

# Unit 2: Geologic Processes & History

Content Area: **Science**  
Course(s): **Earth Science 7 Accelerated**  
Time Period: **DecJan**  
Length: **6 Weeks**  
Status: **Published**

## Geologic Processes & History

## Department of Curriculum and Instruction



**Belleville Public Schools**

**Curriculum Guide**

# ADVANCED EARTH SCIENCE, GRADE 7 GEOLOGIC PROCESSES & HISTORY

**Belleville Board of Education**

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**Belleville, NJ 07109**

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## **Unit Overview**

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### The Dynamic Earth

- Weathering, Erosion, & Deposition
- Rock Cycle
- Earth's Plates
- Earth's Changing Surface

### Earth Through Time

- Age of Earth's Rocks
- Earth's History

## **Enduring Understanding**

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- Interactions between the layers of the Earth result in the movement of tectonic plates.
- Earth's materials cycle and energy flows to drive this process.
- Geologic events are the result of plate tectonics and impact the populations of regions where they occur.
- Plate movement in our lithospheric crust has caused and will continue to cause natural disasters and changes in our earth's topography (mountain building)

- Evidence shows that Geoscience processes have changed Earth’s surface at varying time and spatial scales.
- Rock strata evidence supports earth’s 4.6 billion-year-old history.
- Students will understand how a volcano is “born” and the impact volcanoes have on people and the environment.
- Volcanoes are due to lithospheric plates moving on Earth’s surface and are in turn evidence for the theory of plate tectonics.
- Rocks and minerals, which undergo constant and continual geological change, are essential to sustaining life.
- The unique physical and chemical properties of rocks and minerals make them useful.
- Rocks and minerals are limited resources

## **Essential Questions**

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- To what extent does the exchange of energy within the Earth drive geologic events on the surface?
- According to geological factors and constraints, where would be the best location for a new bridge?
- What natural disasters might one need to prepare for when living in a specific region?
- What evidence is there to support that Pangaea did exist?
- How did Marine fossils end up in the desert?
- How do the collisions of plates contribute to the formation of volcanoes?
- How do humans use rocks as a resource to construct buildings?
- How are minerals used as a resource?

## **Exit Skills**

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By the end of Unit 2, Lesson 1 students should be able to:

- Describe the hypothesis of continental drift
- Identify evidence of supporting continental drift
- Explain sea-floor spreading
- Recognize age and magnetic clues support sea-floor spreading
- Compare and contrast different types of plate boundaries
- Explain how heat inside Earth causes plate tectonics
- Recognize features caused by plate tectonics

By the end of Unit 2, Lesson 2 students should be able to:

- Explain how earthquakes result from the buildup of energy in rocks
- Describe how compression, tension, and shear forces make rocks move along faults
- Distinguish among normal, reverse, and strike-slip faults

## **New Jersey Student Learning Standards (NJSL-S)**

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SCI.6-8.MS-ESS1-4.ESS1.C.1	The geologic time scale interpreted from rock strata provides a way to organize Earth's history. Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale.
SCI.6-8.MS-ESS2-3.ESS2.B.1	Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart.
SCI.6-8.MS-ESS2-2.ESS2.C.1	Water's movements—both on the land and underground—cause weathering and erosion, which change the land's surface features and create underground formations.
SCI.6-8.MS-ESS2-3.ESS1.C	The History of Planet Earth
SCI.6-8.MS-ESS2-2.ESS2.A.1	The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future.
SCI.7-8.5.4.8.D	The theory of plate tectonics provides a framework for understanding the dynamic processes within and on Earth.
SCI.6-8.MS-ESS2-2	Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
SCI.6-8.MS-ESS2-3	Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.
SCI.6-8.MS-ESS2-3.ESS1.C.1	Tectonic processes continually generate new ocean sea floor at ridges and destroy old sea floor at trenches.
SCI.6-8.MS-ESS1-4	Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.
SCI.6-8.MS-ESS1-4.ESS1.C	The History of Planet Earth
SCI.7-8.5.4.8.C.b	Physical and chemical changes take place in Earth materials when Earth features are modified through weathering and erosion.
SCI.7-8.5.4.8.D.b	Major geological events, such as earthquakes, volcanic eruptions, and mountain building, result from the motion of plates. Sea floor spreading, revealed in mapping of the Mid-Atlantic Ridge, and subduction zones are evidence for the theory of plate tectonics.
SCI.7-8.5.4.8.D.2	Present evidence to support arguments for the theory of plate motion.

## **Interdisciplinary Connections**

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MA.7.7.EE	Expressions and Equations
TECH.8.1.8	All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.8.B	Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
LA.RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts.
LA.RST.6-8.3	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
LA.RST.6-8.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

MA.8.8.EE.B

Understand the connections between proportional relationships, lines, and linear equations.

SOC.6.1.8

All students will acquire the knowledge and skills to think analytically about how past and present interactions of people, cultures, and the environment shape the American heritage. Such knowledge and skills enable students to make informed decisions that reflect fundamental rights and core democratic values as productive citizens in local, national, and global communities.

## **Learning Objectives**

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- Students will be able to independently use their learning of geology to explain how rock formations and other matter on Earth's surface have changed over time through chemical and physical processes. Students will also model the effects of erosion and deposition by water and wind.
- Students will be able to independently use their learning of geology to infer that earthquakes are the sudden release of strain energy, usually along faults, but also associated with volcanism and mineral transformations.
- Students will be able to independently use their learning of geology to determine the ages of rocks and fossils using relative and absolute dating methods and analyze evidence used to organize Earth's long history.
- Students will be able to independently use their learning of geological processes, rocks, and fossils to construct explanations for how Earth's history is organized into the geological time scale.
- Students will be able to independently use their learning of geology to analyze the natural processes of the Earth as well as plate tectonics to demonstrate how they have or can change the topography of the area in which they live.
- Students will be able to independently use their learning of minerals to recognize and describe different types of Earth materials
- Students will be able to independently use their learning of rocks to explain how rocks and are used to understand the history of the Earth



## **Suggested Activities & Best Practices**

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Utilization of various DefinedStem.com projects which recognizes the different learning styles of the students. DefinedStem is both problem and project-based learning

## **Evidence of Student Learning - Checking for Understanding (CFU)**

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- Anticipation Guide

- Admit Tickets
- Common benchmarks.
- Compare & Contrast.
- Create a Multimedia Poster.
- Define.
- Describe.
- Evaluate.
- Evaluation rubrics.
- Exit Tickets.
- Explaining.
- Fist- to-Five or Thumb-Ometer.
- Illustration.
- Journals.
- KWL Chart.
- Outline.
- Question Stems.
- Quickwrite.
- Quizzes.
- Red Light, Green Light.
- Self- assessments.
- Study Guide.
- Teacher Observation Checklist.
- Think, Pair, Share.
- Think, Write, Pair, Share.
- Unit test

- Admit Tickets
- Anticipation Guide
- Common benchmarks

- Compare & Contrast
- Create a Multimedia Poster
- Define
- Describe
- Evaluate
- Evaluation rubrics
- Exit Tickets
- Explaining
- Fist- to-Five or Thumb-Ometer
- Illustration
- Journals
- KWL Chart
- Newspaper Headline
- Outline
- Question Stems
- Quickwrite
- Quizzes
- Red Light, Green Light
- Self- assessments
- Socratic Seminar
- Study Guide
- Teacher Observation Checklist
- Think, Pair, Share
- Think, Write, Pair, Share
- Top 10 List
- Unit tests

## **Primary Resources & Materials**

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- Textbook and Dimension's supplementary materials
- Internet resources
- Science Department video DVD library
- Laboratory materials

## **Ancillary Resources**

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- Outdoor area of school
- Computer carts for research when available

## **Technology Infusion**

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- Smart board
- DefinedStem.com
- Document Camera
- Pod-casts video streams
- Discovery Education video streams
- You Tube video streams
- Brain-pop video streams
- Laptops
- Khan Academy
- Power Point presentation

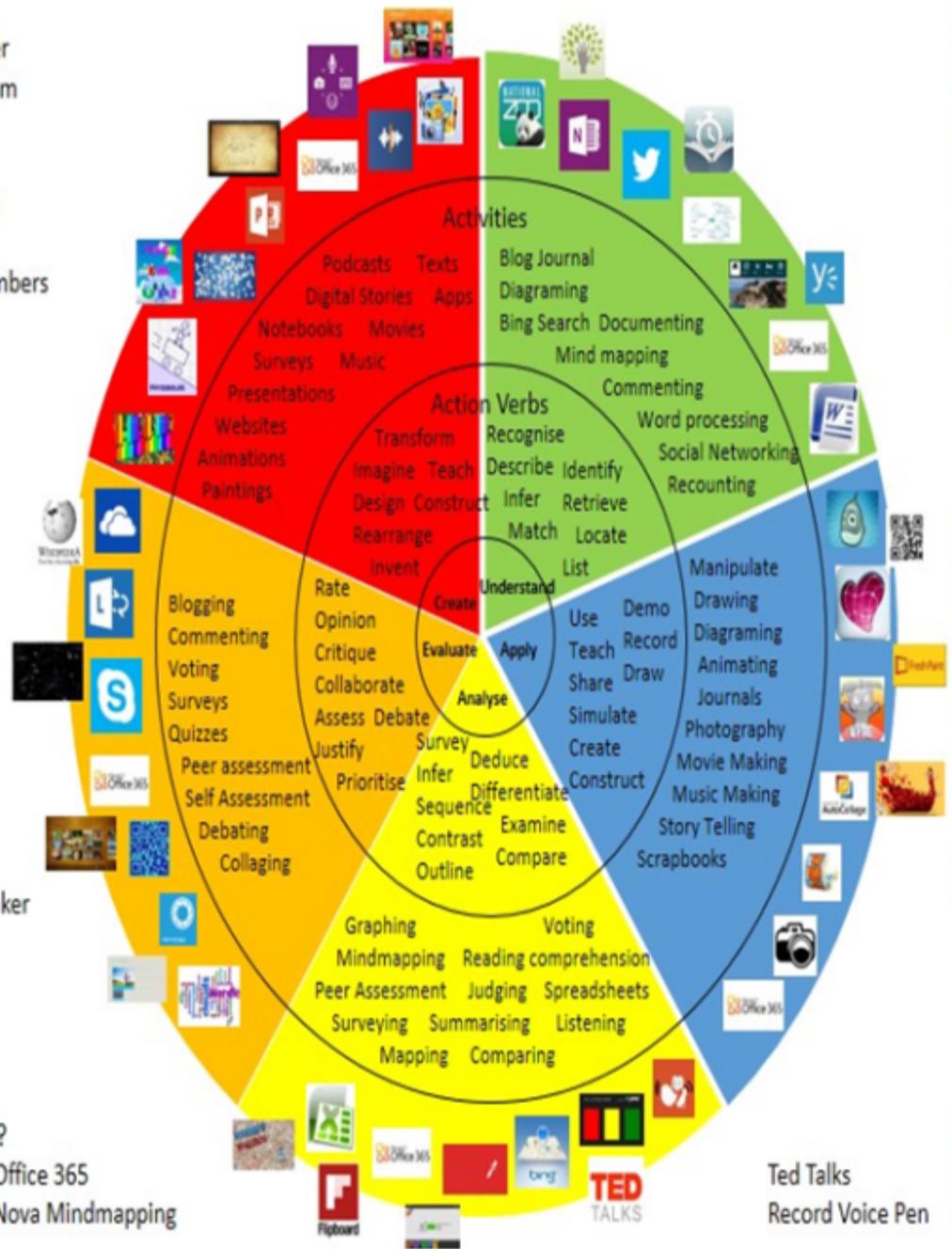
# Win 8.1 Apps/Tools Pedagogy Wheel

Podcasts  
 Photostory 3  
 Kid Story Builder  
 Music Maker Jam  
 Paint A Story  
 Office 365  
 MS PowerPoint  
 Stack 'Em Up  
 NqSquared Numbers  
 Physamajig  
 Xylophone 8

Wikipedia  
 Skydrive  
 Lync  
 SkyMap  
 Skype  
 Office 365  
 Puzzle Touch  
 Easy QR  
 Memorylage  
 Life Moments  
 Word Cloud Maker

Where's Waldo?  
 MS Excel  
 Flipboard  
 Office 365  
 Nova Mindmapping

Ted Talks  
 Record Voice Pen



Originally taken from <http://www.coetail.com/vzimmer/files/2013/02/1Padagogy-Wheel.001.jpg>  
 And adapted for Windows 8.1 devices by Charlotte Beckhurst @CharBeckhurst

## **Alignment to 21st Century Skills & Technology**

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Mastery of key subjects and 21st century themes is essential for all students in the 21st century.

Key subjects include:

- English, reading or language arts
- World languages
- Arts
- Mathematics
- Economics
- Science
- Geography
- History
- Government and Civics

## **21st Century Skills/Interdisciplinary Themes**

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- Environmental Literacy.
  - Financial, Economic, Business and Entrepreneurial Literacy.
  - Global Awareness.
  - Health Literacy
  - Civic Literacy
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- Communication and Collaboration
  - Creativity and Innovation
  - Critical thinking and Problem Solving
  - ICT (Information, Communications and Technology) Literacy
  - Information Literacy
  - Life and Career Skills
  - Media Literacy

## **21st Century Skills**

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- Communication and Collaboration
- Creativity and Innovation
- Critical thinking and Problem Solving.
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- Civic Literacy
- Environmental Literacy
- Financial, Economic, Business and Entrepreneurial Literacy
- Global Awareness
- Health Literacy

## **Differentiation**

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- Have students construct an informational poster representing their own version of Pangaea and what it will become today. They must include evidence discovered by Alfred Wegener.
- Have students construct an interactive notebook activity that will represent sea-floor spreading and the evidence that supports it.
- Have students design a graphic organizer where they will be able to differentiate the differences between: plate boundaries, plate motion, and what results due to their interactions
- Have students create a graphic organizer classifying volcanoes by: eruptive force, type of volcano, magma content, and related plate boundary
- Have students construct an interactive notebook activity classifying the formations of rocks by: cool solutions, hot solutions, and from magma

### **Differentiations:**

- Small group instruction
- Extra time to complete assignments
- Pairing oral instruction with visuals
- Repeat directions
- Use manipulatives
- Center-based instruction
- Study guides
- Teacher reads assessments allowed
- Rephrase written directions
- Multisensory approaches
- Additional time
- Highlight text

### **Lo-Prep Differentiations**

- Exploration by interest
- Flexible grouping
- Goal setting with students
- Jigsaw
- Mini workshops to re-teach or extend skills
- Open-ended activities
- Think-Pair-Share

### **Hi-Prep Differentiations:**

- Alternative formative and summative assessments
- Games and tournaments
- Group investigations
- Guided Reading
- Independent research and projects
- Interest groups
- Multiple texts
- Project-based learning
- Problem-based learning
- Stations/centers
- Think-Tac-Toes
- Tiered activities/assignments
- Tiered products

## **Intervention Strategies**

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- Allowing students to correct errors (looking for understanding).
- teaching key aspects of a topic. Eliminate nonessential information.
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning
- allowing students to select from given choices
- allowing the use of note cards or open-book during testing.
- collaborating (general education teacher and specialist) to modify vocabulary, omit or modify items to reflect objectives for the student, eliminate sections of the test, and determine how the grade will be determined prior to giving the test.
- decreasing the amount of work presented or required
- having peers take notes or providing a copy of the teacher's notes
- marking students' correct and acceptable work, not the mistakes
- modifying tests to reflect selected objectives
- providing study guides
- reducing or omitting lengthy outside reading assignments.
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using authentic assessments with real-life problem-solving

- using true/false, matching, or fill in the blank tests in lieu of essay tests
- using videos, illustrations, pictures, and drawings to explain
  - allowing students to correct errors (looking for understanding)
  - teaching key aspects of a topic. Eliminate nonessential information
  - allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning
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  - tutoring by peers
  - using authentic assessments with real-life problem-solving
  - using true/false, matching, or fill in the blank tests in lieu of essay tests
  - using videos, illustrations, pictures, and drawings to explain or clarify

## **Special Education Learning**

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- printed copy of board work/notes provided
- additional time for skill mastery.
- assistive technology
- behavior management plan.
- Center-Based Instruction
- check work frequently for understanding
- computer or electronic device utilizes
- extended time on tests/ quizzes
- have student repeat directions to check for understanding
- highlighted text visual presentation

- modified assignment format
- modified test content
- modified test format
- modified test length.
- multiple test sessions.
- multi-sensory presentation
- preferential seating
- preview of content, concepts, and vocabulary.
- reduced/shortened reading assignments
- Reduced/shortened written assignments.
- secure attention before giving instruction/directions
- shortened assignments
- student working with an assigned partner.
- teacher initiated weekly assignment sheet.
- Use open book, study guides, test prototype
  - printed copy of board work/notes provided
  - additional time for skill mastery
  - assistive technology
  - behavior management plan
  - Center-Based Instruction
  - check work frequently for understanding
  - computer or electronic device utilizes
  - extended time on tests/ quizzes
  - have student repeat directions to check for understanding
  - highlighted text visual presentation
  - modified assignment format
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  - multiple test sessions
  - multi-sensory presentation
  - preferential seating

- preview of content, concepts, and vocabulary
- reduced/shortened reading assignments
- Reduced/shortened written assignments
- secure attention before giving instruction/directions
- shortened assignments
- student working with an assigned partner
- teacher initiated weekly assignment sheet
- Use open book, study guides, test prototypes

## **English Language Learning (ELL)**

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- teaching key aspects of a topic. Eliminate nonessential information.
  - using videos, illustrations, pictures, and drawings to explain or clarify.
  - allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning
  - allowing students to correct errors (looking for understanding)
  - allowing the use of note cards or open-book during testing
  - decreasing the amount of work presented or required
  - modifying tests to reflect selected objectives
  - providing study guides
  - reducing or omitting lengthy outside reading assignments
  - reducing the number of answer choices on a multiple choice test
  - tutoring by peers
  - using computer word processing spell check and grammar check features
  - using true/false, matching, or fill in the blank tests in lieu of essay
- 
- teaching key aspects of a topic. Eliminate nonessential information
  - using videos, illustrations, pictures, and drawings to explain or clarify
  - allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning;
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- providing study guides
- reducing or omitting lengthy outside reading assignments
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using computer word processing spell check and grammar check features
- using true/false, matching, or fill in the blank tests in lieu of essay tests

## **Sample Lesson**

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**Unit Name:** Earth's Plates

**NJSLS:** See Link

**Interdisciplinary Connection:** See Link

**Statement of Objective:** SDWAT generate a poster or animated visual representing continental drift which led to plate tectonics.

**Anticipatory Set/Do Now:** Describe the ways in which plate tectonics have affected the geography of our world today?

### **Learning Activity:**

1- As a class we will Review do now responses

2- In predetermined pairs, students will create a poster or animated visual on any computer program of their choice with a map of Pangaea.

3- Lower on the poster, they will then create another map of what their continents look like today creating breaking points.

4- Lastly include a key of either walking dinosaurs or plants of that time period that inhabited the Pangaea land mass and the continents as they slowly broke and drifted apart over time.

5- Exit Card: Can fossils of the pterodactyl be found on multiple continents? If yes, how is this ***not*** helpful in supporting the theory of the continental drift?

**Student Assessment/CFU's:** Plickers App: Who is Alfred Wegener?

Can the Appalachian mountains be found on several continents?

**Materials:** 1. Handout Guide

2. Laptops

3. Prezii, publisher, etc.

**21st Century Themes and Skills:** See Link

**Differentiation:** See Link (Heterogeneous student groupings based on current marking period grade -Instruction is by learning style: visual, verbal, tactile/kinesthetic)

## **Integration of Technology: Smart Board**