

**Bloomfield Public Schools
Bloomfield, New Jersey 07003**

Curriculum Guide

**Geoscience
For V.E.S.T Program
Grade 11**

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Introduction:

Geoscience is an introduction to the four major disciplines of earth science: Geology, Meteorology, Oceanography, and Astronomy. Under Geology, there are two subgroups: Physical Geology, which includes rocks, minerals, tectonics, and the study of earthquakes and volcanoes. The other subsection of geology is Historical geology, which explores the earth's distant past: topics will include geological time and fossils. Meteorology is the study of the earth's atmosphere; subtopics include atmospheric moisture, weather, and climate. Oceanography is the study of the geology of the ocean floor, the chemistry of ocean water, and life in the ocean. Astronomy is the study of the stars, included in this study is planets and other objects in the solar system.

Overarching understandings:

- There are four major spheres in earth science, the geosphere, the atmosphere, the hydrosphere and the biosphere. Combine these spheres with outer space and that comprises our earth.**
- Earth's features allow human life to exist on this planet.**
- By exploring earth science, we can learn more about our past, present, and future and hopefully influence it in a positive way.**
- By studying the earth, we can learn how we influence the processes that are going on.**

Established Goals: New Jersey Core Curriculum Content Standards

Bloomfield Public Schools
Understanding by Design Unit Template

Title of Unit	The Earth's Atmosphere	Grade Level	11
Curriculum Area	Geoscience	Time Frame	35 days
Developed By	Mary Jo Roszkowski		
Desired Results (Stage 1)			
Established Goals			
5.1 Science Practices:			
A. Understanding Scientific Explanations			
5.1.12.A.1: Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.			
5.1.12.A.2: Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.			
5.1.12.A.3: Use scientific principles and theories to build and refine standards for data collection, posing controls and presenting evidence.			
5.1.B. Generate Scientific Evidence Through Active Investigations			
5.1.12.B.1: Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, casual/correlational relationships, and anomalous data.			
5.1.12.B.2: Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.			
5.1.12.B.3: Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.			
5.1.12.B.4: Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.			
5.1.C. Reflect on Scientific Knowledge			
5.1.12.C.1: Reflect on and revise understandings as new evidence emerges.			
5.1.12.C.2: Use data representations and new models to revise predictions and explanations.			
5.1.12.C.3: Consider alternative theories to interpret and evaluate evidence-based arguments.			
5.1.D Participate Productively in Science			
5.1.12.D.1: Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.			

5.1.12.D.2: Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.

5.4 Earth Science Systems

B: History of Earth

5.4.12.B.1: Trace the evolution of our atmosphere and relate the changes in rock types and life forms to the evolving atmosphere.

5.4.12.C.2: Analyze the vertical structure of earth's atmosphere, and account for the global, regional, and local variations of these characteristics and their impact on life.

5.4.12.F.1: Explain that it is warmer in summer and colder in winter for people in New Jersey because the intensity of sunlight is greater and the days are longer in summer than in winter. Connect these with seasonal changes in sunlight to the tilt of the Earth's axis with respect to the plane of its orbit around the sun.

5.4.12.F.2; Explain how the climate in regions throughout the world is affected by seasonal weather patterns, as well as other factors, such as the addition of greenhouse gases to the atmosphere and proximity to mountain ranges and to the ocean.

Primary Interdisciplinary Connections

RST. 9-10.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

RST.9-10.2. Determine the central ideas or conclusions of a text; trace the texts explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

RST.9-10.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

8.1.8.D.1. Model appropriate online behaviors related to cyber safety, cyber bullying, cyber security and cyber ethics.

8.1.8.D.3. Demonstrate how information on a controversial issue may be biased.

9.1.12.A.1. Apply critical thinking and problem-solving strategies during structured learning experiences

9.1.12.A.2. Participate in online strategy and planning sessions for course-based, school based, or outside projects.

9.1.12.B.1. Present resources and data in a format that effectively communicates the meaning of the data and its implications for solving problems, using multiple perspectives.

9.1.12.C.4. Demonstrate leadership and collaborative skills when participating in online learning communities and structured learning experiences.

9.1.12.C.5. Assume a leadership position by guiding the thinking of peers in a direction that leads to successful completion of a challenging task or project.

9.1.12.F.2. Demonstrate a positive work ethic in various settings during structured learning experiences.

21st Century Interdisciplinary Themes: ___X___ Global Awareness Financial, economic, business, and entrepreneurial literacy _____ Civic Literacy _____ Health Literacy	
Transfer	
Students will be able to independently use their learning to... T1: Explain the structure of the earth's atmosphere. T2: Describe weather and understand how it can and should influence our actions. T3: Identify and describe the three world climate zones	
Meaning	
Understandings	Essential Questions
Students will understand that...	Students will keep considering...
U1: Climate and weather influence us on a daily basis. U2: Weather is the result of the interactions of water and heat in the atmosphere. U3: Proper planning can help to alleviate damage caused by severe weather.	Q1: Why is it important to understand a region's climate? Q2: How does society apply our knowledge of weather? Q3: How does weather and climate influence who we are?
Acquisition	
Knowledge	Skills
Students will know...	Students will be able to...
K1: Selected scientific vocabulary K2: All factors that influence weather K3: Polar climates, Temperate climates and Tropical climates	S1: Use scientific vocabulary S2: Describe weather conditions S3: identify different climate zones

Evidence (Stage 2)		
<u>Checks for Alignment</u>	<u>Evaluation Criteria</u> Performance is judged in terms of...	<u>Assessment Evidence</u>
T1-T3 K1-K3 U1-U3	Comprehension	<u>Transfer Task(s)</u> Formative • Questioning • Self Assessment • Graphic organizers
	Application	
	Evaluation	Summative *Tests *Quizzes *Projects
T1-T3 S1-S3	Responses	<u>Other Evidence</u> Formative • Observation • Worksheets • Homework
	Application	
	Descriptions	Summative *Short answers *Labs
	Comparisons	
Learning Plan (Stage 3)		
Checks for alignment and best practice	Summary of Key Learning Events and Instruction <i>The teaching and learning needed to achieve the unit goals.</i>	
T1-T3 K1-K3 U1-U3 T1-T3 S1-S3	Required Activities Reading for Meaning	Required Resources General Science (AGS Publishing -2004) Chapter 15 pg. 332-349 and Chapter 16 pg 350-369.

	Watch Eyewitness video on weather	
	Diagram main types on clouds	
	Track weather, temperature and air pressure for a week	
	Learn scientific vocabulary	Vocabulary list attached
	Suggested Activities	Suggested Resources
	Investigation 15 Making a Model of Rain	General Science Text p. 342-343
	Worksheets on using weather maps	On the Mark Press

Strategies for Differentiation	
Students Below Target:	Students Meeting or Exceeding Target:
Paired/Group Activity	Cooperative learning
Guided practice	Learning Buddies
Cooperative Learning	Independent Study
Learning Buddies	Interest-based mini lessons
Small Group instruction	Teach organizational skills
One on One instruction from paraprofessional	Test modifications/ time extensions
Modified worksheets	
Chunking or grouping of material	
Provide study guides	
Teach Organizational skills	
Test Modifications/ time extensions	

Additional	Strategies
Choose broad instructional concepts and skills that lend themselves to understanding at various levels of complexity	Teacher adjusts content, process, product according to students' readiness, interest, and learning profile.
Provide access to a variety of materials which target different learning preferences and reading abilities	Use a variety of assessment strategies, including performance-based and open-ended assessment.
Develop activities that target auditory, visual, and kinesthetic learners	Encourage thinking at various levels of Bloom's taxonomy.
Have a variety of materials, resources, and texts available for student use. Students exploring a concept should have access to written descriptions, graphic images, and audio-visual representations related to the topic. A student with above or below grade-level reading ability will benefit from studying text books and reading material at the appropriate level. Supporting materials for investigation and experimentation should be readily available and students should be trained in their use.	Engage students in orbital studies: develop a list of topics related to a science concept or theme. Allow each student to select a topic based on interest. Have each student conduct an independent investigation of the chosen topic with guidance and coaching from the teacher. This type of activity allows flexibility in pacing, degree of complexity, and the nature of the product produced by the student.
Establish stations for inquiry based, independent learning activities.	Balance teacher assigned and student selected projects.
Create activities that vary in level of complexity and degree of abstract thinking required.	Offer students a choice of projects that reflect a variety of learning styles and utilize pre-tests to assess where individual students need to begin study of a given topic or unit.
Use flexible grouping to group and regroup students based on factors including content, ability, and assessment results.	Use a variety of instructional delivery methods to address different learning styles.
Tiered assignments- direct instruction, guidance based groups, work in higher level learners	Break assignments into smaller, more manageable parts that include structured directions for each part.
Utilize pre-tests to assess where individual students need to begin study of a given topic or unit	Use a variety of instructional delivery methods to address different learning styles.
Break assignments into smaller, more manageable parts that include structured directions for each part.	Encourage thinking at various levels of Bloom's taxonomy.
Vary degree of complexity of lab investigations	Vary the length of time a student may take to complete a task in order to provide additional support for a struggling learner or to encourage an advanced learner to pursue a topic in greater depth.

Bloomfield Public Schools
Understanding by Design Unit Template

Title of Unit	Minerals, Rocks and Fossils	Grade Level	11
Curriculum Area	Geoscience	Time Frame	35 days
Developed By	Mary Jo Roszkowski		
Desired Results (Stage 1)			
Established Goals			
5.1 Science Practices:			
A. Understanding Scientific Explanations			
5.1.12.A.1: Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.			
5.1.12.A.2: Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.			
5.1.12.A.3: Use scientific principles and theories to build and refine standards for data collection, posing controls and presenting evidence.			
5.1.B. Generate Scientific Evidence Through Active Investigations			
5.1.12.B.1: Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, casual/correlational relationships, and anomalous data.			
5.1.12.B.2: Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.			
5.1.12.B.3: Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.			
5.1.12.B.4: Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.			
5.1.C. Reflect on Scientific Knowledge			
5.1.12.C.1: Reflect on and revise understandings as new evidence emerges.			
5.1.12.C.2: Use data representations and new models to revise predictions and explanations.			
5.1.12.C.3: Consider alternative theories to interpret and evaluate evidence-based arguments.			
5.1.D Participate Productively in Science			
5.1.12.D.1: Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas,			

observations, and experiences.

5.1.12.D.2: Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.

5.3 Life Science

E. Evolution and Diversity

5.3.12.E.3: Provide an explanation for the history of life on earth using scientific evidence (e.g., fossil record, DNA, protein structures etc.).

5.4 Earth Systems Science

B. History of Earth

5.4.12.B.1: trace the evolution of our atmosphere and relate changes in rock types and life forms to the evolving atmosphere.

5.4.12.B.2: Correlate stratigraphic columns from various locations by using index fossils and other dating techniques.

5.4.12.B.3: Account for the evolution of species by citing specific absolute-dating evidence of fossil samples.

G. Biogeochemical Cycles

5.4.12.G.2: Explain the unintended consequences of harvesting natural resources from an ecosystem.

Primary Interdisciplinary Connections

RST. 9-10.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

RST.9-10.2. Determine the central ideas or conclusions of a text; trace the texts explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

RST.9-10.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

8.1.8.D.1. Model appropriate online behaviors related to cyber safety, cyber bullying, cyber security and cyber ethics.

8.1.8.D.3. Demonstrate how information on a controversial issue may be biased.

9.1.12.A.1. Apply critical thinking and problem-solving strategies during structured learning experiences

9.1.12.A.2. Participate in online strategy and planning sessions for course-based, school based, or outside projects.

9.1.12.B.1. Present resources and data in a format that effectively communicates the meaning of the data and its implications for solving problems, using multiple perspectives.

9.1.12.C.4. Demonstrate leadership and collaborative skills when participating in online learning communities and structured learning experiences.

9.1.12.C.5. Assume a leadership position by guiding the thinking of peers in a direction that leads to successful completion of a challenging task or project.

9.1.12.F.2. Demonstrate a positive work ethic in various settings during structured learning experiences.	
21st Century Interdisciplinary Themes: _____X_ Global Awareness _____X_ Financial, economic, business, and entrepreneurial literacy ___X___ Civic Literacy _____ Health Literacy	
Transfer	
Students will be able to independently use their learning to... T1 Explain how rocks can be used to understand the history and evolution of earth. T2: Describe how rocks can change form T3: Understand how fossils are evidence of the history of life on earth	
Meaning	
Understandings	Essential Questions
Students will understand that...	Students will keep considering...
U1: The Earth is a mixture of useful compounds and elements. U2: Knowledge of rocks help humans understand their environment. U3: Fossils provide evidence of the history of life on earth.	Q1: Why is it important to learn about minerals? Q2: How can learning about rocks help humans? Q3: What do fossils teach us ?
Acquisition	
Knowledge	Skills
Students will know...	Students will be able to...
K1: Selected scientific vocabulary K2: How rocks and minerals provide resources and information. K3: that fossils provide evidence of the history of the earth.	S1: Formulate meaningful questions S2: Use scientific vocabulary S3: Cite scientific evidence of the history of life on earth.

Evidence (Stage 2)		
<u>Checks for Alignment</u>	<u>Evaluation Criteria</u> Performance is judged in terms of...	<u>Assessment Evidence</u>
T1-T3 K1-K3 U1-U3	Comprehension Application Evaluation	<u>Transfer Task(s)</u> Formative • Questioning • Self Assessment • Graphic organizers
		Summative *Tests *Quizzes *Projects
Q1-Q3 S1-S3	Responses Application Descriptions Comparisons	<u>Other Evidence</u> Formative *Observation *worksheets *homework
		Summative • Short answers • labs

Learning Plan (Stage 3)

**Checks for alignment
and best practice**

Summary of Key Learning Events and Instruction

The teaching and learning needed to achieve the unit goals.

	Required Activities	Required Resources
	Reading for Meaning	General Science (AGS Publishing 2004) Chapter 10 pg. 236-250, Chapter 13 pg. 294-312.
	Worksheets on rocks and minerals	General Science workbook that accompanies text (AGS Publishing).
	Dinosaur timeline	
	Rocks and Minerals Identification Lab	
	Rocks and Minerals Video	Eyewitness video
	Diagram the Rock Cycle	
	Suggested Activities	Suggested Resources
	Demonstration of U.V. activated minerals	Biology Dept.

Strategies for Differentiation	
Students Below Target:	Students Meeting or Exceeding Target:
Paired/Group Activity	Cooperative learning
Guided practice	Learning Buddies
Cooperative Learning	Independent Study
Learning Buddies	Interest-based mini lessons
Small Group instruction	Teach organizational skills
One on One instruction from paraprofessional	Test modifications/ time extensions
Modified worksheets	
Chunking or grouping of material	
Provide study guides	
Teach Organizational skills	
Test Modifications/ time extensions	

Additional	Strategies
Choose broad instructional concepts and skills that lend themselves to understanding at various levels of complexity	Teacher adjusts content, process, product according to students' readiness, interest, and learning profile.
Provide access to a variety of materials which target different learning preferences and reading abilities	Use a variety of assessment strategies, including performance-based and open-ended assessment.
Develop activities that target auditory, visual, and kinesthetic learners	Encourage thinking at various levels of Bloom's taxonomy.
Have a variety of materials, resources, and texts available for student use. Students exploring a concept should have access to written descriptions, graphic images, and audio-visual representations related to the topic. A student with above or below grade-level reading ability will benefit from studying text books and reading material at the appropriate level. Supporting materials for investigation and experimentation should be readily available and students should be trained in their use.	Engage students in orbital studies: develop a list of topics related to a science concept or theme. Allow each student to select a topic based on interest. Have each student conduct an independent investigation of the chosen topic with guidance and coaching from the teacher. This type of activity allows flexibility in pacing, degree of complexity, and the nature of the product produced by the student.
Establish stations for inquiry based, independent learning activities.	Balance teacher assigned and student selected projects.
Create activities that vary in level of complexity and degree of abstract thinking required.	Offer students a choice of projects that reflect a variety of learning styles and utilize pre-tests to assess where individual students need to begin study of a given topic or unit.
Use flexible grouping to group and regroup students based on factors including content, ability, and assessment results.	Use a variety of instructional delivery methods to address different learning styles.
Tiered assignments- direct instruction, guidance based groups, work in higher level learners	Break assignments into smaller, more manageable parts that include structured directions for each part.
Utilize pre-tests to assess where individual students need to begin study of a given topic or unit	Use a variety of instructional delivery methods to address different learning styles.
Break assignments into smaller, more manageable parts that include structured directions for each part.	Encourage thinking at various levels of Bloom's taxonomy.
Vary degree of complexity of lab investigations	Vary the length of time a student may take to complete a task in order to provide additional support for a struggling learner or to encourage an advanced learner to pursue a topic in greater depth.

BloomPublic Schools
Understanding by Design Unit Template

Title of Unit	Soil, Weathering and Erosion	Grade Level	11
Curriculum Area	Geoscience	Time Frame	30 days
Developed By	Mary Jo Roszkowski		
Desired Results (Stage 1)			
Established Goals			
5.1 Science Practices: A. Understanding Scientific Explanations 5.1.12.A.1: Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations. 5.1.12.A.2: Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories. 5.1.12.A.3: Use scientific principles and theories to build and refine standards for data collection, posing controls and presenting evidence. 5.1.B. Generate Scientific Evidence Through Active Investigations 5.1.12.B.1: Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, casual/correlational relationships, and anomalous data. 5.1.12.B.2: Build, refine, and represent evidence-based models using mathematical, physical, and computational tools. 5.1.12.B.3: Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories. 5.1.12.B.4: Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.			

5.1.C. Reflect on Scientific Knowledge

5.1.12.C.1: Reflect on and revise understandings as new evidence emerges.

5.1.12.C.2: Use data representations and new models to revise predictions and explanations.

5.1.12.C.3: Consider alternative theories to interpret and evaluate evidence-based arguments.

5.1.D Participate Productively in Science

5.1.12.D.1: Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.

5.1.12.D.2: Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.

5.3: Life Science

C. Interdependence

5.3.12.C.2: Model how natural and human- made changes in the environment will affect individual organisms and the dynamics of populations.

5.4:Earth Systems Science

G. Biogeochemical Cycles

5.4.12.G.4: Compare over time the impact of human activity on the cycling of matter and energy through ecosystems.

5.4.12.G.5: Assess(using maps, local planning documents, and historical records) how the natural environment has changed since humans have inhabited the region.

5.4.12.G.6: Assess (using scientific, economic, and other data) the potential environmental impact of large scale adoption of emerging technologies (eg. Wind farming, harnessing geothermal energy).

Primary Interdisciplinary Connections

RST. 9-10.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

RST.9-10.2. Determine the central ideas or conclusions of a text; trace the texts explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

RST.9-10.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

8.1.8.D.1. Model appropriate online behaviors related to cyber safety, cyber bullying, cyber security and cyber ethics.

8.1.8.D.3. Demonstrate how information on a controversial issue may be biased.

9.1.12.A.1. Apply critical thinking and problem-solving strategies during structured learning experiences

- 9.1.12.A.2.** Participate in online strategy and planning sessions for course-based, school based, or outside projects.
- 9.1.12.B.1.** Present resources and data in a format that effectively communicates the meaning of the data and its implications for solving problems, using multiple perspectives.
- 9.1.12.C.4.** Demonstrate leadership and collaborative skills when participating in online learning communities and structured learning experiences.
- 9.1.12.C.5.** Assume a leadership position by guiding the thinking of peers in a direction that leads to successful completion of a challenging task or project.

21st Century Interdisciplinary Themes:

☒ Global Awareness	☒ Financial, economic, business, and entrepreneurial literacy
☒ Civic Literacy	☐ Health Literacy

Transfer

Students will be able to independently use their learning to...

T1:Understand earth's formations

T2:Explain natural changes in the earth's landscape

T3: Plant successful landscapes that are environmentally sound

Meaning	
Understandings	Essential Questions
Students will understand that...	Students will keep considering...
U1: Materials on earth's surface are constantly changing. U2: There are many natural occurrences that cause weathering and erosion, but humans can also cause changes in the natural landscape. U3: Soil plays an important role earth's landscape and contributes to the existence of life on earth.	Q1: What makes up the earth? Q2: How is earth's landscape formed? Q3: How do the materials that make up the earth contribute to life on earth?
Acquisition	
Knowledge	Skills
Students will know...	Students will be able to...
K1: selected science vocabulary K2: how the earth's landscape is formed K3: how earth's features contribute to life on earth	S1: use scientific vocabulary S2: formulate meaningful questions S3: Identify natural occurrences that form earth's landscape and how humans can impact earth's landscape

Evidence (Stage 2)		
<u>Checks for Alignment</u>	<u>Evaluation Criteria</u> Performance is judged in terms of...	<u>Assessment Evidence</u>
T1-T3 K1-K3 U1-U3	Comprehension Application Evaluation	<u>Transfer Task(s)</u> Formative • Question • Self assessment • Graphic Organizers
		Summative *Tests *Quizzes *Projects
Q1-Q3 S1-S3	Responses Descriptions Application	<u>Other Evidence</u> Formative *Observation *worksheets * homework
		Summative *Short answers *labs

Learning Plan (Stage 3)

**Checks for alignment
and best practice**

Summary of Key Learning Events and Instruction

The teaching and learning needed to achieve the unit goals.

	Required Activities	Required Resources
	Reading for Meaning	General Science (AGS Publishing 2004) Chapter 11 Weathering and Erosion pg. 252-271
	Worksheets on Weathering and Erosion	General Science Workbook that accompanies text
	Effects of water on soil Lab (Build a Mountain)	
	Suggested Activities	Suggested Resources
	Observing Chemical Weathering Investigation	General Science Text p. 257

Strategies for Differentiation	
Students Below Target:	Students Meeting or Exceeding Target:
Paired/Group Activity	Cooperative learning
Guided practice	Learning Buddies
Cooperative Learning	Independent Study
Learning Buddies	Interest-based mini lessons
Small Group instruction	Teach organizational skills
One on One instruction from paraprofessional	Test modifications/ time extensions
Modified worksheets	
Chunking or grouping of material	
Provide study guides	
Teach Organizational skills	
Test Modifications/ time extensions	

Additional	Strategies
Choose broad instructional concepts and skills that lend themselves to understanding at various levels of complexity	Teacher adjusts content, process, product according to students' readiness, interest, and learning profile.
Provide access to a variety of materials which target different learning preferences and reading abilities	Use a variety of assessment strategies, including performance-based and open-ended assessment.
Develop activities that target auditory, visual, and kinesthetic learners	Encourage thinking at various levels of Bloom's taxonomy.
Have a variety of materials, resources, and texts available for student use. Students exploring a concept should have access to written descriptions, graphic images, and audio-visual representations related to the topic. A student with above or below grade-level reading ability will benefit from studying text books and reading material at the appropriate level. Supporting materials for investigation and experimentation should be readily available and students should be trained in their use.	Engage students in orbital studies: develop a list of topics related to a science concept or theme. Allow each student to select a topic based on interest. Have each student conduct an independent investigation of the chosen topic with guidance and coaching from the teacher. This type of activity allows flexibility in pacing, degree of complexity, and the nature of the product produced by the student.
Establish stations for inquiry based, independent learning activities.	Balance teacher assigned and student selected projects.
Create activities that vary in level of complexity and degree of abstract thinking required.	Offer students a choice of projects that reflect a variety of learning styles and utilize pre-tests to assess where individual students need to begin study of a given topic or unit.
Use flexible grouping to group and regroup students based on factors including content, ability, and assessment results.	Use a variety of instructional delivery methods to address different learning styles.
Tiered assignments- direct instruction, guidance based groups, work in higher level learners	Break assignments into smaller, more manageable parts that include structured directions for each part.
Utilize pre-tests to assess where individual students need to begin study of a given topic or unit	Use a variety of instructional delivery methods to address different learning styles.
Break assignments into smaller, more manageable parts that include structured directions for each part.	Encourage thinking at various levels of Bloom's taxonomy.
Vary degree of complexity of lab investigations	Vary the length of time a student may take to complete a task in order to provide additional support for a struggling learner or to encourage an advanced learner to pursue a topic in greater depth.

Bloom ilic Schools
Understanding by Design Unit Template

Title of Unit	Forces in the Earth	Grade Level	11
Curriculum Area	Geoscience	Time Frame	40 days
Developed By	Mary Jo Roszkowski		
Desired Results (Stage 1)			
Established Goals			
5.1 Science Practices: A. Understanding Scientific Explanations 5.1.12.A.1: Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations. 5.1.12.A.2: Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories. 5.1.12.A.3: Use scientific principles and theories to build and refine standards for data collection, posing controls and presenting evidence. 5.1.B. Generate Scientific Evidence Through Active Investigations 5.1.12.B.1: Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, casual/correlational relationships, and anomalous data. 5.1.12.B.2: Build, refine, and represent evidence-based models using mathematical, physical, and computational tools. 5.1.12.B.3: Revise predictions and explanations using evidence, and connect explanations/arguments to established C. Forms of Energy 5.2.12.C.2: scientific knowledge, models, and theories. 5.1.12.B.4: Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations. 5.1.C. Reflect on Scientific Knowledge			

5.1.12.C.1: Reflect on and revise understandings as new evidence emerges.

5.1.12.C.2: Use data representations and new models to revise predictions and explanations.

5.1.12.C.3: Consider alternative theories to interpret and evaluate evidence-based arguments.

5.1.D Participate Productively in Science

5.1.12.D.1: Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.

5.1.12.D.2: Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.

5.2 Physical Science

C. Forms of Energy

5.2.12.C.2: Account for any trends in the melting points and boiling points of various compounds.

D. Energy Transfer and Conservation

5.2.12.D.4: Measure quantitatively the energy transferred between objects during a collision.

5.4 Earth Systems Science

D. Tectonics

5.4.12.D.1: Explain the mechanisms for plate motions using earthquake data, mathematics, and conceptual models.

Primary Interdisciplinary Connections

RST. 9-10.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

RST.9-10.2. Determine the central ideas or conclusions of a text; trace the texts explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

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9.1.12.A.1. Apply critical thinking and problem-solving strategies during structured learning experiences

9.1.12.A.2. Participate in online strategy and planning sessions for course-based, school based, or outside projects.

9.1.12.B.1. Present resources and data in a format that effectively communicates the meaning of the data and its implications for solving problems, using multiple perspectives.

9.1.12.C.4. Demonstrate leadership and collaborative skills when participating in online learning communities and structured

learning experiences.

9.1.12.C.5. Assume a leadership position by guiding the thinking of peers in a direction that leads to successful completion of a challenging task or project.

21st Century Interdisciplinary Themes:

___X___ Global Awareness

_____ Civic Literacy

_____ Financial, economic, business, and entrepreneurial literacy

_____ Health Literacy

Transfer

Students will be able to independently use their learning to...

T1: Understand that the earth is continually evolving and changing.

T2: Explain the structure of the Earth

T3: Describe forces in the earth that cause movement, earthquakes and volcanoes.

Meaning

Understandings

Students will understand that...

U1: The earth is made of layers and is constantly changing

U2: There are plates that make up the earth's crust and they are constantly moving.

U3: Movement in the earth's plates can cause earthquakes and volcanoes.

U4: Knowledge of plate tectonics can help us predict how earthquakes and volcanoes behave.

Essential Questions

Students will keep considering...

Q1: What is the earth made of and how does it change?

Q2: How does the earth move?

Q3: How can learning about earthquakes and volcanoes help us?

Acquisition

Knowledge

Students will know...

K1: Selected scientific vocabulary

K2: The structure of the earth

K3: How the earth changes

Skills

Students will be able to...

S1: Formulate meaningful questions

S2: Use scientific vocabulary

S3: Explain plate tectonics

Evidence (Stage 2)		
<u>Checks for Alignment</u>	<u>Evaluation Criteria</u> Performance is judged in terms of...	<u>Assessment Evidence</u>
T1-T3 U1-U4 Q1-Q3	Comprehension Application Evaluation	<u>Transfer Task(s)</u> Formative • Questioning • Self assessment • Graphic Organizers
		Summative • Tests • Quizzes • Projects
K1-K3 S1-S3	Responses Application Descriptions	<u>Other Evidence</u> Formative • Observation • Worksheets • Homework
		Summative • Short answers • Labs

Learning Plan (Stage 3)

**Checks for alignment
and best practice**

Summary of Key Learning Events and Instruction

The teaching and learning needed to achieve the unit goals.

	Required Activities	Required Resources
T1-T3 U1-U4 Q1-Q3 K1-K3 Q1-Q3	Reading for meaning	General Science (AGS Publishing 2004) Chapter 12 pgs. 272-293.
	Apple Demonstration	
	Continents Jigsaw Puzzle lab	Continental Press
	Eyewitness video on earthquakes and volcanoes	Eyewitness Video
	Worksheets on Parts of a Volcano	Continental Press
	Build an earthquake –proof structure using toothpicks Lab	
	Suggested Activities	Suggested Resources
	Watch movie “Earthquake in New York.”	Bloomfield Public Library
	Watch movie “Dantes Peak”	Bloomfield Public Library
	Make an earthquake website	www.TLC.com . Earthquakes

Learning Plan (Stage 3)

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Strategies for Differentiation

Students Below Target:	Students Meeting or Exceeding Target:
Paired/Group Activity	Cooperative learning
Guided practice	Learning Buddies
Cooperative Learning	Independent Study
Learning Buddies	Interest-based mini lessons
Small Group instruction	Teach organizational skills
One on One instruction from paraprofessional	Test modifications/ time extensions
Modified worksheets	
Chunking or grouping of material	
Provide study guides	
Teach Organizational skills	
Test Modifications/ time extensions	

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Additional	Strategies
Choose broad instructional concepts and skills that lend themselves to understanding at various levels of complexity	Teacher adjusts content, process, product according to students' readiness, interest, and learning profile.
Provide access to a variety of materials which target different learning preferences and reading abilities	Use a variety of assessment strategies, including performance-based and open-ended assessment.
Develop activities that target auditory, visual, and kinesthetic learners	Encourage thinking at various levels of Bloom's taxonomy.
Have a variety of materials, resources, and texts available for student use. Students exploring a concept should have access to written descriptions, graphic images, and audio-visual representations related to the topic. A student with above or below grade-level reading ability will benefit from studying text books and reading material at the appropriate level. Supporting materials for investigation and experimentation should be readily available and students should be trained in their use.	Engage students in orbital studies: develop a list of topics related to a science concept or theme. Allow each student to select a topic based on interest. Have each student conduct an independent investigation of the chosen topic with guidance and coaching from the teacher. This type of activity allows flexibility in pacing, degree of complexity, and the nature of the product produced by the student.
Establish stations for inquiry based, independent learning activities.	Balance teacher assigned and student selected projects.
Create activities that vary in level of complexity and degree of abstract thinking required.	Offer students a choice of projects that reflect a variety of learning styles and utilize pre-tests to assess where individual students need to begin study of a given topic or unit.
Use flexible grouping to group and regroup students based on factors including content, ability, and assessment results.	Use a variety of instructional delivery methods to address different learning styles.
Tiered assignments- direct instruction, guidance based groups, work in higher level learners	Break assignments into smaller, more manageable parts that include structured directions for each part.
Utilize pre-tests to assess where individual students need to begin study of a given topic or unit	Use a variety of instructional delivery methods to address different learning styles.
Break assignments into smaller, more manageable parts that	Encourage thinking at various levels of Bloom's taxonomy.

include structured directions for each part.	
Vary degree of complexity of lab investigations	Vary the length of time a student may take to complete a task in order to provide additional support for a struggling learner or to encourage an advanced learner to pursue a topic in greater depth.

Bloomfield Public Schools
Understanding by Design Unit Template

Title of Unit	The Earth's Water	Grade Level	11
Curriculum Area	Geoscience	Time Frame	20 days
Developed By	Mary Jo Roszkowski		
Desired Results (Stage 1)			
Established Goals			
5.1 Science Practices: A. Understanding Scientific Explanations 5.1.12.A.1: Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations. 5.1.12.A.2: Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories. 5.1.12.A.3: Use scientific principles and theories to build and refine standards for data collection, posing controls and presenting evidence. 5.1.B. Generate Scientific Evidence Through Active Investigations 5.1.12.B.1: Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, casual/correlational relationships, and anomalous data. 5.1.12.B.2: Build, refine, and represent evidence-based models using mathematical, physical, and computational tools. 5.1.12.B.3: Revise predictions and explanations using evidence, and connect explanations/arguments to established C. Forms of Energy 5.2.12.C.2: scientific knowledge, models, and theories. 5.1.12.B.4: Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations. 5.1.C. Reflect on Scientific Knowledge			

5.1.12.C.1: Reflect on and revise understandings as new evidence emerges.

5.1.12.C.2: Use data representations and new models to revise predictions and explanations.

5.1.12.C.3: Consider alternative theories to interpret and evaluate evidence-based arguments.

5.1.D Participate Productively in Science

5.1.12.D.1: Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.

5.1.12.D.2: Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.

5.2. Physical Science

D. Energy Transfer and Conservation

5.2.12.D.4: Measure quantitatively the energy transferred between objects during a collision.

5.4. Earth Science Systems

E. Energy in Earth Systems.

5.4.12.E.2: Predict what the impact on biogeological systems would be if there were an increase or decrease in internal and external energy.

Primary Interdisciplinary Connections

RST. 9-10.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

RST.9-10.2. Determine the central ideas or conclusions of a text; trace the texts explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

RST.9-10.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

8.1.8.D.1. Model appropriate online behaviors related to cyber safety, cyber bullying, cyber security and cyber ethics.

8.1.8.D.3. Demonstrate how information on a controversial issue may be biased.

9.1.12.A.1. Apply critical thinking and problem-solving strategies during structured learning experiences

9.1.12.A.2. Participate in online strategy and planning sessions for course-based, school based, or outside projects.

9.1.12.B.1. Present resources and data in a format that effectively communicates the meaning of the data and its implications for solving problems, using multiple perspectives.

9.1.12.C.4. Demonstrate leadership and collaborative skills when participating in online learning communities and structured learning experiences.

9.1.12.C.5. Assume a leadership position by guiding the thinking of peers in a direction that leads to successful completion of a challenging task or project.

21st Century Interdisciplinary Themes:

___X___ Global Awareness

_____ Civic Literacy

___X___ Financial, economic, business, and entrepreneurial literacy

_____ Health Literacy

Transfer

Students will be able to independently use their learning to...

T1: Understand that water constantly moves and changes on Earth

T2: Explain the water cycle

T3: Describe properties of the ocean and life in the ocean and cite reasons for protecting earth's oceans

Meaning

Understandings

Students will understand that...

U1: The land and the oceans are directly linked to one another.
U2: Water constantly moves through the earth and its atmosphere by the water cycle.
U3: The ocean is a major source of energy and the health of the ocean is directly related to actions on land.

Essential Questions

Students will keep considering...

Q1: What is the relationship between land and ocean?
Q2: Where does ocean energy come from?
Q3: Why is the ocean important to life on earth?

Acquisition

Knowledge

Students will know...

K1: selected scientific vocabulary
K2: how land and ocean are related
K3: why oceans need to be protected

Skills

Students will be able to...

S1: use scientific vocabulary
S2: form meaningful questions
S3: Identify properties of the ocean and explain its importance to life on earth.

Evidence (Stage 2)		
<u>Checks for Alignment</u>	<u>Evaluation Criteria</u> Performance is judged in terms of...	<u>Assessment Evidence</u>
T1-T3 U1-U3 Q1-Q3	Comprehension Application Evaluation	<u>Transfer Task(s)</u> Formative • Question • Self assessment • Graphic organizers
		Summative • Tests • Quizzes • Projects
S1-S3 K1-K3	Responses Application Descriptions	<u>Other Evidence</u> Formative • Observation • Worksheets • Homework
		Summative • Short answers • Labs

Learning Plan (Stage 3)

**Checks for alignment
and best practice**

Summary of Key Learning Events and Instruction

The teaching and learning needed to achieve the unit goals.

	Required Activities	Required Resources
	Read for Meaning	General Science (AGS Publishing, 2004) Chapter 14 pg. 314-330.
	Watch Eyewitness video on Oceans	Eyewitness video
	Diagram the water cycle	
	Make a model of the different groups of ocean life	
	Complete Lesson 1 and Lesson 2 Reviews	General Science Text pg 320 and 328
	Suggested Activities	Suggested Resources
	Individual or group reports on ocean life	
	Watch video "Blue Planet: Tidal Seas."	

Strategies for Differentiation	
Students Below Target:	Students Meeting or Exceeding Target:
Paired/Group Activity	Cooperative learning
Guided practice	Learning Buddies
Cooperative Learning	Independent Study
Learning Buddies	Interest-based mini lessons
Small Group instruction	Teach organizational skills
One on One instruction from paraprofessional	Test modifications/ time extensions
Modified worksheets	
Chunking or grouping of material	
Provide study guides	
Teach Organizational skills	
Test Modifications/ time extensions	

Additional	Strategies
Choose broad instructional concepts and skills that lend themselves to understanding at various levels of complexity	Teacher adjusts content, process, product according to students' readiness, interest, and learning profile.
Provide access to a variety of materials which target different learning preferences and reading abilities	Use a variety of assessment strategies, including performance-based and open-ended assessment.
Develop activities that target auditory, visual, and kinesthetic learners	Encourage thinking at various levels of Bloom's taxonomy.
Have a variety of materials, resources, and texts available for student use. Students exploring a concept should have access to written descriptions, graphic images, and audio-visual representations related to the topic. A student with above or below grade-level reading ability will benefit from studying text books and reading material at the appropriate level. Supporting materials for investigation and experimentation should be readily available and students should be trained in their use.	Engage students in orbital studies: develop a list of topics related to a science concept or theme. Allow each student to select a topic based on interest. Have each student conduct an independent investigation of the chosen topic with guidance and coaching from the teacher. This type of activity allows flexibility in pacing, degree of complexity, and the nature of the product produced by the student.
Establish stations for inquiry based, independent learning activities.	Balance teacher assigned and student selected projects.
Create activities that vary in level of complexity and degree of abstract thinking required.	Offer students a choice of projects that reflect a variety of learning styles and utilize pre-tests to assess where individual students need to begin study of a given topic or unit.
Use flexible grouping to group and regroup students based on factors including content, ability, and assessment results.	Use a variety of instructional delivery methods to address different learning styles.
Tiered assignments- direct instruction, guidance based groups, work in higher level learners	Break assignments into smaller, more manageable parts that include structured directions for each part.
Utilize pre-tests to assess where individual students need to begin study of a given topic or unit	Use a variety of instructional delivery methods to address different learning styles.
Break assignments into smaller, more manageable parts that include structured directions for each part.	Encourage thinking at various levels of Bloom's taxonomy.
Vary degree of complexity of lab investigations	Vary the length of time a student may take to complete a task in order to provide additional support for a struggling learner or to encourage an advanced learner to pursue a topic in greater depth.

Bloomfield Public Schools
Understanding by Design Unit Template

Title of Unit	The Solar System	Grade Level	11
Curriculum Area	Geoscience	Time Frame	20 days
Developed By	Mary Jo Roszkowski		
Desired Results (Stage 1)			
Established Goals			
5.1 Science Practices: A. Understanding Scientific Explanations 5.1.12.A.1: Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations. 5.1.12.A.2: Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories. 5.1.12.A.3: Use scientific principles and theories to build and refine standards for data collection, posing controls and presenting evidence. 5.1.B. Generate Scientific Evidence Through Active Investigations 5.1.12.B.1: Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, casual/correlational relationships, and anomalous data. 5.1.12.B.2: Build, refine, and represent evidence-based models using mathematical, physical, and computational tools. 5.1.12.B.3: Revise predictions and explanations using evidence, and connect explanations/arguments to established C. Forms of Energy 5.2.12.C.2: scientific knowledge, models, and theories.			

5.1.12.B.4: Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.

5.1.C. Reflect on Scientific Knowledge

5.1.12.C.1: Reflect on and revise understandings as new evidence emerges.

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5.1.12.D.2: Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.

5.2. Physical Science

D. Energy Transfer and Conservation

5.2.12.D.1: Measure the relationship between the height of an object and its potential energy.

5.2.12.D.4: Measure quantitatively the energy transferred between objects during a collision.

5.4. Earth Systems Science

A. Objects in the Universe

5.4.12.A.2: Collect, analyze and critique evidence that supports the theory that the earth and the rest of the solar system formed from a nebular cloud of dust and gas 4.6 billion years ago.

5.4.12.A.4: Analyze simulated and/or real data to estimate the number of stars in our galaxy and the number of galaxies in our universe.

5.4.12.A.5: Critique evidence for the theory that the universe evolved as it expanded from a single point 13.7 billion years ago.

Primary Interdisciplinary Connections

RST. 9-10.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

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21st Century Interdisciplinary Themes:

☒ Global Awareness
☐ Civic Literacy

☐ Financial, economic, business, and entrepreneurial literacy
☐ Health Literacy

Transfer

Students will be able to independently use their learning to...

T1: Identify objects in the solar system

T2: Explain why earth is the only planet to sustain human life

T3: Understand how objects in the solar system affect us.

Meaning

Understandings

Students will understand that...

U1: The universe is incredibly large.

U2: Earth is the only planet that can sustain human life.

U3: Knowledge of space has helped create advancement in civilization.

Essential Questions

Students will keep considering...

Q1: Where did earth come from?

Q2: Why and how do earth's features allow human life to exist?

Q3: What is the benefit to society to study space?

Acquisition

Knowledge

Students will know...

K1: selected scientific vocabulary

K2: how the earth was created and how it sustains human life

K3: that actions and events in the solar system could affect earth.

Skills

Students will be able to...

S1: use scientific vocabulary

S2: formulate meaningful questions

S3: identify features of earth that allow human life to exist on this planet

Evidence (Stage 2)

<u>Checks for Alignment</u>	<u>Evaluation Criteria</u> Performance is judged in terms of...	<u>Assessment Evidence</u>
T1-T3 U1-U3 Q1-Q3	Comprehension Application Evaluation	<u>Transfer Task(s)</u> Formative • Questioning • Self assessment • Graphic organizers
		Summative • Tests • Quizzes • Projects
K1-K3 S1-S3	Responses Application Descriptions	<u>Other Evidence</u> Formative • Observation • Worksheets • homework
		Summative • Short answers • Labs

Learning Plan (Stage 3)

**Checks for alignment
and best practice**

Summary of Key Learning Events and Instruction

The teaching and learning needed to achieve the unit goals.

	Required Activities	Required Resources
	Reading for meaning	General Science (AGS Publishing 2004) Chapter 17 Pg. 370- 395.
	Complete worksheets on each planet	Milliken Workbooks
	Watch video on the Solar System	Eyewitness
	Complete Chapter Review	General Science Text pg. 394-395
	Suggested Activities	Suggested Resources
	Watch video "Death of a Star"	Biology Department
	Report on Solar Energy	

Strategies for Differentiation	
Students Below Target:	Students Meeting or Exceeding Target:
Paired/Group Activity	Cooperative learning
Guided practice	Learning Buddies
Cooperative Learning	Independent Study
Learning Buddies	Interest-based mini lessons
Small Group instruction	Teach organizational skills
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Modified worksheets	
Chunking or grouping of material	
Provide study guides	
Teach Organizational skills	
Test Modifications/ time extensions	

Additional	Strategies
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Geoscience Vocabulary

Unit 1 – The Earth's Atmosphere

Air Mass
Air Pressure
Anemometer
Atmosphere
Barometer
Climate
Front
Humidity
Hurricane
Meteorologist
Precipitation
Storms
Thermometer
Tornado
Weather
Wind
Weather vane

Unit 2 – Minerals, Rocks and Fossils

Geologist
Hardness
Igneous rock
Lava
Luster
Magma
Metamorphic rock
Mineral
paleontology
petrification
sedimentary rock
streak

Unit 3 – Soil, Weathering and Erosion

Clay
Erosion
Glacier
Gravity
Silt
Subsoil
Topsoil
Weathering

Unit 5 – The Earth's Water

Benthos
Condensation
Continental Shelf
Continental Slope
Current
Evaporation
Ground Water
Nekton
Plankton
Precipitation
Runoff
Seamount
Surface Water
Trench
Wave

Unit 4 – Forces in the Earth

Continental Drift
Core
Crust
Earthquake
Epicenter
Fault
Lava
Magma
Mantle
Plate tectonics
Pumice
Ring of Fire
Tsunami
Volcano

Unit 6 – The Solar System

Asteroid
Comet
Galaxy
Meteor
Meteorite
Moon
Planet
Solar System
Star
Sunspot

