Kenmore-Tonawanda Union Free School District
1500 Colvin Blvd
Buffalo, NY 14223-3119

Science - Earth Science

Add to My ePortfolio | Export | Print | Display Mode

Options	Standards	Essential Questions	Content	Skills	Suggested Resources	Assessment	Resources
		Measuring the Earth					
	MST4.C.PS1.ES.A Students explain complex phenomena, such as tides, variations in day length, solar insolation, apparent motion of the planets, and annual traverse of the constellations.	What is the need for a coordinate system How do we locate a position on Earth? How does Polaris (North Star) help you locate your latitude in the Northern Hemisphere? Why do we have time zones?	Local Time, Solar Time and Time Zones Models Coordinate System (Latitude and Longitude) Equator Prime Meridian North Star (Polaris) Earths rotation and revolution	Explain the difference between latitude and longitude on maps and diagram. Create/ Interpret a map and properly label latitudes , longitudes, equator, prime meridian and international dateline. Utilizing the ESRT's (p3, 5) give examlpes, recognize, and/or locate cities or features on a map by applying an understanding of latitude and longitude. Describe how the North Pole is aligned with Polaris and helps determine ones latitude in the Northern Hemisphere Explain how you can determine ones latitude from a given point in the Northern Hemisphere using the North Star (Polaris) Restate that Earth rotates (Supported by foucult pendelumn) once (360 degrees) every 24 hours= 15 degrees of longitude every hour resulting in 24 tine zones. Utilizing page 3 of ESRT's The students will	0.0 Guided Reading From Review Book 1.Map Basics, 2.Latitude, 3.Longitude, 4.Mapping our Earth and 5.Using Latitude and Longitude Video Clips 6.0 Blank Map with Lat and Long of NY 7.0 Plotting Shipwrecks of Lake Ontario Lab. Students practice latittude and longitude skills while plotting shipwrecks in lake Ontario. 8.0 Latitude and Longitude Quiz 9.0 Latitude and Longitude World Map. 10.0 Where in the World is Baldwin New York Lab. Students practice Latitude and Longitude and make connections with page 3 of		

				demonstrate an understanding of Coordinate System (Latitude and Longitude) The students will demonstrate how to Explain the difference between latitude and longitude on maps and diagram. The students will demonstrate how to Utilizing the ESRT's (p3, 5) give examlpes, recognize, and/or locate cities or features on a map by applying an understanding of latitude and longitude.	ESRT's 11.0 Plotting Hurricane paths (used in weather unit but excellent review of latitude and longitude		
		Maps					
		How can maps show such things as land forms, elevation and 3 dimentional features? How can you calculate gradient (slope) between two locations on a map? How do you make a profile from a topographic map?	Topographic Maps Landforms Contour lines (Isolines) Elevation Gradient Profiles Field Value	Define elevation, isoline, contour line, contour interval and field value. Draw a simple contour map of a model landform Design / Interpret a 3-D landscape model from a contour map. Construct a nd interpret a profile based on a topographic map. Interpret / Solve for gradient by looking at closeness of isolines on a map or by using the gradient formula on page 1 of ESRT's	11.5 Guided Readings from Review Book 12.0 Practice Drawing Contour Lines ws 13.0 Creating a Contour Map (Volcano) Lab. Students use a plastic model of a volcano to create a 2-D version of that model. 14.0 Creating a Topographic Map Lab 15.0 Isolines and Gradient Practice ws 16.0 Gradient Practice ws #2 17.0 Profile practice ws 18.0 Measuring the		_Latitude and L _mapping.pdf 1.0 map basics. 10.0 Where_in_ 12.0 Practice Dr 15.0 Isoline and 16.0 gradient ws 17.0 Profile prac 17.0 Profile prac 2.0 latitude.asf 3.0 longitude.as 3.0 Topo Maps 4.0 mapping our 5.0 using lat and 6.0 NYS Latlong 9.0 Lat and Lon Circumference% Creating_a_Top Hurricane_Katri

					Earth Unit Test		Lab 5 Contourm Latitude and Lor mapping.pdf Measuring Earth
		Energy and heat transfer					
		What is electromagnetic energy? What distinguishes different forms of electromagnetic energy? What does a graphic analysis of the phase changes of water appear like? How do various surface properties affect the rate of absorption and radiation? What are the different methods of energy transfer? How does the specific heat of a material affect it's rate of energy absorption and radiation? What does a graphic analysis of the phase changes of water appear like?	ESRT pg. 14- the electromagnetic spectrum Methods of energy Transfer Geothermal Energy Radiation Convection Conduction **Transfer of heat as it relates to density.** Density **Internal and External sources of heat.** Solar energy source Heat Specific Heat Phase Changes (Water)	Define three methods of energy transfer: convection, conduction and radiation Compare and contrast three methods of energy transfer Illustrate a convection current Identify areas of the ESRT where energy transfer is evident. Explain how differences in density drive convection currents Identify the relationship between convection currents, plate tectonics, winds and ocean currents. Identify sources of geothermal energy. Identify the effects of geothermal energy on the earth.(plate tectonic action) State the process by which solar energy (the sun) generates heat. Define specific heat Locate and apply the specific heat information in the ESRT Label a chart showing the phase changes of	Guided readings using the review book. Heat Transfer Lab- The students will demonstrate how to Define three methods of energy transfer: convection, conduction and radiation		Greenhouse%2 Heat%20Facts% Water%20Phas

				water Utilize the ESRT to compute the caloric energy transfer during phase changes Methods of energy transfer 9/1/2008 Convection current diagram 9/1/2008 Evidence of energy transfer 9/1/2008 ESRT computation 9/1/2008 Density drive convection currents 9/1/2008 Density drive 9/1/2008 Solar Energy source 9/1/2008 ESRT specific heat 9/1/2008 Sources of weather patterns 9/1/2008 Water phase changes 9/1/2008 Caloric energy transfer during phase changes 9/1/2008			
		Weather and Meteorology					
	MST4.C.PS2.ES.A Students use the concepts of density and heat energy to explain observations of weather patterns, seasonal changes, and the	**Weather variables are interrelated**	**Weather Variables** temperature	Describe the effect that changing altitude has on temperature, moisture, and pressure Identify the location of these variables on a	Guided readings using the review book, additional regents questions and a review of each unit can be found on first class.		_weather.pdf 1.temperature c 10.0 cloudforma 10.5 Precipitatio 11.0 Predicitng 11.2 Interpeting_ 11.5 SynopticIso 12.0 solarAngle.

movements of the Earth's plates.

moisture

air pressure

Air density

wind

radar

satellite images

station models

isobars

dewpoint

wind vane

anemometer

thermometer

barometer

precipitation gauge

psychrometer

Weather patterns can be predicted

fronts

air masses

atmospheric cross section

cloud formation and cover

vertical atmospheric movement

weather patterns

Seasonal changes

weather station model

Describe the relationship between temperature, pressure, moisture, and air density

Describe different tools used in measuring weather, including: thermometer, barometer, psychrometer, precipitation guage, anemometer and wind vane.

Describe the relationship between wind and air pressure gradient

Describe what air density is.

Discuss how radar plays a role in satellite images and station models.

Describe how isobars and fronts play a key role in predicting weather patterns.

Discuss the relationship between dewpoint and it's effect on the formation of clouds.

Discuss the effect that seasonal changes have on temperatures around the globe and the the effect it has on planetary wind patterns.

Discuss adverse weather patterns including: monsoons, hurricanes, flooding and severe weather.

Discuss the relationship between weather and how it is effected by the Earth's rotation.

1.0 Temperature conversion worksheet. Students practice converting temperatures from various units using page 14 of their ESRT's

2.0 Pressure conversion practice using ESRT's. Students practice converting between millibars and inches of pressure using page 14 of their ESRT's.

3.0 Station Model Ws #1

3.1 Station Model Ws #2

3.2 Station Model Half Sheet

3.3 Station Model Practice #2 half sheet

3.4 Station Model Quiz

4.0 Relative Humidity and Dew Point Ws

5.0 Air Temp , Relative Humidity and Dew Point Ws

5.5 Dew Point and Relative Humidity Practice

6.0 Relative Humidity and Dew Point Demo / Lab

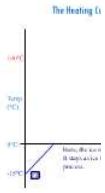
13.0 Specific He
14.0 Globabl Wi
14.0 Globabl Wi
14.5 Ocean_Cu
15.0 _Hurricane

15.5 HURRICAN
THUNDERSTO
15.6 HURRICAN
16.0 Noreasters
18.0 Climate Gu
18.0 Climate qu
19.0 Questions
19.1 Weather R
19.2 Graphic Or
19.3 Graphic Or
2.0 Presconvw

20.0 Question fo
20.1 Meteorolgy
3.0 Station Mod
3.1 Station Mod
3.2 Station Mod
3.3 Station Mod
3.4 Staion mode
3.5 Station Mod
4.0 Rel Humidit
5.0 Air temp, Re
5.5 Dewpoint an

6.0 Relative Hur
6.2 Atmosphere
6.3 atmospheren
6.5 Pop can air
6.6 cancrush vid

7.0 heatingcurve

			and heat energy. movement of earth's plates global temperature zones shifting of planetary wind and ocean currents Coriolis Effect Foucault Pendulum monsoons hurricanes flooding severe weather temperature and pressure distributions jet streams frontal boundaries cyclonic systems tornadoes emergency preparedness **Weather and Earth's rotation and effects.** El Nino Volcanic Eruptions deforestation urbanization greenhouse gases i.e. carbon dioxide and methane	Including a discussion of: Foucault Pendulum, Coriolis Effect, El Nino and Volcanic eruptions. Describe some of the effects of humans on weather and the planet including: deforestation, urbanization and greenhouse gases. Identify pressure distributions, how temperature effects them, and how they are influenced by jet streams, air masses, frontal boundaries, cyclonic systems and tornadoes	6.2 Atmosphere DBQ 6.3 Atmosphere Review Sheet 6.5 Pop Can Air Pressure Lab 6.6 Can Crushing video Air Pressure 12 Station Lab Critical Thinking Worksheet 7.0 Heat Curve Shock Wave Video 8.0 DBQ Air Masses 8.5 Air Mass Ws 9.0 Fronts DBQ 9.1 Fronts Video Clip 10.0 Cloud Formation 10.5 Precipitation and Clouds 11.0 Predicting the Weather Ws 11.2 Interpreting Weather Maps 12.0 Solar Angle		 8.0 DBQ air mas 8.5 What_are_a 9.0 DBQ Fronts. 9.1 weather fron Atmosphere-We Weather Part 1. Weather Part 2. Weather Part 3. Weather part 4. Weather%20Re weather.pdf

Shockwave

12.0 Specific Heat Shockwave

14.0 Global winds lab. This lab allows students to recreate the global wind section of their ESRT's and make connections between global winds and climate.

14.5 Ocean Currents worksheet. This worksheet addresses a variety of ocean currents found on page 2 of the ESRT's

15.0 Hurricanes Video Clip.

15.5 Hurricane Video Clip

15.6 Hurricane Tracking Lab. Students use real data to plot and make prediction about the path of a hurricane.

16.0 Noreasters

18.0 Climate (Orographic Uplift) notes and questions

19 -19.3 Unit Test Review Material

20.0 - 20.1 Unit Test

		Seasons and Insolation					
	MST4.C.PS2.ES.A Students use the concepts of density and heat energy to explain observations of weather patterns, seasonal changes, and the movements of the Earth's plates.	Why do we have Seasons? How does latitude affect ones angle of insolation? How does a materials characteristics affect energy absorption?	Why do we have Seasons? How does latitude affect ones angle of insolation? How does a materials characteristics affect energy absorption?	Explain and apply how the intensity of insolation received differs due to the earths position around the sun and the tilt of the Earth axis. Give examples of how atmospheric transparency and angle of incidence varies with time of day, latitude and season. Explain how characterisitics of materials affects energy absorption such as color, texture, transparency, state of matter, and specific heat.	Explain and apply how the intensity of insolation received differs due to the earths position around the sun and the tilt of the Earth axis. Give examples of how atmospheric transparency and angle of incidence varies with time of day, latitude and season. Explain how characterisitics of materials affects energy absorption such as color, texture, transparency, state of matter, and specific heat.		Celestial%20Sp Heat budget clin Insolation and S
		Water & Climate					
		How does the water cycle work? How does water move into the earth? How does water move on the surface of the earth? What is the human impact on the earth's hydrologic system? What are the two main factors in classifying a climate? What factors affect the	Where's the water? Hydrologic Cycle Factors Affecting Infiltration Porosity Permeability Capillarity Stream Drainage Climate Ratio Factors affecting climate Imaginary	Label a diagram of the hydrologic cycle with the following terms: evapotranspiration, condensation, precipitation, infiltration, runoff List different factors that affect infiltration Describe the difference between porosity, permeability, and capillarity with respect to conditions of sediment size, shape, and packing List and describe the factors affecting runoff and stream drainage Explain climate ratio- the relationship between the annual	**Lab- Soil Water Movement- Goto first Class** The student will gain a greater understanding of how porosity, permeability, and capillarity affect soil water movementThe student will gain a greater understanding of how porosity, permeability, and capillarity affect soil water movement Cimate Lab The student will investigate the effect of latitude, prevailing winds & mountains, elevation, proximity to a large body of water, subtropical High & Low		Climate orograp Ground%20Wat Heat budget clin

		climate of a area?	Continents Climate Graph Interpretation Climate Variation with Time Climate Change Realities and Predictions	precipitation and temperature (Potential Evapotranspiration) of an area List and describe several factors that may affect the climate of an area Analyze and infer the connection between the climate of a city and the monthly precipitation and temperature pattern as represented on a climagraph for that city Describe how climate conditions have varied over millenniums and the conditions implicated with those changes Cite several current environmental, geological, and astronomical factors that may result in both macro and micro climatic variations (El Nino/La Nina ; Ozone depletion ; global warming)	pressure area's, as well as, interpretation of potential evapotranspiration data as plotted with precipitation data.		
		Geologic History					
		What is Geologic History?	Time units	Identify and define the different units of geological time (pg 8 and 9 of ESRT's) Define based on time, frequency, size, and fossils Define, Identify and apply the concepts of original horizontality, superposition, inclusions, cross-cutting, contact metamorphism, unconformities, volcanic ash layers, index fossils and meteoritic debris	Guided readings using the review book, additional regents questions and a review of each unit 1.0 Edible Dating Intro 2.0 Geohistory Relative Dating Guided Reading for Review Book 3.0 Page 3,8 and 9 ESRT Worksheet. Practice using pages 3, 8 an d9 of		2.0 Geohistory F 20.0 Geologic_H 21.0 Geohistory 22.0 Geohistory 3.0 ESRT 3 8 9 4.0 Fossil Mode 5.0 radioact.dati

				Create geologic profiles and identify the geologic sequence of the profiles. Correlate bedrock types	ESRT's by answering regents level questions drawn from those pages. 4.0 Geohistory Lab Model with Fossils. Students use a 3-D color model to interperate and make predictions as to its geological history.		6.0 GeoHistory I 7.0 Geo Time P 1.0 geotime edit 10.0 Relavtive D 11.0 Geohistory 11.0 Geohistory 11.0 Geohistory 13.0 Radiometri 14.0 Radioactive 15.0 radioactive 16.0 Radioactive 17.0 Radioactive 18.0 ESRT 3 8 9 19.0 Earths_His
		How do you determine the relative age of a rock layer?	Rock type Fossils Age relationship Original Horizontality Superpostion Cross Cutting Unconformities Contact Metamorphism Index Fossils	Define, Identify and apply the concepts of original horizontality, superposition, inclusions, cross-cutting, contact metamorphism, unconformities, volcanic ash layers, index fossils and meteoritic debris Create geologic profiles and identify the geologic sequence of the profiles. Correlate bedrock types	5.0 Radiometric Dating Video Clip 6.0 Geohistory Murder Mystery 7.0 GeoHistory Practice ws 8.0 Sequence of Events 9.0 Relative Dating Regents Practice 10.0 Relative Dating Lab 11.0 Geohistory Model Lab 12.0 Geohistory Quiz		2.0 Geohistory F 20.0 Geologic_H 21.0 Geohistory 22.0 Geohistory 3.0 ESRT 3 8 9 4.0 Fossil Mode 4.0 Geohistory L 5.0 radioact.dati 6.0 GeoHistory I 7.0 Geo Time P 9.0 Relative dati Geohistory Rel D Radioactive dati

		How do you determine the Absolute Age of a Rock or Rock Layer?	Radioactive isotopes Relative Age vs Absolute Age	Define half-life Identify the common radioactive isotopes as shown in the Earth Science Reference Tables. Distinguish between absolute age and relative age	13.0 Radioactive Dating Video Clip 14.0 Radioactive dating guided reading 15.0 Radioactive dating post it notes activity 16.0 Radio Active Decay lab with pennies 17.0 Radioactive Dating Practice ws or quiz		
		How has early Earth evolved?	Past environmental conditions Early atmospheres Early oceans Lifes evolution Evolution of life forms	Define how fossils tell about past environments Identify how outgassing of water vapor, corbon dioxide, nitrogen and other gases created and evolved the atmosphere Define how precipitation over million of years formed oceans Identify how sedimentary rocks show how oceans formed over four billion years Identify at what point in Earth's history oxygen-producing organisms changed the composition of the atmosphere Analyze how, according to the Earth Science Reference Tables, fossil evidence shows a variety of life forms exisited and many are now extinct Compare and contrast the existence of	18.0 Page 3,8 and 9 ESRT Worksheet 19.0 Earths History Regents Practice Questions 20.0 Geologic History of NYS 21.0 Unit Test Part I 22.0 Unit Test Part II		

				humans and the existence of the Planet Earth and the Solar System			
		Plate Tectonics					
		What are the mechanisms of plate tectonics?	Lithosphere Asthenosphere	Define lithosphere. Describe fluid asthenosphere. Explain separate plates. Identify convergent, divergent, and transform plate boundaries. Compare oceanic and continental crust. Describe mid-ocean ridges. Explain the geologic hazards of earthquakes and volcanoes to humans Apply density Describe how convective circulation in the mantle moves plates. Using the Earth Science Reference Tables, identify and analyze the lithosphere and asthenosphere and compare and contrast their characteristics and density.	Guided readings using the review book 0 Four Layers of Earth Video 1.5 Inferred Properties of Earth worksheet. Students use page 10 of ESRT's to answer questions about the Earths interior. 2.0 Whats Inside the Earth Video Clip 2.5 Earths Interior Video Clip 5.5 Interiors of Earth Lab 3.0 Composition of the Earth worksheet. Students use page 11 of their ESRT's to answer questions about the Earths composition. 4.0 Interiors of Earth DBQ 4.5 ESRT Quiz pages 10 and 11 5.0 Continental Drift Theory. A worksheet that		1.0 Four layers 1.5 Inferred Pro 11.0 rockcycle v  5.0 Plate tectoni 5.5 Interiors of E 6.5 Plate tectoni 7.0 plate tectoni 7.5 DBQ Plate T 7.6 Crustal Plate 8.0 Earthquake  8.5 Epicenter 1 9.0 Epicenter 2 9.5 Epicenter 3 Earthquakes.do Interiors of the E Plate Tectonics. worksheet_for_

					opens a debate about the theory of continental drift.		
		What forces drive plate tectonics?	Plate Motion	Describe the relationship between mid-ocean ridges and rifts. Describe the relationship between trenches, subduction zones and island arcs. Describe the relationship between folded, faulted, and volcanic mountain ranges. Describe and locate hotspots. Use magnetic age patterns to defend plate motion. Explain how the outward transfer of Earth's heat drives convective ciculation in the mantle. Identify how movement has resulted in changes in geography, climate, and organic evelotion. Using the Earth Science Reference Tables, identify areas of major plate boundaries and what type of motion is occuring at each.	**Plate Tectonics Lab** Plate Tectonics Bingo 6.0 Page 5 of ESRT's 6.5 Plate Tectonics Hot Choc Demo / Notes. Students make connections between the convection currents within the Earth and hot chocolate. 7.0 Plate Tectonics Video Clip 7.5 Plate Tectonics DBQ 7.6 Crustal Plate Lab. Students are asked to plot a variety of earthquakes and volcanoes to help determine were the Earths plate boundaries are located. Page 5 of the ESRT's are utilized in this lab.		
		How do we know the Earth's internal structure?	Earth's internal Structure Seismic Waves	Describe the behavior of seismic waves to define crust, mantle, inner core, outer core. Relate each layer to states of matter.	8.0 Earthquake Video Clip 8.5 Epicenter 1 Practice. Students practice locating		

				Relate each layer to the relative size of Earth. Analyze seismic waves to determine location of earthquake epicenter and infer composition of Earth's interior. Using the Earth Science Reference Tables, calculate the arrival and travel times of seismic waves, as well as how far away the epicenter was located.	the epicenters of earthquakes by studying the arrival times of S and P waves. 9.0 Epicenter 2 with circles 9.5 Epicenter 3 with circles (quiz)		
		What can humans do to stay safe during earthquakes and volcanic eruptions?	Geologic Hazards	Explain that earthquakes and volcanoes cause loss of property, personal injury, and loss of life. Describe effective emergency preparedness.	10.0 Earthquake Safety Lab		
		How does Earth recycle materials?	Plate Dynamics Rock Cycle	Diagram the rock cycle. Describe the production of magma. Describe regional metamorphism within subduction zones. Explain the creation of depositional basins by down-warping of crust. Identify rifting regions. Using the Earth Science Reference Tables, identify, define, and analyze the rock cycle	11.0 Rock Cycle Video Clip 11.5 Rock Cycle worksheet. Students practice answering questions about the cycle of rocks using page 6 of their ESRT's 12.0 Plate Tectonic Test Question Bank		
		Astronomy					
	MST4.C.PS1.ES.B Students describe current theories about the origin of the universe and solar system.	How does the Earth move in space and how does this affect daily and yearly changes on Earth?	Rotation and Revolution of the Earth in space. Imaginary Axis - 23.5 degree tilt	Define Rotation Define revolution Compare and contrast rotation and revolution Illustrate the 23.5			astronomy.pdf Earth and the U Earth%20Motior Hours%20of%2(Moon%20Phase Motion of Earths Motions of the E New%20Date%:

			Local Time Time Zones Apparent Motion of Sun and Moon Predictable Motion Daily Changes Yearly/Seasonal Changes Mass Extinctions Global Climactic Changes Impact Craters	degree tilt of the Earth Hypothesize the possible changes on Planet Earth if the tilt of the axis were to either increase or decrease Define local time Explain and give examples of how rotation provides a basis for our system of local time, longitude, and time zones. Define apparent motion Explain how rotation produces daily changes on Earth. Give examples of daily changes on Earth produced by rotation Explain how revolution around the sun produces yearly/seasonal changes on Earth Give examples of the yearly/seasonal changes that occur on Earth as a result of the revolution around the Sun Hypothesize possible astronomical causes of mass extinctions on Earth Identify global changes that have occurred as a result of astronimical changes throughout time			Orbital%20Diag Son%20of%20C
		What is an ellipse and an eccentric orbit?	Ellipses Foci	Calculate eccentricity of an ellipse Identify foci of an ellipse Define relationship between distance of the two foci and eccentricity of the	Elliptical Orbits Lab 3/1/2009 Lab- Elliptical Orbits The student will examine the relationship between foci distance and eccentricity.		

				ellipse	Comparisions between the eccentricity of various ellipses and that of the actual planets will be explored.		
		What are the major relationships of the Earth, Moon, and Sun?	**Earth/Sun/Moon Relationships** Phases of the Moon Eclipses Tides	Identify phases of the Moon Define cyclic changes in regards to phases of the moon Compare and contrast lunar and solar eclipses Identify the cause of tides on Earth and low vs. high tide.	Moon Phase Quiz 3/1/2009		
		What are the other celestial objects in space that affect Earth?	**Stars** Constellations Star Characteristics - Size, Tempearature, Age Nuclear Fusion The Sun	Define Nuclear Fusion Using the luminosity of stars chart in the Earth Science Reference Tables identify various stars and their characteristics Using Luminosity of Stars chart in the Earth Science Reference Tables, compare and contrast different groups of stars and their characteristics.	Earth Science Reference Table Quiz 3/1/2009 Lab- The Black Abyss- This lab will simulate the life of a star from Main sequence, to Red Giant, to Supernova, to Black Hole with regard to the affects on diameter, mass, temperature, luminosity, and density.		
		What is the theory of the creation of the universe, galaxies, and our solar system?	**Galaxies** Models of Solar System Planets Relationship to Sun Terrestrial Planets Jovian Planets Asteroids, Comets, and Meteors	Define the Big Bang Theory Identify how we know the universe is expanding according to the Red Shift Using the Solar System Data chart in the Earth Science Reference Tables, identify the characteristics of each planet. Define and identify terrestrial and jovian plantes			

			Milky Way Galaxy **Universe** Big Bang Cosmic Radiation Red-Shift (Doppler Effect) **Solar System** Gravity	Using the Solar System Data Chart in the Earth Science Reference Tables, compare and contrast the Terrestrial plantes with the Jovian planets.			
		Physical and Chemical Properties of Minerals					
	MST4.C.PS3.ES.A Students explain the properties of materials in terms of the arrangement and properties of the atoms that compose them.	How does the chemical composition and the crystaline structure of a mineral determine its physical properties?	Cleavage Fracture Color Density Hardness Streak Luster Crystal Shape Reaction with Acid Density Mass Volume Rearrangement of atoms	Define cleavage Identify cleavage Give an example of cleavage Define fracture Identify fracture Compare and contrast cleavage versus fracture Define Mohr's hardness scale Give examples of minerals on Mohr's hardness scale Apply Mohr's hardness scale to various minerals(fingernail, penny, nail, glass) Define streak Produce a streak using a streak plate Define luster	Lab. Guided readings using the review book. **Mineral ID Lab** - Lab includes Introduction, Data Table, physical description of metallic and non-metallic minerals, along with helpful hints on how to remember minerals and summary questions. **Review Sheet for Rock and Mineral Test -** 4 page review sheet covering all the important points found in the Rock and Mineral units. **Minerals and Rocks Reading Packet with questions** - Packet contains		

				Compare and contrast metallic and non-metallic minerals Give examples of metallic and non-metallic minerals Define crystal shape Sketch molecular structure of crystals Explain internal arrangement of atoms with reference to crystal shapes Give examples of minerals that react with acids Distinguish between a carbonate and non-carbonate mineral using an acid test	information on mineral properties and identification, along with readings on rock formation and the rock cycle. Many Regents level multiple choice and short answer questions are included. **Mineral Identification Sheet with Moh's Hardness Scale -** 8 different test mentioned for mineral identification, along with a description of Moh's Hardness Scale. 5 characteristics of minerals also mentioned. A good supplemental note sheet to go along with the Mineral Identification **Rock Forming Minerals Lab (Chemical Group Classification) -** Students will become familiar with the elements that compose most of the common minerals and mineral groups. They will also learn to recognize the importance of the silicate group. This is a pencil and paper lab - rock samples are not needed, but are recommended for comparison purposes. 10 multiple choice Regents level questions are included at the end for review.	

Identification of Minerals Flow Chart -
Non-metallic light colored, non-metallic dark colored, and metallic minerals are classified based on mineral properties.

Minerals: The Materials of the Earth - Earth Revealed Video Series #9 -
13 Question video worksheet to go along with the Earth Revealed Video series - #9 (Minerals).

Video covers mineral uses, identification, and most common chemical groups.

Introduction to Minerals Quiz -
Quiz contains 23 questions - fill in the blank and multiple choice. Use of the Earth Science Reference Table is required.

Mineral Test / Quiz -
20 multiple choice questions - Earth Science Reference Table is required.

Mineral Identification Key -
A copy of the old Earth Science Lab

					Practical mineral identification chart. **Mineral Characteristic Chart -** Mineral characteristic chart from the old Earth Science Lab Practical. Covers cleavage, streak, hardness, and luster. **Mineral ID Worksheet -** Samples #1-10 supplied by the teacher. Students must identify hardness, luster, streak, cleavage, color, and special properties. Based on what the student determines as properties, students must then identify the correct mineral name based on the Mineral ID flowchart, or the Earth Science Reference Table Mineral Chart. **Rock and Mineral Quiz - 20 questions -** 20 Regents multiple choice questions. Use at end of unit for review, or a quiz. Earth Science Reference Table use is required.		
		Minerals are formed inorganically by the process of crystallization					

	MST4.C.PS3.ES.A Students explain the properties of materials in terms of the arrangement and properties of the atoms that compose them.	Explain the properties of materials in terms of the arrangement and properties of the atoms that compose them.	Cooling and Solidification Rearrangement of atoms High temperature and pressure	Students should observe crystallization caused by cooling. Sketch molecular structure of crystals Describe the rearrangment when minerals are subjected to high temperature and pressure Define cooling and solidification	crystallization 4/20/2009 crystallization 4/20/2009		
		Preface / Prologue					
	MST1.C.SI3A Students use various means of representing and organizing observations (e.g., diagrams, tables, charts, graphs, equations, matrices) and insightfully interpret the organized data.	What is considered safe laboratory procedure?	Laboratory safety	Students should be able to recognize and carry out proper laboratory procedures in a safe and effective manner.	Guided readings using the review book Laboratory Safety and Student Guidelines Lab		
		What is the process of carrying out a scientific investigation?	Scientific Method	Students should be able to list and apply the steps of the scientific method in a laboratory setting	**Scientific Method Lab** - Lab focuses on building a peanut butter and jelly sandwich. Students need to write a good procedure in order for other students to follow their directions		
		What senses are used in the process of gathering scientific data?	Observation Inference	Students should be able to distinguish the difference between an observation and an inference.	**Observation and Inference Worksheet -** Students will take notes while making observations and inferences based on several different experiments performed by the instructor. **Come To Your Senses Worksheet** Questions regarding all 5 of our senses with magazine articles.		1. Observation a 10. Percent Erro 11. Percent Erro 22. Graphing Ch 23. DataGraph A 24. Measuremer 25. Topic I Obse 26. METRIC ME 27. What I Need 28OBSE~1.DOC 29OBSE~1.DOC 3. Come To You 30OBSE~1.DOC 4. Observation a 6. Reading Grac 7. Shoebox obse 8. Observations 8.0 Sequence_c 9. 1758-1 page

					Come To Your Senses Answer Sheet **Observation and Inference Worksheet 2** - Define terms, and decide between "observation" or "inference" for questions. **Shoebox Observation Lab -** Students will stop at 5 stations and make a list of observations and inferences used at each. They also need to identify sense used, and answer Regents level questions **Quiz on Observations / Inferences / Classification -** **Ten question multiple choice quiz.**		Graphing Exerci Graphing.ppt
		What tools are available to scientists to help them measure both liquids and solids in the laboratory setting?	Density Mass Volume Metric Measurement Millimeters Centimeters Decimeters Meter Graphs Inverse Direct Cyclic	Students should be able to successfully measure the weight of an object using a triple beam balance, and should also know how to zero the scale if it is not calibrated correctly. Students should be able to correctly measure the amount of a liquid using a graduated cylinder, and should recognize that the measurement should be made from the bottom of the miniscus. Students should be able to measure using metric units, and convert to different metric lengths. Students should be	**Reading Graduated Cylinders Practice Sheet** - Students read sample cylinders by looking at miniscus'. **Volume Calculation Worksheet** - 10 figures shown. Students must calculate the volume of each figure by showing all work, and label their answer correctly. **What are you DENSE?** - Worksheet on density, mass and volume		

				able to create and/or analyze graphs illustrating different relationships between variables.	calculations. **Metric Measurement Quiz -** 12 questions - covers milli, centi, deci, and meter measurements and conversions. **Observation and Measurement Worksheet #2** - Calculations, conversions, and Reference Table questions. **Measurement Mania Worksheet** Measuring using metric, with conversions. **Data / Graph Analysis Worksheet** - Graphing exercise looking at the number of sunspots vs. year with questions. **Graphing Changes and their Relationships Worksheet** - Creating, interpreting, and analyzing direct, inverse, and cyclic relationships. **Graphing Vocabulary Worksheet** - Graphing vocab. terms **Density (Topic 1) Worksheet (Turtle) -** Calculations using density / mass / volume **Mass vs. Volume Graphing Worksheet (Lion)** -	

					3 "samples" will be graphed (A,B,and C), and their densities compared.		
		How can the use of mathmatics be applied to gather scientific data for analytical purposes?	Percent Deviation Rate of Change	Students should be able to utilize a calculator correctly, and be able to round their answer to the nearest tenth, hundreth, and thousandth. Students should be able to calculate density by employing the density formula as found on the front of the Earth Science Reference Table. The difference between weight and mass should be recognized by the student as it applies to the study of gravity here on earth, as well as other planets and moons in our solar system. Student should be able to differentiate between actual and accepted values as they apply to the Percent Deviation formula as seen on the Earth Science Reference Tables.	**Density of Penny Lab** **The students will demonstrate how to Students should be able to calculate density by employing the density formula as found on the front of the Earth Science Reference Table. The students will demonstrate how to Students should be able to utilize a calculator correctly, and be able to round their answer to the nearest tenth, hundreth, and thousandth. The students will demonstrate how to The difference between weight and mass should be recognized by the student as it applies to the study of gravity here on earth, as well as other planets and moons in our solar system.** **Density of the Earth Lab** This lab is designed to be a culminating activity for the Observation / Inference / Measurement unit. Real earth materials will be weighed, and their volumes calculated. Based on these observations,		

					students will infer as to what layer of the earth each material would represent (crust, mantle, or core), and label a cut-away diagram of the earth appropriately The students will demonstrate an understanding of Percent Deviation The students will demonstrate how to differentiate between actual and accepted values as they apply to the Percent Deviation formula as seen on the Earth Science Reference Tables. The students will demonstrate how to calculate density by employing the density formula as found on the front of the Earth Science Reference Table. The students will demonstrate how to utilize a calculator correctly, and **Unit Test (1758-1 - Page 1** 20 question multiple choice unit test covering everything outlined above for the Prologue / Preface. **Percent Deviation Calculations Worksheet #1** - 6 questions, students must show all work. **Percent Deviation Calculations Worksheet #2 -** 6 questions -	

					students must show all work. **Percent Deviation Quiz** - 3 questions - students must show all work **Unit Test - Observation and Measurement (The Changing Environment) - VERSION 1** Exam covers everything outlined above in the Prologue / Preface. 25 multiple choice questions. **Unit Test - Observation and Measurement (The Changing Environment) - VERSION 2** Exam covers everything outlined above in the Prologue / Preface. 25 multiple choice questions. **Unit Test - Observation and Measurement (The Changing Environment) - PART 2** Graphing density by plotting mass vs. volume. **Review Sheet for Unit Tests** - Definitions, formulas, helpful hints. **Density Lab (Slabs and Cubes)** After students have completed this lab, they should be able to accurately measure the mass and volume of a given material and	

determine the density of that material from the mass and volume data. They will also calculate the percent deviation between a particular measurement and a standard accepted value. Reference Table use will be required.

How Much Does a Can of Soft Drink Weigh on Another Planet? (Lab) -

Nine cans of soft drink will be compared, each of which has been prepared to simulate the weight of a full can on a different one of the nine planets. Once the weight of the can has been determined by using a triple beam balance, students will attempt to

match each can with the planet on which a full can of soft drink would have the same weight.

Determining the Density of ICE Lab -

Lab employs the use of observations and inferences, reading a triple beam balance, using the volume, density, and mass formula, and finally calculating percent deviation from

					accepted value **Regents Questions Worksheet** Questions focus on Prologue / Preface topics outlined above.		
		Rocks					
	MST4.C.PS3.ES.A Students explain the properties of materials in terms of the arrangement and properties of the atoms that compose them.	What is the earth made of?	Nearly all rocks are composed of one or more minerals. Rocks are classified on the basis of their origin.	Students should recognize the fact that minerals are the "building blocks" of rocks. Students should develop a variety of systems, to classify large numbers of various types of rock samples.	Guided readings using the review book, **12 Station Rock Lab-** Lab contains sedimentary, metamorphic, and igneous rocks - good for an end of unit review. **Igneous Rock Activity / Lab-** A quick and fun activity for in class. **Rocks for the Rock Cycle Activity** A quick introductory or review acitivity - classify actual rocks according to origin based on written physical description. **The Big Rock (Children's Storybook) -** The Big Rock (By Bruce Hiscock) is a story centered around a rock (granite) found on a hillside in upper NY state, in the Adirondack Mountains. The book tells the story of the big rocks formation, movement, and eventual weathering away. It is a kids book, but it is written at the		_rocks.pdf 1. Rock & Miner 10. Rock Quiz.d 11.0 rockcycle v  11.5 rockcycle v 12 Station Activi 13. Nonsedimen 14. Metamorphi 15. Metamorphi 16. characteristi 17. The Rock C 18. Rock Types 19. Rock Quizzy 2. The Big Rock 22. Minerals & F 23. Rock Cycle 24. ANSWER S 25. multi page r 28. Minerals.doc 28OBSE~1.DOC 29MINE~1.DOC 29OBSE~1.DOC 3. Metamorphic 30. Rock Formir 30OBSE~1.DOC

7th or 8th grade science level.

This worksheet contains 36 questions that can be answered as the book is read to the students aloud.

Rock Formation -

Guided note sheet covering what rocks are made of, the three different classifications of rocks, and an introduction into how sedimentary rocks form. 1 page.

Rock Types Found Throughout New York State

Worksheet that utilizes the Generalized Bedrock Geology Map of New York State as found in the Earth Science Reference Tables. 18 questions covering sedimentary, igneous, and metamorphic rocks.

Rock Quizzy

10 question quiz. Clues are given, and students have to either name the rock classification, or

the actual rock name based on the Earth Science Reference Table rock diagrams.

Rock Type Flash Cards -

Questions on the front of the cards, answers on the back. Covers all types of rocks, how

31. Identificatior
32. Earth Revea
33. 20 question
34. Introduction
35. Mineral Quiz
36. Mineral Iden
37. Mineral - cha
38. Mineral ID cl
4. Lab 10 Rock I

5. Sedimentary I
6. Rock Formati
8. Characteristic
Igneous Rock A
Igneous Rocks.
IgneousRockRe
MetamorphicRo
MetamorphicRo
Mineral Identific
Minerals.doc
Rock Cycle Reg
Rock Cycle Reg
Rock%20&%20I
Rocks for the R
rocks.pdf
Sed and Met an

					they formed, and how they are classified. Reference Table use is suggested. **Rock Quiz** 34 question multiple choice quiz/test. Use at the end of the rock unit. Earth Science Reference Table is needed. **Minerals and Rocks Review Quiz** 20 question multiple choice quiz. All 3 kinds of rocks are included. Earth Science Reference Table is needed. **Rocks and Minerals Exam (Version 1) -** **55 question multiple choice exam. Covers both the unit on minerals, and** **the unit on rocks. Earth Science Reference Table is required.** **Rocks and Minerals Exam (Version 2) -** 50 question multiple choice exam. Covers both the unit on minerals, and the unit on rocks. Earth Science Reference Table is required. **Rock and Mineral Exam (PART II)** 7 short response questions /	

					graphs based on the NYS Regents exam. Diagrams are included. **Review Sheet for Rock and Mineral Test** 4 page review sheet covering all the important points found in the Rock and Mineral units.		
		How do igneous rocks form? What can we learn about the earth by studying igneous rocks?	Igneous rocks form by the crystallization of molten magma. From the size of the crystals in igneous rocks, we can infer the rate of cooling Crystal size, mineral composition, density and color are used to identify most igneous rocks. Intrusive igneous rocks can be distinguished from extrusive igneous rocks based upon crystal size. Felsic rocks are common in the continents, while mafic rocks are more common in the ocean basins.	Students should observe crystallization caused by cooling. Students should be able to identify the relative rates of cooling of obsidian, granite, and basalt with the use of the Earth Science Reference Tables. Students should identify a variety of common igneous rocks using the Earth Science Reference Table. Given examples or descriptions of igneous rocks, students should be able to distinguish between intrusive and extrusive rocks.	**Igneous Rock Regents Question Worksheet-** May be used as lab supplement, test questions, or for review. **Earth Revealed - Video Series #14 Intrusive Igneous Rocks** - 17 fill in the blank questions that follow along with Episode #14 of the Earth Revealed video series. Video covers formation and identification of igneous rocks. **Worksheet on Igneous Rocks - Reference Table and Review Book Diagrams and Questions -** Open ended and multiple choice questions based on the NYS curriculum. A good review activity for students after unit on igneous rocks has been completed. **Nonsedimentary Rocks - Igneous Rocks** - Guided note sheet on igneous		

					rocks. Covers formation, cooling, crystal size, and texture. Earth Science Reference Tables are needed.		
		How do sedimentary rocks form? What information about earth history can be gained through the study of sedimentary rocks?	Most sedimentary rocks form as a result of the compression and cementing of sediments. Sedimentary rocks usually contain rounded grains cemented in layers. Other sedimentary rocks form from the evaporation of sea water or organic processes. Sedimentary rocks form at or near the surface of the Earth. Fossils are found almost exclusively in sedimentary rocks. Sedimentary rocks are classified as fragmental, chemical, or organic, depending upon how they were formed. Fragmental sedimentary rocks are classified on the basis of grain size. Organic and chemically formed sedimentary rocks are primarily identified through composition and texture. Fossils in sedimentary rocks	Students should be able to identify shale, sandstone and conglomerates based upon their textures and the use of the Earth Science Reference Table. Students should be able to differentiate between the grains that make up sedimentary rocks, and the cement that holds the grains together. Students should be able to create their own "rocks" to simulate the formation of various types of sedimentary rocks. Students should be able to formulate the reasons why sedimentary rocks cannot be found deep within the Earth. Students could create different fossil types by making their own fossils out of clay or plaster. Students should be able to read and interpret a bedrock map of New York State to illustrate the distribution of sedimentary and non-sedimentary rocks. Students should examine rocks containing fossils, and discuss how these rocks may have formed. Students should recognize the reasons why most sedimentary	**Sedimentary Rock Regents Review Question Worksheet** These questions may be used as a lab supplement, test questions, or for test review. **Sedimentary Rocks Lab -** Students must identify and classify sedimentary rocks according to their origin. Sedimentary rock samples, classification chart, hand lens, and dilute hydrochloric acid are utilized in this lab. You will also need an Earth Science Reference Table. **Characteristics of Sedimentary Rocks -** Guided note sheet used as an introduction to sedimentary rocks. Included is how to identify them by utilizing the chart in the Earth Science Reference Tables, and practice NYS Regents questions. **Worksheet for Sedimentary Rocks -** Open ended and multiple choice questions for students to answer after the unit		

			provide evidence of the environment in which they formed.	rocks are formed originally in horizontal layers. Students should be able to identify common sedimentary rocks using the Earth Science Reference Tables. Students should identify common organic and chemically formed sedimentary rocks using the Earth Science Reference Tables. Students should recognize that we can often distinguish between land and ocean environments based on their fossil history. Students may want to create their own chemically formed sedimentary rocks.	on sedimentary rocks has been completed. An Earth Science Reference Table is required. **Video - Earth Revealed #17** - Guided note sheet that follows along with Episode #17 of the Earth Revealed series. Video focuses on formation of sedimentary rocks, and how to identify them based on their characteristics. **Sedimentary Rock Quiz -** 20 question multiple choice quiz based on rock formation in general, and focusing mainly on sedimentary rocks in particular. All Regents level questions.		
		What are metamorphic rocks? What can we learn through the investigation of metamorphic rocks?	Metamorphic rocks form as a result of crystal growth without melting, usually under conditions of high temperature and pressure. Metamorphic rocks often show foliation (mineral alignment) or banding (separation into distinct layers) and high density. It is possible to infer the parent rock from the mineral composition and structure of most metamorphic rocks.	Students should be able to point out that metamorphic rocks result from the recycling of other rocks, including both sedimentary and igneous rocks. Students should be able to distinguish between the different features of metamorphic rocks by utilizing the metamorphic rock diagram in the Earth Science Reference Table. Students should be able to understand and explain why metamorphic rock is different from its parent rock.	**Metamorphic Rock Regents Review Questions** These questions may be used as a lab supplement, for a test, or for test review. **Metamorphic Rock Lab -** Students must identify the nature and origin of foliation in metamorphic rock samples. Hand lens, metamorphic rock set, and Earth Science Reference Tables are needed. **Metamorphic**		

			Contact metamorphism occurs when molten rock comes in contact with surrounding rocks. Regional metamorphism occurs over large areas, and is generally associated with mountain building. Metamorphic rocks are classified according to their texture and composition including foliation and banding. Metamorphic rocks occur on a continuum from little alteration to major changes.	Students should recognize that transition zones from altered to unaltered rock can be identified. Students should identify common metamorphc rocks using the Earth Science Reference Tables. Students should understand and be able to visualize how the same parent rock could form different metamorphic products depending upon the type and degree of metamorphism. Students should compare various metamorphic rocks with their parent rocks such as shale/slate, limestone/marble, and sandstone/quartzite	**Rocks - Earth Revealed Video -** 17 question open ended question sheet to follow along with the Earth Revealed Video series - Metamorphic rocks. Video covers formation, composition, and identification **Metamorphic Rock Regents Questions -** Sample multiple choice Regents questions.		
		How do rocks change?	Rock materials cycle through a variety of forms.	Students should be able to visualize and draw the variety of paths that rocks may take as they "travel through" the rock cycle. The Earth Science Reference Table would be useful in the construction of such a diagram. Students should understand through the rock cycle diagram that the earth is a closed system in that the same rock materials ae constantly recycled.	**Rock Cycle Regents Questions-** These questions may be used as a lab supplement, for a test, or for test review. **The Rock Cycle -** 12 question worksheet based on the Rock Cycle diagram as seen in the Earth Science Reference Table. **The Rock Cycle Review Quiz** - 10 multiple choice question quiz. Earth Science Reference Table is needed.		
		Weathering and Erosion					
		How is the earth's	The weathering	Students should be	Guided readings		10. Deposition.d

		crust affected by its environment?	process involves the physical and chemical breakdown of rocks. Weathering occurs when rocks are exposed to the hydrosphere, biosphere, and atmosphere. The weathering process is affected by climatic conditions. The rate of the weathering process is affected by particle size. The rate of the weathering process is affected by the mineral composition of the rock.	able to distinguish rock that has been weathered from unweathered rock based on their observations of the rock surface. Students should be able to see the connection between the degree of weathering and the amount of time there has been exposure of the surface to the atmosphere. Students should be able to draw the connection between moisture in the air, temperature, and the amount and type of weathering that takes place. Moist and warm climates favor chemical weathering, while cold climates favor physical weathering. In dry climates, weathering is slow. Students should understand that there is no chemical weathering on the moon since there is no atmosphere. Students should be able to show how weathering accelerates as particles are broken and more surface area is exposed. Students should be able to show how abrasion rates are affected due to different minerals or rocks being exposed to weathering over a period of time.	using the review book, additional regents questions and a review of each unit can be found on first class. **Lab - Weathering & Erosion- *Comparative Observations* -** Goto First Class The student will gain a greater understanding of the difference between physical and chemical weathering. The student will be able to visually inspect how sediment shape changes over time in an erosional system. The student will be able to interpret how composition is a factor in weathering rate The student should be able to predict relative sediment trasportation rates in a fluvial erosional system **Physical and Chemical Weathering Review Questions (5 Mult. Choice)** - Goto First Class 5 multiple choice questions including weathering diagram from review book. Covers physical and chemical weathering causes, dominant climate types, and effects of temperature and precipitation upon different earth materials. **Weathering Quiz**		12. Raging Rapi 13. Love Canal - 14. History of Ni 15. Niagara Fall 16. Weathering 17. River Chann 18. A Day at the 19. A Day at the 20. Characterist 21. Deposition.d 21. Which granit 24. Erosion Quiz 26. Glacial Proc 27. NEW YORK 28. BIG Glacier 29. REVIEW SH LANDSCAPES. 30. Erosion & Ri 31. 44 questions 31. Erosion & D 32. Weathering, 4.0 Fossil Mode 4.0 Geohistory L 5. Weathering a 8. Erosion & Ro 9. Weathering, F surface.pdf Weathering and Weathering,%2(Wind, Glaciers a

(15 mult. choice) - Goto First Class
15 multiple choice questions covering physical and chemical weathering, climate conditions, and weathering rates based on exposed surface area.

Critical Thinking (Graph of precipitation / temperature / weathering) - Goto First Class
Worksheet contains 5 open ended questions that can be answered by looking at the weathering chart/graph included.

Rate of Change (Weathering and Erosion) Worksheet - Goto First Class
13 question worksheet using the Rate of Change formula to solve questions based on an experiment in which rocks of different types were shaken for (4) 5 minute intervals (20 minutes total), and then their remaining mass was calculated. Worksheet includes completed data table.

Erosion and Rock Abrasion Quiz - Goto First Class
Quiz includes 6 questions in which students have to calculate the rate of change of three different rock types

					which were shaken over a 20 minute period. Using data supplied, students must also plot Mass of Rock vs. Shaking Time on graph provided. **Weathering Worksheet / Quiz -** Goto First Class 10 multiple choice questions focusing on frost action, chemical weathering, mineral hardness and weathering resistance, and surface area vs. weathering rate.		
		What are the products of weathering?	Human activities affect the distribution and quality of soil. Soils contain both weathering products of rock and organic materials. Soils develop as a result of the processes of weathering and biological activity over long periods of time. Soils develop horizons through weathering, leaching, and biological processes.	Students should realize that air and water are also important in making soils productive. Students should point out that soils from the same kind of parent materials (bedrock) may differ depending upon the climate in which they form. Students should be able to show through direct observation that glacially transported soils in New York State show incomplete C horizon development Students should understand that soil conservation efforts are needed to protect our soils. Soil is a limited resource. Students should discuss how herbicides, road salting, landfilling, construction, farming and mining all have an	**Weathering and Erosion (SOIL) -** A guided note sheet focused on soil formation. Soil types, horizons, and depletion are all covered. Note sheet contains fill in the blank, matching, word scrambles, and true/false. **Soils Quiz (7 mult. choice questions) -** 7 multiple choice question quiz on soil horizons. cleanup (OK - coverup). Pictures included. **Love Canal - A Legacy of Neglect -** 46 question worksheet based on a UB Libraries website. Website tells the history of		

				impact on soil development.	Love Canal from contamination		
		How are the products of weathering transported?	Most weathered materials are eroded from their place of formation. Gravity is the primary force that drives agents of erosion. Running water is the most important agent of erosion. The amount of erosion by a stream depends primarily on the velocity and volume of water flowing in the stream. The geometry of a stream channel influences where erosion and deposition will occur. The size of the particles that can be transported increases as the water velocity increases. Streams carry sediments in various ways including floating, solution, suspension, and by bouncing and rolling materials along their stream beds.	Students need to realize that a mineral content different from the underlying bedrock indicates a transported soil. Students should be able to utilize and interpret a geology map of New York State. Students should observe the force of gravity at work as an agent of erosion, but they must also realize that wind, water, or ice may also be agents too. Students should either experience first hand, or by the use of visuals, efforts to control stream erosion. effort should be made by the student to understand that even though glacial erosion produced dramatic changes in New York State in the past, worldwide, stream erosion was and is more significant. An Students should be able to measure and quantify stream velocity by changing the gradient of a "stream", and it's velocity in a laboratory setting. They should also realize that a greater volume of water can carry more sediments Students should be able to illustrate the concept of how streams erode the banks on the outsides of curves (due to a greater velocity), and deposit sediments along the insides of	**Raging Rapids - Niagara Falls (Video) -** 35 question fill in the blank worksheet that follows along with the video entitled, "Raging Rapids - Niagara Falls". This video originally was shown on Channel 17 PBS), and occasionally it is re-aired on our local public broadcasting station. It tells the story of how Niagara Falls formed, is being eroded, and eventually what it will look like years from now. Tourism, daredevils, and power generation are also included in this production. A very entertaining look at a close natural wonder of the world. **Niagara Falls - Post Video Quiz -** A 6 question quiz based on the video, "Raging Rapids - Niagara Falls", and the Earth Science Reference Table. Diagrams of the Niagara River and Escarpment are included, along with a cross section of the rock layers which make up the gorge wall. **The History of Niagara Falls (Project) -** An individual student PowerPoint project focused on		

				meanders (due to less velocity). By observing sediments in a stream bed, students should be able to infer relative stream velocities. They should be able to see the relationship of this in the Earth Science Reference Table. Students should be shown that the velocity needed to start erosion is greater than the velocity needed to keep the sediments in motion.	answering the questions of how did the falls form and what rock layers make up the gorge? Past and present flow models of the Great Lakes are looked at, along with what types of past life forms can be found as fossils along the Niagara Escarpment. Project takes approximately 4 to 5 45 minute class periods to complete. Websites used for pulling off text and graphics may have to be updated. **A Day at the Water Park -** A short story focused on introducing the concept of stream erosion due to water velocity, particle size, particle shape, and river channel gradient. **A Day at the Water Park - Supplement Sheet -** After reading the story entitled, "A Day at the Water Park", students should use this sheet to help them explain the point of the story in EARTH SCIENCE terms. Diagrams are provided. **River Channel Changes -** Using the diagram at the top of this worksheet, students have to	

					construct 3 different river channel profiles based on where the fastest flowing water would be found, and river depth. They then have to answer 10 questions based on their drawings, and their understanding of an erosional / depositional system. **Erosion Quiz -** 14 question multiple choice quiz with diagrams. Stream velocity diagram in Reference Table is focused on, along with stream profile interpretation and questions about erosional agents. **Regents Questions on Transportation / Deposition -** 10 multiple choice question quiz / homework focused on transportation and deposition of particles in a stream system.		
		How are eroded materials deposited?	Sediments deposited by gravity acting alone and by glaciers are usually unsorted. Particle characteristics determine the rate and pattern of the deposition. Water and wind usually deposit sediments sorted by size and / or density causing layering. Horizontal and	Students should be able to identify what kinds of particles are most likely to be carried by each method shown in the Earth Science Reference Table Stream Velocity graph. Students should be able to demonstrate how the largest, most dense, and rounded particles settle first, and smallest least dense, and flatter particles settle last. Students should be	**Characteristics of an Erosional - Depositional System -** Guided note sheet about erosion and deposition in a stream system. Graded bedding and horizontal sorting are also presented. **Deposition -** Guided notes regarding factors that cause deposition, and how sediments are sorted. Graded		

			vertical sorting create natural features of deposition.	able to illustrate how the movement of air or water tends to transport smaller particles further than larger particles. Students should recognize graded bedding, and how it is created in a delta or an alluvial fan environment. There should be an emphasis placed on the students that glacial till is unsorted due to melting ice, and because of this many areas of New York State contain glacial erratics.	bedding, horizontal sorting, and unsorted glacial deposits are all presented here. **Deposition in Calm Water (Lab) -** Lab focuses on dropping objects of different shapes and sizes in a long column of water, and timing their settling rate. Factors that affect deposition is the topic at hand, and size, shape, and density of the particles all play a part in determining their rate of deposition.		
		How is the earth's surface shaped by weathering, erosion and deposition?	The climate, rock types and geologic structures in a region influence the rate of landscape development and landscape patterns. Glaciers have greatly altered the landscape of New York State. Human activities influence landscape development. Landscape and drainage patterns are interdependent.	Pictures showing landscapes in arid regions should illustrate to students how angular formations are created due to the rapid erosion of unprotected soil. Students should explain how farming and construction projects can cause severe erosion unless they are guided by appropriate conservation practices. Students should have practice in identifying the types of drainage patterns that can be expected on particular landscapes and bedrock structures.	**Review Sheet for Surface Processes and Landscapes (Erosion and Deposition) Test -** Bulleted review sheet for students which covers weathering, soil formation, transportation of weathered products, deposition, and the shaping of earth's surface. 23 important concepts to know. **Erosion and Deposition (Test #1) -** 43 question multiple choice test on erosion and deposition. Use of the Earth Science		

					Reference Table is required. **Erosion and Deposition (Test #2) -** Part I - 40 multiple choice questions. Part II - 4 questions requiring students to plot points to illustrate the bottom of a stream bed, and then interpret where the water would move the fastest based on the diagram shown, along with how big the largest particle transported could be based on the velocity of the stream. Use of the Earth Science Reference Table is required. **Erosion and Deposition (Test #3) -** Part A - 18 question multiple choice. Part B - Combination of multiple choice and short answer / graphing questions. Part C - Short answer questions based on paragraph and chemical / physical weathering diagram. Use of the Earth Science Reference Tables is required.		