

Some items to be given as project work for class-10 students.
They can do any one of the following. The report should be in at least two A4 pages.

1. HEAT

1. Place a Pyrex funnel with its mouth-down in a sauce pan full of water, in such a way that the stem tube of the funnel is above the water or pointing upward into air. Rest the edge of the bottom portion of the funnel on a nail or on a coin so that water can get under it. Place the pan on a stove and heat it till it begins to boil. Where do the bubbles form first? Why? Can you explain how geyser works using this experience.
2. Collect information about working of geyser and prepare a report.
3. Assume that heat is being supplied continuously to 2 Kg of ice at -5°C . You know that ice melts at 0°C and boils at 100°C . Continue the heating till it starts boiling. Note the temperature every minute. Draw a graph between temperature and time using the values you get. What do you understand from the graph? Write the conclusions.
4. Collect the information about specific heat that how it is useful in our day to day life.
5. In which places dew is formed. Collect the information about why the dew formed in such places and what are the circumstances or weather conditions required to it.
6. Collect the information about evaporation in daily life. Report any 10 situations.
7. Water is used as coolant. Suggest any ten examples to support this. Give reason.

2. CHEMICAL REACTIONS AND EQUATIONS

Write the word equations for each of the following chemical reactions:

- 1) When dissolved beryllium chloride reacts with dissolved silver nitrate in water, aqueous beryllium nitrate and silver chloride powder are made.
- 2) When dissolved sodium hydroxide reacts with sulfuric acid (H_2SO_4), aqueous sodium sulfate, water, and heat are formed.
- 3) When fluorine gas is put into contact with calcium metal at high temperatures, calcium fluoride powder is created in an exothermic reaction.
- 4) When sodium metal reacts with iron (II) chloride, iron metal and sodium chloride are formed.

Observe the following equations and indicate the type of reaction taking place:


- | | |
|---|-------------------------|
| 1) $3\text{NaBr} + \text{H}_3\text{PO}_4 \rightarrow \text{Na}_3\text{PO}_4 + 3 \text{HBr}$ | Type of reaction: _____ |
| 2) $3\text{Mg} + \text{Fe}_2\text{O}_3 \rightarrow 2 \text{Fe} + 3 \text{MgO}$ | Type of reaction: _____ |
| 3) $\text{C}_2\text{H}_4 + 3\text{O}_2 \rightarrow 2 \text{CO}_2 + 2 \text{H}_2\text{O}$ | Type of reaction: _____ |
| 4) $2 \text{PbSO}_4 \rightarrow 2\text{PbSO}_3 + \text{O}_2$ | Type of reaction: _____ |
| 5) $2\text{NH}_3 + 3\text{I}_2 \rightarrow \text{N}_2\text{I}_6 + 3\text{H}_2$ | Type of reaction: _____ |
| 6) $\text{H}_2\text{O} + \text{SO}_3 \rightarrow \text{H}_2\text{SO}_4$ | Type of reaction: _____ |

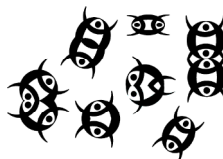
Balance the following equations:

- 1) $\text{NaNO}_3 + \text{PbO} \rightarrow \text{Pb}(\text{NO}_3)_2 + \text{Na}_2\text{O}$
- 2) $\text{AgI} + \text{Fe}_2(\text{CO}_3)_3 \rightarrow \text{FeI}_3 + \text{Ag}_2\text{CO}_3$
- 3) $\text{C}_2\text{H}_4\text{O}_2 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
- 4) $\text{ZnSO}_4 + \text{Li}_2\text{CO}_3 \rightarrow \text{ZnCO}_3 + \text{Li}_2\text{SO}_4$
- 5) $\text{V}_2\text{O}_5 + \text{CaS} \rightarrow \text{CaO} + \text{V}_2\text{S}_5$
- 6) $\text{Mn}(\text{NO}_2)_2 + \text{BeCl}_2 \rightarrow \text{Be}(\text{NO}_2)_2 + \text{MnCl}_2$
- 7) $\text{AgBr} + \text{GaPO}_4 \rightarrow \text{Ag}_3\text{PO}_4 + \text{GaBr}_3$
- 8) $\text{H}_2\text{SO}_4 + \text{B}(\text{OH})_3 \rightarrow \text{B}_2(\text{SO}_4)_3 + \text{H}_2\text{O}$
- 9) $\text{S}_8 + \text{O}_2 \rightarrow \text{SO}_2$
- 10) $\text{Fe} + \text{AgNO}_3 \rightarrow \text{Fe}(\text{NO}_3)_2 + \text{Ag}$

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3. REFLECTION OF LIGHT BY DIFFERENT SURFACES

1. Collect information about the history of spherical mirrors in human civilization. Display it in your class room.
2. Think about the objects which act as a concave or convex mirrors in your surroundings. Make a table and display it in your class room.
3. How will our image be in concave and convex mirrors? Collect photographs and display in your class room.
4. Make a Pin hole camera. Observe the image size and clarity in it. What happened if the size of the hole increases? Which type of images can be seen, If we arrange two or many hole in that camera?
5.  Observe the given picture. What will you do to obtain that are figures shown in the following box?



Note: Use plane mirror to identify the line of reflection as shown in the following figure.



6. Draw the ray diagrams for the formation of images by a concave mirror when an object placed at the following places.
(a) At infinite distance (b) beyond 'C' (c) at 'C' (d) between 'C' and 'F' (e) at 'F' (f) between 'F' and 'P'. Also interpret the size and properties of image.
7. Draw the ray diagrams for the formation of images by a convex mirror when an object placed at the following places.
(a) At infinite distance (b) between infinity and Pole.
Also interpret the size and properties of image.
8. Make a model of Solar cooker by using card board box, Aluminium foils and transparent sheets, steel box, black colour paint.
9. Collect photographs from your daily life where you use convex and concave mirrors and display in your class room.

4. ACIDS, BASES AND SALTS

1. Prepare your own turmeric indicator paper strips and beet root indicator strips. Also prepare your own blue litmus papers with the liquid extraction of Hibiscus flowers.

Test with the following substances.

- | | | | |
|---------------------------|----------------------|--------------------------|------------------|
| (a) lemon juice | (b) tomato juice | (c) lime water | (d) soap water |
| (e) surf water | (f) apple juice | (g) tea | (h) coffee |
| (i) sapota juice | (j) pine apple juice | (k) baking soda solution | (l) coconut oil |
| (m) cool drink | (n) tamarind juice | (o) orange juice | (p) butter milk |
| (q) milk | (r) curd | (s) saliva | (t) banana juice |
| (u) distilled water | (v) tap water | (w) urine of buffalo | (x) vinegar |
| (y) washing soda solution | | (z) soda | |

What do you observe?

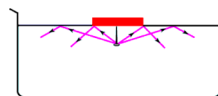
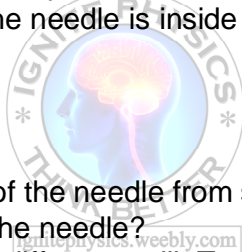
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2. Collect soil from three different areas/places. Test the soil for P^H . What do you observe? What are the qualities of soil?
3. Collect the information about digestive system. Which type of food materials can we eat? What are the precautions to be taken for better health? What should we do for not getting acidity problems/ gastric trouble?
4. Is all vegetables are acids? To find this investigate with P^H paper and tabulate the values and write a report on it.
5. Collect information about importance of the P^H value in daily life to human beings as well as plants.

5. REFRACTION OF LIGHT BY PLANE SURFACES

1. Collect the values of refractive index of the following media. Water, coconut oil, flint glass, crown glass, diamond, benzene and hydrogen gas.
2. Collect information on working of optical fibres. Prepare a report about various uses of optical fibres in our daily life.
3. Take a thin thermocol sheet. Cut it in circular discs of different radii like 2cm, 3cm, 4cm, 4.5cm, 5cm etc and mark centers with sketch pen. Now take needles of length nearly 6cm. Pin a needle to each disc at its centre vertically. Take water in a large opaque tray and place the disc with 2cm radius in such a way that the needle is inside the water as shown in figure.



Now try to view the free end (head) of the needle from surface of the water.

- Are you able to see the head of the needle?

Now do the same with other discs of different radii. Try to see the head of the needle, each time.

Note: the position of your eye and the position of the disc on water surface should not be changed while repeating the activity with other discs.

- At what maximum radius of disc, were you not able to see the free end of the needle?
- Why were you not able to view the head of the nail for certain radii of the discs?
- Does this activity help you to find the critical angle of the medium (water)?
- Draw a diagram to show the passage of light ray from the head of the nail in different situations.

6. REFRACTION OF LIGHT BY CURVED SURFACES

1. Collect the information about the lenses available in an optical shop. Find out how the focal length of a lens may be determined by the given 'power' of the lens.
2. Collect the information about lenses used by Galileo in his telescope.
3. Collect information about making of soap babuls. What do you observe on seeing images on a soap babul?
4. Draw the ray diagrams for the formation of images, when object is placed at different distances on the principal axis of a convex lens. Also draw the ray diagrams, when object is not placed on the axis.
 - (a) at infinity
 - (b) beyond C_2
 - (c) on C_2
 - (d) between C_2 and F_2
 - (e) on F_2
 - (f) between F_2 and P

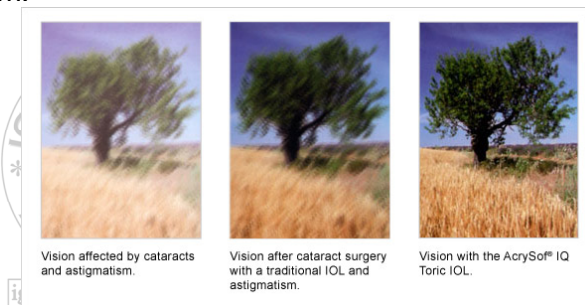
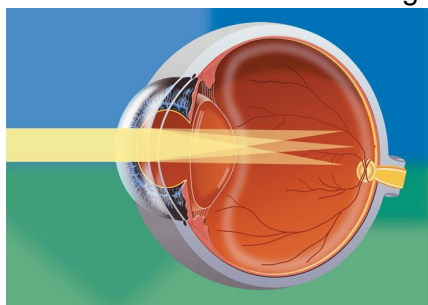
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- Draw the ray diagrams for the formation of images, when object is placed at different distances on the principal axis of a concave lens. Also draw the ray diagrams, when object is not placed on the axis.
 - at infinity
 - beyond C_2
 - on C_2
 - between C_2 and F_2
 - on F_2
 - between F_2 and P
- Take two watch glasses and affix them by pouring two different liquids (Ex. Water, Navaratan oil) and now it will acts like a lens with two different materials . Put a light source (object) in front of this lens and note the observations and write a report on it.

7. HUMAN EYE AND COLOURFUL WORLD

- Prisms are used in binoculars. Collect information why prisms are used in binoculars.
- Explain the structure of eye with a neat diagram.
- Collect information about various eye defects. (From an eye specialist or from optical shop)
 - Myopia
 - Hypermetropia
 - Presbyopia.
- Collect information about Astigmatism.



- Collect the life history of Sir C.V.Raman and collect some photographs of his history.
- What is Raman Effect? Collect information about it.
- Collect the different types of lenses used for correcting the eye defects and write report.
- Collect the information about the dispersion phenomenon occurs in the daily life.

8. STRUCTURE OF ATOM

- Collect the information regarding wave lengths and corresponding frequencies of three primary colours Red, Blue and Green.
- Collect the information about electro magnetic waves like production, range of wave lengths and their uses.
- Collect the information and photographs about the emission spectrum, absorption spectrum. Also collect about continuous and discontinuous spectrum.
- Make a model to show the stationary and sub stationary levels in an atom by using strings or cycle wheel folks or threads.
- Make the clay models of s, p and d- orbitals.
- Make a model of Moeller chart by using card board and thermocole. Use magnets to show the filling of electrons in orbitals.
- Collect the information of historical development of the atomic theory.
- Collect the information about the scientists who developed the atomic theories.

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9. CLASSIFICATION OF ELEMENTS – THE PERIODIC TABLE

1. Collect the information about reactivity of VIII A group elements (noble gases) from internet or from your school library and prepare a report on their special character when compared to other elements of periodic table.
2. Collect information regarding metallic character of elements of IA group and prepare a report to support the idea of metallic character increases in a group as we move from top to bottom.
3. Collect the information about the uniqueness / special properties of elements. Make a list in tabular form.
4. Prepare a chart of elements having atomic number, Name of the element, Symbol, Discoverer of that element and year of discovery.
5. Comment on the position of Hydrogen in Modern periodic table. And give reasons to support your opinion.
6. Comment on the position of Helium in Modern periodic table. And give reasons to support your opinion.
7. Prepare a PPT on the periodic table of elements.
8. Prepare a PPT that shows the properties of elements shown in the periodic table.

10. CHEMICAL BONDING

1. Collect the information about properties and uses of covalent compounds and prepare a report.
2. Collect the information about properties and uses of ionic compounds and prepare a report.
3. Collect the information about hybridization of orbitals with examples.
4. Collect the information about arrangement of ions in ionic compound. Write the details about crystalline structure.
5. Prepare some clay models that represent the structures of these molecules.
(a) Ammonia (b) Water (c) Methane
(d) Acetylene (e) Ethane (f) Ethylene

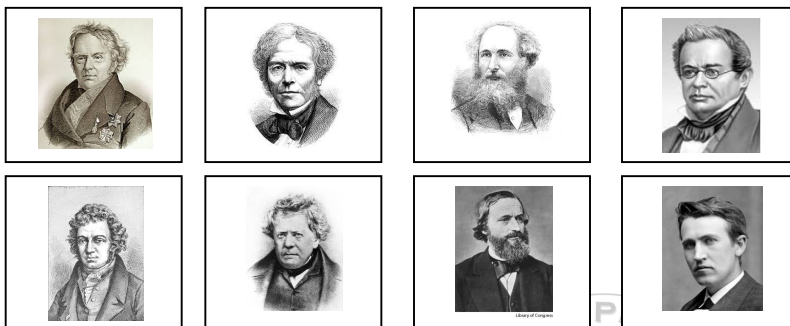
11. ELECTRIC CURRENT

1. Take a battery and measure the potential difference. Make a circuit and measure the potential difference when the battery is connected in the circuit. Is there any difference in potential difference of battery?
2. Measure the resistance of a bulb (filament) in open circuit with a multi-meter. Make a circuit with elements such as bulb, battery of 12V and key in series. Close the key. Then again measure the resistance of the same bulb (filament) for every 30 seconds. Record the observations in a proper table. What can you conclude from the above results?
3. Prepare a model for the series combination and parallel combination of bulbs. Write the advantages and disadvantages for each case.
4. Prepare a model for the series combination and parallel combination of batteries. Write the advantages and disadvantages for each case.
5. Prepare a model for the series combination and parallel combination of resistances. Write the properties of V, I, R for each case.
6. Collect the information and prepare a report on power consumption in your town or locality.

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12. ELECTROMAGNETISM

1. Collect information about generation of current by using Faraday's law.
2. Collect information about material required and procedure of making a simple electric motor from internet and make a simple motor on your own.
3. Collect information of experiments done by Faraday.
4. Collect the life history of Hans Christian Oersted.
5. Collect the information about working of Telephone receiver.
6. Collect the information about working of Electric bell.
7. Identify the scientists in the following pictures. Collect information about them.



13. PRINCIPLES OF METALLURGY

1. Collect information about extraction of metals of low reactivity silver, platinum and gold and prepare a report.
2. Collect the photographs of some minerals / ores. Prepare a list of ores and stick the images in that list.

SL NO	Name of the ore	Formula	image

3. Collect information about the reactivity of all metals and arrange them in the increasing order of their reactivity.
4. Prepare a model that shows the working of Magnetic separation method.
5. Rusting of iron needs air and water. Is Rusting of Aluminium, Magnesium also need water and air ? Is patina of Silver, Copper needs water and air ? Check with an experimentation. Write a report.
6. Collect information about furnaces.

14. CARBON AND ITS COMPOUNDS

1. Prepare models of methane, ethane, ethene and ethyne molecules using clay balls and match sticks.
2. Collect information about artificial ripening of fruits by ethylene.
3. Collect information about the properties of carbon. Why it is called as King of Elements ?
4. Collect the information about all allotropes of Carbon. Collect the related photographs.
5. Prepare a PPT or Flow chart on classification of hydrocarbons..
6. Collect information Alcoholic detectors used by Police in your locality.
7. Collect the information about manufacturing of Soaps. Is there any soap industry in your area ? Visit and make a detailed report with photographs.