



EARTH SCIENCE

INTRODUCTION

COMPONENTS OF STUDY

- Geology: Earth physical & historical
- Metaphysiology: Weather & Climate
- Oceanography: The oceans
- Astronomy: What is external to the atmosphere

THE FOUR SPHERES (See The Water Cycle)

- Lithosphere: The solid earth
- Hydrosphere: The liquid earth
- Atmosphere: The gaseous earth
- Biosphere: Where life exists

CONCERN IN OUR PHYSICAL ENVIRONMENT

- Resources: Water, soil, metallic & non-metallic elements, sunlight, sunlight, wind, etc.
- The capita use of metallic and non-metallic elements is 11 tons per year
- Renewable vs. non-renewable resources
- Environmental and population problems

MINERALS

- A mineral is a naturally occurring, inorganic, solid material with a definite atomic structure.
- An ore is a useful mineral resource.

A. Atom and Minerals

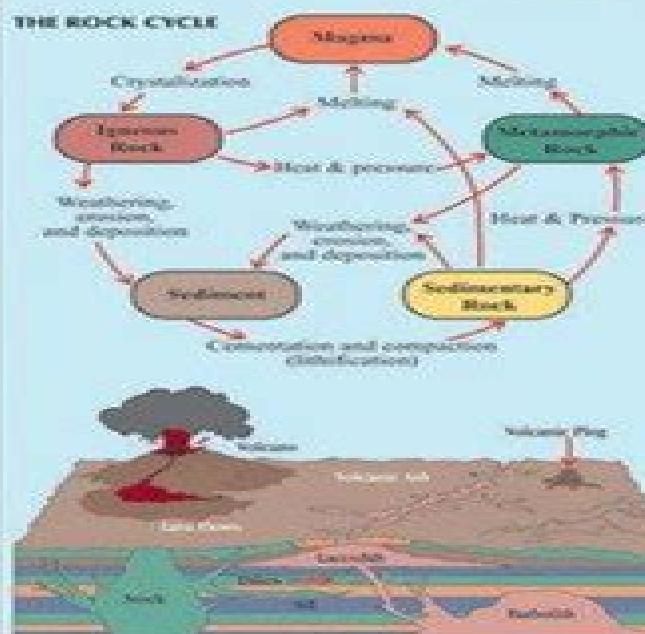
- Atoms in ancient Greek means "un-cut" i.e., the Greeks believed the atom to be the smallest particle of matter.
- Atoms are composed of neutrons, protons and electrons.
- Atomic number: Number of protons in nucleus.
- Atomic weight: Average weight of an atom.
- Isotopes: Atoms with the same atomic number but different numbers of neutrons in the nucleus.
- Forces: Strong, weak, electromagnetic and gravity.
- Properties of Minerals**
 - Color: Appearance or quality of light from surface.
 - Texture: Nature of light and cause of color.
 - Streak: Color of material in powdered form.
 - HARDNESS: Mohs' Scale (See Figure Below).
 - Scratch Test: Higher numbered materials can scratch lower numbered materials.
 - Shape is determined by cleavage, crystal form and structure.
- Specific Gravity: The ratio of the weight of a mineral to the weight of an equal volume of water.
- Density of water = 1 gram/cubic centimeter.
1 g/cm³ = 7.7, aluminum = 2.7, iron = 7.2.

MOM'S SCALE		MINERALS
10	Diamond	
9	Corundum	
8	Topaz	
7	Quartz	
6	feldspar	
5	Spatite	
4	Fluorite	
3	Gypsum	
2	Sphalerite	
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MINERAL CONCEPTS

- Silicates: Minerals with silicon and oxygen.
- Silicates are a large class which forms a pyramidal-shaped structure with oxygen.
- Other forms include simple non-silicate minerals, carbon, diamonds, noble elements, 3-D structures, hydrocarbons and quartz.
- Non-Silicates
- Make up one-fourth of continental crust.
- Carbides: Minerals with carbon and oxygen including calcium, those which are present in meteorites (meteors) and meteorite (interplanetary material).
- Oxides: Oxygen-banded solids, i.e., iron sulfides (FeS), sulfates (MgSO₄), halides (CaCl₂, F).
- Halides: Mineral form of salt.
- Corundum: Plastic, calcite.
- Noble metals: Iron, zinc, gold, silver, nickel.

THE ROCK CYCLE



IGNEOUS ROCKS

A. Formation

- Extrusive igneous rocks are formed in volcanic eruptions at surface.
- Extrusive or plutonic igneous rocks are produced within the earth.
- Magmatic**
 - Contains mainly of silicate minerals.
 - Has gasses, such as water vapor.
 - Temperature there are about 2000 °K.
 - Causes rise of cooling, chemical composition, and removal of gases.
 - Produces intrusive igneous rocks.
- Extrusive**
 - Similar to igneous.
 - Most gaseous elements have escaped.
 - Produces extrusive (volcanic) igneous rocks.
- Metamorphic**
 - Can stabilize different patterns of ions.
 - The rate of cooling strongly affects crystal size.
 - Slow cooling = Large crystals.
 - Quick cooling = Small crystals.
- Amorphous (non-crystalline) pattern of ions**
 - rocks with constant cooling (quenching).
 - produces rocks referred to as glass.
- Classifying Igneous Rocks**
 - By texture: size and arrangement of interlocking crystals.
 - Face-granular
 - Forms at surface or within upper crust.
 - Crystals left the gas bubbles are called vesicles.
 - Ground-granular = Formed deep within the interior.
 - Porphyritic = Large crystals embedded in matrix of smaller crystals.
 - By mineral composition
 - Depends on composition of magma and cooling.
 - Some magmas can create rocks of varying mineral content.
 - An igneous rock contains minerals crystallized first (or very early) to form

ROCK TYPES

METAMORPHIC ROCKS

A. Formation

- Metamorphism: To change form.
- Regional metamorphism: Material under intense pressure, high temperature.
- Contact metamorphism: Metamorphism caused by proximity to magma.
- Low grade metamorphism: Shallow metamorphic rocks.
- High grade metamorphism: Deeper metamorphic rocks.
- foliation: During metamorphism, minerals are arranged in layers.
- Metamorphic structures: Features of material arranged into layers with one another.
- Agents of Metamorphism**
 - Heat
 - Water
 - gases
 - minerals
 - pressure
 - Chemical Activity: Most common chemical agent is water.

Types of Metamorphic Rocks

- Metamorphic:** Fine grained, dark, shiny rock with randomly arranged minerals.
- Schist:** Fine grained, often grey, foliated rock, right below along cleavage, process of metamorphism.
- Migmatite:** Contains one migmatite rock, formed from foliated rock.
- Phyllite:** Shiny, foliated rock, more commonly foliated than slate.
- Slate:** Foliated rock, more coarsely grained and w/ higher metamorphic grade than phyllite.
- Gneiss:** Foliated, banded rock w/ the highest metamorphic grade.
- Quartzite:** Very hard, granular quartz rock, formed from sandstone.

ROCKS' REACTION SERIES

- is a mineral, which has already formed, reacts w/ other minerals, it will react with the remaining magma to produce the next mineral in the sequence. For example, olivine reacts w/ plagioclase, plagioclase reacts w/ remaining magma to form pyroxene.
- High-Grade vs. Low-Grade Series**
 - Causes w/ ions of other minerals, then small crystals w/ foliation.
 - These react w/ sodium in the magma to become more and more sodium rich.

End of Cooling

- Without cooling is allowed cool, remaining magma with have high silicate content, and quartz w/ feldspar.
- Without cooling is complete, everything that reacted at the same time will react by the time for one another (pyroxene, and quartz) cool down over time for magmatic growth.



Earth Science High School Essential Question

D Siedentop

Earth Science High School Essential Question:

Teaching Discipline-Specific Literacies in Grades 6-12 Vicky I. Zygouris-Coe, 2014-10-30 Comprehensive timely and relevant this text offers an approach to discipline specific literacy instruction that is aligned with the Common Core State Standards and the needs of teachers students and secondary schools across the nation It is essential that teachers know how to provide instruction that both develops content and literacy knowledge and skills and aims at reducing student achievement gaps Building on the research supported premise that discipline specific reading instruction is key to achieving these goals this text provides practical guidance and strategies for prospective and practicing content area teachers and other educators on how to prepare all students to succeed in college and the workforce Pedagogical features in each chapter engage readers in digging deeper and in applying the ideas and strategies presented in their own contexts Classroom Life real 6 12 classroom scenarios and interviews with content area teachers Common Core State Standards Connections College Career and Workforce Connections Applying Discipline Specific Literacies Think Like an Expert habits of thinking and learning specific to each discipline Digital Literacies Differentiating Instruction Reflect and Apply Questions Extending Learning Activities The Companion Website includes Lesson plan resources Annotated links to video files Annotated links to additional resources and information Glossary Flashcards For Instructors All images and figures used in the text provided in an easily downloadable format For Instructors PowerPoint lecture slides *The Mastery Learning Handbook* Jonathan Bergmann, 2022-10-14 Mastery learning is an instructional approach that empowers every student to progress with confidence Using flexible pacing and targeted supports teachers guide students through a cyclic process of preparation demonstration and formative feedback until there is a mutual agreement between teacher and student that the student is ready to advance In this book educator Jonathan Bergmann a pioneer of the flipped classroom movement walks you step by step through the mastery learning cycle explaining what it entails and providing the templates models and rubrics you need to start using it in your own classroom You ll learn how to Set meaningful measurable and transferable learning objectives that target essential knowledge skills and dispositions Develop a mastery rubric to check for student levels of proficiency Create an assessment plan that ensures positive learning experiences for all Plan and deliver units that incorporate both time shifted direct instruction and collaborative application activities within the classroom space Provide timely differentiated support based on students individual learning needs Informed by trial and error in his own classroom and by discussions with other expert practitioners Bergmann shares commonsense solutions to the major challenges of mastery learning implementation everything from how to manage pacing to how to create multiple versions of tests determine grades and get stakeholder buy in The Mastery Learning Handbook is both an introduction to this exciting instructional approach and a practical resource that K 12 teachers can turn to again and again See for yourself just how effective enjoyable and transformative mastery learning can be *Resources in Education* , 1992 Serves as an index to Eric reports microform

Strategies for Teaching Boys and Girls -- Secondary Level Michael Gurian,Kathy Stevens,Kelley King,2011-01-06 In his best selling classic Boys and Girls Learn Differently Michael Gurian explained the origin and nature of gender differences in the classroom His important book explored the behavior teachers observed and the challenges they faced with both boys and girls in their classrooms Taking the next step Strategies for Teaching Boys and Girls Secondary level A Workbook for Educators offers teachers a hands on resource that draws on the Gurian Institute s research and training with secondary schools and school districts The workbook presents practical strategies lessons and activities that have been field tested in real classrooms and developed to harness boys and girls unique strengths The workbook is designed to help teachers build a solid foundation of learning and study habits that their students can use in the classroom and at home It covers the key curricular areas and offers proven techniques to make learning no matter what the subject more engaging for all students The workbook is an essential resource for all teachers who want to improve their practice and get the most from all students whatever their gender *Developing Learning Communities Through Teacher Expertise* Giselle O. Martin-Kniep,2003-10-14 Learn practical methods for developing a collaborative environment where teachers and administrators work together to enhance teachers practices increase student learning and produce valuable school processes

Science Curriculum Resource Handbook ,1992 **Intersections of Formal and Informal Science** Lucy Avraamidou,Wolff-Michael Roth,2016-03-10 Science learning that takes place between and at the intersections of formal and informal science environments has not been systematically reviewed to offer a comprehensive understanding of the existing knowledge base Bringing together theory and research this volume describes the various ways in which learning science in various settings has been conceptualized as well as empirical evidence to illustrate how science learning in these settings can be supported

Sg Essentials Geology Wicander,2001-09 Manual of Standards and Suggestions on Organization for the High Schools of Ohio Ohio. Department of Education,1921 Resources in Education ,1992 *The Lincoln Library of Essential Information an Up to Date Manual for Daily Reference, for Self Instruction, and for General Culture Named in Appreciative Remembrance of Abraham Lincoln, the Foremost American Exemplar of Self Education* ,1924 Proceedings of the Department of Superintendence of the National Educational Association ... National Education Association of the United States. Department of Superintendence,1909 Interdisciplinary Approaches to Teaching Art in High School Pamela G. Taylor,2006 The authors present works of art artmaking skills and ways of knowing as catalysts for learning across the traditional disciplinary boundaries in high school Both timely and enduring this is the book that will inspire and support the work of veteran new and pre service high school art teachers The book includes issues theories and practices related to high school curriculum advocacy classroom management assessment cultural understanding idea based instructional strategies team teaching technology visual culture and student initiated learning The authors draw upon their own experiences and those of other high school art teachers to create a motivating and provocative text that challenges readers to critically and

continually reflect collaborate read and research their own interdisciplinary thinking teaching and learning processes
Publisher **Proceedings of the ... Annual Conference** Science Teachers Association of New York State,1904

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