

# Table of Contents

Science Skills Checklist .....	5
General Science Skills .....	5
Physical Science Skills .....	6
Earth & Space Science Skills .....	7
Life Science Skills .....	8
Science Concepts .....	10
Science Methods & Processes .....	11
Some Branches of Science .....	12
Some Memorable Scientists & Their Work .....	14
Laboratory Safety Procedures .....	16
Parts of a Compound Microscope .....	16
25 Simple Microscope Investigations .....	17
Some Key Scientific Laws & Principles .....	18
Scientific Formulas .....	18
Tables of Measure .....	19
Student Checklist for Science Projects .....	20
Teacher's Assessment for Student Science Projects & Experiments .....	20

## Physical Science

45 Student Investigations .....	21
Properties and Uses of Acids & Bases .....	23
The pH Scale .....	22
Characteristics of Some Mixed-Up Substances .....	23
The Periodic Table of Elements .....	24
Common Elements & Their Uses .....	26
Flame Tests for Common Elements .....	27
Common Hydrocarbons & Their Uses .....	27
Six Simple Machines .....	28
Electric Current and the Dry Cell Battery .....	29
Pitch & Volume Scales .....	30
Physical Science Glossary .....	31

## **Earth & Space Science**

45 Student Investigations .....	33
Gases in the Atmosphere .....	34
Types of Clouds .....	34
The Beaufort Scale of Wind Strength .....	35
The Cycles of Nature .....	36
The Geologic Time Scale .....	38
Biome Characteristics .....	39
The Make-Up of the Earth .....	40
Common Minerals & Their Uses .....	41
Crystal Shapes .....	41
Colour Sorting Key for Minerals in Rocks .....	41
Hardness Scales .....	42
Solar System Statistics .....	43
Phases of the Moon .....	43
The Night Sky .....	44
Earth & Space Science Glossary .....	45

## **Life Science**

45 Student Investigations .....	47
System of Classification for Organisms .....	48
Parts of a Plant Cell .....	48
Parts of an Animal Cell .....	48
Parts of a Flower .....	49
Some Common Poisonous Plants .....	49
Animal Groupings & Offspring Names .....	50
Selected Endangered Animal Species .....	51
Diagrams of the Five Senses .....	52
The Human Organ Systems .....	54
Diagrams of the Human Systems .....	55
The Food Pyramid .....	58
Food Tests .....	58
Important Vitamins & Minerals .....	59
Life Science Glossary .....	60

# 25 SIMPLE MICROSCOPE INVESTIGATIONS

1. **Wool and thread:** Examine a variety of weights and textures of ribbon, rope, twine, wool and string.
2. **Mold:** Observe the structure of mold on bread or fruit. Leave the moldy food on a slide for one day. Note the changes that have occurred since the first observation.
3. **Cloth fibers:** Compare the structures of cotton, rayon, nylon, silk and polyester.
4. **Fingerprints:** Press a finger on carbon paper or an inkpad and then onto clean paper to make a print. Examine the fingerprint.
5. **Insects:** Collect a variety of dead insects and study their different structures.
6. **Onion skin:** Peel a very thin layer from the white skin of an onion. Locate cells and examine their structures.
7. **Pepper:** Note the structure of pepper. Compare the magnified pepper to salt, sugar and any other spices.
8. **Iron fillings:** Observe several iron fillings. Look for ways that they vary in size and shape.
9. **Money:** Observe the different patterns and markings of various coins and notes.
10. **Hair:** Compare hairs of different people and animals. Examine samples of different colours and thickness.
11. **Chalk:** Rub a piece of chalk on sandpaper and cut a sample to make a slide. Examine the chalk dust and the sandpaper.
12. **Water:** Collect water samples after a rain from puddles, leaves and grass. Examine a drop from each surface and compare it to a drop of tap water, soapy water, salt water, etc.
13. **Colour printing:** Study different colours and patterns in coloured newspaper comics.
14. **Crystals:** Compare the crystal shapes of Epsom salts, boric acid, baking soda, bicarbonate soda, copper sulfate and other crystals.
15. **Seeds:** Collect seeds and compare their shapes, structures and interiors.
16. **Foods:** Examine parts of fruits, vegetables, cereals, breads and other foods.
17. **Wood shavings:** Compare wood shavings from a variety of trees.
18. **Soil:** Study the differences in samples of clay, sand and earth.
19. **Feathers:** Find and examine feathers from different birds.
20. **Rocks:** Look for crystals of varying sizes in pieces of rock.
21. **Salt:** Look for cube-shaped crystals.
22. **Sugar:** Look for interesting crystal shapes. Place a drop of water on the slide and watch the crystals dissolve.
23. **Soap:** Examine and compare shavings from different kinds of soap.
24. **Potato starch:** Scrape a potato and study the starch granules.
25. **Printing:** Study words printed on paper, cloth, or plastic.

# PROPERTIES AND USES OF ACIDS & BASES

## Common Acids

Name	Formula
Boric Acid	$H_3BO_3$
Carbonic Acid	$H_2CO_3$
Hydrochloric Acid	HCl
Nitric Acid	$HNO_3$
Phosphoric Acid	$H_3PO_4$
Sulfuric Acid	$H_2SO_4$

## Properties of Acids

neutralise bases  
 turn litmus paper red  
 taste sour  
 react with many metals to produce hydrogen  
 conduct electricity

## Uses of Acids

water treatment  
 household cleaning products  
 used to etch metals and glass  
 used in batteries  
 production of synthetic fibers

## Common Bases

Name	Formula
Aluminium Hydroxide	$Al(OH)_3$
Ammonium Hydroxide	$NH_4OH$
Calcium Hydroxide	$Ca(OH)_2$
Potassium Hydroxide	KOH
Sodium Hydroxide	NaOH

## Properties of Bases

neutralise acids  
 turn litmus paper blue  
 taste bitter  
 feel slippery  
 conduct electricity

## Uses of Bases

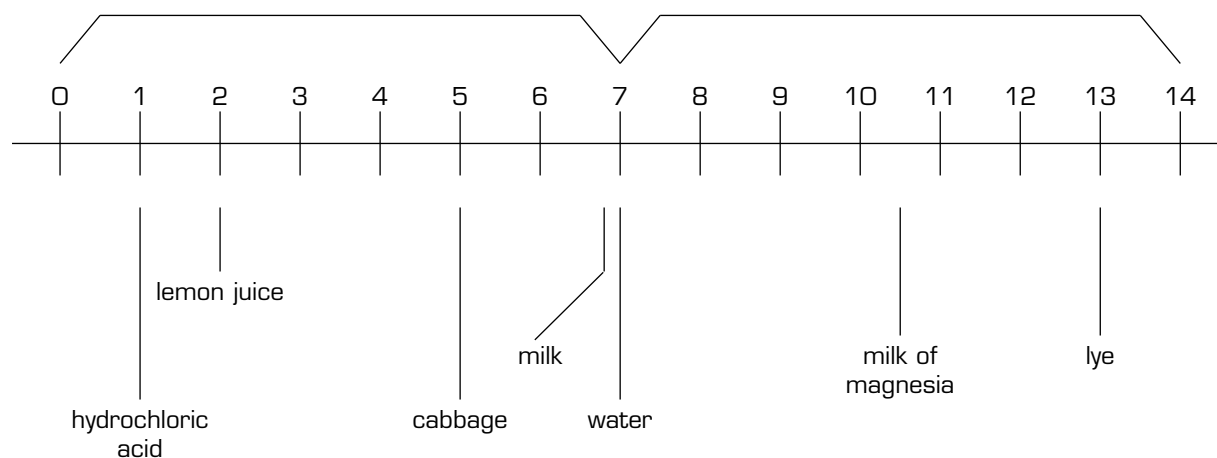
soap, glass  
 milk of magnesia  
 mortar  
 coagulants for water purification  
 ammonia water  
 lye soap

# THE pH SCALE

**ACIDS**

**NEUTRAL**

**BASES**



# CHARACTERISTICS OF SOME MIXED-UP SUBSTANCES

## Characteristics of Mixtures

- A mixture is made up of two or more substances that are mixed together.
- The substances in a mixture retain their individual properties.
- The substances in a mixture can be separated by physical means.
- A mixture has no definite chemical composition.
- A mixture has no chemical formula.

## Characteristics of Compounds

- A compound is made up of two or more substances which are chemically combined.
- A compound has new properties unlike those of the substances that make up the compound.
- A compound can be separated only by chemical means.
- A compound has a definite chemical composition.
- A compound has a chemical formula.

## Characteristics of Solutions

- A solution is a homogeneous mixture (same in structure).
- A solution is made of one or more liquid, gaseous, or solid substances dispersed in another.
- The particles in a solution dissolve.
- Solutes (substances that are dissolved in a solution) dissolve faster in a solution when they are stirred.
- Solutes dissolve faster in hot solutions than in cool solutions.
- Solutes dissolve faster in a solution when they are broken into small particles.
- A warm solvent (substance in which a solute dissolves) can usually hold more dissolved solute than a cold solvent.
- Saturated solutions contain all of the dissolved solute that they can hold
- Unsaturated solutions can dissolve more solute.

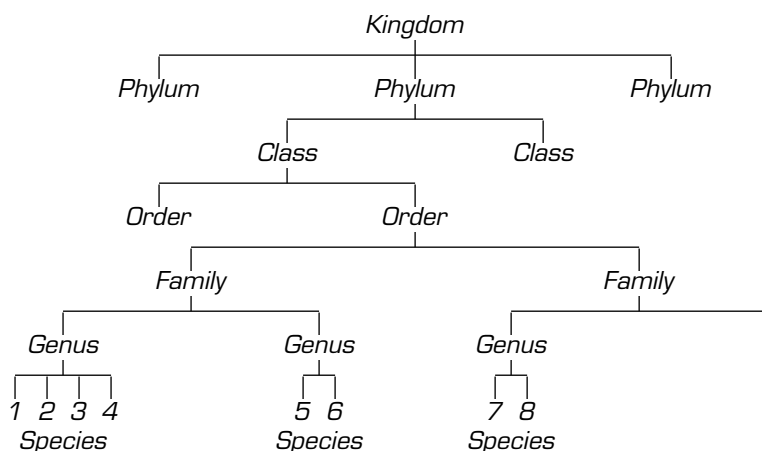
## Characteristics of Suspensions

- A suspension is a mixture of two or more substances.
- A suspension is cloudy.
- The particles in a suspension do not dissolve.
- A suspension usually settles on standing.
- Filtering can separate a suspension.
- The particles in a suspension are larger than molecular size.

# SYSTEM OF CLASSIFICATION FOR ORGANISMS

A Swedish scientist named Carolus Linnaeus developed the modern classification system for grouping organisms in the 1700s. This system involves seven classification groups. This branch of science that deals with classification is called taxonomy.

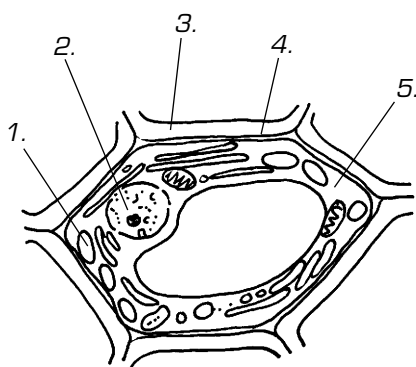
## CLASSIFICATION CHART



### Example: DOG

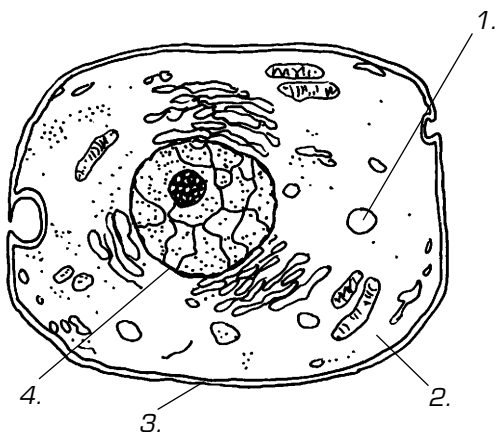
- Kingdom** – Animal
- Phylum** – Chordata
- Class** – Mammalia
- Order** – Carnivora
- Family** – Canidae
- Genus** – Canis
- Species** – Canis familiaris

## PARTS OF A PLANT CELL



1. **Chloroplast** – the oval body in a green plant cell which contains the chlorophyll
2. **Nucleus** – the central mass of protoplasm, which contains most of the hereditary material necessary for such functions as growth, reproduction, etc.
3. **Wall** – the rigid covering of the cell that contains cellulose and other substances
4. **Membrane** – a very thin living membrane surrounding the cytoplasm
5. **Cytoplasm** – the protoplasm (essential living matter) of a cell that is found outside the nucleus

## PARTS OF AN ANIMAL CELL



1. **Vacuole** – a clear, fluid-filled cavity within the plasma membrane believed to discharge excess water or wastes
2. **Cytoplasm** – the protoplasm (essential living matter) of a cell that is found outside the nucleus
3. **Cell Membrane** – a very thin living membrane surrounding the cytoplasm
4. **Nucleus** – the central mass of protoplasm that contains most of the hereditary material necessary for such functions as growth, reproduction, etc.