



## K-5 Physical Science Overview with Activities

The physical science strand encourages the basic observations of what our physical reality is made of and how it interacts – matter, energy, forces, atoms and molecules. This is the arena of physics and chemistry, from the very biggest things we know to the very smallest. What are things made of? How do physical objects behave? Why?

### Kindergarten

**Describing Physical Properties-** Observing and naming are focus across all strands in K. This is an **intro to PS**: observing and labeling different materials and properties of matter. (flexibility, shape, size, weight, buoyancy); Start to explore matter by playing with and observing water changing through different states and back again.

**Properties of materials can be observed, measured and predicted.**

- 1) You can describe objects' **materials** (paper, cloth, clay) and **physical properties** (shape, size, weight, buoyancy, flexibility, color, magnetism, texture)
- 2) **Water can change from liquid to solid and back again.**
- 3) **Water evaporates**, escaping from an open container, but remaining inside a closed container.

### **Kindergarten Activities:**

- *Sort objects by different properties, exploring and describing properties, sinking and floating experiments.*
- *See water in different forms, ice, jars of water in sun and shade, puddles*

### 1<sup>st</sup> Grade

**Exploring states of matter-** Move beyond water to compare common properties of any solid, liquid or gas. Notice that all states of matter take up space and have weight, but each state has distinguishing properties. Notice that matter's properties and states change with heating, cooling, or mixing.

**States of Materials**

- 1) **Solids, liquids, gases** have different properties
- 2) Substances' **properties change with mixing, cooling, heating**

### **1st Grade Activities:**

- *Explore and compare groups of solids (matter with pieces of definite shape and volume, include sand to look at small pieces of solid),*
- *Explore and compare groups of liquids (matter with definite volume, but take shape of container),*
- *Explore and compare groups of gases (balloons, cups and water tubs, balloons, plungers, matter that compresses to take shape and volume of container) --- Note all 3 have weight and take up space.*
- *Experiment with cooking or things to mix, heat and cool to explore changing properties.*

## 2<sup>nd</sup> Grade

**Motion & forces** – what causes matter to move?: how you observe & describe motion: describe position, and observe change over time; different forces that cause motion (pushing/pulling – stronger force/bigger change, sound waves as vibration physically moving medium, and forces that act at a distance (gravity, magnets ). How tools can focus physical force to do work.

***Motion of objects can be observed and measured.***

- 1) **Positions can be described** (relative to objects or background)
- 2) **Motion can be described** (observe position change over time)
- 3) **Motion can be changed with force** (push, pull, size of change is related to strength or amount of force)
- 4) **Simple tools and machines can apply force** (shovels, pulleys)
- 5) **Objects fall** to Earth unless held up
- 6) **Magnets** can apply force to move some objects
- 7) **Sound** is vibration, describe with pitch and volume

### **2nd Grade Activities:**

- *Race cars and describe and measure motion, examine forces that cause and stop movement.*
- *Explore Forces: Pushing pulling, magnets and objects, gravity in marble ramp setups, blowing on balls with straws,*
- *Explore gravity with objects with same shape/diff mass for dropping. balance toys.*
- *Explore Simple Tools: pulleys, “Lift a Lion”, tools in the garden,*
- *Explore Sound: rice on drums, musical instruments.*

## 3<sup>rd</sup> Grade

**Energy and Matter** - In the physical universe there are two things that exist: matter and energy: **Energy** can take many forms: comes from Sun as light, can be stored, converted, carried (waves, current, moving objects). Start to explore energy by looking at **Light**: has source and direction, can be blocked, reflected, seen, contains many colors.

**Matter** can also take many forms: has 3 states for its mass/substance, states change with energy added or removed (add in heat, remove w/ cooling), matter can be combined to make something new, all matter is made of atoms too small to see; until we did experiments that revealed different atoms or elements, people thought matter was different combinations of earth/wind/fire/water



**CRS**

COMMUNITY RESOURCES FOR SCIENCE

WWW.CRSCIENCE.ORG

***Energy and matter have multiple forms and can be changed.***

- 1) **Energy comes from Sun to Earth** in the form of **light**.
- 2) **Energy can be stored** in many forms (food, fuel, batteries)
- 3) **Energy can be converted to motion and heat** by living things and machines
- 4) **Energy can be carried** in waves (water waves, sound) electric current, and moving objects
- 5) **Matter has three states (solid, liquid, gas) that change when energy is added** (heating to evaporate or melt) **or removed** (cooling to freeze solid)
- 6) **Combining substances can create new substances with different properties**
- 7) **All matter is made of atoms**, particles too small to be seen with the naked eye, not earth, wind, fire, and water as once thought
- 8) Experiments have revealed **many kinds of atoms or elements**

***Light has a source and travels in a direction.***

- 1) Sunlight can be blocked to create **shadows**
- 2) **Light is reflected** from mirrors and other surfaces
- 3) The **color of light** striking an object affects how our eyes see it
- 4) **Vision:** We see objects when light traveling from an object enters our eye.

**3<sup>rd</sup> Grade Activities:**

- **Examine forms of energy**
  - *Burn a peanut (chemical energy stored in molecules),*
  - *Trace energy conversion from food to muscles to bike to friction/heat,*
  - *Energy stored in batteries and moving in sound waves,*
  - *Play with marble ramps (physical energy stored and momentum),*
- **Explore Light**
  - *Demonstrate light moving in straight lines,*
  - *Different colors of visible radiation within white light using prisms,*
  - *Bending light with water and mirrors,*
  - *Blocking light to create shadows,*
  - *Using spoons to show reversed image,*
  - *Sun dials and shadows can connect in Earth Science unit.*
- **Examine how matter changes**
  - *Connect state changes to energy removed by cooling and added with heat by light bulbs and sun and cooking experiments,*
  - *Mystery powders*
  - *Mixtures to separate with tools like screens, water, magnets.*

**4<sup>th</sup> Grade**

**Electricity and Magnetism** - explore relationships between electricity and magnetic force: build circuits, notice currents can produce magnetic field so can build simple electromagnet; review behavior of magnets and build compass to detect magnetic fields; then look at how electrically charged objects act like magnets. Explore how electromagnets can be used to generate electric current. Understand uses of electromagnets and electricity to do work.



**CRS**

WWW.CRSCIENCE.ORG

COMMUNITY RESOURCES FOR SCIENCE

***Electricity and magnetism are related effects that have useful applications in everyday life.***

- 1) You can **build series and parallel circuits** with wires, batteries and bulbs
- 2) You can **build a simple compass** to detect Earth's magnetic field
- 3) Electric currents produce magnetic fields, **build simple electromagnet**
- 4) **Electromagnets are used** to construct electric motors, generators, and simple devices (doorbells)
- 5) **Behavior of electrically charged objects** (repel, attract)
- 6) **Magnets have two poles that react to each other** (north, south, like poles repel, unlike poles attract)
- 7) **Electrical energy can be converted to heat, light, motion** (electrical cars and trains, power to homes)

#### **4<sup>th</sup> Grade Activities:**

- *Build parallel and series circuits to light bulbs or measure with amp meters,*
- *Build electromagnets and simple compasses,*
- *Look at pictures of dust/aurora borealis to show magnetic field of Earth and experiment with compass,*
- *Compare the shape of magnetic fields shown with iron filings around bar magnets.*
- *Show attraction and repelling behavior of magnets and charged wires.*
- *Use electromagnets to generate electricity and build working motor.*

**5: What is Matter?** – atoms and molecules in ordered arrays. We arrange what we know about each element's (substance with only 1 kind of atom) unique properties in the periodic table. Most elements are metals. Metals are elements with specific set of properties – conduct heat & electricity, reactive, combine easily into alloys, make positive ion in solution, most elements are metals. Just a few elements make up LT & most of the matter in universe.

Second part of standard is about combinations of elements and how only 112 elements can make up the wide variety of matter around us: atoms and molecules can combine and rearrange. When molecules combine, changing their ordered arrays, new molecular structures produce different properties. Learn properties of salts & common molecules (sugar, water, oxygen). Apply knowledge of the different properties of molecules and elements to separate mixtures & identify compounds;

***Elements and their combinations account for all the varied types of matter.***

- 1) During chemical reactions **atoms rearrange** into different products with different properties
- 2) All **matter is made of atoms**, which combine to form molecules
- 3) Common **properties of metals** (conductivity, reactivity, alloys, ionic solutions)
- 4) Each **element** is one kind of atom, organized in **Periodic Table**
- 5) With **instruments** you can see that atoms and molecules are discrete and in well ordered arrays.
- 6) **Separate mixtures** and **identify compounds** using their chemical and physical properties
- 7) **Properties of common molecules** (sugar, water, oxygen, etc.)
- 8) Just a **few elements** make all living things and most materials
- 9) Common **properties of salts** (sodium chloride)



**CRS**

COMMUNITY RESOURCES FOR SCIENCE

WWW.CRSCIENCE.ORG

### **5<sup>th</sup> Activities:**

- *Periodic table & collections of pictures (what's it made of?),*
- *Electron microscope pictures of molecules and crystals to show order and structure.*
- *Experiment with conductivity, rust, with different metals (including non-shiny) using magnets and incomplete circuit.*
- *Dissolve sugar and salt in water and test conductivity with electrodes All salts conduct electricity when dissolved in water because are composed of metal and non-metal.*
- *Explore properties of sugar, salt, water, carbon.*
- *Identify and separate compounds and mixtures using their properties. (reactions, dissolving, magnets, screens).*



**CRS**

[WWW.CRSCIENCE.ORG](http://WWW.CRSCIENCE.ORG)

COMMUNITY RESOURCES FOR SCIENCE