Experiment 1

Title: Seed germination

Objective: To investigate the relationship between seed sowing depth in soil and the height of germination.

Problem statement: How does the depth of seed in soil affect its germination?

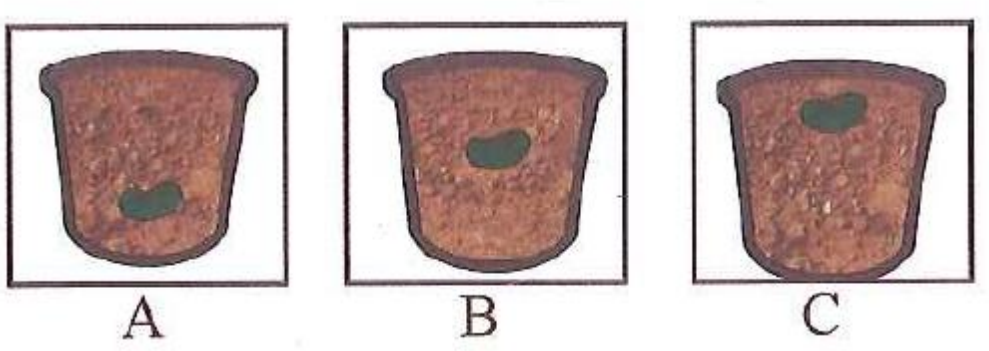
Hypothesis: Seeds can grow well when it is sowed at appropriate depth of soil.

Apparatus and Materials: seeds, soil, pot, water and meter ruler.

Variables:

i. Manipulated: depth of seed in soil
ii. Responding: height of germinations
iii. Controlled: type of seed

Procedures:



1. Label the three pots as A, B and C.
2. Put soil in the three pots.
3. Sow the seeds as follow.

Pots	Depth of seed in soil
A	30cm
B	15cm
C	5cm

4. Observe the height of the germinations at 6^{th} day, 10^{th} day and 14^{th} day.
5. Record the data obtained.

Results / Observations:

Pot	Height of the germinations (cm)		
	6^{th} day	**10^{th} day**	**14^{th} day**
A			
B			
C			

Science behind it:

Too shallow sowing results in poor germination due to inadequate soil moisture at the top soil layer. Deep sowing can also significantly reduce crop emergence and yield.

References:

https://pdfs.semanticscholar.org/c7d7/f2871a2ea635e1426f18093258c9b8b245bf.pdf

Experiment 2

Title: Potential Energy

Objective: To study the relationship between the height of slide and speed of sliding ball.

Problem statement: How the heights of slide affect the speed of sliding ball?

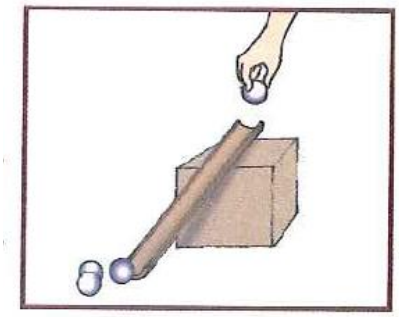
Hypothesis: The higher the height of slide, the higher the speed of sliding ball.

Variables:

i. Manipulated: height of slide / number of wooden blocks used for height
ii. Responding: speed of balls / time taken by the ping pong ball to reach surface
iii. Controlled: mass of balls / length of slide

Apparatus and Materials: ping pong balls, slides, wooden blocks, stopwatch

Procedures:



1. Set up the apparatus as shown in the diagram.
2. Roll the ping pong ball from height of one wooden block.
3. Record the time for the ball to reach the surface.
4. Repeat the experiment with height of two and three wooden block.
5. Record your observations.

Results / Observations:

Number of wooden block used for height	Time taken for the ping pong ball to reach surface (seconds)	Speed of ping pong ball (ms^{-1})
1		
2		
3		

Science behind it:

When an object falls, its gravitational potential energy is changed to kinetic energy. You can use this relationship to calculate the speed of the object's descent. Gravitational potential energy for a mass m at height h near the surface of the Earth is mgh more than the potential energy would be at height 0.

Potential Energy= mgh

Where m is mass, g is gravitational acceleration and h is height.

When the ball is moving, the potential energy is converted into kinetic energy. So,

Potential Energy = Kinetic Energy

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

To get the speed / velocity of the ball, we can use the following formula

$$v = \sqrt{2gh}$$

Where v is speed and g is constant, its value is g = 9.81ms^{-1}

References:

https://www.dummies.com/education/science/physics/how-to-convert-potential-energy-into-kinetic-energy/

Experiment 3

Title: Seed dispersal distance

Objective: To study the relationship between speed of fan and distance where the seed fall.

Problem statement: How does the speed of fan can affect the distance where the seed fall?

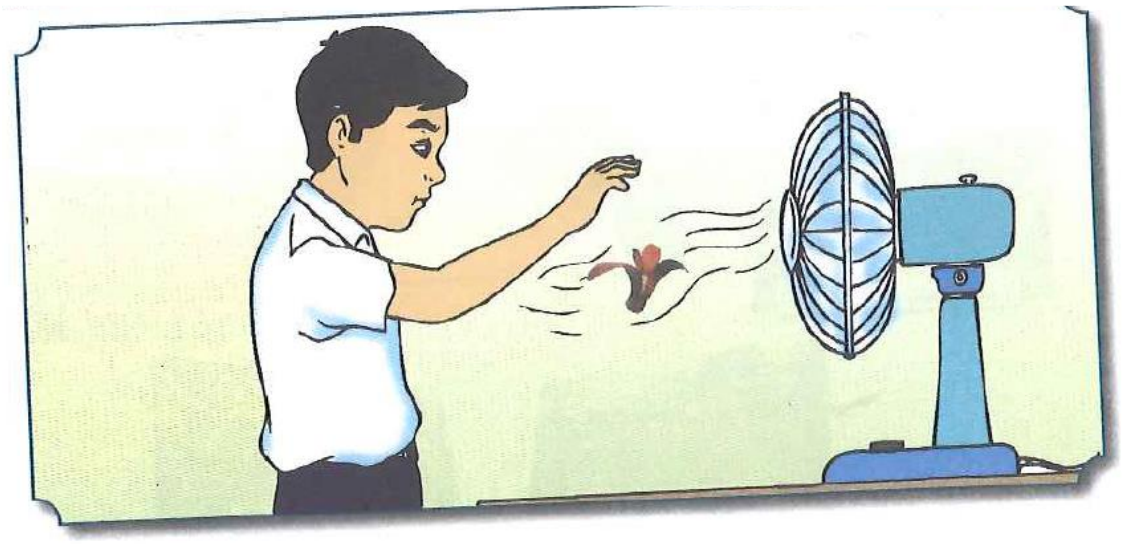
Hypothesis: The higher the speed of distance, the longer the distance where the seed fall.

Apparatus and Materials: Meranti seeds, fan, measuring tape.

Variables:

i. Manipulated: speed of fan
ii. Responding: distance where the seed fall
iii. Controlled: the height where the seeds are dropped

Procedures:



1. Drop the meranti seed from height of 100cm and with fan speed 1.
2. Measure the distance where the meranti seeds fall using measuring tape from where it is dropped.
3. Repeat the experiment with fan speed 2 and 3.
4. Record your observations.

Results / Observations:

Fan speed	Distance where the Meranti seed fall (cm)
1	
2	
3	

When the fan speed is 3, the seed fall further compared to fan speed 1.

Science behind it:

Dispersal of seeds is very important for the survival of plant species. If plants grow too closely together, they have to compete for light, water and nutrients from the soil. Seed dispersal allows plants to spread out from a wide area and avoid competing with one another for the same resources.

Seeds are dispersed in several different ways. In some plants seeds are housed within a fruit (such as apples or oranges). These fruits, including the seeds, are eaten by animals that then disperse the seeds when they defecate. Some fruits can be carried by water, such as a floating coconut. Some seeds have little hooks that can stick on to an animal's furry coat. (You may have gotten them stuck on your clothing if you ever went hiking in the woods or tall grass.)

Other seeds are dispersed by the wind—such as the "winged" seeds from a maple tree that spin and "helicopter" through the air as they fall or the light feathery seeds from a dandelion that can catch on the breeze. The longer a seed stays in the air, the farther it can be blown by the wind, helping the plant species widely scatter its offspring.

References:

https://www.scientificamerican.com/article/gone-with-the-wind-plant-seed-dispersal/

Experiment 4

Title: Vibration

Objective: To study relationship between length of ruler and vibration frequency.

Problem statement: How does length of ruler can affect its vibrations frequency?

Hypothesis: The longer the length of ruler, the more the vibration frequency caused by it.

Apparatus and Materials: Plastic ruler and table.

Variables:

i. Manipulated: length of ruler
ii. Responding: vibration frequency caused by ruler
iii. Controlled: force given on the ruler

Procedures:

1. Place the ruler as shown in diagram above.
2. At 5cm length, give force to one side of the ruler while holding another side firmly.
3. Record your observations.
4. Repeat the experiment with 10cm and 15cm length.
5. Record the data obtained.

Results / Observations:

Length of ruler	Vibration frequency
5cm	Less
10cm	Moderate
15cm	High

Science behind it:

The vibrating ruler pushes the molecules in the air, making them bunch together. As the ruler vibrates back and forth it makes waves of molecules pushed together (pressure waves). The molecules transmit these pressure waves through the air into our ear, where they are converted to electrical signals that get sent to our brain.

When the ruler is longer it vibrates more slowly, so pushes molecules together less often, so the waves of molecules are further apart - the frequency of sound waves are lower. Lower frequency waves have a lower pitch.

When the ruler is shorter it vibrates more quickly, so makes higher frequency pressure waves, which have a higher pitch.

References:

https://m.youtube.com/watch?v=4SpSwTvbZI4

https://www.ingridscience.ca/node/497

https://www.youtube.com/watch?v=3qPzsoQzo9s

Experiment 5

Title: Solar Oven

Objective: To cook using solar oven.

Problem statement: How does the solar oven is made?

Hypothesis: Food can be cooked using solar oven.

Procedures:

1. Use a box knife or sharp scissors to cut a flap in the lid of the pizza box.
2. Cut along three sides, leaving about an inch between the sides of the flap and the edges of the lid.
3. Fold this flap out so that it stands up when the box lid is closed.

4. Cover the inner side of the flap with aluminum foil so that it will reflect rays from the sun.
5. To do this, tightly wrap foil around the flap, and then tape it to the back, or outer side of the flap.

6. Use clear plastic wrap to create an airtight window for sunlight to enter into the box. Do this by opening the box and taping a double layer of plastic wrap over the opening you made when you cut the flap in the lid.

7. Leave about an inch of plastic overlap around the sides and tape each side down securely, sealing out air.
8. If you use a plastic bag, cut out a square big enough to cover the opening, and tape one layer over the opening.

9. Line the bottom of the box with black construction paper—black absorbs heat. The black surface is where your food will be set to cook.
10. How much you need will depend on the size of the pizza box you're using to make your solar oven.

11. To insulate your oven so it holds in more heat, roll up sheets of newspaper and place them on the bottom of the box.
12. Tape them down so that they form a border around the cooking area.
13. It may be helpful to also tape the rolls closed first. The newspaper rolls should make it so that the lid can still close, but there is a seal inside of the box, so air cannot escape.

14. The best hours to set up your solar oven are when the sun is high overhead—from 11 am to 3 pm.
15. Take it outside to a sunny spot and adjust the flap until the most sunlight possible is reflecting off the aluminum foil and onto the plastic-covered window. Use a ruler to prop the flap at the right angle.
16. You may want to angle the entire box by using a rolled up towel.

17. You can make toast by buttering a slice of bread then letting the sun do the rest. Cooking a hot dog or making nachos with chips and cheese are also fun treats to make in your solar oven! It would also work great to heat up leftovers.
18. So the paper at the bottom doesn't get dirty, put what you would like to cook on a clear plastic or glass plate.
19. A pie plate would work well.
20. Place the thermometer inside your oven before you close it, so you can check the temperature.

21. To take food out of the oven, open up the lid of the pizza box, and using oven mitts or potholders lift the glass dish out of the oven.

Science behind it:

The heat from the sun is trapped inside of your pizza box solar oven, and it starts getting very hot. Ovens like this one are called collector boxes, because they collect the sunlight inside. As it sits out in the sun, your oven eventually heats up enough to melt cheese, or cook a hot dog! How does it happen? Rays of light are coming to the earth at an angle. The foil reflects the ray, and bounces it directly into the opening of the box. Once it has gone through the plastic wrap, it heats up the air that is trapped inside. The black paper absorbs the heat at the bottom of the oven, and the newspaper makes sure that the heat stays where it is, instead of escaping out the sides of the oven.

Your solar oven can reach about 200° F on a sunny day and will take longer to heat things than a conventional oven. Although this method will take longer, it is very easy to use, and it is safe to leave alone while the energy from the sun cooks your food. We made a cheese roll up by melting cheese on a corn tortilla. It took about 45 minutes for our cheese to melt and the tortilla to become soft. The internal temperature of our pizza box solar oven was 125° F.

If you do not want to wait long to have a solar-cooked dish, try heating up something that has already been cooked, like leftovers, or a can of soup. Putting solid food in a glass dish and liquids in a heavy plastic zip lock bag works well. You can also pre-heat your oven by setting it in direct sun for up to an hour.

Other recipes you may want to try are making baked potatoes, rice with vegetables, chocolate fondue, s'mores, and roasted apples with cinnamon and sugar. Even on partly cloudy days there may be enough heat and light from the sun to slow cook a special dish. Here are a few tips for having success with your solar oven:

- Stir liquids (if you're cooking something like fondue, rice, or soup) every 10 minutes. You can rotate solid food every 10-15 minutes as well, so it cooks evenly.

- Reposition your solar oven when needed, so that it faces direct sunlight. You should be checking periodically on your oven, to make sure it is in the sun.
- Make sure that the foil-covered flap is reflecting light into the pizza box, through the plastic-covered window.

References:

https://www.homesciencetools.com/article/how-to-build-a-solar-oven-project/

Experiment 6

Title: Electricity

Objective: To study the relationship between number of bulbs and brightness of bulb in a circuit.

Problem statement: How the number of bulbs can affect the brightness of bulb in a circuit?

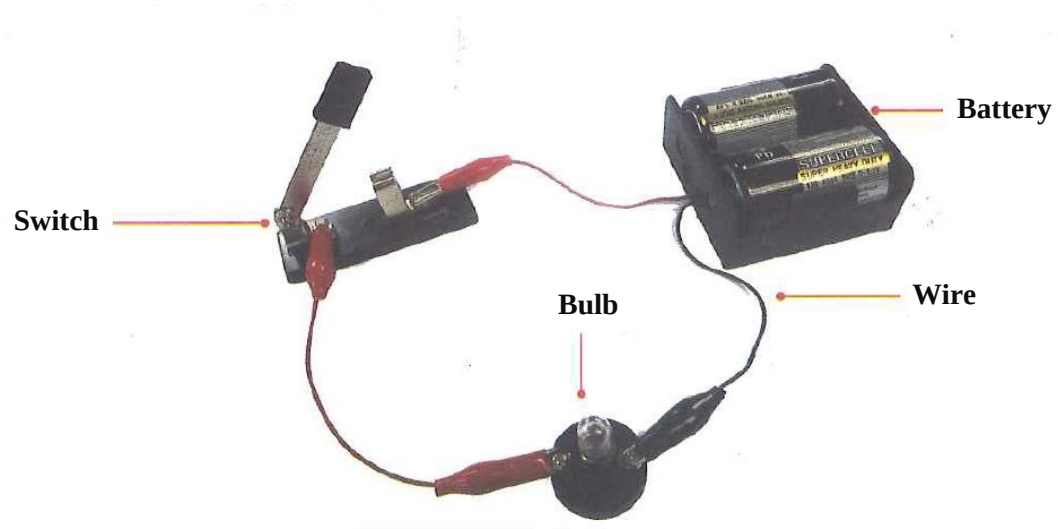
Hypothesis: When the number of bulbs in a circuit increases, the brightness of bulbs decreases.

Apparatus and Materials: bulbs, batteries, switch, wires and bulb holders.

Variables:

i. Manipulated: number of bulbs in a circuit
ii. Responding: brightness of the bulbs
iii. Controlled: number of batteries

Procedures:



1. Set up the apparatus as shown.
2. Switch on the switch.
3. Observe the brightness of the bulb.
4. Repeat the experiment with 2 and 3 bulbs.
5. Record your observations.

Results / Observations:

Number of bulbs	Brightness of bulbs
1	Very bright
2	Bright
3	Dim

The bulb lights up brighter when there is only one bulb compared to three bulbs. When there are three bulbs the brightness of bulbs are dim.

Science behind it:

Increasing the number of bulbs in a series circuit decreases the brightness of the bulbs. In a series circuit, the voltage is equally distributed among all of the bulbs.

References:

http://www.ric.edu/faculty/PSCI103/electricity/bulbs_answers.pdf

Experiment 7

Title: Electricity

Objective: To study the relationship between number of batteries and brightness of bulb in a circuit.

Problem statement: How the number of batteries can affect the brightness of a bulb in a series circuit?

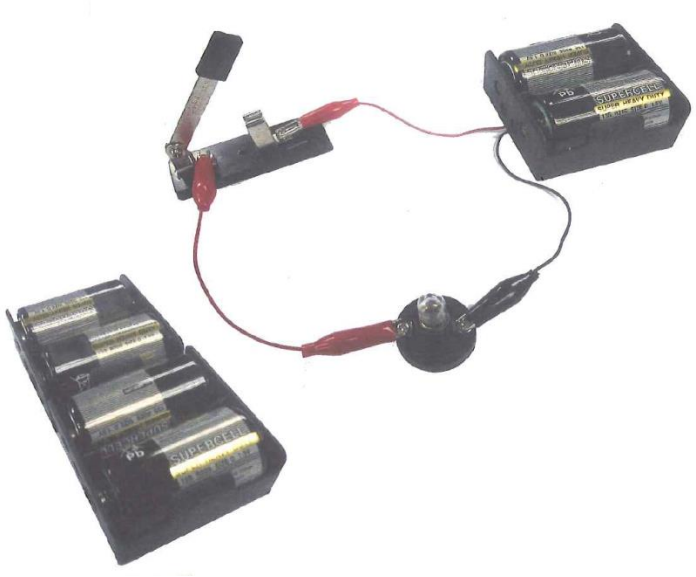
Hypothesis: When the number of batteries in a series circuit increases, the brightness of bulb decreases.

Apparatus and Materials: bulbs, batteries, switch, wires and bulb holders.

Variables:

i. Manipulated: number of batteries in a circuit
ii. Responding: brightness of the bulb
iii. Controlled: number of bulb

Procedures:



1. Set up the apparatus as shown.
2. Switch on the switch.
3. Observe the brightness of the bulb.
4. Repeat the experiment with 4 batteries.
5. Record your observations.

Results / Observations:

Number of batteries	Brightness of bulbs
2	Bright
4	Very bright

Science behind it:

As the number of batteries increase, the voltage also increases. Higher voltage contributes to higher brightness of bulb.

Experiment 8

Title: Series and Parallel circuit

Objective: To study about the series and parallel circuits.

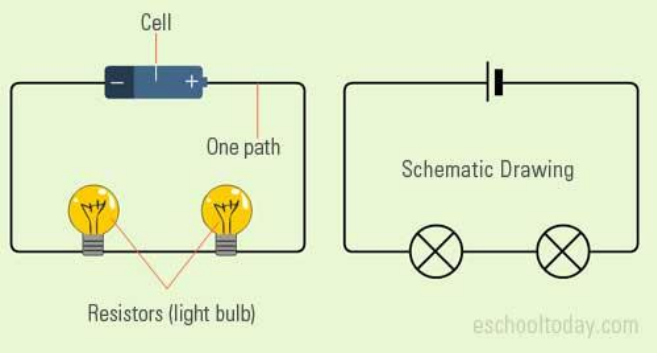
Apparatus and Materials: bulbs, wires, batteries, battery holders and switches.

Procedures:

1. Set up series and parallel circuits using the apparatus prepared.
2. Discuss the advantages and disadvantages of both circuits.

Science behind it:

- ✓ Series circuit

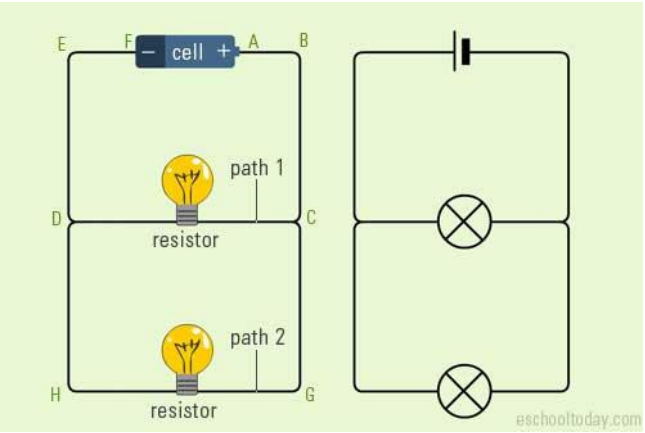


A series circuit is one that has more than one resistor, but only one path through which the electricity (electrons) flows. From one end of the cell (battery), the electrons move along one path with NO branches, through the resistors, to the other end of the cell. All the components in a series circuit are connected end-to-end.

A resistor in a circuit is anything that uses some of the power from the cell. In the example below, the resistors are the bulbs. In a series circuit, the components are arranged in a line, one after the other.

Each time there is damage (break) in any one of the resistors the entire circuit will not function. For example, if one light bulb goes out, all the other lights will go off because the electricity path in the broken bulb is cut off.

- ✓ Parallel circuit



From the above, it is clear that electricity from the cell can take either path A or Path B to return to the cell. The great thing about parallel circuits is that, even when one resistor (bulb) burns out, the other bulbs will work because the electricity is not flowing through one path.

Think of all the light bulbs in your home. If one bulb burns out, the other bulbs in the rooms still work.

Another great thing is that the bulbs in a parallel circuit do not dim out like the case in series circuits. This is because the voltage across one branch is the

same as the voltage across all other branches.

Science behind it:

https://eschooltoday.com/science/electricity/what-is-a-parallel-circuit.html

Experiment 9

Title: Electricity from food

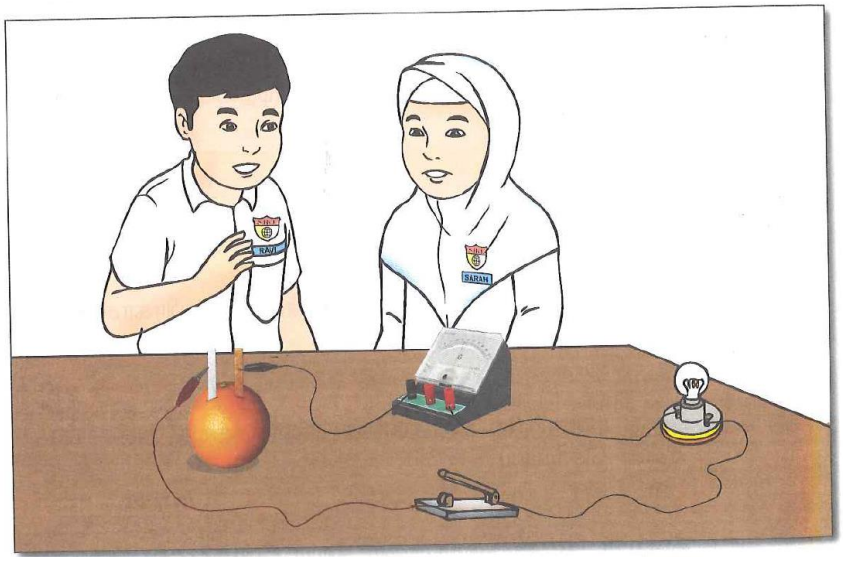
Objective: To light up a bulb from fruits.

Problem statement: How fruits can contribute electricity to light up a bulb?

Hypothesis: Foods that produce electricity are usually high in acidity or potassium.

Apparatus and Materials: orange, bulb, switch, wires, crocodile clip, galvanometer, copper plate and tin plate.

Procedures:



1. Set up the experiment as shown.
2. Switch on the switch.
3. Measure and record the reading of galvanometer.

Science behind it:

Some fruits and vegetables can conduct electricity, often providing a current strong enough to act as a battery. Foods that produce electricity are usually high in acidity or potassium.

- ✓ Citrus Fruit

The acidity of citrus fruit juice acts as an electrolyte that conducts electricity. Citrus fruits such as oranges, grapefruits, limes and lemons have high acidity levels. One lemon can produce 7/10 of one volt of electricity. Electrical power increases as you connect more fruits.

- ✓ Vegetables

According to the website MadSci.org, one raw potato has 407 milligrams of potassium, which acts as a conduit for electrical power. Potatoes may also have a higher number of ions that can produce electricity. Other vegetables that conduct electricity due to their potassium and ionic content are tomatoes, carrots, sweet potatoes and cucumbers.

References:

https://sciencing.com/foods-make-electricity-6519340.html

Experiment 10

Title: Boiling point of water

Objective: To study the boiling point of water

Problem statement: What is the boiling and melting point of water?

Apparatus and Materials: beaker, Bunsen burner, wire gauze, tripod stand, thermometer, matchbox, measuring cylinder and graph paper.

Variables:

i. Manipulated: heating time
ii. Responding: temperature of water
iii. Controlled: volume of water

Procedures:

1. Set up the apparatus as shown.
2. Heat the water using Bunsen burner.
3. Measure and record the change in temperature of water every one minute using thermometer.
4. **Record the data obtained.**

Results / Observations:

Time (minutes)	1	2	3	4	5
Temperature (°C)					

The temperature of water increases as the time increases.

Science behind it:

- ✓ What Is the Boiling Point of Water?

The simple answer to this question is that the boiling point of water is 100 C or 212 F at 1 atmosphere of pressure (sea level).

However, the value is not a constant. The boiling point of water depends on the atmospheric pressure, which changes according to elevation. Water boils at a lower temperature as you gain altitude (e.g., going higher on a mountain), and boils at a higher temperature if you increase atmospheric pressure (coming back down to sea level or going below it).

The boiling point of water also depends on the purity of the water. Water that contains impurities (such as salted water) boils at a higher temperature than pure water. This phenomenon is called boiling point elevation, which is one of the colligative properties of matter.

- ✓ What Is the Melting Point of Water?

The melting point of water is not always the same as the freezing point of water! Here is a look at the melting point of water and why it changes.

The melting point of water is the temperature at which it changes from solid ice into liquid water. The solid and liquid phase of water is in equilibrium at this temperature. The melting point depends slightly on pressure, so there is not a single temperature that can be considered to be the melting point of water. However, for practical purposes, the melting point of pure water ice at 1 atmosphere of pressure is very nearly 0 °C, which is 32 °F or 273.15 K.

The melting point and freezing point of water ideally are the same, especially if there are gas bubbles in water, but if the water is free of nucleating points, water can supercool all the way down to −42 °C (−43.6 °F, 231 K) before freezing. So, in some cases, the melting point of water is considerably higher than its freezing point.

References:

https://www.thoughtco.com/what-is-the-boiling-point-of-water-607865

https://www.thoughtco.com/what-is-the-melting-point-of-water-609414

Experiment 11

Title: Effect of temperature

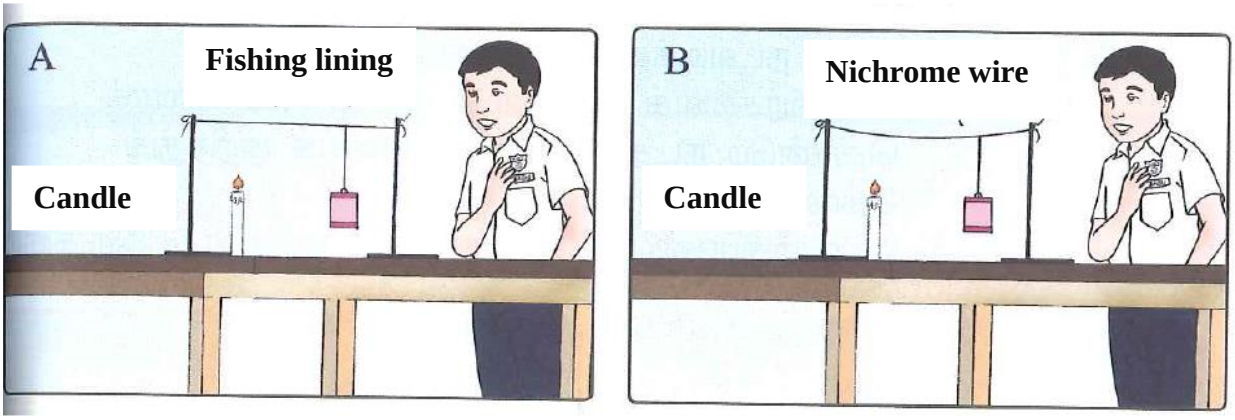
Objective: To study the effect of temperature on surroundings.

Apparatus and Materials: Nichrome wire, candles, fishing wire, match box and loads.

Variables:

i. Manipulated: type of wires used (Nichrome & Metal)
ii. Variables: what happens to the both wires when heat is applied
iii. Controlled: amount of heat applied

Procedures:



1. Set up the apparatus and materials as shown above.
2. Light up the candle.
3. Observe what happens to both wires after 5 minutes.
4. Record your observations.

Results / Observations:

Type of wires	Observations
Nichrome	The wire expands and hangs loosely after 5 minutes.
Fishing lining	There is no change to the fishing wire.

Science behind it:

Thermal Expansion

Metal expands when heated. Length, surface area and volume will increase with temperature. The scientific term for this is thermal expansion. The degree of thermal expansion varies with different types of metal. Thermal expansion occurs because heat increases the vibrations of the atoms in the metal. Accounting for thermal expansion is essential when designing metallic structures. An everyday example would be the design of household pipes, which must accommodate expansion and contraction as the seasons change.

Electrical wires are made up of copper which is a metal, metals conduct heat and electricity. The main reason they conduct heat and electricity is because they have additional electrons, when heat is applied it provides energy to these electrons, this additional energy makes them move out of their original shell thus expanding the atom structure. This overall expansion of the shells makes the entire wire expand to a certain extent. Similarly the exact opposite is the case when metal is cooled i.e. at night, the atoms receive less or no energy from the sun this makes them go back to a more stable state and thus contracting to its initial or even to smaller size depending on the surrounding temperature. Because of this phenomena the wire undergoes expansion and contraction every single day, thus if the wires were tightly held in the long run the wires might get snapped because of the contraction it faced.

Similar is the case in railway tracks where they place small gap between two joints of the track to allow it to expand during daytime.

References:

https://www.metalsupermarkets.com/how-heating-metal-affects-its-properties/

Experiment 12

Objective: To study the acidity and basicity of substances.

Problem statement: How determine the acidity and basicity of a substance?

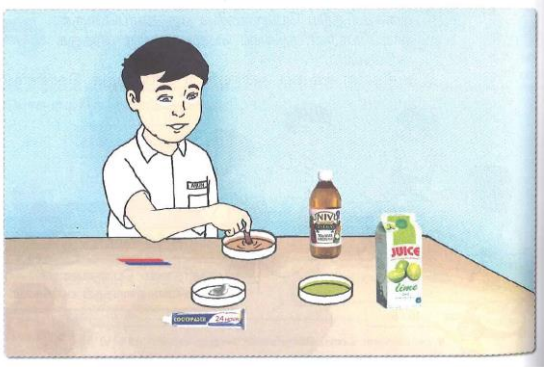
Hypothesis: Different substances have different acidity and basicity properties.

Apparatus and Materials: petri dish, red and blue litmus papers, lime juice, toothpaste and vinegar.

Variables:

i. Manipulated: type of substances used to test
ii. Responding: acidity and basicity of substances
iii. Controlled: method used to determine acidity and basicity

Procedures:



1. Pour some amount of lime juice in the petri dish.
2. Use red and blue paper to immerse in the juice.
3. Observe the color change and record it.
4. Repeat the experiment with toothpaste and vinegar.
5. Record the color change of litmus paper.

Results / Observations:

Substances	Red litmus paper	Blue litmus paper	Acid or Base
Lime juice	No change	Turns red	Acid
Toothpaste	Turns blue	No change	Base
Vinegar	No change	Turns red	Acid

When lime juice was tested with red litmus paper, no changes occur but when it was tested with blue litmus paper, it turns red. It shows acidic property of lime juice.

Tooth paste was tested with red litmus paper. We can observe the change of color of red litmus paper to blue. Toothpaste can be concluded as base.

Vinegar has acidic property because when it was tested with blue litmus paper, it turns red.

Science behind it:

- ✓ Red Litmus Paper Properties

Litmus paper is made from wood cellulose that is infused with an aqueous solution consisting primarily of lichens. During the production of red litmus paper, the lichens are left to ferment in potassium carbonate, ammonia, and a small amount of sulfuric or hydrochloric acid. The mass is then mixed with chalk. It is this solution that makes the paper pH active. White paper is impregnated with the solution and left to dry in open air. The process for blue litmus paper is similar, but no sulfuric or hydrochloric acid is added to the solution.

- ✓ Using Red Litmus Paper

Red litmus paper is dipped into a solution to establish whether a substance is acidic or alkaline. In an acidic or neutral solution, red litmus paper remains red. In an alkaline solution, red litmus paper turns blue. When an alkaline compound dissolves in water, it produces hydroxide ions, which cause the solution to become alkaline. Red litmus paper can also be used to test the pH of a water-soluble gas by dampening the paper and exposing it to the gas.

- ✓ Red Litmus Paper Limitations

While red and blue litmus papers can reveal whether a substance is acidic or alkaline, they cannot tell you the exact pH value of that substance. However, litmus papers are easy to handle and use. They give instantaneous readings and provide accurate results most of the time.

- ✓ Blue Litmus Paper

When blue litmus paper is placed in a substance that is acidic, it will turn to red. However, if placed in a substance that is basic or neutral, it will remain blue. Blue litmus paper is meant to test only for an acidic pH level.

- ✓ What Are Acids?

Acids are substances that have a low hydrogen potential, meaning that they will not readily bind with hydrogen molecules. Anything with a pH level of less than 7 is said to be acidic.

- ✓ Red Litmus Paper

When red litmus paper is placed into a basic substance, it will turn blue. If it comes in contact with an acidic or neutral substance, it will remain red. Red litmus paper is meant to test only for an alkaline pH level. Common acids include tartar sauce, corn, bacon and beer.

- ✓ What Are Alkalis?

Alkaline, or basic, substances are those that have a high hydrogen potential, meaning that they will readily bind with hydrogen molecules. Anything with a pH of more than 7 is basic. Common alkalies include tomatoes, almonds and molasses.

References:

https://sciencing.com/litmus-paper-types-7237523.html

Experiment 13

Title: Stability

Objective: To study the relationship between height of models and their stability.

Problem statement: What affect the stability of a building?

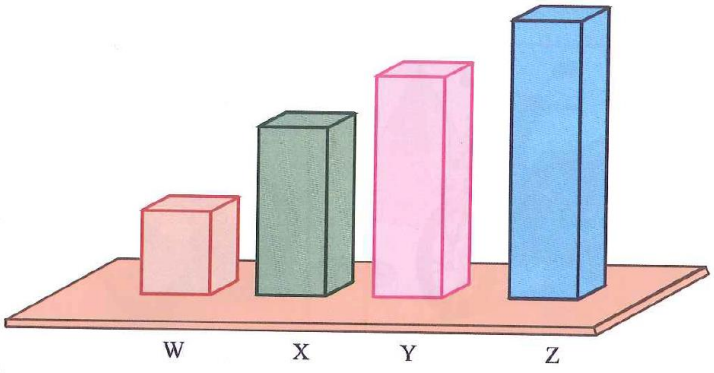
Hypothesis: The shorter the height of model, the stronger the stability of the model.

Apparatus and Materials: 4 models with different heights, thick cardboard.

Variables:

i. Manipulated: height of models
ii. Responding: stability of the model
iii. Controlled: the size of their base

Procedures:



1. Create four models as shown in the picture.
2. Label them as W, X, Y and Z.
3. Place the models on a thick cardboard.
4. Lift the cardboard upwards and downwards.
5. Record your observations.

Results / Observations:

We can observe the models with different heights but same base area. When it is lifted upwards and downwards, the taller model (Model Z) falls down first followed by Model Y and X. The model W does not falls when lifted.

Science behind it:

Stability: A measure for an object to displace or topple when pushed or moved an external force is referred to as stability.

Stable objects are difficult to displace while unstable objects topple very easily.

The stability of an object is dependent on two factors:

- The base width of the object
- The center of gravity

Stability is directly proportional to the width of the base and is inversely proportional to the position of the center of gravity.

✓ What is the center of mass?

The center of mass is a position defined relative to an object or system of objects. It is the average position of all the parts of the system, weighted according to their masses.

For simple rigid objects with uniform density, the center of mass is located at the centroid. For example, the center of mass of a uniform disc shape would be at its center. Sometimes the center of mass doesn't fall anywhere on the object. The center of mass of a ring for example is located at its center, where there isn't any material.

✓ What is "center of gravity"?

Throw a ball in the air and gravity pulls it straight back down. Not everything moves like this when gravity acts on it. Most objects are not nice, neat shapes like balls. That means gravity acts on them in more complex ways. Even so, all objects behave as though their mass (the stuff they're made from) is concentrated at a point called their center of gravity. A simple object like a ball has its center of gravity in a very obvious place: right at its center. But in a more complex object, like your body, the center of gravity is slightly higher than your waist because there's more weight in the top half of your body than in the bottom half.

✓ Why do tall things topple over?

Thinking about center of gravity helps us answer questions like this. Stand up straight, then try leaning over to one side. Very quickly you'll reach a point where your whole body feels like it's about to topple over. You're not actually moving but turning about your ankles. Your head moves faster than your knees. In fact, your whole body turns around your ankles like a wheel. You might think gravity is something that pulls things downward, but here it's making you turn in a circle! The taller you are, the more you'll turn because your whole body is acting like a lever, helping the force of gravity to turn you around.

To see how that works, try opening a door by pushing the handle with one finger. Easy, isn't it? When a force pushes something that can freely pivot (like a door on its hinges), that thing will turn instead of moving. Now try opening the same door by pushing with one finger near the hinge. This time it's much harder. The shorter the distance between the force and the pivot point, the harder it is for the force to make something turn. Wider doors are easier to open than narrower ones because the entire door acts like a lever, multiplying the force you use when you push on the handle. In exactly the same way, it's much easier to make something tall topple over than to topple something that's close to the ground.

References:

http://www.schoolphysics.co.uk/age11-14/Mechanics/Statics/text/Stability_/index.html

https://brainly.in/question/6268261

Experiment 14

Title: Stability

Objective: To study the stability of different materials.

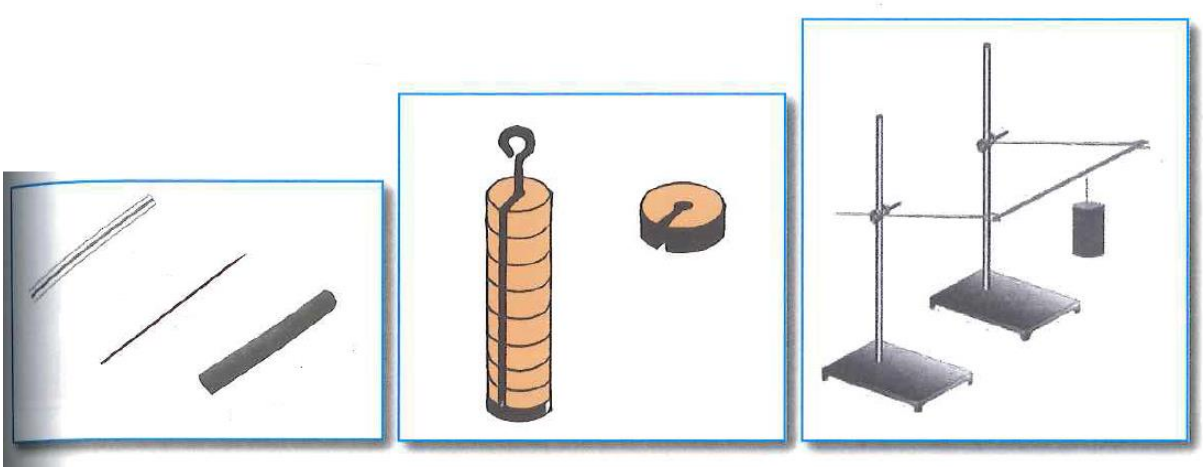
Problem statement: How to determine the stability of different materials?

Apparatus and Materials: straw, sate stick, wooden rod, glass rod, mass, retort stands with clamp

Variables:

i. Manipulated: types of material used
ii. Responding: stability of materials
iii. Controlled: height where the mass hanged

Procedures:



1. Set up the apparatus and materials as shown.
2. Place the straw on the clamp of both retort stands.
3. Hang the mass at the center of the straw.
4. Add mass and record how many masses it can withstand.
5. Repeat the experiment with sate stick and wooden rod.
6. Record your observations.

Results / Observations:

Materials	Mass that can withstand (g)
Straw	
Sate stick	
Wooden rod	
Glass rod	

Science behind it:

Metallurgical stability refers to the physical and chemical behavioral conditions of metallic elements, their intermetallic compounds and their mixtures such as alloys. It is the tendency of a material to resist change or decomposition due to an internal reaction, or due to the action of air, heat, light or pressure.

Physical stability refers to the structural stability, elastic strength and metal hardness. Chemical stability refers to the thermodynamic stability of the metal in corrosive environments.

References:

https://www.corrosionpedia.com/definition/5003/metallurgical-stability