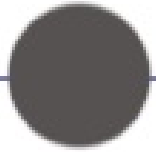
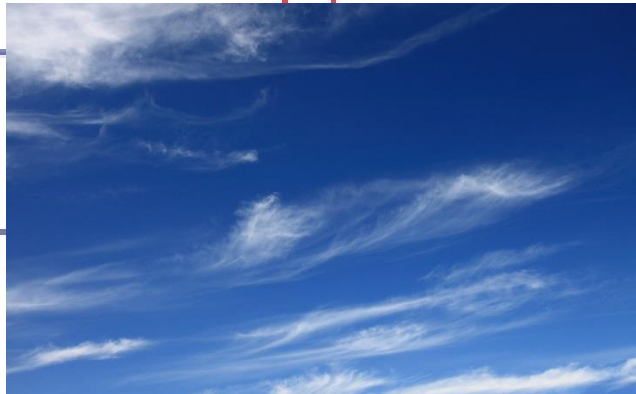


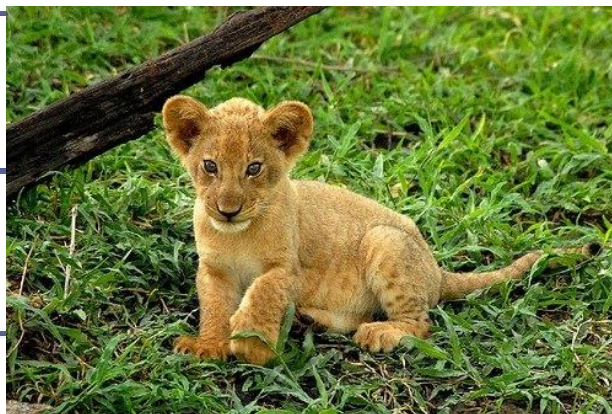
What is matter?





What is matter?

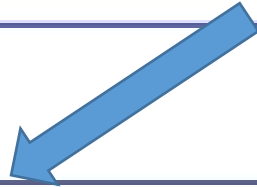
- Matter = anything that has mass and takes up space



What is matter?

- Matter = anything that has mass and takes up space

**Mass = amount of matter
in an object, always
constant
(Units: grams (g))**



**To measure:
Use a triple beam balance**

What is matter?

- Matter = anything that has mass and takes up space

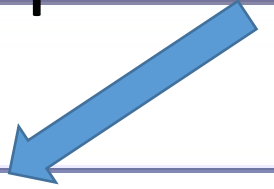
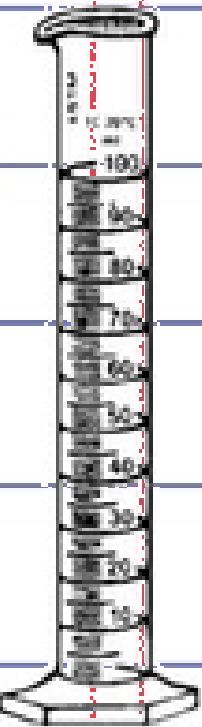
**Volume = amount of space occupied by an object
(Units: liters (L), milliliters (mL), cubic centimeters (cm³))**

To measure:

Liquid: graduated cylinder (bottom of meniscus)

Rectangular object: length x width x height

Irregular object: volume of water displaced



What is matter?

- Matter = anything that has mass and takes up space

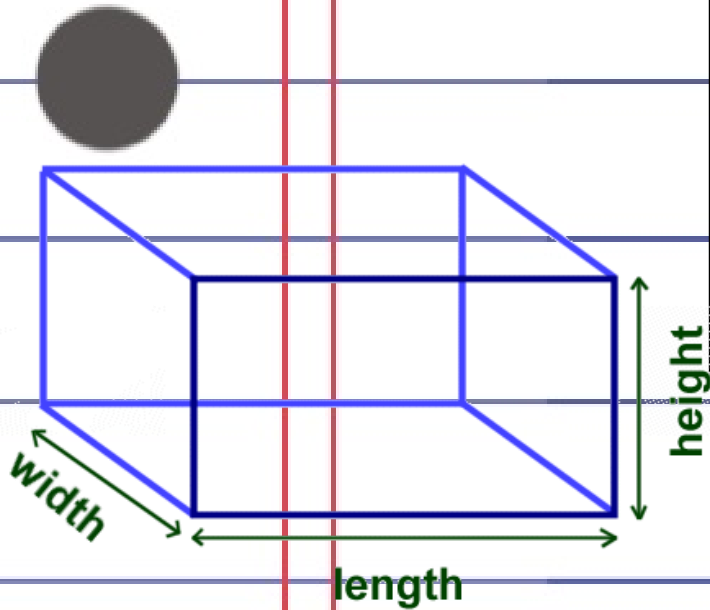
**Volume = amount of space occupied by an object
(Units: liters (L), milliliters (mL), cubic centimeters (cm³))**

To measure:

Liquid: graduated cylinder (bottom of meniscus)

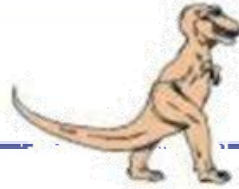
Rectangular object: length x width x height

Irregular object: volume of water displaced



Water Displacement

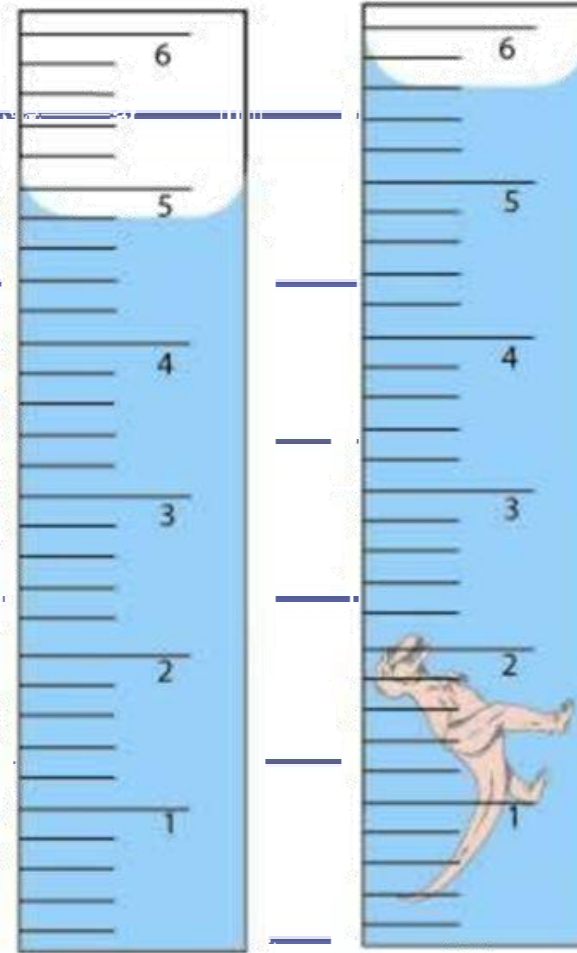
Water before = 4.8 mL
Water after = 5.6 mL



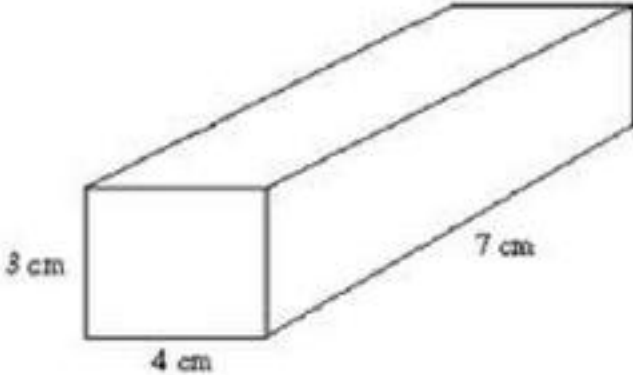
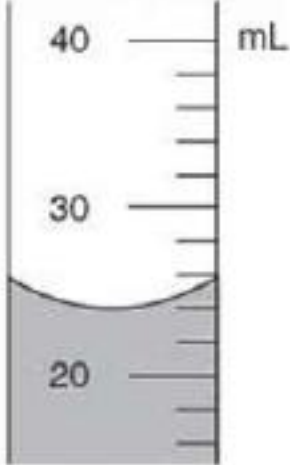
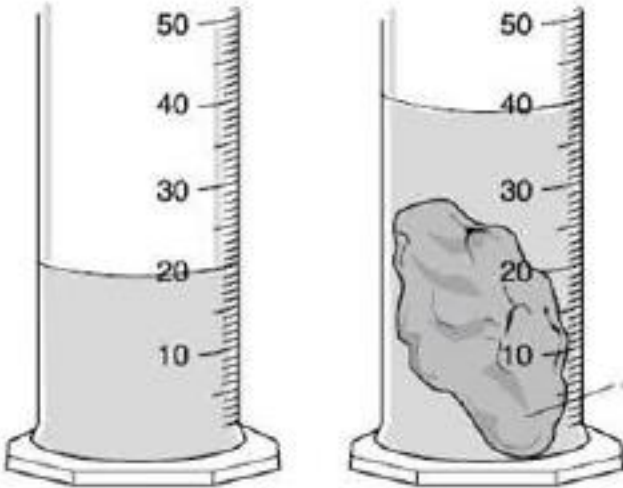
What is the volume of the toy dinosaur?

5.6ml
-4.8 ml


.8 ml



Volume Practice

Regular Shape	Liquid	Irregular shape
		
Volume _____	Volume _____	Volume _____

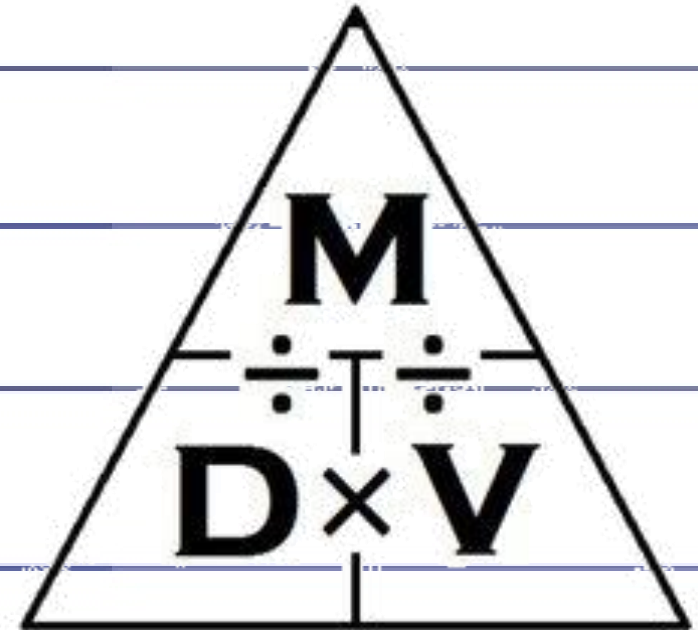
[illegible]

- 
- Physical Properties = can be observed with 5 senses, tested with lab tools, observed or measured without changing the identity of the substance
 - Examples:
 - Mass = triple-beam balance
 - Volume = graduated cylinder
 - Height, length, width = metric ruler
 - Color = eyes
 - Smell = nose
 - Taste = tongue
 - Texture = touch
 - Hardness
 - Ability to conduct heat and electricity
 - State of matter
 - Density
 - Solubility – ability of one substance to dissolve into another
 - Ductility – ability to make object into a wire
 - Flexibility – ability to be bent into a shape
 - Temperature – how hot or cold something is
 - Weight – measure of the force of gravity on an object, changes depending on where you are in the universe
 - Magnetic
 - Float (buoyancy) and sink

Density = relationship between mass and volume of an object, density for an object is always the same no matter the amount

- a glass of water has the same density as Lake Michigan (1.00 g/mL)

• Which of the following objects has more density?



- Physical Properties = Which of these is not a physical property?



- Physical Properties = Which of these is not a physical property?



- Chemical property = describe a substance's ability to participate in chemical reactions, identity of a substance is changed (light a match – turns to ash)

- Examples

- Reactivity
- Rust
- Flammability
- Oxidation
- Non-reactivity
- Decay
- fading

- Chemical Properties = Which of these is not a chemical property?



SILVER AS GOOD AS NEW !



- Chemical Properties = Which of these is a chemical property?



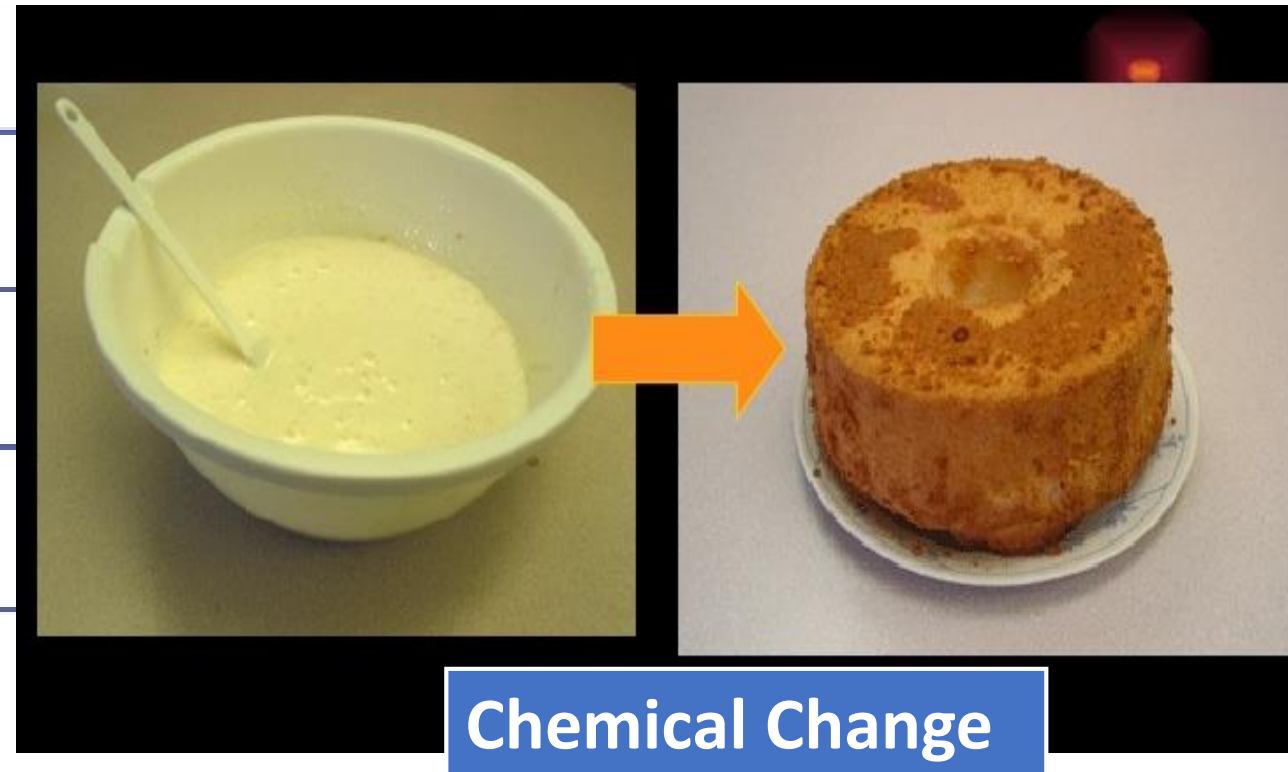
SILVER AS GOOD AS NEW !



Which picture below is a physical change and a chemical change?



Which picture below is a physical change and a chemical change?



- **Physical Change = alters the form or appearance of matter, does not turn it into something new**

- Example

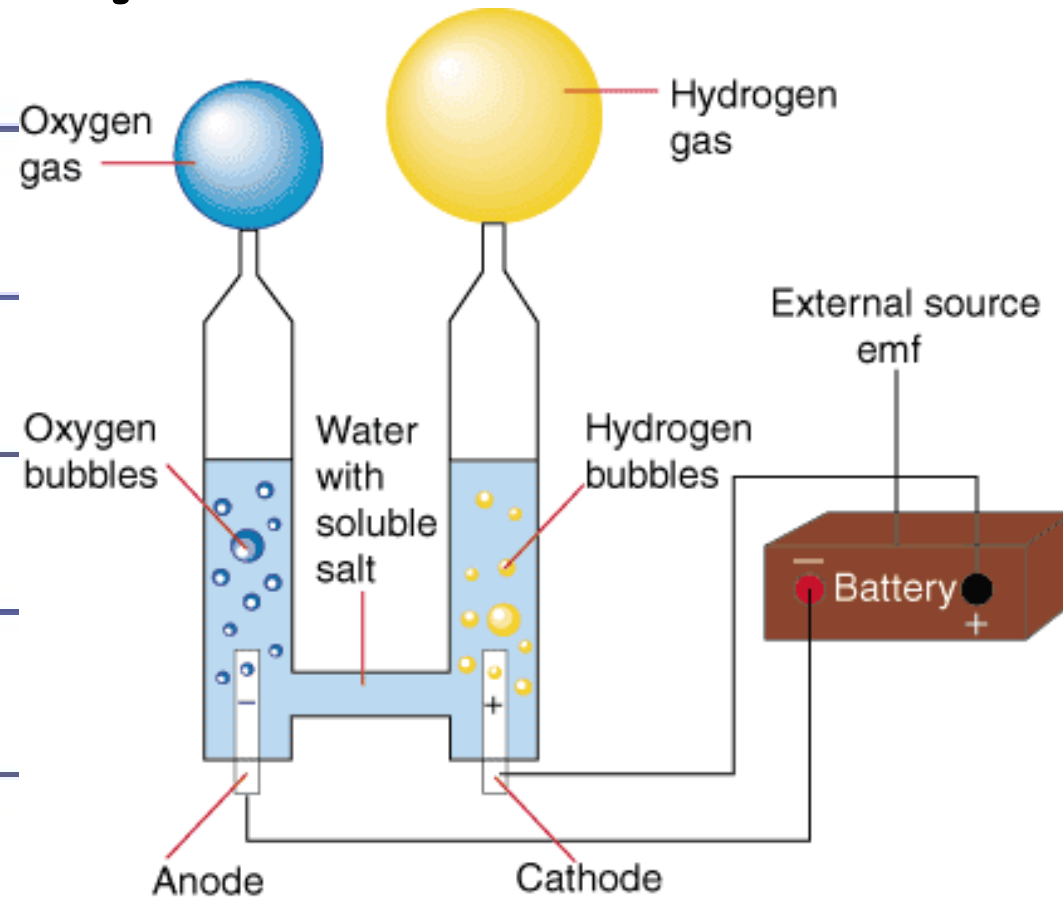
- Changes of state – solid to liquid, liquid to gas, gas to solid, liquid to solid, gas to liquid
- Dissolving
- Bending
- Crushing
- Breaking
- Chopping
- Separating mixtures
- Folding paper
- Drying wet clothes
- Melting
- Freezing
- Boiling

- Chemical Changes (chemical reactions) = change in matter that produces one or more new substances
- Examples:
 - Combustion – rapid combustion of a fuel with oxygen; produce heat, light, new substances
 - Electrolysis – use of electricity to break a compound into elements or simpler compounds (The Martian)
 - Oxidation – combination of a substance with oxygen, turns the substance another color
 - Tarnishing – slow combination of a bright metal with sulfur or another substance, produces a dark coating

Combustion



Electrolysis



Oxidation



Tarnishing



Law of Conservation of Mass =
matter is not created nor destroyed in
any chemical or physical change

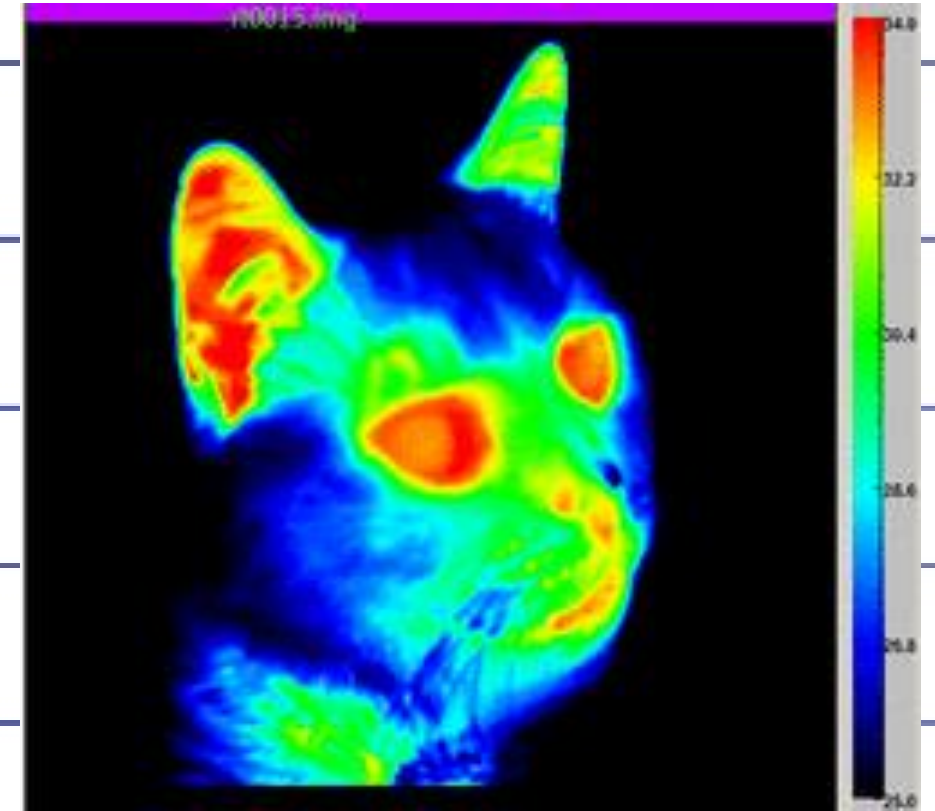
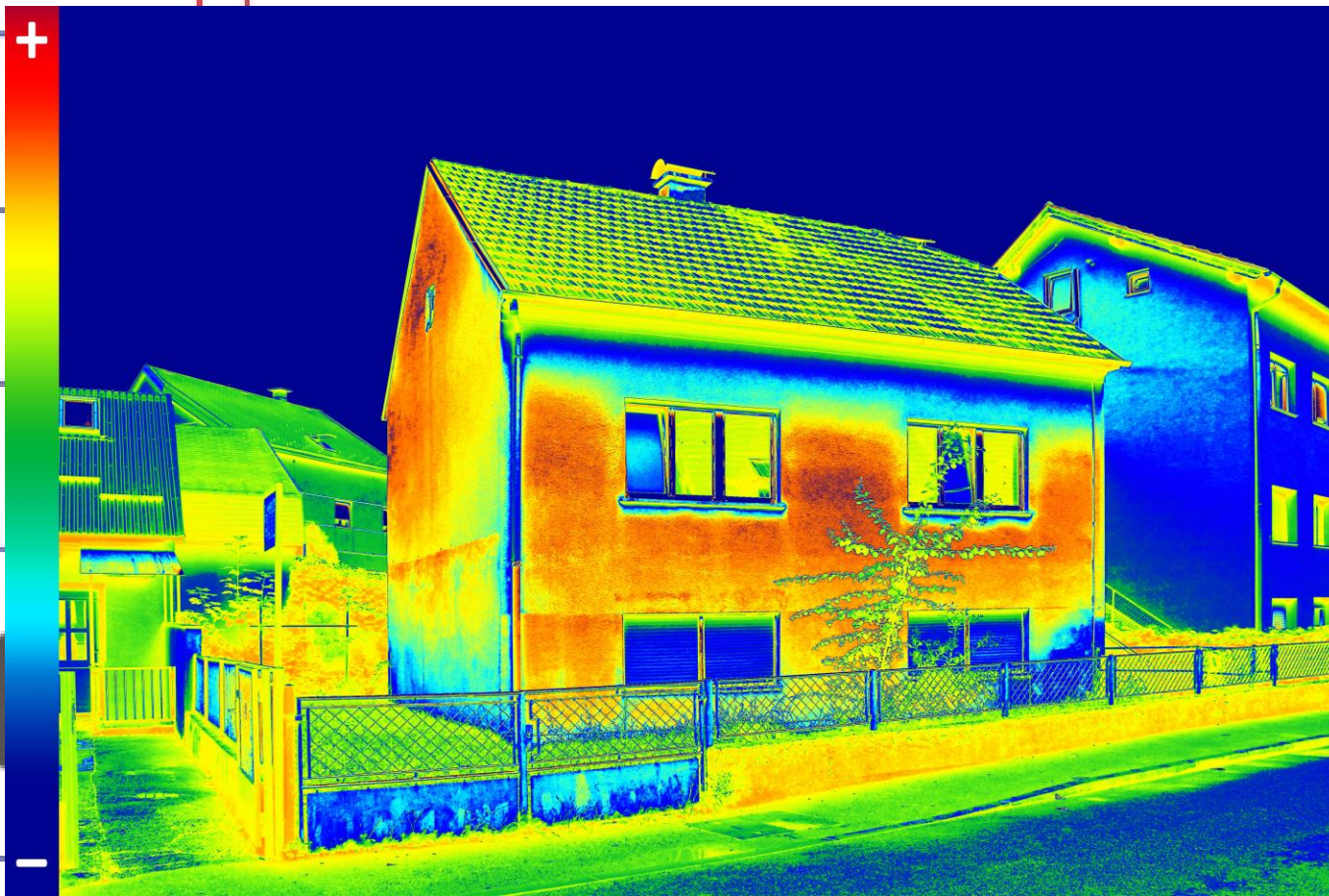


APPLICATION OF THERMAL ENERGY



Thermal energy

energy possessed within the object or system due to movement of the particles within the object or system



- More thermal energy = higher temperature
- Less thermal energy = lower temperature

Endothermic vs. Exothermic Change (types of physical and chemical reactions)

- Endothermic Change = change in which energy is absorbed.
 - Melting of ice – heat is absorbed by ice to make it melt
- Exothermic Change = change in which energy is released.
 - Combustion – releases thermal energy and light