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22/25

Kinetic Energy, and its relationship to temperature

- you can not measure energy because it is an abstract substance but scientists were still trying to figure out a way to quantify it.
- you can only measure the effect of the energy

"Heat is energy measured in joules" key thing to remember

- but there are many different kinds of energy

How did was he when discovering his main things

kenetic energy, potential energy, gravitational energy. ect.

HISTORY

no-body liked Isaac Newton, but he was a genious. But even he did not understand energy

he was very quiet, irratable, and boring when he lectured

energy: the ability to do work. it is not a thing, but an abstract concept.

vis vivan - the energy of life.

Life Energy "vis vi Va" the energy of life. (would look at 'dead' people and alive people to try to understand what energy is.

Scientists were not sure how to quantify motion

it was a proplem that many of them were trying to solve during this time period.

quantify - to put a number on

Emilie du chatelet

- Emily Duchatule
- 17 years old
- daughter of rich frenchmen

she demanded the freedom to study science

- she was 23, when she got into french mathematics was already married and a mother of 3!

- Her husband allowed her boyfriend (Voltaire) to come and live in their thoushold.

This is crazy! He was her husband, and he let her boyfriend live with them.

Was kind of a criminal for his new theories

- she learned from the men around her, but also began to come up with ideas of her own I think this angered the men around her

They just weren't sure how it all came together.

They were still trying to figure out energy but they knew that mass and velocity had to do with it, and how to compare it.

At around this same time, the battery was invented.

There was a depate

Newton = velocity · mass = energy mv^2

Leibniz = mass · velocity^2 = energy

wrong order!

Newton had come up with laws of motion used dropping balls into clay

Emilie continued to do this experiment to prove her theories

All CHPs are trained in physics. by measuring how long the skid tracks are, they can see how fast you were going.

Published in 1740 her physics book

Voltaire said "she was a great man who's only fault was being a women."

this was very dangerous during her time.

got pregnant at age 43, and died 6 days after giving birth to Hm child

After her death, it took 100 years for her idea to catch on. ideas that were then used by Einstien

It would not have taken this long

Kinetic Energy

$KE = mv^2$

Today, the measurement for mass is kg, and joules

kilograms

Joules ____ $\frac{1}{2}$ 2 kg $(5\ m/s^2)$

the purpose of this is to make the units work

When Emily was doing her experiments and discoveries, they did not have these units of energy. This probably made it so much harder! to make discoveries?

1780 - Galvanie - was eating lunch of frog legs and stuck a battery into legs making them kick
He published a paper about electricity being the energy of life

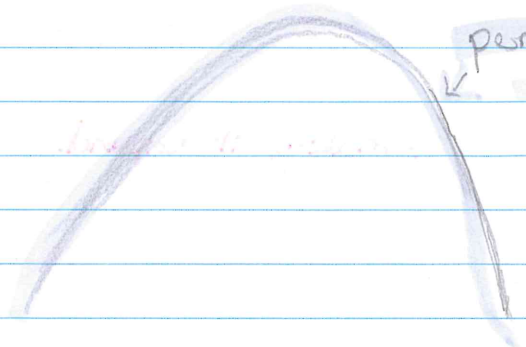
muscles are triggered by little electric waves?

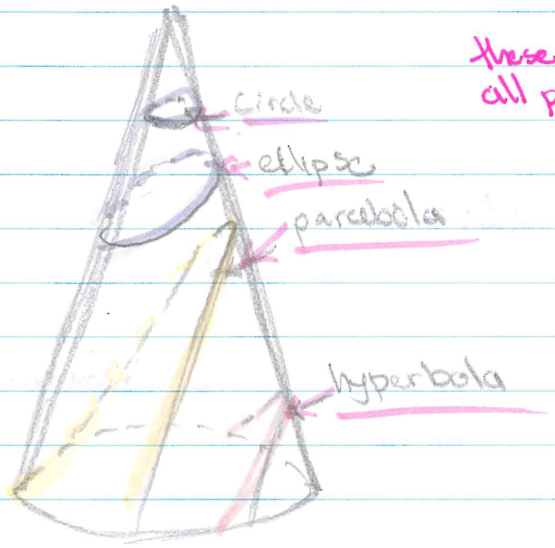
This is bc we used to be monkies that would climb trees and grasp branches.

If you are getting shocked, it activates all of your muscles, and bc the muscles on the inside of your arms are stronger, and close your hands, you can not let go!

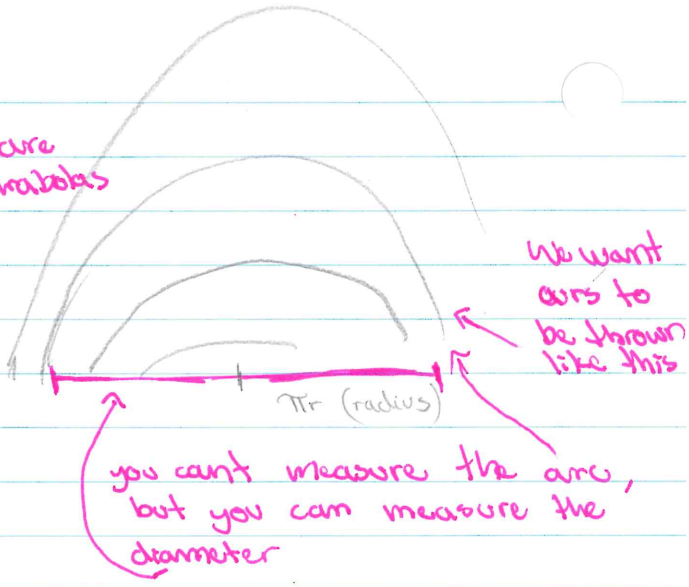
How do you get your hands unstuck? do you just die?

1800 - mary shelly read his papper, and wrote frankinstien (a story about a bunch of dead parts being brought back together with electricity)





these are all parabolas



We want ours to be thrown like this

you can't measure the arc, but you can measure the diameter

If we are going to do kinetic energy, we need to know the velocity

$KE = \frac{1}{2}mv^2$

Velocity - $V = \frac{\text{distance}}{\text{time}}$

This was to calculate what the kinetic energy of the ball was

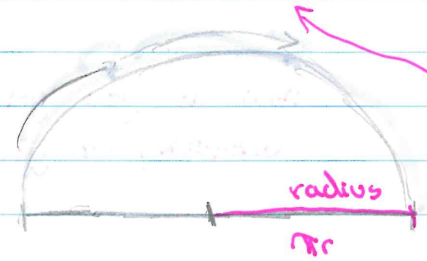
1st throw:

$V = \frac{5m}{1.81 sec}$

2nd

$V = \frac{5m}{1.70}$

$V = \frac{5m}{1.18}$



this was the numbers from our experiment.

$V = \frac{d}{time}$ $\frac{m}{sec}$

This makes so much sense!

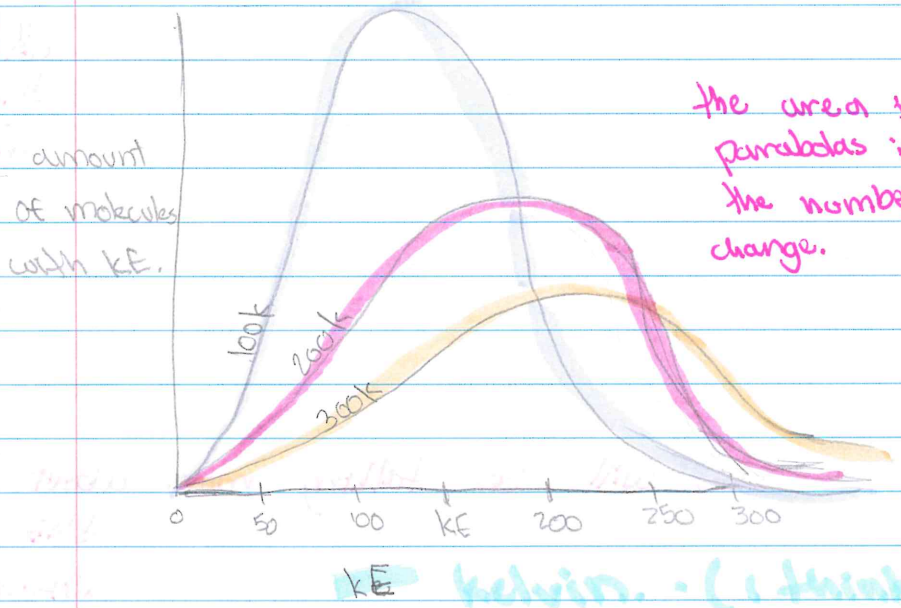
Adding energy will add speed to the system, and the pressure will increase, making it expand.

Adding Heat does not change the particles, it only changes the energy of the particles.

See diagram on next page!

I think this is connected to what Emilie could have been trying to discover

When talking about temp, you are actualy talking about the average kenetic energy of the particles in the system. this is the definition of temperature (basically) who invented this rule? or discovered it?



the area inside these parabolas is the same, because the number of particles did not change.

kelvin. (I think)

Every temperature scale has a history.

Quantify: to put a number on this is what scientists spent so long trying to do to energy.

Fernheight came first?

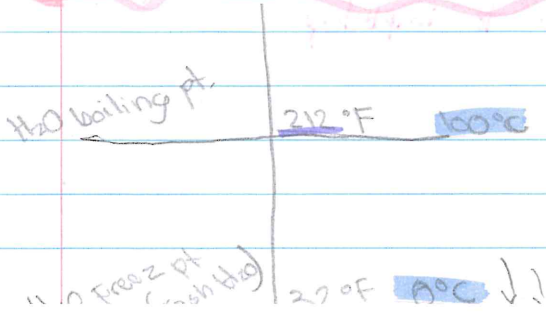
0° F - temp that sea water freezes 32°F - fresh water freezes

was this better or worse for the environment?

1900 - 90% of Americans lived on farms, so when Henry Ford brought automobile he made them run of alcohol that farmers were making from apples on their farms

just some history

they could get drunk, and fuel their cars with the same product.



but temp can go way below 0°

Is there a limit to how cold temp can get? Yes there is!

Since temp is a measure of kinetic energy. When the speed slows down, so does temp. You can't get colder than absolute zero when all the particles stop

this is because the particles get so cold that they stop moving.

Absolute zero -273°C below 0°

kelvin scale starts at absolutes zero but the size of units of kelvin and °C are the same

water boils at 373° and freezes at 273°

We will be talking more about this in future classes with Mr. Clark

Rule in Physics - anything above absolute zero has to admit radiation

Solids also have motion. things expand when they get hot because they move around and take up more space.

This is why things expand from heat!

Fun Fact

Golden gate bridge has expansion joints so that when it expands on hot days, it doesn't collapse.

many - or maybe all - bridges also have expansion joints.

How did they discover that bridges needed expansion joints? did they just use to implode?