YOUNG SCIENTIST ACTIVITY BOOK

CLASS - X

Sample Pages

EDUHEAL FOUNDATION
• LEARNING FOR LIFE •

DISCOVER ● INVENT ● EXPERIMENT ● EXPLORE

CLASS - X

SYLLABUS GUIDELINES

Chemical Reactions & Equations-
Chemical Equations Types of chemical reactions.
To observe following reactions:-
i. Burning of Mg ribbon
ii. Reaction of Zn granules with dil HCl.
iii. Formation of slaked lime by the reaction of CaO with water.
iv. Heating crystals of $FeSO_4$ or $CuSO_4$ & $Pb(NO_3)_2$
v. Reaction of $CuSO_4$ solution and iron nails dipped in it
vi. Reaction between Sodium Sulphate solution and Barium Chloride solution.
vii. Oxidation of Cu to CuO.
Chemical Reactions & Equations
Corrosion, Rancidity
i.To observe corrosion in different metals such as Iron, Aluminum, Copper, Silver etc.
ii. To observe the rusting of Iron and conditions necessary for it.
iii. To observe the changes in colour odour, etc. in cut fruits & vegetables.
Acids, Bases & salts
Chemical properties of acids & Bases
Common properties of acids & bases
i. Identification of Acids & bases using different indicators.
ii. Passing CO_2 through $Ca(OH)_2$ solution.
iii. Reaction of Metal carbonates and bicarbonates with acids.
iv. Titration of acid with base using phenolphthalein.
v. Preparation of HCl from NaCl and conc. H_2SO_4 acid.
Strength of Acids & Base solutions,
Importance of pH value, more about salts, Chemicals from common salts
i- To test the pH value of different solutions and soil.
ii- Test pH of different salts To Find pH of the following samples by using pH paper /universal indicator –dil HCl, NaOH, Ethanoic acid, lemon juice, water, $NaHCO_3$
Life Process
What are life processes, Nutrition, Respiration, Transportation Excretion
i. To show that chlorophyll is essential for photosynthesis.
ii. Testing presence of CO_2 in exhaled air.
iii. To observe transpiration in plants.
iv. To study the Excretion system of man with the help of a chart.
To show that CO_2 is given out during respiration.
To prepare a temporary mount leaf to show its stomata.
To show that light is necessary for photosynthesis.
Light – Reflection & Refraction
Reflection of light, Spherical mirrors
i. To study the images formed on both sides of shining spoon.
To determine the focal length of concave mirror by obtaining the image of a distant object.
Refraction of Light
i. To study the images formed through spherical lenses of object kept at different distances.
To determine the focal length of convex lens by obtaining the image of a distant object.
To trace the path of a ray of light passing through glass slab.
Human Eye & the colourful world
Human eye, defects of vision and their correction, refraction of light through a prism.
Dispersion of white light by glass prism, atmospheric refraction, scattering of light

i. To study the parts of human eye with the help of model of human eye.
ii. To identify the students in the class with eye defects and to suggest correction of vision with nutritional remedy.
ii. To study the path of light passing through prism.
iv. To study the dispersion of white light by glass prism.
v. To study scattering of light in colloidal solution.

Metals and Non metals

Physical and chemical properties of metals, Reaction of metals and nonmetals, occurrence of metals, corrosion
i. To Observe physical properties of metals such as Fe, Zn, and Cu and non metals such as graphite, Sulphur, Iodine.
ii. To test conductivity through metals.
iii. To test the chemical properties of metal oxides and non metal oxides.
iv. To study the chemical reactions of metals with water, acids and solutions of other metal salts.
v. To study reactivity series.
vi. To investigate the conditions under which iron rusts.
To observe action of Zn, Fe, Cu, Al on
$ZnSO_4$, $FeSO_4$, $CuSO_4$, $Al_2 (SO_4)_3$.
To prepare SO_2 gas and observe colour ,solubility in water, effect on litmus paper, action of $K_2Cr_2O_7$

Control and coordination

Animals – Nervous system, coordination in plants, hormones and animals
i. To observe reflex action in one's body
ii. To observe the functioning of taste buds.
iii. To study parts of brain with the help of model/chart.
iv. To study tropism in plants.
v. To study Endocrine glands in man with the help of chart.

Electricity

Electric current and circuit, electric potential and potential difference circuit diagram, Ohm's law
i. To prepare a simple circuit
ii .To study symbols of different components of a circuit.
iii. To observe & learn to use instruments such as ammeter and voltmeter and learn to calculate their least counts.

Electricity

Factors on which the resistance of a conductor depends, resistance of a system of resistors, heating effect of electric current, electric power
To determine the equivalent resistance of two resistors in series and in parallel.

Magnetic effects of electric current

Magnetic field and Magnetic lines, magnetic field current carrying conductor, force on a current carrying conductor in a magnetic field, electric motor
i. To observe pattern formed by iron fillings around magnet.
ii. To observe magnetic lines around a bar magnet with the help of a compass needle.
iii. To observe magnetic field around a wire carrying current & change the direction of deflection with change of current direction.
iv. To observe the magnetic field around current carrying loop.

Magnetic effects of electric current

Electro magnetic induction, electric generator, domestic electric circuit
1. To set up current in the coil circuit with the help of moving magnet

Carbon and its compounds-

Bonding in carbon-the covalent bond, versatile nature of carbon
i. To study the arrangement of atoms in allotrops of carbon (Ball and stick model).
Chemical properties of carbon compounds, Important carbon compounds-
Ethanol and Ethanoic acid, soaps and detergents.
i. To observe the burning of carbon compounds like camphor
ii. To show cleansing action of soaps and detergent
i. To study the following properties of acetic acid
a) Odour
b) Solubility in water

c) Effect on litmus
d) Reaction with $NaHCO_3$

How do organism reproduce

Modes of reproduction by single organism, variation in off springs, sexual reproduction

i. To observe formation of mould on bread.
ii. To observe different tissues in spirogyra filaments.
iii. To observe leaf for budding in bryophylum
iv. To study sexual reproduction in flowering plants & human beings with the help of chart paper.

To study

i. Binary fission in amoeba
ii. Budding in yeast with the help of prepared slides.
iii.. To study the amount of water absorbed by raisins.

Heredity and Evolution

Accumulation of variation during reproduction, heredity, evolution

i. To study the works of Mendel (1822-1884) with the help of internet

Heredity and Evolution

Evolution, speciation, evolution and classification, evolution should not be equated with progress

i. To study the works of Charles Darwin (1809-1882) with the help of internet.
ii. To find out about homologous organs in different animal species

Periodic classification of elements

attempts at classification of elements, Mendleef's periodic table, Modern periodic table.

i. To study the different classification made by different scientists.
ii. To study Mendleef's periodic table & Modern periodic table.

Sources of energy

Good source of energy, conventional source of energy, non conventional source of energy, environmental consequences

i .List different forms of energy used by us.
ii. To learn about different types of power plants.
iii. To prepare and study the structure and working of solar cooker & heater.
iv. To find out how energy sources affect environment.
v. To study the factors that lead to Global Warming.

Our Environment

Ecosystem – what are its component, food chains and food webs, how do our activities affect the environment

i. To collect the waste and categorize it into biodegradable and non-biodegradable substances.
ii. To design an aquarium and study it.
iii. To find out the chemicals responsible for depletion of ozone layer with the help of relevant books, internet or newspaper.
iv. To calculate the amount of waste generated in school and at home.

Management of Natural Resources

Need to manage our resources, Water for all,

i. To find out about the international norms to regulate the emission of CO_2.
ii. To find out the extent of pollution of Ganga and Yamuna rivers with the help of internet and the measures being taken to clean it.
iii. To check the pH of water supply of your house.

Management of Natural Resources

coal and petroleum, an overview of natural resources management

i. To find out about any two forest produce that are basis of an industry
ii. To study the rainfall pattern in India from atlas.
iii. To study water harvesting system.
iv. To find out about Euro I and Euro II norms for emission from vehicles

Interactive Activity : Periodic Table

Periodic Table of the Elements

Prashant is a student of class X. He was studying periodic table with the interactive kit provided by Eduheal Foundation. He has square cards of elements having symbol, name, atomic number, atomic mass and valence shell electron of each element. While he was making the periodic table some of the square cards were spoiled by water. He managed to read the symbols on the cards. Being a student of his standard can you help him to complete his periodic table?

He gave correct answer to the following questions. Now, check if you can give the correct answer to the same questions.

Study the Periodic Table on page 7.

Q.1. Which of the following is placed at atomic number 28 position?

(a) Cs (b) Ni (c) La (d) In

Q.2. How many elements you have placed in noble gas category?

(a) 6 (b) 7 (c) 8 (d) 9

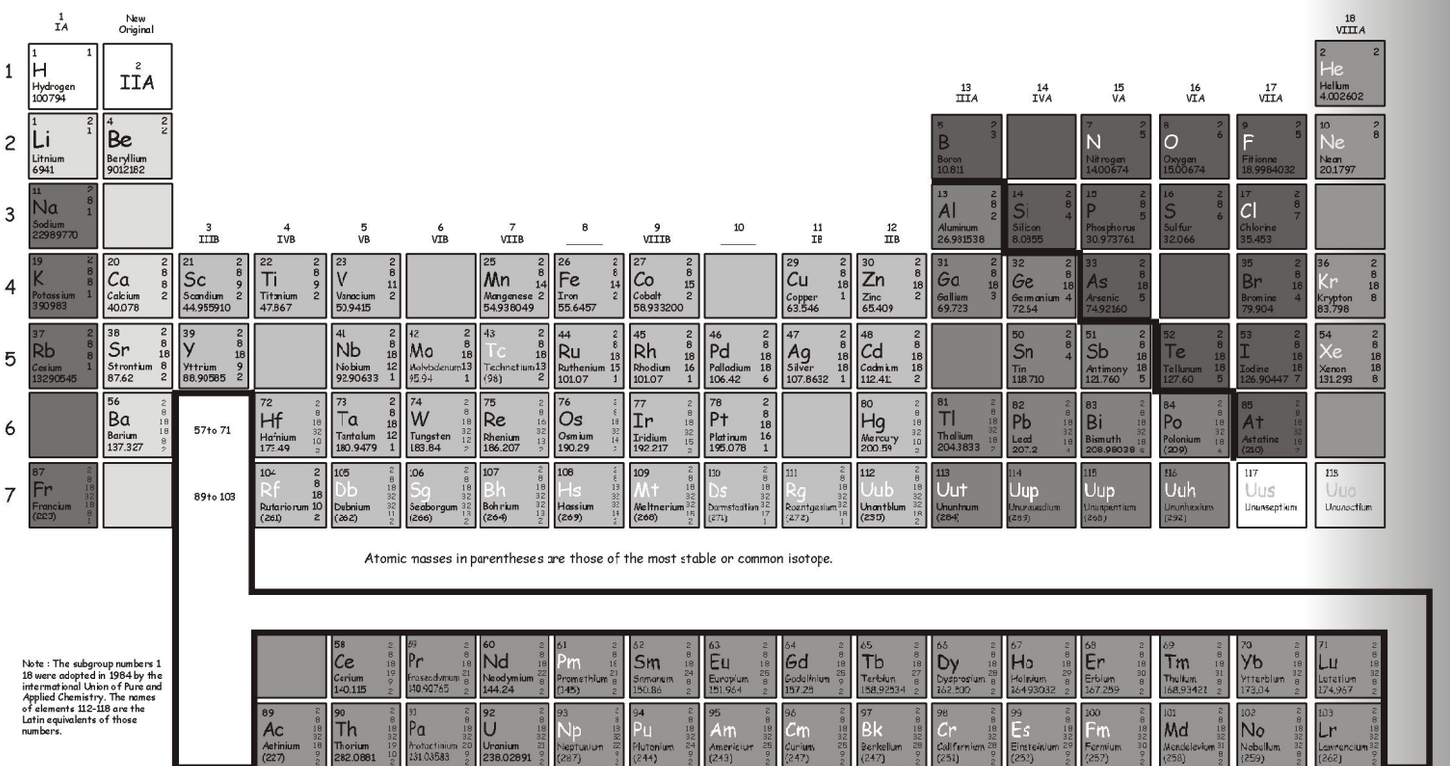
Q.3. Which of the following is placed before 'In'?

(a) Cd (b) Rn (c) Ra (d) Se

Q.4. Which element derives its symbol from the Latin word, aurum, which means 'shining dawn'?

(a) Aluminum (b) Americium (c) Gold (d) Silver

Periodic Table



Note : The subgroup numbers 1 18 were adopted in 1984 by the international Union of Pure and Applied Chemistry. The names of elements 112-118 are the Latin equivalents of those numbers.

Q.5. Which element best characterizes an organic compound?

(a) Oxygen (b) Carbon (c) Hydrogen (d) Nitrogen

Q.6. Where are the atoms with the largest atomic radius located?

(a) At the top of their group.

(b) In the middle of their group.

(c) At the bottom of their group.

(d) You cannot predict atomic radius by location within a group.

Fun with Periodic Table

Use your periodic table to solve these puzzles. For each answer write down the name of the element and its symbol.

1. Which metal's symbol could be a nickname for **Alan**?
2. Find the **superman** element.
3. Find a metal named after **Germany**.
4. Find two more elements named after countries.
5. The famous scientic **Albert**_____ proved $E=mc^2$.
6. **Dmitri Mendeleev** is the father of the periodic table. Can you find his element?
7. Which gas is used to kill germs in a **swimming pool**?

Put the symbols of these elements together to complete these messages

8. Salt and vinegar are my favourite **Chromium Iodine Sulphur Phosphorous Sulphur**.
9. I like to **Silicon Phosphorous** my tea from a **Copper Phosphorous**.
10. A **Chromium Oxygen Tungsten** is a type of blackbird.
11. If you are noisy, teacher can get **Chromium Osmium Sulphur**.
12. It's nice to get a **Potassium Iodine Sulphur Sulphur** on the **Lithium Phosphorous Sulphur**.

10 NITROGEN FACTS

1. Nitrogen is odourless, tasteless, and colourless.
2. Nitrogen gas (N_2) makes up 78.1% of the volume of the Earth's air.
3. Nitrogen is a **non-metal**.
4. Nitrogen gas is relatively inert, but soil bacteria can 'fix' nitrogen into a form that plants and animals can use to make amino acids and proteins.
5. The French chemist Antoine Laurent Lavoisier named nitrogen *azote*, meaning without life.
6. Nitrogen was sometimes referred to as 'burnt' or 'dephlogisticated' air. One of its oxide is used as laughing gas.
7. Nitrogen compounds are found in foods, fertilizers, poisons and explosives.

8. Nitrogen is responsible for the orange-red, blue-green, blue-violet and deep violet colours of the dawn.
9. One way to prepare nitrogen gas is by liquefaction and fractional distillation from the atmosphere.

10 Oxygen Facts

1. Animals and plants require oxygen for respiration.
2. Oxygen gas is colourless, odourless, and tasteless.
3. Liquid and solid oxygen are pale blue.
4. Oxygen is a **non-metal**.
5. Oxygen gas normally is the divalent molecule O_2. Ozone, O_3, is another form of pure oxygen.
6. Oxygen supports combustion.
7. Oxygen is paramagnetic.
8. Approximately 2/3 of the mass of the human body is oxygen.
9. Excited oxygen is responsible for the bright red and yellow-green colours of the down.
10. Oxygen was the atomic weight standard for the other elements until 1961 when it was replaced by carbon 12.

Make a phrase of your own using the elements.

_____

_____

_____

Now you are nearly finished, which element thanks you by saying "**Ta**"?

Colourful Investigation !

Catching criminals with colour

Hey ! Do you want to be a forensic scientist ?

Follow these instructions to create your own chromatography experiment and learn about how ink can help forensic scientists to catch criminals.

Forensic scientists extract the ink from the envelope so that it can be analysed. The extracted ink can then be compared with ink from the pens of the suspects.

Catch criminals with ink? It's easy!

What you need

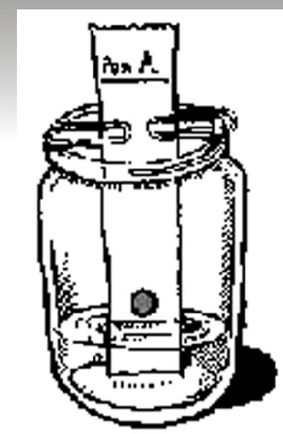
To do this experiment you will need the following items:

☺ filter paper
☺ scissors
☺ a jar
☺ ink pens and markers
☺ two paper clips
☺ water.

What to do

1 Cut a filter paper into strips about 2 cm wide. The length depend on the size of the jar you hang them in.

2 Draw a small circle 1 cm from the bottom of the paper with different black markers or ink pens.



3 Fill a clean jar with about 1 cm of water and carefully place the paper into the jar making sure that the bottom of the paper is in the water. The circle must be ABOVE the water level. Use paper clips to hold the paper upright in the jar. Watch the water rise up the paper.

4 After a few minutes remove the paper from the jar. Notice how different colours in the ink travel up the paper at different speeds.

5 Now try some different colour pens and markers. Can you see any differences?

6 Did you have any pens for which the ink did not separate? If so, repeat the experiment using methylated spirits such as after shave lotion instead of water in the jar. Try out a variety of pens. Can you see any differences?

What's Going On :

The method used to compare inks is called chromatography. It involves separating the ink in each of the pens. As the solvent (water) rises up the paper, the different colours of the ink separate.

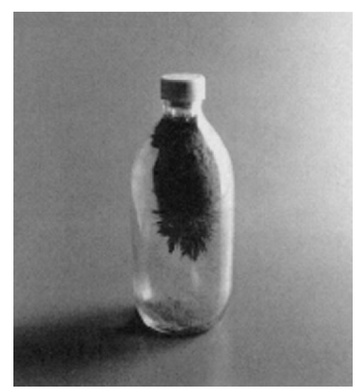
Ask your family members to play your suspects. Ask them to use specific pens for the job and see if you can figure out which ink comes from which pen and nab your suspect!

Magnetic Lines of Force

Iron filings will trace out the lines of a magnetic field in three dimensions

Iron filings will line up parallel to a magnetic field, making the pattern of the field visible. Since the filings are trapped in a bottle, they don't make a mess.

You will Need:



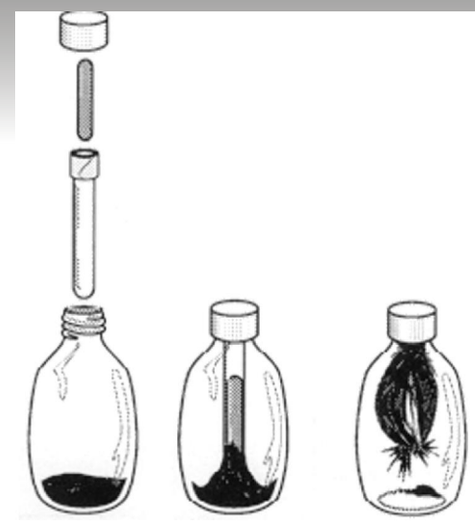
- ☺ **A plastic bottle,** 1/2 litre size.
- ☺ **A plastic test tube** that fits into the mouth of the bottle and is about 75% as long as the bottle is tall.
- ☺ **A cow magnet** or other cylindrical magnet that fits into the plastic tube.
- ☺ **Masking tape.**
- ☺ **Iron filings**

Here's How

Fill the Plastic bottle about one-fifth full of iron filings. Wrap the top of the test tube with masking tape so that the tube fits snugly into the mouth of the bottle, plugging the opening completely. After you put the iron filings into the bottle, jam the tube into the mouth of the bottle.

Slide the cylindrical magnet into the test tube and put the bottle cap back on. Turn the bottle on its side and rotate it.

Watch what happens to the iron filings. They will form a three-dimensional pattern that traces out the magnetic field of the magnet.



Pay attention to what happens at the end of the magnet. Here, the iron filings stand out like a punk haircut. Shake the magnet out of the tube, and watch the filings collapse.

What's going On?

Each atom in a piece of iron is a magnet, with a north pole and a south pole. Most pieces of iron are not magnetic, since the atomic magnets all point in different directions.

When you bring a magnet near a piece of iron, the iron-atom magnets line up with the applied magnetic field. The north poles of the iron atoms all point in the same direction. Because the iron atoms line up, the piece of iron becomes a magnet and is attracted to the original magnet.

In a rod-shaped piece of iron, the atoms will tend to line up so that all the north poles face one end of the rod and all the south poles face the other end. Since iron filings are rod-shaped, the atoms line up pointing along the length of the rod, and the rods line up parallel to the direction of the applied magnetic field. The field of a cylindrical magnet comes out of the end of the magnet and then loops around next to the side. The iron filings stick out like a crew cut on the ends of the magnet but lie flat on the sides.

Because the iron filings become magnets themselves, their presence slightly changes the shape of the magnetic field. Even so, this experiment gives an indication of the shape of the magnetic field in three dimensions.

Etcetera

If you use a plastic bottle and seal it well by jamming the test tube into its mouth, the sides of the bottle will begin to collapse inward after a few hours - particularly if the inside of the bottle is damp. This happens because the iron filings are rusting. As the iron rusts, it combines with oxygen and removes it from the air trapped in the bottle. To prevent the bottle's collapse, simply punch a small hole in the plastic with a pin.

Cow magnets are strong, permanent magnets made out of *alnico*, an iron alloy containing aluminium, nickel, and cobalt. **Ranchers** feed these magnets to their cows. The magnet settles in the cow's first stomach. When the cow eats bits of steel or iron, the magnet attracts the metal bits and holds them in the first stomach. If the sharp pieces of metal were to pass through the cow, the animal would suffer what ranchers call "hardware disease."

> There are no physicists in the hottest parts of hell, because the existence of a "hottest part" implies a temperature difference, and any marginally competent physicist would immediately use this to run a heat engine and make some other part of hell comfortably cool. This is obviously impossible.

Sinking and Floating Soda Cans

Imagine a hot summer day. You are at a picnic and go to the ice chest where the sodas are staying nice and cool. Which cans are floating in the ice water, and which have sunk to the bottom?

You will need:

- ☺ several unopened cans of regular soda of different varieties
- ☺ several unopened cans of diet soda of different varieties
- ☺ a large aquarium or sink

You will do:

Fill the aquarium or sink almost to the top with water. Place a can of regular soda into the water. Make sure that no air bubbles are trapped under the can when you place it in the water. Does it sink or float? Repeat the experiment with a can of diet soda. Does it sink or float?

Why does one can sink, and the other can float?

The cans of soda have exactly the same volume, or size. But their density differs due to what is dissolved in the soda. Regular soda contains sugar as a sweetener. If you look at the nutrition facts on a can of regular soda, you will notice that it contains a lot of sugar. In some cases a 300 grams can of regular soda will contain over 40 grams of sugar. Diet sodas, on the other hand, use artificial sweeteners such as aspartame. These artificial sweeteners may be hundreds of times sweeter than sugar, which means that less than a few grams of artificial sweetener is used

in a can of diet soda. The difference in the amount of dissolved sweeteners leads to a difference in density. Cans of regular soda tend to be more dense than water, so they sink. Cans of diet soda are usually less dense than water, so they float.

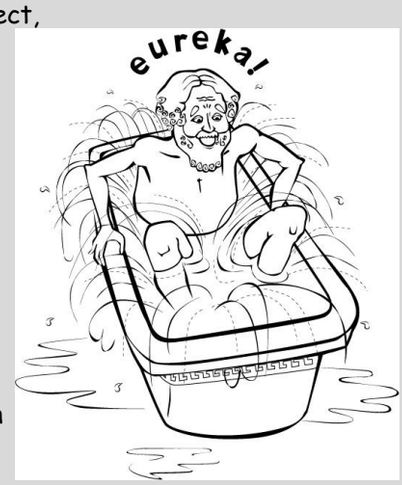
Explore

Are there any varieties of regular soda that will float? Are there any varieties of diet soda that sink? Can you think other factors that might influence which sodas float or sink?

Eureka !

Students of physics are frequently told
Of experiments performed by great physicists of old
Like Boyles and Charles — but greatest of these
Was the Principle discovered by Archimedes.

The Sicilian King, Archimedes was told,
Ordered a crown from a large lump of gold,
And though the weight of the gold was completely correct,
The goldsmith's eye made the King suspect
That he'd made up the weight with some cheaper metal
And stolen some gold, that his debts he might settle.
His problem was then of outstanding immensity
As he had no idea, whatsoever, of density.



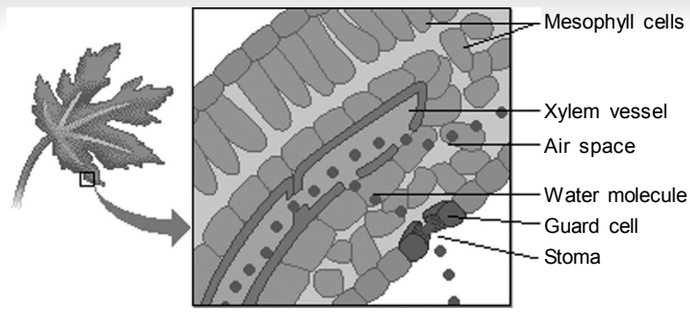
Climbing into a bath he received a surprise
When he noticed the water beginning to rise.
He suddenly snapped, and let out a scream,
As he realised, with joy, his long-wished-for dream.

He found the upthrust, produced on a body's base*,
To be equal in weight to the water displaced,
And soon volumes and weights would make it quite plain
What various metals the crown could contain,
And so he could easily show to his Royalty
The absolute proof of the goldsmith's disloyalty.

Leaping out of the bath at remarkable rate,
He made for the palace by doorway and gate —
But the men in the street were completely confounded
To see a naked man shout "Eureka! I've found it!"

* Is this the only error? The upthrust is not on the base, but at the Centre of Pressure.

Water Transport in Plant Stems



As water evaporates from the leaves of a plant, more water is drawn up by osmosis from the tissues below to replace it. The replacement of water lost through transpiration is possible because water molecules have polar covalent bonds. This causes one end of the molecule to have a slightly positive charge and the other end to have a negative charge. Because of this, the water molecules act like "small magnets". The positive end of one water molecule sticks to the negative end of another in a long chain that is pulled upward against the force of gravity.

When enclosed in a narrow tube, such as the transport vessels of a plant, water molecules can withstand a large force without being pulled apart.

Materials Needed:

1 Celery stalk with leaves intact
2 400-mL beaker
3 Glass bowl
4 blade
5 Scale
6 Distilled water
7 Red food colouring
8 Stirring rod

Procedure:

1 Fill the beaker with **100 mL** of distilled water. Add drops of red food colouring, stir with the stirring rod, until the water is a dark red colour. Set this aside.

2 Put some distilled water in the glass bowl. While holding the bottom end of the celery stalk under water, cut off the bottom two centimeters of the celery stalk.

3 Quickly place the freshly cut celery stalk upright in the beaker of coloured water. Record the beginning time on your **DATA TABLE**

4 Allow the celery to remain in the food colouring until the colour is visible in the upper stem and leaves. Record the ending time on your **DATA TABLE**, and remove from the beaker of food colouring.

5 Measure the length the red colour traveled up the celery stalk in centimeters. Record on your **DATA TABLE**

Data Table:

Beginning time: _____ Ending time: _____

Length food colour travelled up stalk _____ **cm**

Calculations:

6 Calculate the number of minutes it took for the colouring to reach the top. Time for colour to reach the top of stalk = _____ **minutes**

7 Calculate the **rate of travel** of the food colouring up the celery stalk in **centimeters per minute**

$$\text{Rate of Travel} = \frac{\text{length of celery stalk(cm)}}{\text{time for colour to reach top of stalk(min)}}$$

Rate of travel = _____ $^{cm}/_{min}$

Now try to find out answers of these Questions:

1. What type of tissue moves water upward in a plant stem?

   _____

2. Name and explain two properties of water that enable it to move upward against gravity in a stem.

   _____

   _____

3. What is transpiration and where does it occur in plants?

   _____

   _____

4. How does transpiration help the upward movement of water?

   _____

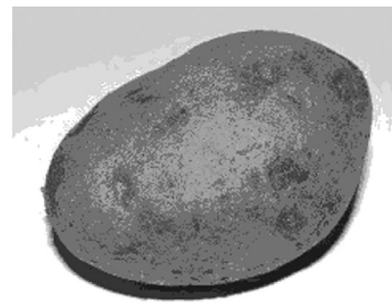
   _____

   _____

Potato Clock

Potato Battery

You have seen and even used a variety of batteries. But can you ever imagine that potato – the most common vegetable found in kitchens, can be used as battery ? Come lets do and find...



A potato battery is a type of **electrochemical cell**. An electrochemical cell converts chemical energy into electrical energy. In the potato battery, there is a transfer of electrons between the zinc coating the galvanized nail that will be inserted into the potato and the copper wire that will be inserted into another part of the potato. The potato conducts electricity, yet keeps the zinc ions and copper ions separate, so that the electrons in the copper wire are forced to move (generate current). The power is not enough to shock you, but the potato can run a small digital clock or light, an LED (light emitting diode)

You will need:

LED

- ☺ 2 potatoes (or cut one potato in half)
- ☺ 2 short lengths of copper wire
- ☺ 2 galvanized nails (not all nails are galvanized or zinc-coated)
- ☺ 3 alligator clip wire units (alligator clips connected to each other with wire)

- ☺ 1 low-voltage LED clock (type that takes a 1-2 volt button battery)

How to Make a Potato Clock

Here what you need to do is to turn the potato into a battery and get it to work the clock:

1 Insert a galvanized nail into each potato.

2 Insert a short piece of copper wire into each potato. Put the wire as far as possible from the nail.

3 Use an alligator clip to connect the copper wire of one potato to the positive (+) terminal of the clock's battery compartment.

4 Use another alligator clip to connect the nail in the other potato to the negative (-) terminal in the clock's battery compartment.

5 Use the third alligator clip to connect the nail in potato one to the copper wire in potato two.

6 Set your clock

Potato Battery - More Fun Things to Try

Let your imagination run with this idea. There are variations on the potato clock and other things you can try.

computer fan

☺ See what else your potato battery can power. It should be able to run a computer fan. Can it light a light bulb?

☺ Try substituting copper coins (if you have them!) for the copper wire.

☺ Potatoes are not the only foods that can act as electrochemical cells. Experiment with lemons, banans, pickles, or cola as a power source.

Nationwide Interactive Science Olympiad, 2007

Sample Paper

SCIENCE

1. The safest way to dilute concentrated sulphuric acid is to add –
(a) a series of small volumes of water to the acid while stirring
(b) the acid to water slowly while stirring constantly
(c) the acid to a small volume of water and then add more water
(d) dilute sulfuric acid to a small volume of the concentrated acid.

2. The smell of an ammonia solution used to clean a floor can quickly be detected throughout a house. Scientists explain this phenomenon by theorizing that gas molecules from the ammonia are in continuous random high-speed motion, drifting rapidly and permeating the air. Which statement best demostrates the strength of this theory?
(a) Scientists have observed tiny smoke particles moved by unseen particles in a rapid, irregular fashion.
(b) Scientists have unanimously agreed on this theory since Thomas Graham's experiments in the 1820s.
(c) The possibility of another theory being formed to explain the phenomenon as well is very remote.
(d) Reason, as opposed to experimentation, is superior to any explanation found through chemical testing.

3. Four lab groups measured the volume of acid required to neutralize a standard solution of sodium hydroxide base. Which of the groups measured the volume with the highest precision?

(a) 

(b)

(c) 

(d) 

4. According to the periodic table, which element most readily accepts electrons?
(a) Fluorine (b) Nitrogen (c) Arsenic (d) Aluminium

5. If the properties of water were to change so that the solid form was denser than the liquid form, organisms living in a cold pond environment would be less likely to survive because water would no longer-
(a) dissolve enough oxygen from the air
(b) produce solutions containing vital nutrients
(c) remain neutral, instead becoming highly acidic
(d) produce a floating insulating layer of ice

6.

How much work is performed when a 50 kg crate is pushed 15 m with a force of 20 N?
(a) 300 J (b) 750 J (c) 1,000 J (d) 15,000 J

7. If a force of 100 newtons was exported on an object and no work was done, the object must have –
(a) accelerated rapidly (b) remained motionless
(c) decreased its velocity (d) gained momentum

8. Compared to annual rings of trees that have experienced years of sufficient rainfall, the annual rings of trees that have experienced a dry period will -
   (a) be softer (b) grow at a faster rate
   (c) be thinner
   (d) photosynthesis at a faster rate

9. A science class is conducting an experiment that produces noxious fumes. Because of inadequate ventilation, some students begin to feel nauseated and dizzy. The first response should be to -
   (a) neutralize the acid that is reacting to produce the noxious fumes
   (b) carry the reactants outside, away from other students
   (c) leave the room and go to an area with fresh air
   (d) spray the reaction with a fire extinguisher

10. Which of the following is directly caused by muscle action?
   (a) Regeneration of nerves (b) Healing of wounds
   (c) Release of hormones (d) Extension of limbs

MENTAL ABILITY

11. Read the following information and answer question based on it:
Eight friends I, II, III, IV, V, VI, VII and VIII are sitting in a circle facing the centre. II is sitting between VII and IV, VIII is third to the left of II and second to the right of I. III is sitting between I and VII and II and V are not sitting opposite of each other.
Which of the following statements is not correct?
   (a) IV & I are sitting opposite of each other.
   (b) III is third to the right of IV
   (c) V is sitting between VI and IV
   (d) I is sitting between III & VI

12. If '+' means '÷', '–' means '×', '×' means '–' and '÷' means '+' which of the following will be the value of the following expression?

16 ÷ 8 – 4 +2 × 4 = ?

(a) 16 (b) 44 (c) 28 (d) 32

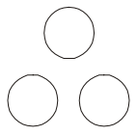
13. In a certain code GENIUS is coded us IGPKWU, then IDIOT will be written in the same code as :

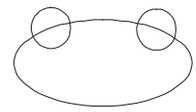
(a) JEJPU (b) KFKQV (c) LGLRW (d) HCHNS

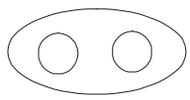
14. Indira is 7th from the left and Jaya is 5th from the right. When they interchange their positions Jaya becomes 19th from the right. What is Indira's position from the left?

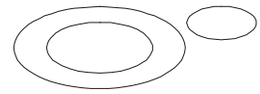
(a) 21st (b) 19th (c) 23rd (d) 20th|

15. Choose the diagram that depict the correct relationship between the group Dogs, Pets, Cats

(a) 

(b) 

(c) 

(d) 

COMPUTER

16. Which of the following is not correct?

(a) E–Commerce includes all business activities involved in the development, facilitation and implementation of business communications and transaction through electronic media

(b) The internet is a restricted version of the internet within a group of users.

(c) The Extranet is a closed online network connecting two or more organisations.

(d) None of these

17. It is the most exciting innovation of recent times. It uses computers and the Internet to make high quality healthcare available to people in remote areas. Apollo hospital has initiated

a similar project in Andhra Pradesh.
What are we talking about?

(a) telepathy (b) telemetry
(c) telemedicine (d) telecommunication

18. Which of the following is a correct definition of volatile memory?

(a) It loses its contents at high ambient temperatures
(b) Its contents are lost on failure of power supply
(c) It is to be kept in air-tight boxes always
(d) It is the latest type of bubble memory

19. Many times the computer hangs, that is, it does not respond to any command. Which key combination is used to reboot the system? (↵ = enter)

(a) Ctrl + Alt + Del (b) Ctrl ↵ Alt ↵ Del ↵
(c) Ctrl + Alt (d) Alt + Del

20. The correct order of data hierarchy is

(a) Bit-byte-record-field-file-data base
(b) Bit-byte-field-record-file-data base
(c) Bit-byte-file-record-field-data base
(d) Bit-byte-field-data base-file-record

Answer key :-

1. (b)	2. (a)	3. (d)	4. (a)	5. (d)
6. (a)	7. (b)	8. (c)	9. (c)	10. (d)
11. (c)	12. (c)	13. (b)	14. (a)	15. (c)
16. (d)	17. (c)	18. (b)	19. (a)	20. (b)