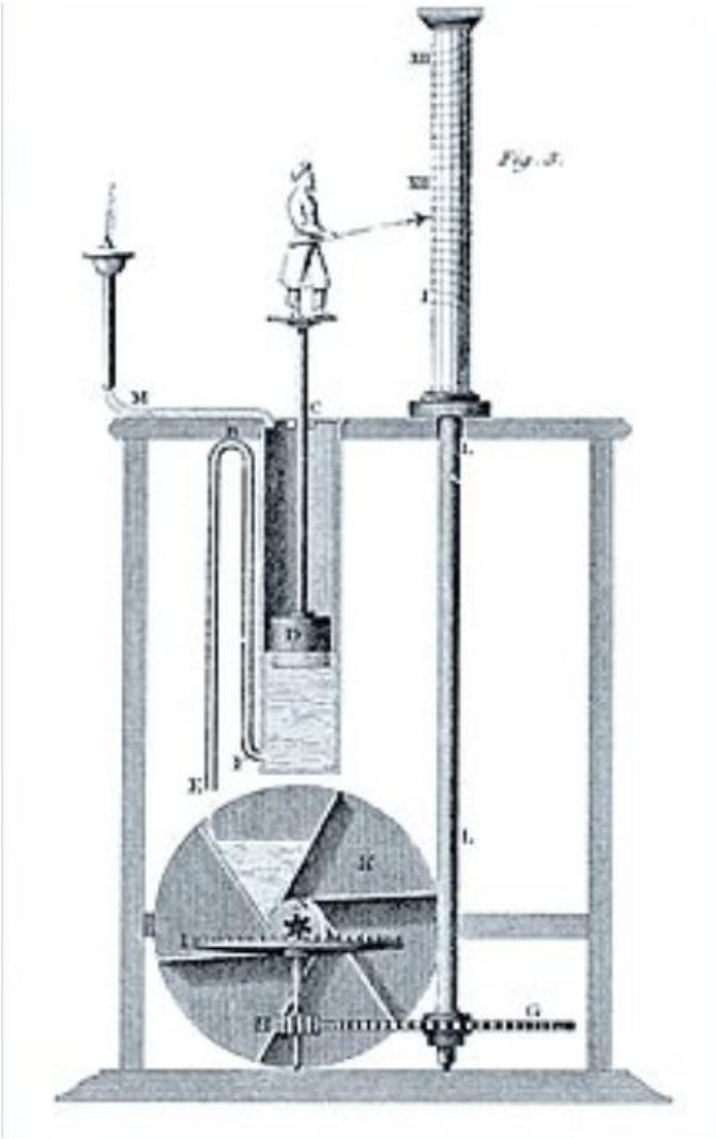
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THE CLASSICAL AGE

- Thoughts, ideas, and schooling flourished
- Greek Philosophers teach mathematics, physics, natural law, and logic beginning around ~600 BC
- The Library of Alexandria compiles knowledge from around the world, ~300 BC





CONCEPTS PUT INTO MOTION

Force = mass x acceleration

Gravity also ($m \times a$)

Rotational Motion (wheels, shafts, etc)

BATTERING RAMS: Simple physics $F = ma$

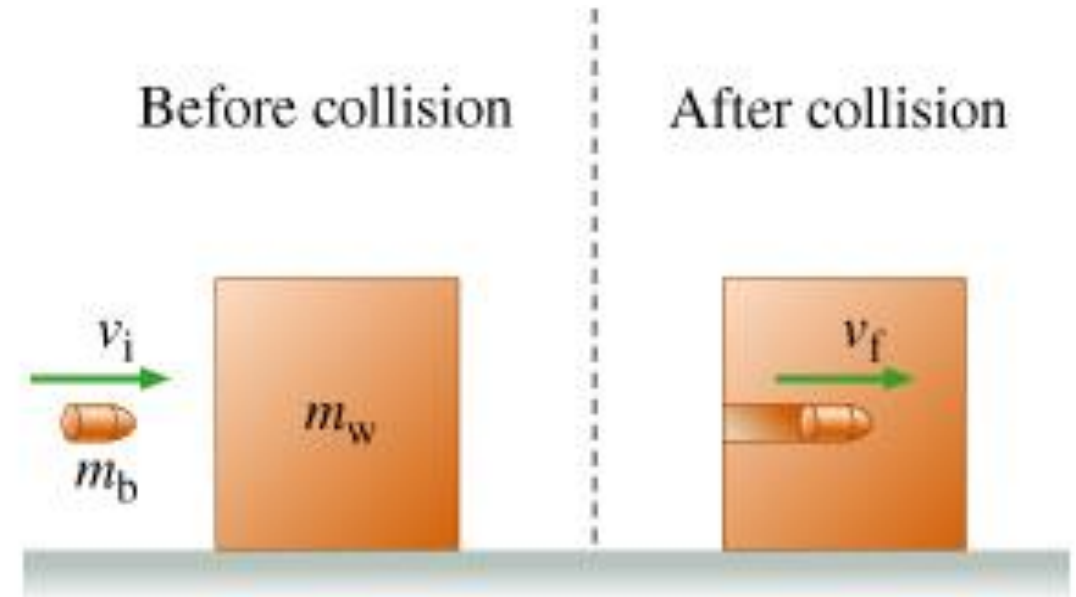
WATER CLOCK ALARMS— water weight (gravity) turns a shaft on cogs, turns a shaft with gears, attached to another shaft... water level rises to indicate elapsed time

$$\text{SPEED} + \text{METAL} + F = ma$$

The larger and faster the battering ram...
The greater the force...



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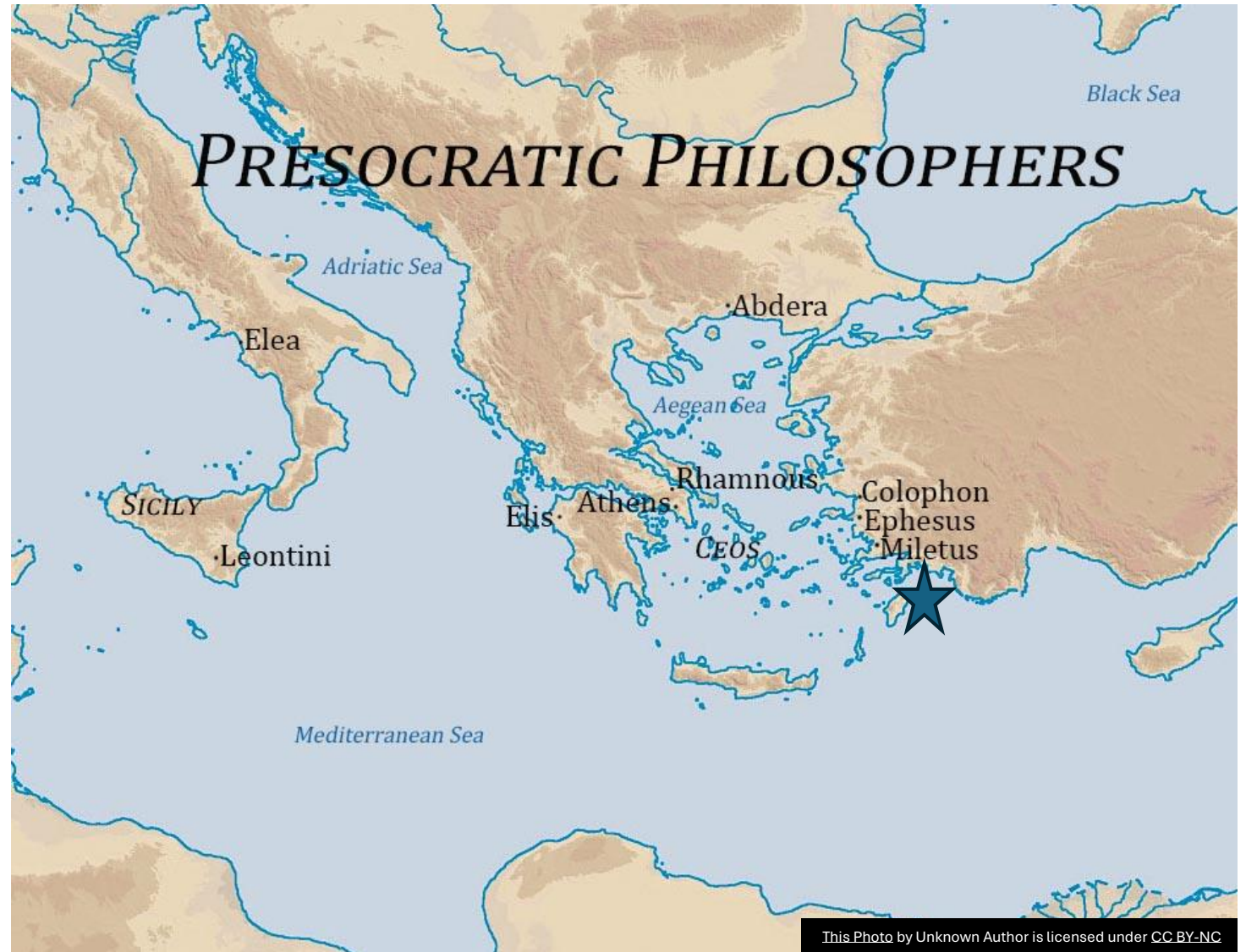


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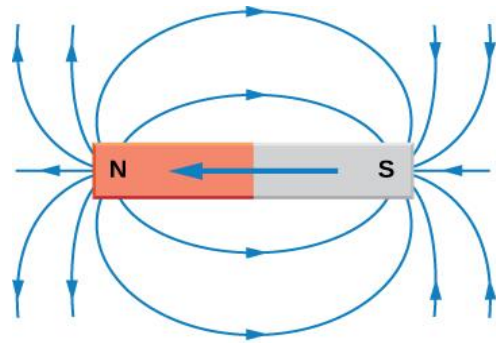
Thales of Miletus 600 BC

DEMONSTRATES & TEACHES
PROPERTIES OF:

- **MAGNETISM**
- **STATIC ELECTRICITY**
- **EQUINOXES AND SOLSTICES**
- **ECLIPSES**
- **WEATHER**
- **AND DEDUCTIVE REASONING**

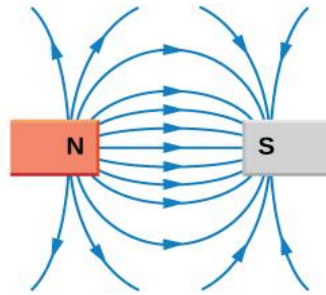


THALES – ONE OF THE EARLIEST PHILOSOPHERS DEMONSTRATES PROPERTIES OF MAGNETISM



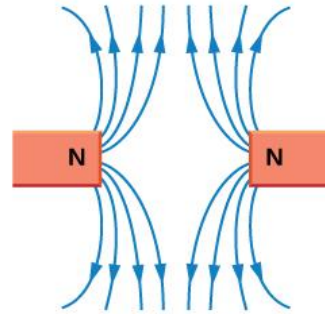
Magnetic field lines of a bar magnet

(a)



Magnetic field lines
between unlike poles

(b)



Magnetic field lines
between like poles

(c)

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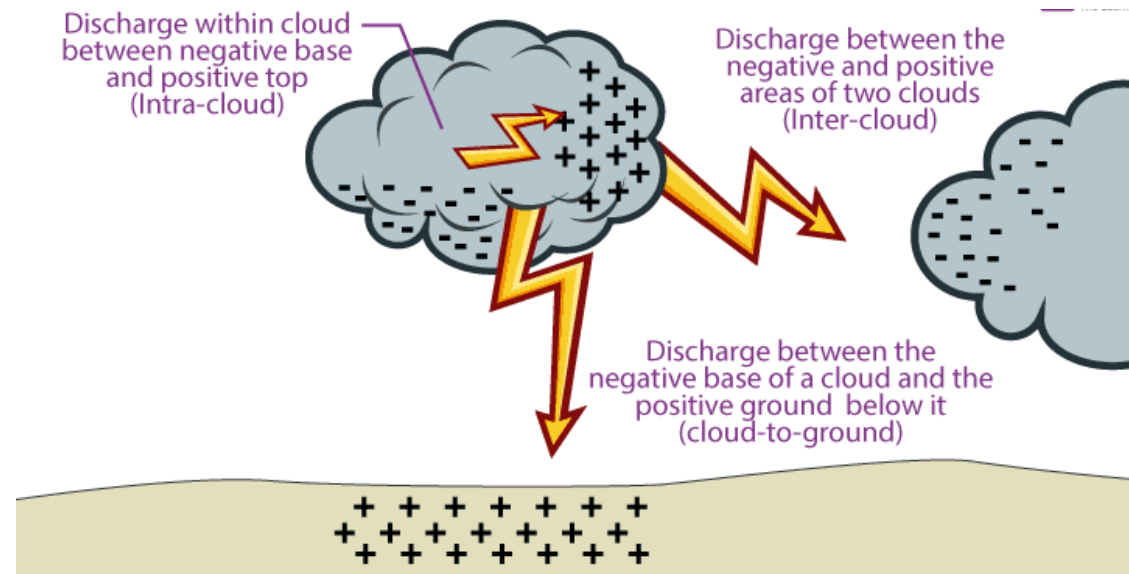
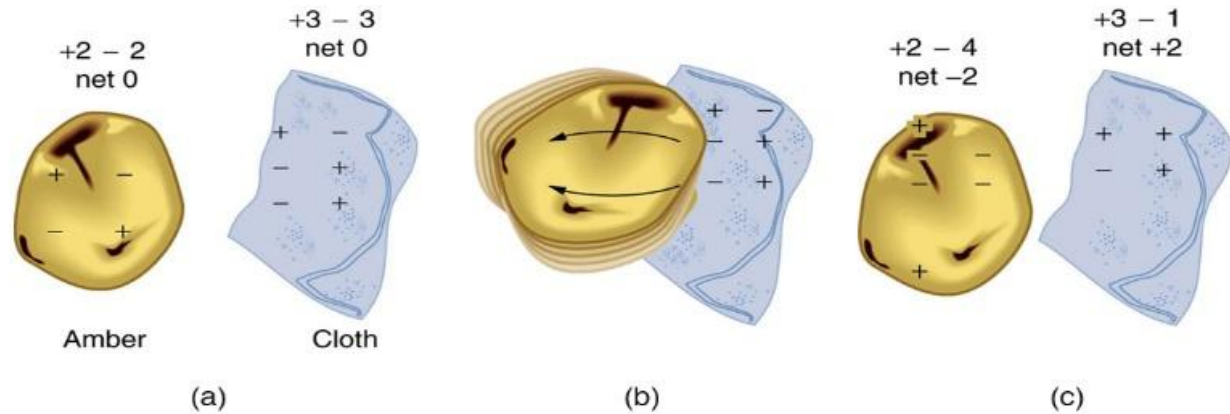
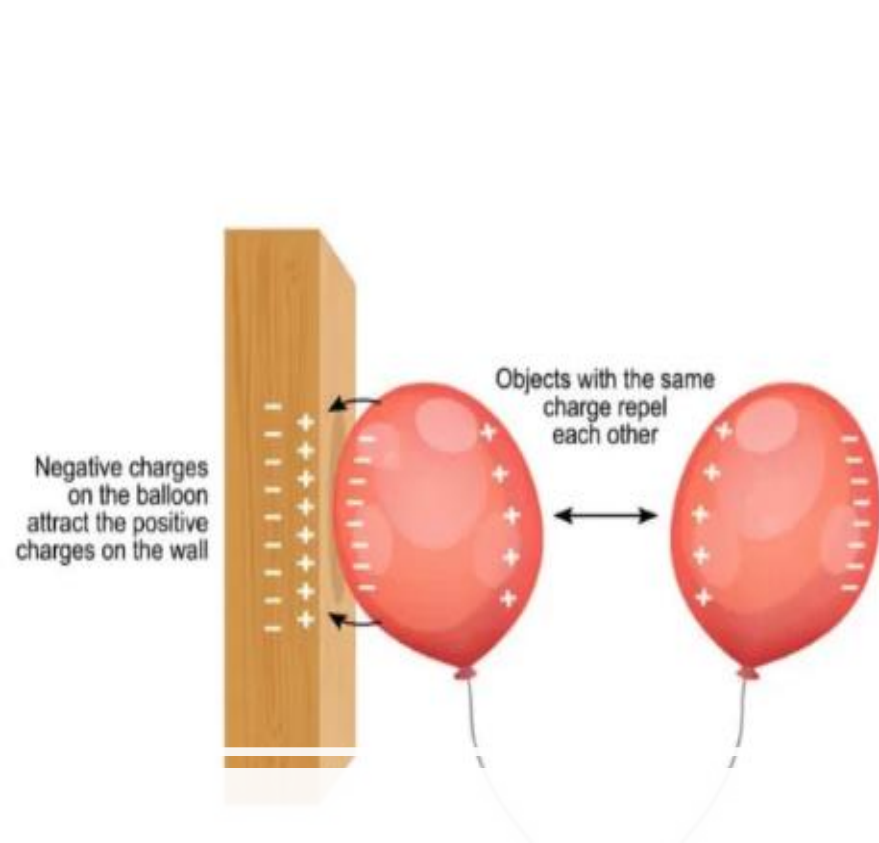
OPPOSITES ATTRACT



TWO NEGATIVES OR TWO POSITIVES REPEL

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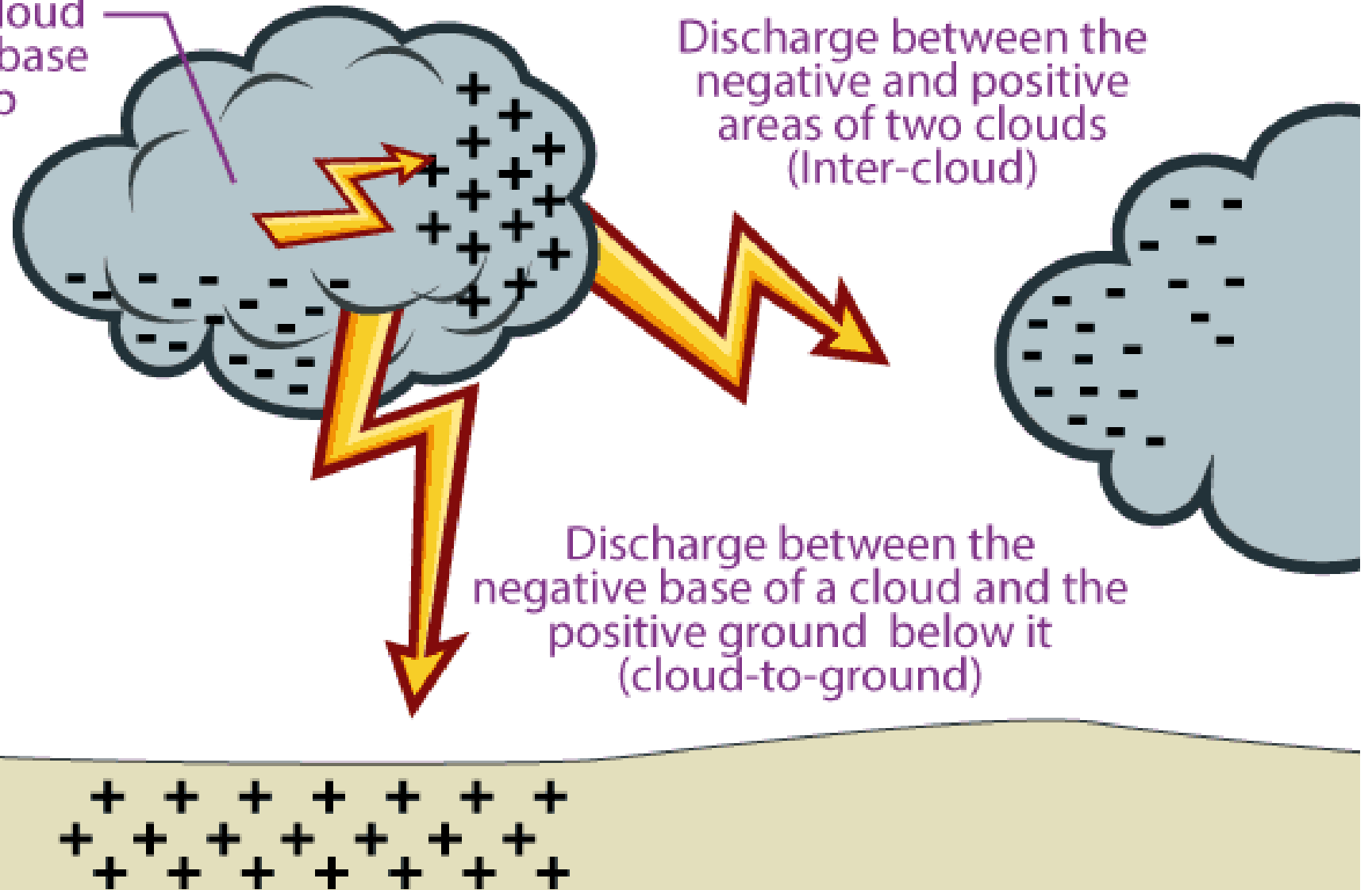
THALES EXPLORED - STATIC ELECTRICITY WITH AMBER AND WEATHER



Discharge within cloud
between negative base
and positive top
(Intra-cloud)

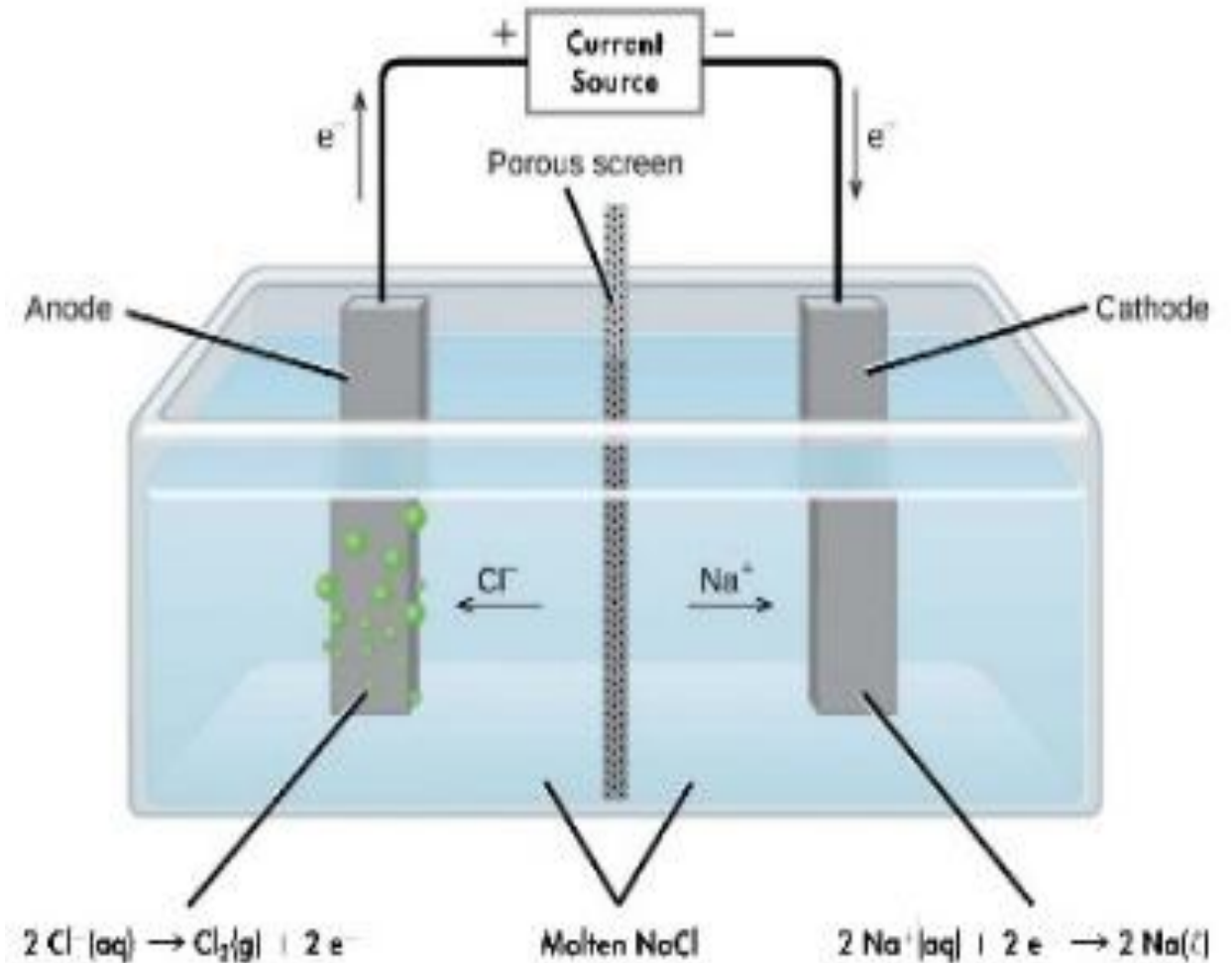
Discharge between the
negative and positive
areas of two clouds
(Inter-cloud)

Discharge between the
negative base of a cloud and the
positive ground below it
(cloud-to-ground)



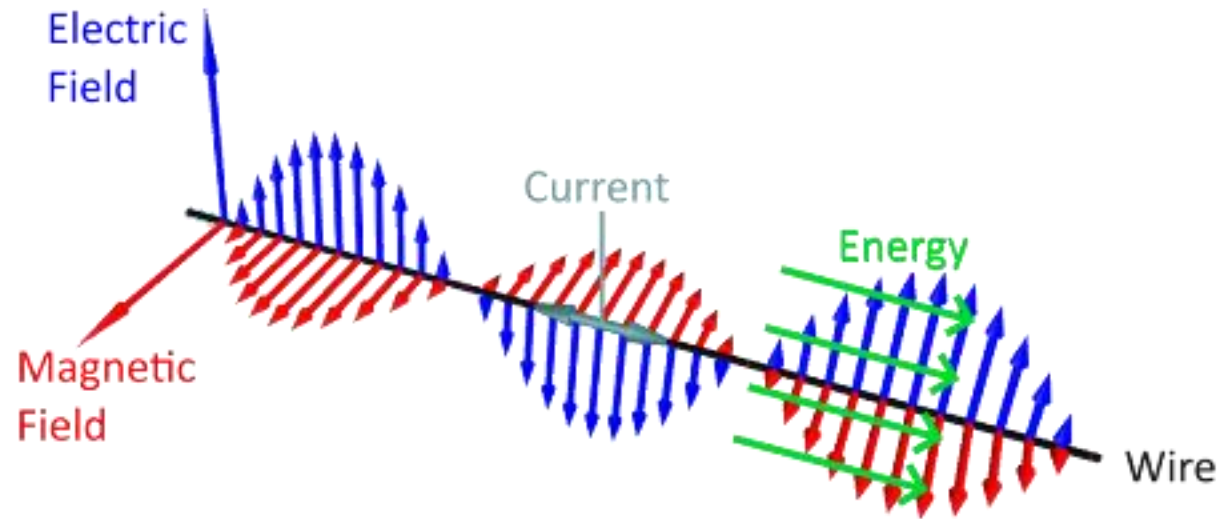
CHEMICAL ENERGY

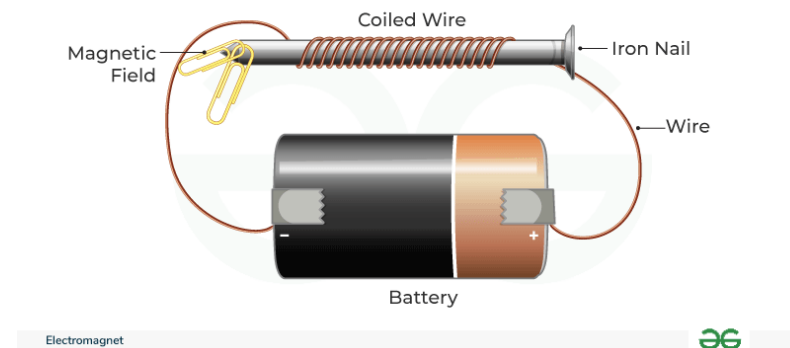
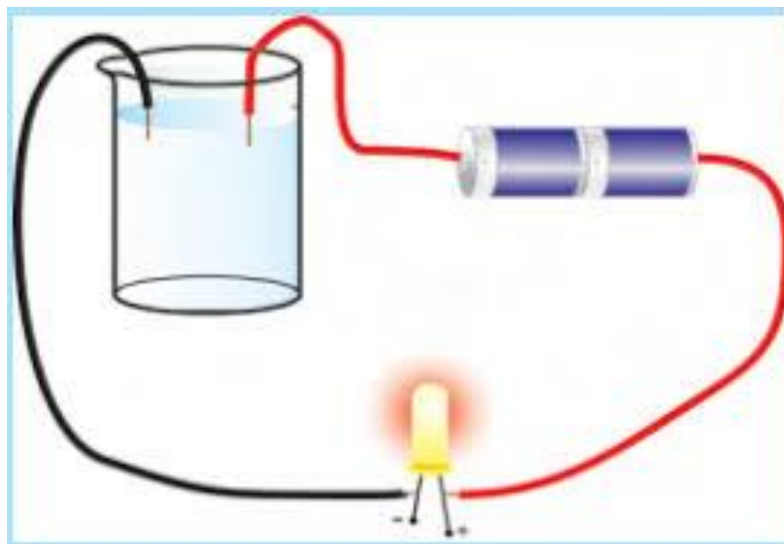
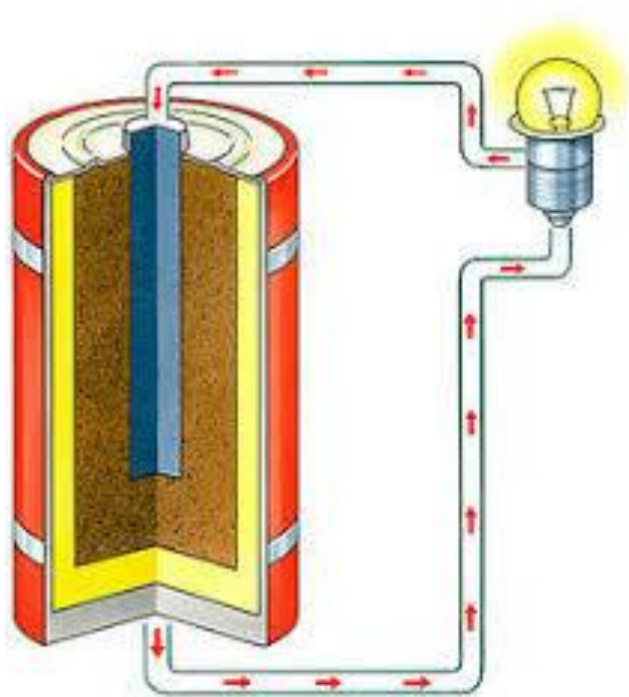
- Harnessing electron motion to create a power source
- Chemical Energy
- Example – Na⁺ and Cl⁻
- Sodium Na⁺ is a cation
- Chlorine Cl⁻ is an anion



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ELECTRICAL POWER

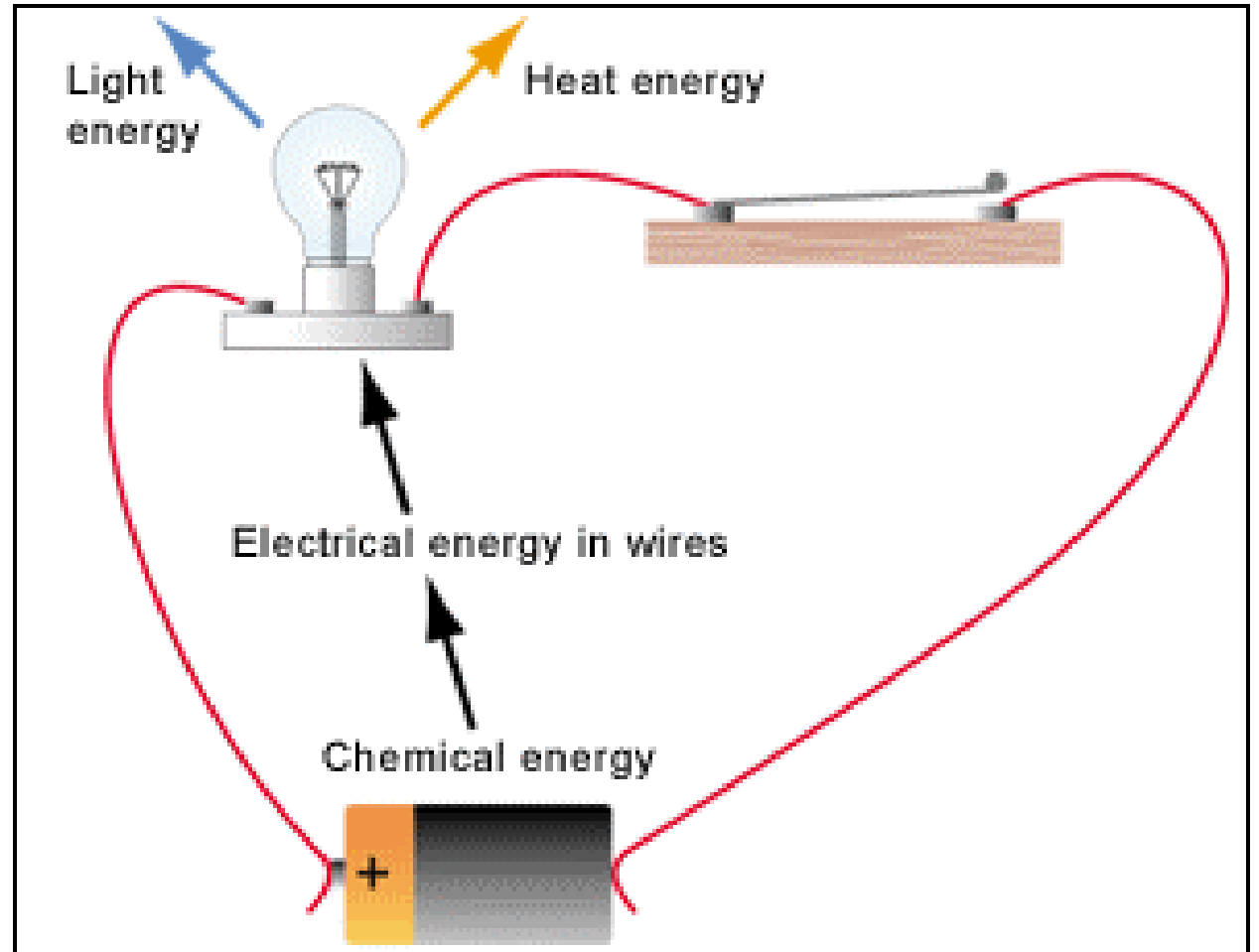




BATTERY POWER AT WORK

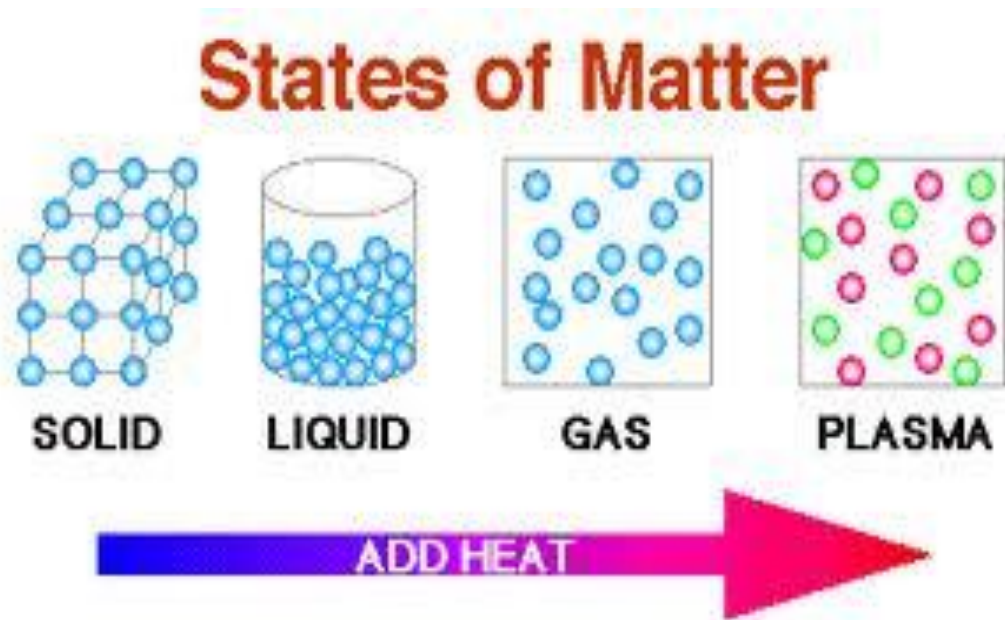
ENERGY IS...

- Energy is released/generated in various forms
- Seen in simple circuits:
 - Chemical Energy
 - Heat & Kinetic
 - Light Energy
- Kinetic, if the energy is in motion
- Potential, if the energy is in storage

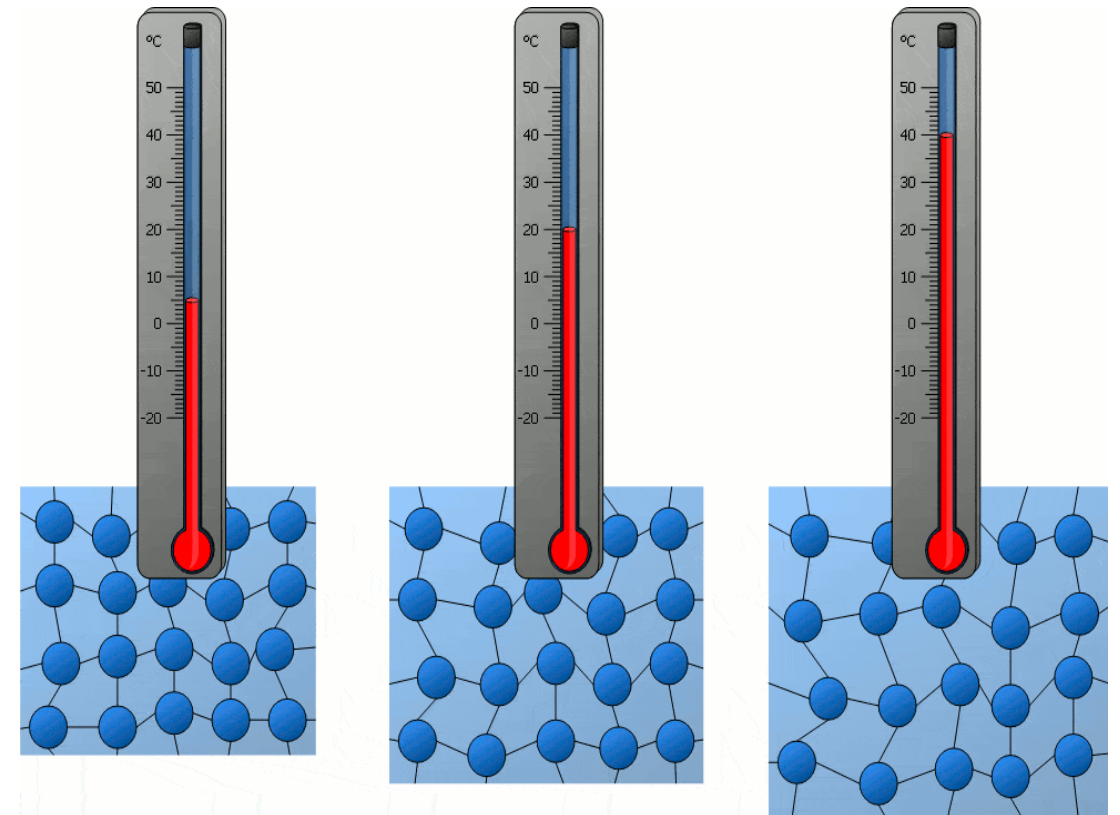


THE KINETIC ENERGY OF MATTER AT ABSOLUTE 0 KELVIN IS “ZERO”

Temperature is a measure of the motion of atoms.

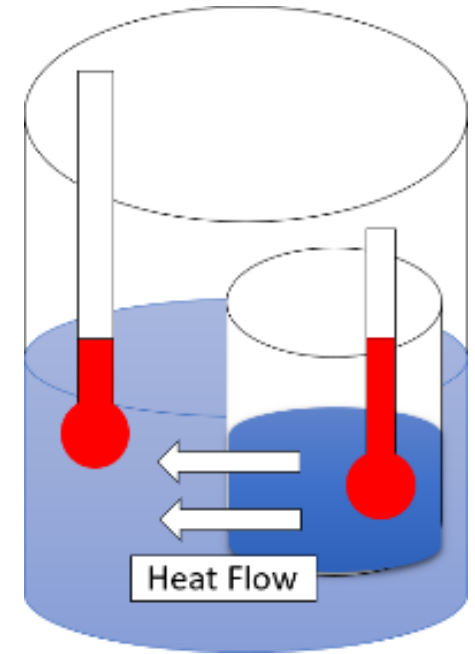


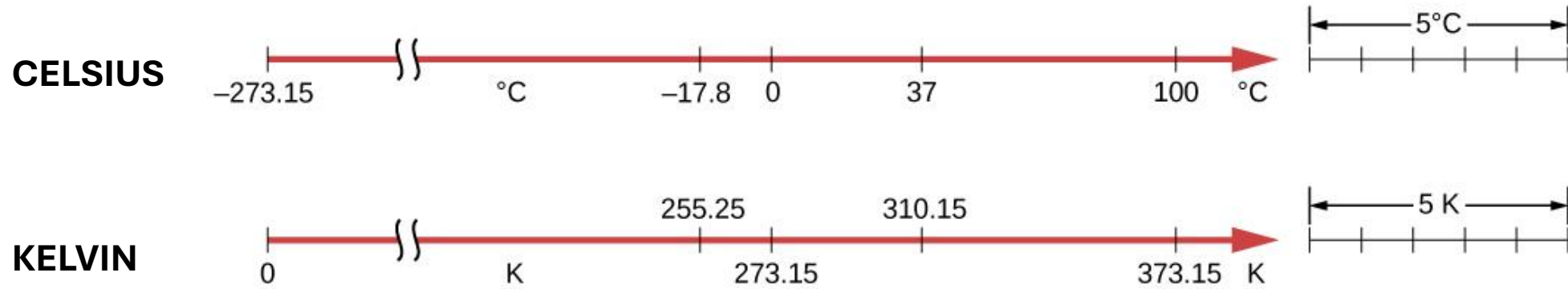
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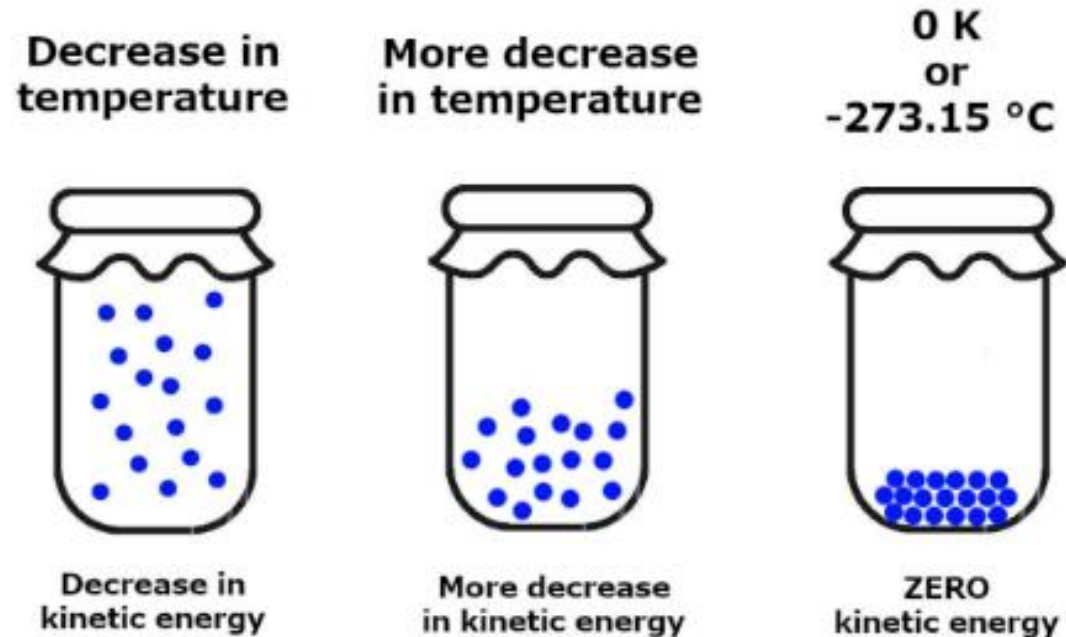
The 3 Laws of Thermodynamics (summarized):

- **Law 1:** Energy can be converted from one form to another. **Energy is neither gained or lost, but it (conservation of energy).**
- **Law 2:** Heat transfer naturally occurs from higher to lower-temperature bodies and from order to disorder in a system
- **Law 3:** Entropy is zero at absolute 0 K (Kelvin).





Absolute 0 Kelvin equals the “**heat death**” of the universe and every thing in it.

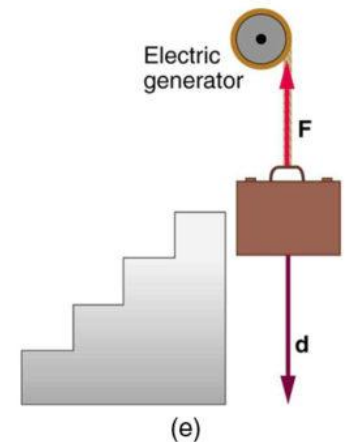
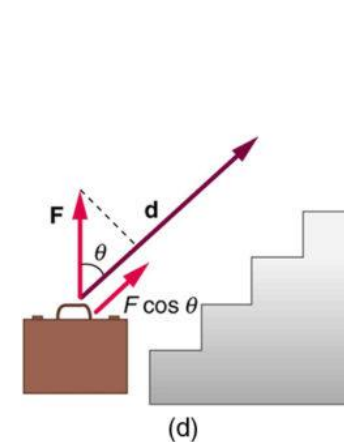
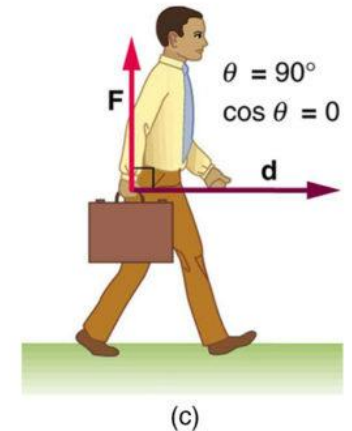
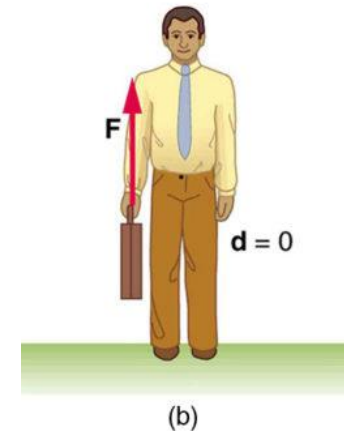
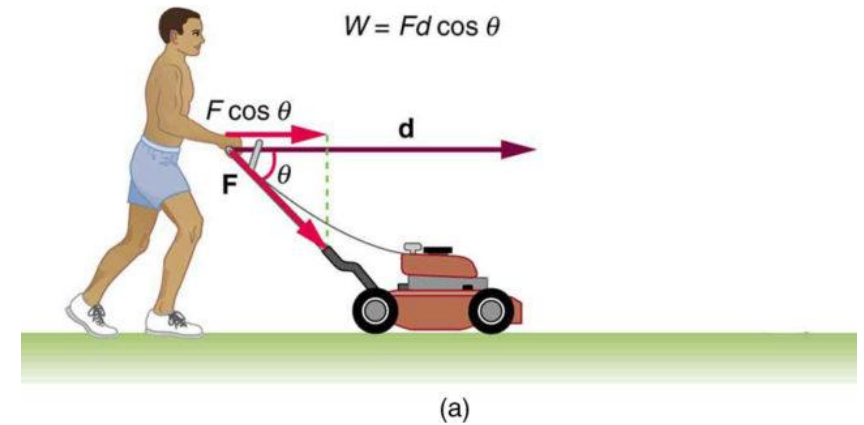


WORK REQUIRES ENERGY

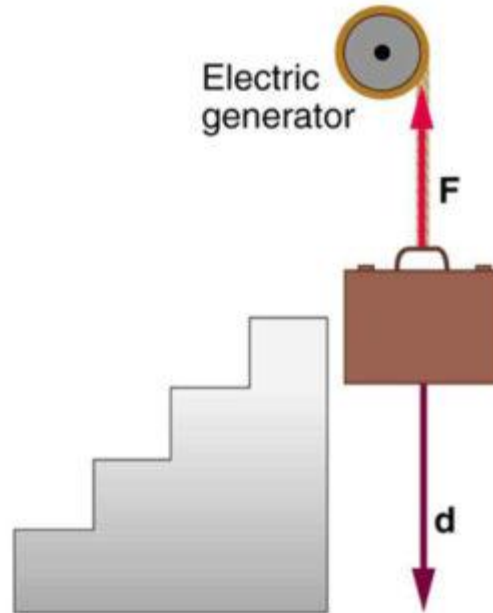
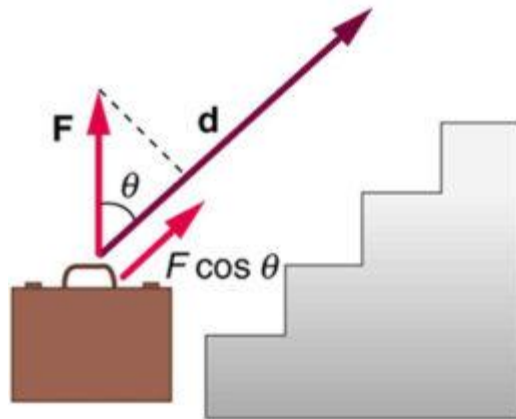
**How fast is this
work getting done?**

WORK = $F \times d$ (measured in J)
ENERGY is also measured in Joules

Unit of work: J
 $1\text{J} = 1\text{N.m}$
 $= 1\text{kg.m.s}^{-2}.\text{m}$
 $= 1\text{kg.m}^2\text{s}^{-2}.\text{m}$



REVIEW: POWER is the **RATE** Work is Done



Power

Power is the rate at which energy is transferred or the rate at which work is done.

$$P = \frac{W}{t}$$

$$P = \frac{\Delta E}{t}$$

P = power (Watt)

W = work done (J)

ΔE = energy transferred (J)

t = time (s)

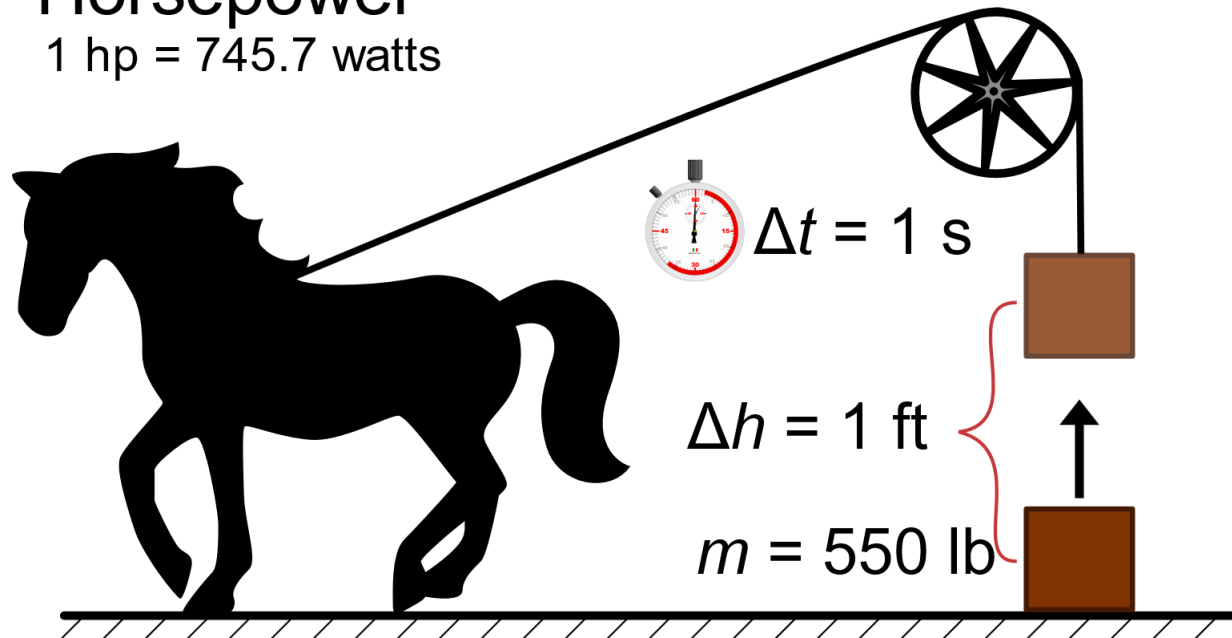
TIME IS KEY

Power (is a measure of the rate work is done)

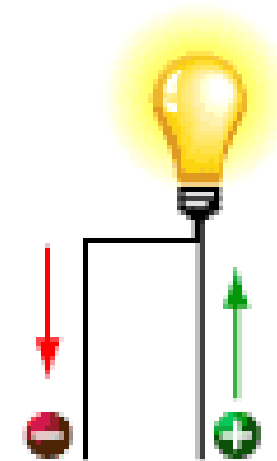
Power = W/t and is measured in Joules/sec (J/s) = Watts or Horsepower

Horsepower

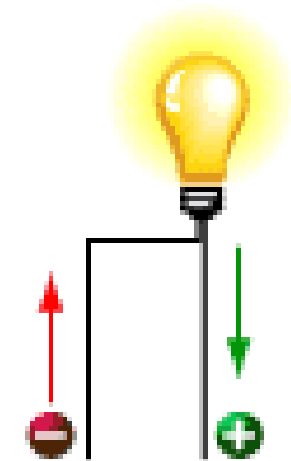
1 hp = 745.7 watts



WATTS



Current flow



Electron flow

REMEMBER THESE THINGS

Power isn't over-rated, it's undercharged. We've rarely been charged with defeating giants even though we have been infused with power from above, the power of the Holy Spirit and the power of truth. Our fears tell us to avoid tough conversations or to listen to the cynics who say, "You can't talk about Christ here!" But, Ephesians 1:19b-20a command us to, "understand the incredible greatness of God's power for us who believe in Him. This is the same mighty power ²⁰ that raised Christ from the dead..."



Ephesians 6:10-12 ¹⁰ Finally, be strong in the Lord and in his mighty power. ¹¹ Put on the full armor of God, so that you can take your stand against the devil's schemes. ¹² For our struggle is not against flesh and blood, but against the rulers, against the authorities, against the powers of this dark world and against the spiritual forces of evil in the heavenly realms.