

# Meteorology Unit Organizer

## Fourth Grade

Vocabulary: meteorology, meteorologist, cycle, evaporation, condensation, precipitation, cirrus, stratus, cumulus, atmosphere, prevailing, mass, front, thunder, lightning, charge, tornado, hurricane, forecasting, barometer, satellite, weather, climate

Thinking Frame Work Key: K=knowledge, P=Patterns, M=Modeling, C=Creativity

### Core Knowledge Standards

- The water cycle: evaporation, condensation, precipitation (K,P)
- Clouds: cirrus, stratus, cumulus (K,P,M,C)
- The Atmosphere
  - troposphere, stratosphere, mesosphere, thermosphere, ionosphere, exosphere (K,P)
- Air movement: wind direction and speed, prevailing winds, air pressure, low and high pressure, air masses (K,P,M,C)
- Cold and warm fronts: thunderheads, lightning and electric charge, thunder, tornadoes, hurricanes (K,P,M,C)
- Forecasting the weather: barometers (relation between changes in atmospheric pressure and weather), weather maps, weather satellites (K,P,M)
- Weather and climate: “weather” refers to daily changes in temperature, rainfall, sunshine, etc. while “climate” refers to weather trends that are longer than the cycle of the seasons. (K,P,M,C)

### Colorado State Standards

#### Standard 1: Scientific Investigation

Students understand the processes of scientific investigation and design as well as conduct, communicate about, and evaluate such investigations.

##### I.1 Scientific investigations

##### *Understand and practice the process of scientific investigation.*

With teacher facilitation and in small groups the student will learn and follow the steps in the Scientific

Method:

- identify the problem.
- form a hypothesis (make a prediction).
- identify a procedure (list materials, steps, plan or strategy).
- test (experimentation).
- make observations (use tables, pictures and charts to explain in written form).
- collect data.
- interpret and draw conclusions.

Continue to develop appropriate questions and identify likely resources (For example: encyclopedia, atlases, nonfiction books and electronic media).

## **Standard 2: Physical Science**

**Students know and understand common properties, forms, and changes in matter and energy.**

### 2.1 Characteristics of matter

***Know that matter has characteristic properties, which relate to its composition and structure.***

Examine, describe, classify and compare tangible objects in terms of common physical properties (For example: state of matter, size, shape, texture, flexibility and color).

Measure common physical properties (mass, volume and temperature).

The student will investigate and understand the characteristics of electricity. Key concepts include:

- the nature of electricity (conductors and insulators circuits: open/closed, magnetism and magnetic field, static electricity.)

- electricity and Safety.

### 2.2 Forms of energy

***Know that energy appears in different forms and can move (be transferred) and change (be transformed).***

Compare interactions of electricity and magnetism with different materials

### 2.3 Interactions of objects in a system

***Understand that interactions can produce changes in a system, although the total quantities of matter and energy remain unchanged.***

Describe and observed change (For example: crystal growth, circuit, chromatography in terms of starting conditions, type of change, and ending conditions, using words, diagrams or graphs).

## **Standard 3: Life Science**

**Students know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment.**

### 3.1 Characteristics of living things

Know and understand the characteristics of living things, the diversity of life and how living things interact with each other and their environment.

### 3.2 Matter and energy of living systems

Know and understand interrelationships of matter and energy in living systems.

### 3.3 Human body

Know and understand how the human body functions and how these structure and functions compare with those of other factors that influence its structure and functions compared with those of other organisms.

### 3.4 Organisms change over time

Know and understand how organisms change over time in terms of biological evolution and genetics.

## **Standard 4: Earth and Space Science**

**Students know and understand the processes and interactions of Earth's systems and the structure and dynamics of Earth and other objects in space.**

### 4.1 Earth

*Know and understand the composition of Earth, its history and the natural processes that shape it.*

Identify major features of Earth's surface (For example: mountains, rivers, plains, hills, oceans and plateaus).

### 4.2 Atmosphere and Weather

Know and understand the general characteristics of the atmosphere and fundamental processes of weather

### 4.3 Water

*Know major sources of water, its uses, importance and cyclic patterns of movement through the environment.*

## **Standard 5: Science, Technology and Human Activity**

**Students know and understand interrelationships among science, technology, and human activity and how they can affect the world.**

### 5.I Science, technology and human activity

*Understand the connections between science, technology, human activity and their impact on the world.*

Recognize the diversity of resources provided by the Earth and sun (For example: minerals).

Design a device that addresses a problem or task, communicate the problem or task and develop a solution (For example: GIS).

Identify careers that use science and technology.

Describe the effects of pollution of the environment and suggest activities designed to conserve natural resources.

## **Standard 6: Scientific Connections**

**Students understand that science involves a particular way of knowing and understanding common connection among scientific disciplines.**

### 6.I Scientific connections

Understand that science is a changing body knowledge driven by a process of observation and investigation.

Recognize that when a science experiment is repeated with the same conditions, the experiment generally works the same way.

Identify observable patterns and changes in their lives and predict future events based on the patterns.

Compare a model with what it represents.

### **Objectives:**

- **will be able to explain the hydrological cycle**
- **able to identify the main form kinds of clouds**
- **able to label the layers of the atmosphere**
- **explain the effects of air movement**
- **explain the effects of warm fronts and cold fronts**

- explain the effects of high and low pressure
- able to identify forecasting tools and the use
- able to forecast possible weather conditions due to fronts, air pressure and the jet stream

### **Procedures:**

- read informational packets
- read and interpret poster
- create posters
- label diagrams
- record, graph and interpret data
- view photos and articles from the internet
- weather videos
- slide show on computer

### **Character Education**

- **Cooperation-** Meteorologists work in teams. They cannot accomplish their tasks without working as a team.
- **Citizenship-** Meteorologists are in a field that requires them to use their knowledge for the common good of all communities.
- **Responsibility-** One must be responsible in serious weather situations.

### **Questions to answer:**

1. What causes thunder, lightning and electrical charges?
2. What are the conditions that cause tornadoes and hurricanes?
3. What causes hail to vary in size and shape?

**Grades will be gathered from:**

1. Quiz on hydrological cycle
2. Cloud poster
3. Quiz on layers of the atmosphere
4. Labs and activities on gathering and interpreting data
5. Final unit exam

**Materials:**

- Unit informational packet
- Books relating to meteorology
- Cotton and poster boards
- Worksheets and comprehension
- Posters on the atmosphere, air movement, weather map,
- Overheads on clouds, fronts, cycles
- Computer and projector
- Quizzes
- Final test

**Habits of Mind:**

This unit is designed to help student develop the Habits of the Mind skills.

**12A Values and Attitudes**

**Achieved**

**Recording temperatures, precipitation and barometric pressure.**

**Use reasoning about fronts and high and low pressure for forecasting.**

## **12B Computation and Estimation**

**Achieved**

**Recording rainfall and precipitation and comparing various data.**

**Finding averages in temperature and precipitation.**

## **12C Manipulation and Observation**

**Achieved**

**Making anemometer to record wind speed.**

**Taking class notes and using them to make predictions.**

## **12D Communication Skills**

**Achieved**

**Taking notes in class, able to explain what was noted during class.**

**Recording heights of various cloud formations and predicting weather associated to them.**

## **12E Critical Response Skills**

**Achieved**

**Explaining weather formations and patterns such as hurricanes and tornadoes. Giving reasoning for strength and location.**

## **Benchmarks**

### **1c Scientific Enterprise**

**Discussing different theories and techniques used in meteorology.**

### **1b Scientific Inquiry**

**Compare techniques and skills used in different parts of the world. Using similar equipment to track and predict weather. Discuss the how information needs to be backed up with evidence.**

### **3a Technology of Science**

**Discuss and give examples of different tools used throughout history for measuring and predicting weather conditions. Examples: thermometer, anemometer, radar, weather balloons and the barometer. Compare changes in the tools and improvements made.**

### **3b Designs and Systems**

**Changes in equipment occur on a regular basis. Breakthroughs in various fields allow for changes and improvements.**

### **3c Issues in Technology**

**Technology has shaped all lives. Advanced equipment has made for casting and predicting weather more accurate. In one way or another we all depend on technology.**

#### **4B The Earth**

**Discuss solar radiation, the water cycle and patterns of weather formation.**

#### **4G Forces of Nature**

**Explain how gravity effects the atmosphere and anything in it.**

#### **6D Learning**

**Discuss different items that motivate and intrigue people. Why some people find it interesting to follow and chase storms.**