

Course Description

Earth Science builds upon the lessons of introduction to earth science. The mapping unit serves a two-fold purpose. First, students learn to interpret and construct topographic maps. Second, the mapping unit provides the students with the necessary background to analyze weather maps. The meteorology unit focuses on conceptual understanding of the earth's atmosphere and its dynamic nature. Upon the completion of the unit, students develop forecasts and complete a research project based upon a specific weather phenomenon of interest. Assessment activities include lab investigations, quizzes, tests, and project-based assignments.

Scope And Sequence

Timeframe	Unit	Instructional Topics
2 Week(s)	Unit 1- Mapping	1.1: Types of Maps 1.2: Uses of Maps
4 Weeks	Unit 2- Atmosphere and Weather	2.1: The Atmosphere 2.2: Water in the Atmosphere 2.3: The Atmosphere in Motion 2.4: Weather 2.5: Climate
3 Week(s)	Unit 3- Astronomy	3.1: Earth's Moon 3.2: The Sun and the Solar System 3.3: The Planets and the Solar System 3.4: Stars and Galaxies 3.5: Independent Research
Ongoing	Unit 4- Technology	4.1: Informational Research
Ongoing	Unit 5- Reading and Language Arts	5.1: Reading and Writing in Science
Ongoing	Unit 6- Strategies to Build One's Own Vocabulary	6.1: Logging with Words and Images 6.2: Chaos to Categories 6.3: Rate and Log- DVD Tool 6.4: Pencil to Publish 6.5: Vocabulary Dice 6.6: Merge and Fork
Ongoing	Unit 7- Strategies to Comprehend Concepts	7.1: Synthesizing 7.2: Questioning
Ongoing	Unit 8- Thinking Maps to Organize and Remember	8.1: Circle Map

		8.2: Bubble Map 8.3: Double Bubble Map 8.4: Tree Map 8.5: Flow Map 8.6: Multi-Flow Map 8.7: Brace Map 8.8: Analogy or Bride Map 8.9: Multiple Features Map
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Materials and Resources

Course Details

Unit: Strategies to Build One's Own Vocabulary Copy

Duration: Ongoing

Unit Overview

These are strategies for the students. As students gain control of these vocabulary tools they will be able to increase vocabulary proficiency as they gain new knowledge and manipulate content.

Topic: Logging With Words and Images **Duration:** Ongoing

Topic Overview

When students use **Log of Words** and Images as a strategy throughout the instructional cycle, they benefit in the following ways:

- Clear up confusions or explain ever-changing understandings
- "Slow down" to wrestle with the tougher parts or focus on the important parts
- Heighten awareness of how one thinks as concepts evolve

- Solidify understandings

Learning Targets

Students will record important concepts and continually evaluate their own understanding of content. Description: Record the words, phrases, and pictures that come to mind as your understanding grows.

Topic: Chaos to Categories **Duration:** Ongoing

Topic Overview

When students use **Chaos to Categories** as a strategy throughout the Instructional cycle, they benefit in the following ways:

Connect new learning to make meaning. Create visual cues of what is being read.

Periodically evaluate their understanding

Learning Targets

Students will develop thinking about relationships between concepts and solidify their understandings.

Topic: Rate and Log - DVD Tool **Duration:** Ongoing

Topic Overview

When students use **Rate and Log** as a strategy throughout the instructional cycle, they benefit in the following ways:

Clear up confusions or explain ever-changing understandings

"Slow down" to wrestle with the tougher parts or focus on the important parts Heighten awareness of how one thinks as concepts evolve

Confirm, build upon or reshape schema

Solidify understandings

Learning Targets

Students will explain ever-changing understandings and reshape schema.

Topic: Pencil to Publish **Duration:** Ongoing

Topic Overview

Pencil to Publish is used when students are asked to recall everything they know or think they know about a particular topic, they are improving their skills in becoming more independent readers and focusing on some critical reading strategies:

Connecting new knowledge to make meaning. Thinking ahead to what might be coming in the text.

Regularly evaluating their own understanding.

Having a plan for how to approach a task.

Learning Targets

Students will connect new knowledge to make meaning and think ahead while reading.

Topic: Vocabulary Dice **Duration:** Ongoing

Topic Overview

When students use **Vocabulary Dice** as a strategy throughout the instructional cycle, they benefit in the following ways:

Clear up confusions or explain ever-changing understandings

"Slow down" to wrestle with the tougher parts or focus on the important parts Heighten awareness of how one thinks as concepts evolve

Allow more deeply developed thinking about relationships between concepts

Solidify understandings

Learning Targets

Students will develop relationships between concepts.

Topic: Merge and Fork **Duration:** Ongoing

Topic Overview

The **Merge and Fork** is used when students are asked to compare people, items, or concepts they are thinking about what might be similar or different about the two. By practicing this strategy, students are improving their skills in becoming more independent readers and focusing on some critical reading strategies:

Connecting new knowledge to make meaning. Regularly evaluating their understanding.

Occasionally summarizing what is read.

Having a plan for how to approach the reading task.

Learning Targets

Students will complete the vocabulary tool by comparing and recording similarities and differences.

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Unit: Strategies to Comprehend Concepts Copy

Duration: Ongoing

Topic: Synthesizing

Duration: Ongoing

Topic Overview

Benefits of **SYNTHESIZING**:

- uses schema to help understand new information
- uses schema to enrich interpretations
- prioritizes thinking
- allows deep thinking about relationships between concepts
- clears up confusion
- confirms schema
- builds and creates new schema
- solidifies understandings
- develops awareness of thinking

- expands thinking
- allows for consideration of larger issues and ideas
- results in questioning, inferring and connecting

Learning Targets

Students will show ownership of I Remember strategy.

Description: I Remember strategy builds the habit of flexibility in reading rate, chunking information, and stating information in one's own words.

Students will show ownership of Rank Ordering strategy.

Description: Rank Ordering strategy will support positive thinking, deeper thinking, solid understandings, and consideration of larger issues and ideas.

Students will show ownership of RCRR strategy.

Description: Read-Cover-Remember-Retell (RCRR) RCRR builds the habits of chunking thoughts and restating understanding and slowing one's own thoughts while reading.

Students will show ownership of the Key Word strategy Description: Key Concept:

When students use the **Key Word** Strategy, they pause after each paragraph or small chunk of text and select a word or short phrase that best represents the main message in that portion of text. Students will benefit in a variety of ways:

- Students must pause frequently and consider the content of what was just read. This slows reading pace.
- Students make a conscious effort to identify the most important information in each paragraph.

By slowing down and thinking about the information, children are more likely to incorporate new knowledge into their prior knowledge. Students will show ownership of VIP strategy.

Description: VIP strategy develops habits of flexible reading rates, merging of new ideas, and restating in one's own words.

Topic: Questioning **Duration:** Ongoing

Topic Overview

Benefits of **QUESTIONING**:

- dispels confusion
- probes into new areas
- strengthens ability to analyze
- strengthens ability to draw conclusions
- explains ever changing understandings
- helps formulate beliefs
- helps focus on important parts of presentation
- helps focus on important parts of text
- develops awareness of toughest parts to understand
- slows down reading rate to allow time to visualize
- identifies points to request a slow-down of presentation

Learning Targets

Students will show ownership of First Thoughts and Revised Questions strategy

Description: This strategy helps students wrestle with tougher parts, probe into new areas, formulate new beliefs, and draw conclusions.

Students will show ownership of Questions Searching For Answers strategy

Description: This strategy helps students explain ever changing understandings, draw conclusions and wrestle with new information.

Students will show ownership of Two Page Note Taking strategy

Description: This strategy helps students slow down and focus on important parts, practice note taking strategies, analyze information and draw new conclusions.

Unit: Thinking Maps to Organize and Remember Copy

Duration: Ongoing

Unit Overview

As students manipulate content in a Thinking Map they gain awareness and increased understanding of the content area concepts.

Topic: Circle Map **Duration:** Ongoing

Topic Overview

- Seeking context
- Generate relevant information

Learning Targets

Students will generate relevant information or seek context using a circle map.

Topic: Bubble Map **Duration:** Ongoing

Topic Overview

- Attributes
- Traits
- Properties
- Description

Learning Targets

Students will organize attributes, traits, properties or descriptions with a bubble map.

Topic: Double Bubble Map **Duration:** Ongoing

Topic Overview

- Compare and contrast
- Prioritize importance within a comparison
- Comparison

Learning Targets

Students will compare and contrast using a double bubble map.

Topic: Tree Map **Duration:** Ongoing

Topic Overview

- Classification
- Main Idea/Details
- Persuasive
- Theme

Learning Targets

Students will construct a Tree Map to classify or sort main ideas from details.

Topic: Flow Map **Duration:** Ongoing

Learning Targets

Students will organize sequences, develop timelines and show chronological order.

Topic: Multi-Flow Map **Duration:** Ongoing

Learning Targets

Students will organize cause and effect information and make predictions.

Topic: Brace Map **Duration:** Ongoing

Learning Targets

Students will organize information for technical writing. Students will organize information from whole to part.

Students will recognize physical relationships of an object.

Topic: Analogy or Bridge Map **Duration:** Ongoing

Learning Targets

Students will compare and reason analogies. Students will solve analogies.

Topic: Multiple Features Map **Duration:** Ongoing

Learning Targets

Students will classify multiple sources of information.

Students will organize information by attributes, traits or properties.

Unit: Mapping

Duration: 2 Week(s)

Unit Overview

Students analyze the history, types, and construction of maps. In addition, students utilize maps to interpret environments and construct maps to represent landforms.

Academic Vocabulary

1. Topographic map/Topography
2. Scale
 1. Fractional
 2. Graphic
 3. Verbal

3. Compass rose
4. Magnetic declination
 1. True north
 2. Magnetic North
5. Contour lines
6. Contour interval
7. Legend/key
7. Latitude & Longitude
8. Township & Range
9. Hachure
10. Relief
11. Gradient slope
12. Benchmarks
13. Global Positioning System (GPS)
14. Triangulation

Key Questions

What is scale?

What is absolute location on a map? What is a topographic map?

How do we create topographic maps? How does a compass work?

How does GPS work?

Topic: Types of Maps Duration: 1 Day(s)

Learning Targets

Students define and use different components of a map.

Students utilize different types of maps to interpret environments.

Topic: Uses of Maps Duration: 9 Day(s)

Learning Targets

Students develop topographic maps based on accumulated data (elevation, distance, and scale).

Students interpret and use different types of maps (topographic maps, latitude and longitude, township and range).

Unit: Atmosphere and Weather

Duration: 4 Week(s)

Unit Overview

Students will investigate phenomena of the atmosphere and the weather processes that result. In addition, students must utilize map interpretation skills and computer software to accurately interpret, describe, and predict weather phenomena.

Vocabulary:

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1. Atmosphere
2. Heat
3. Temperature
4. Radiation
5. Conduction
6. Convection
7. Troposphere
8. Stratosphere
9. Mesosphere
10. Thermosphere
11. Ionosphere
12. Insolation
13. Greenhouse effect
14. Albedo
15. Water Vapor
Humidity
16. Relative humidity
17. Psychromotor
18. Condensation
19. Dew Point
20. Condensation nuclei
21. Precipitation/hydrometeor
22. Orographic effect
23. Station model
24. Air pressure
25. Barometer
26. Isobars
27. Pressure gradient
28. Sea-breeze
29. Lang-breeze
30. Coriolis effect
31. Air mass
32. Front
33. Mid-latitude cyclone

Key Questions

What is weather?

What is the general composition of Earth's atmosphere? What is specific heat? How does it affect weather?

What is albedo? How does it affect weather? What is humidity?

What is dew point?

What are clouds and how do they form? How do different types of precipitation form?

What are general precipitation patterns across the U.S.? What causes wind?

What creates changes in weather?

What is a mid-latitude cyclone?

What is a weather forecast and how do we create one? How does severe weather form?

Materials and Resources

3-ring Binder Internet Access Course Handouts

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Topic: The Atmosphere **Duration:** 3 Day(s)

Learning Targets

Students analyze the Earth's heat budget.

Students demonstrate how the Earth system continually recycles gases such as oxygen, carbon dioxide, and water vapor. Students describe how energy from the sun moves through the atmosphere via radiation, conduction, and convection.

Students describe how human activities can affect the atmosphere.

Students describe how the characteristics of a material affect its rate of solar absorption. Students describe the characteristics of each atmospheric layer.

Students describe the formation of Earth's early atmosphere and the current composition of the lower atmosphere. Students identify the factors that cause the intensity of insolation to vary from place to place.

Topic: Water in the Atmosphere **Duration: 2 Day(s)**

Learning Targets

Students analyze how condensation occurs in the atmosphere. Students describe basic cloud formation.

Students describe how rising air produces condensation. Students describe the formation of precipitation.

Students describe the three states in which water vapor can exist in the atmosphere. Students explain how air temperature affects the amount of water air can hold.

Topic: The Atmosphere in Motion **Duration: 3 Day(s)**

Learning Targets

Students define air pressure, how changes in elevation, temperature, and humidity affect air pressure, and how air pressure relates to winds.

Students describe the Coriolis effect.

Students describe the effects of seasons and continents on wind patterns.

Students explain how the Coriolis effect, friction, and pressure gradients affect wind direction. Students explain the circulation of sea, land, mountain, and valley breezes.

Students identify factors that affect global wind patterns.

Topic: Weather Duration: 3 Day(s)

Learning Targets

Students analyze weather symbols, models, and maps. Students compare and contrast different types of air masses.

Students compare and contrast the different technologies used to gather weather data. Students compose a detailed project examining a weather phenomenon.

Students describe how weather forecasts are made.

Students describe the conditions necessary for the formation of thunderstorms and tornadoes.

Students describe the formation and effects of hurricanes, and the measures taken to mitigate their damage. Students describe the hazards of thunderstorms and tornadoes, and discuss related safety measures.

Students describe the life cycle of a mid-latitude low.

Students describe the weather conditions associated with different types of fronts. Students identify factors that determine the characteristics of an air mass.

Topic: Climate Duration: 3 Day(s)

Learning Targets

Students define climate.

Students describe Earth's major climate zones. Students describe the factors that influence climate.

Students explain the causes of climate change.

Unit: Astronomy

Duration: 3 Week(s)

Unit Overview

Students will investigate distant phenomena of space. This unit builds upon the near-space astronomy unit of Introduction to Earth Science. Earth's moon, the sun and the solar system, stars and galaxies, and the planets of the solar system are the backbone of this unit.

Topic: Earth's Moon **Duration:** 2 Day(s)

Learning Targets

Students analyze various hypotheses for the formation of the moon. Students describe features and properties of the moon.

Topic: The Sun and the Solar System **Duration:** 5 Day(s)

Learning Targets

Students describe the structure of the sun and how it produces energy.

Students investigate early evidence and models for the structure of the solar system. Students investigate how sunspots, solar winds, and magnetic storms affect Earth.

Topic: The Planets and the Solar System **Duration:** 3 Day(s)

Learning Targets

Students describe the characteristics of the inner planets. Students describe the characteristics of the outer planets.

Students describe the relative positions of the inner planets.

Students explain the origin and composition of satellites in our solar system. Students generalize effects of solar debris colliding with Earth.

Students identify solar debris in our solar system.

Topic: Stars and Galaxies **Duration:** 5 Day(s)

Learning Targets

Students classify stars based on mass, size, temperature, color, and luminosity. Students compare and contrast different theories of origins of the universe.

Students define characteristics of electromagnetic radiation. Students describe the different types of galaxies.

Students describe the life cycle of a star similar to our sun.

Students explain how the Doppler effect provides insight about the structure of the universe. Students explain why constellations in the night sky change throughout the year.

Students utilize and explain techniques for analyzing electromagnetic radiation.

Topic: Independent Research **Duration:** Ongoing

Learning Targets

Students compose a project to demonstrate an understanding of an astronomical phenomenon.

Unit: Technology**Duration:** Ongoing**Unit Overview**

Technology serves as a research tool (e.g. data collection) and is also utilized for laboratory simulations.

Topic: Informational Research **Duration:** Ongoing

Learning Targets

Students analyze data collected via the internet (e.g. weather station data). Students construct personal understanding through web-based research.

Unit: Reading and Writing in Science**Duration:** Ongoing**Unit Overview**

Students continually analyze and reflect upon personal writing as well as the writing of field scientists.

Topic: Scientific Reading and Writing **Duration:** Ongoing

Learning Targets

Students compose, interpret, and explain scientific ideas and reasoning. Students read, summarize, and discuss historical and current topics in science.