STEM EARTH SCIENCE

Chapter 3:

Minerals, Rocks and Structures

Big Question: What are the major geologic features of our region and what can they tell us about its history?
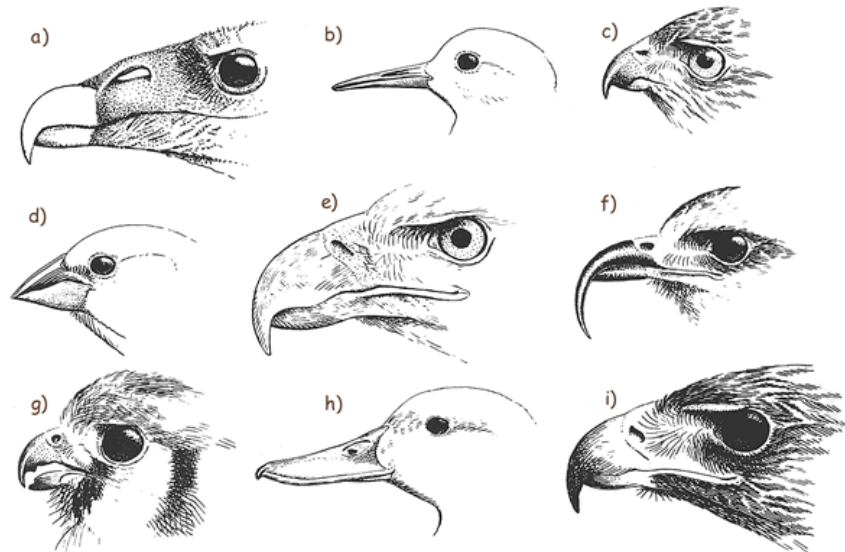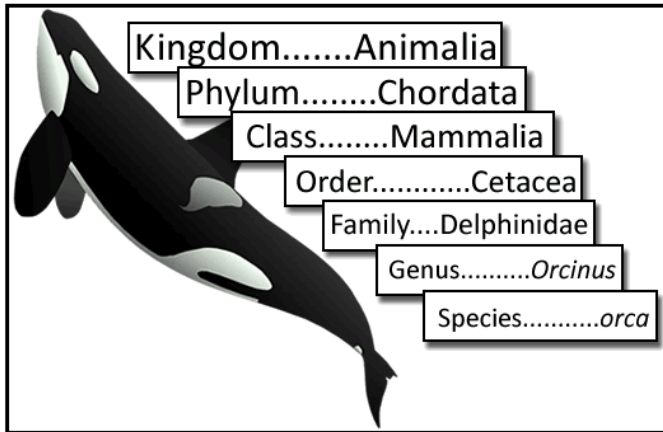
Scenario: Economically valuable mineral deposits are formed in a great variety of geologic settings. Ores of many metals are formed in association with igneous processes. Some of these metal ores are formed directly by precipitation of certain metal-bearing minerals during cooling and crystallization of the magma, and then segregation of the crystals by such processes as settling to the bottom of a magma chamber. Most, however, are precipitated by aqueous solutions or water-rich residues of magmas.

Chapter Challenge: Your class will be studying rocks, the rock cycle, and its associated processes. Your group will be responsible for formulating a plan to excavate iron ore from a mineral deposit model created by another group. You will develop a plan while remaining within the constraints set forth by the rules of the excavation. You must be concerned with time, cost of sand removal, and cost of environmental reclamation. Groups will then carry out their plan and determine how much money you made (or lost!) from the excavation.

Activities We Did Patterns or observations/What happened	What do you think caused these patterns or observations?	How do these patterns relate to Earth Science?
Section 1		
Section 2		
Section 3		

Activities We Did Patterns or observations/What happened	What do you think caused these patterns or observations?	How do these patterns relate to Earth Science?
Section 4		
Section 8, 6		
Section 3,7 and 8,5		

Section 1: Minerals

Kingdom.......Animalia
Phylum........Chordata
Class........Mammalia
Order...........Cetacea
Family....Delphinidae
Genus..........*Orcinus*
Species..........*orca*

a) b) c)

d) e) f)

g) h) i)

Section 1 Question: What are minerals and how can we distinguish them from one another?

What do you See?

What do you think? *Investigate the composition of column of the properties of common minerals page in the ESRT. What elements are most common in minerals and what does this tell you about the composition of Earth?*

Properties of Common Minerals

LUSTER	HARD-NESS	CLEAVAGE FRACTURE	COMMON COLORS	DISTINGUISHING CHARACTERISTICS	USE(S)	COMPOSITION*	MINERAL NAME

What do you think now?

Focus Question: How are minerals different from each other?

Observe: Use the microscope to take a close look at the three crystal samples. Draw a picture of each below.

Predict: What properties of minerals can be used to classify them? (write a list of properties that could be used to classify each mineral below)

Compare: How does your list compare to other groups?

Investigate: Describe the first 10 minerals in your trays using the properties you identified in the previous section.
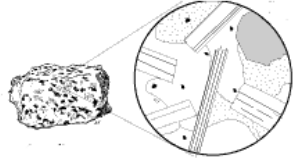
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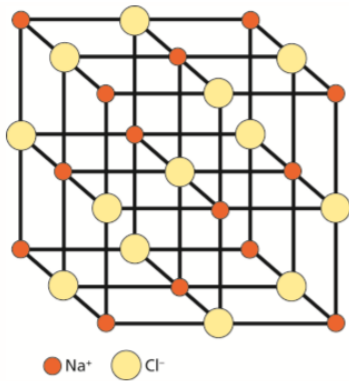
2.

3.

4.

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7.

8.

9.

10.

Predict: What gives minerals their different characteristics?

Explore: *Crystallography*

Explain:

RETURN TO WDYTN

DIGGING DEEPER

Types of Minerals	

• A mineral has the following characteristics
  o Solid, Inorganic, Naturally Occurring, Definite Chemical Compositions, and Crystal Structure
• There are 9 groups of minerals that are classified by their chemical composition:
  o Native element, Sulfides, Halides, Oxides/Hydroxides, Nitrates/Carbonates/Borates, Sulfates, Phosphates, Silicates
• There are more than 4,900 known minerals on Earth.
• Of these, 8 rock forming minerals make up the bulk of most rocks.
  o Quartz, Plagioclase Feldspar, Potassium Feldspar, Olivine, Pyroxene, Amphibole, Biotite, Muscovite
	How is a mineral different from a rock?
	
	List the uses of the minerals below.
	
	Calcite
	
	Flourite
	
	Talc
	
	Gypsum

Chemistry and Structure of Minerals	
• Minerals consist of atoms of one or more elements. • Atoms are the smallest unit of a chemical element that has all the element's properties. • The atoms arrange themselves in a regular three-dimensional arrangement. • The atoms in a mineral and their arrangement affect the minerals properties. o Color, shape, hardness, breakage, luster, streak, color, specific gravity, crystal shape, electrical conductivity, reaction to acid, smell, taste. • These properties are used to identify minerals	

Chapter 3, Section 1 E.B.C.   Name:_____
Minerals   Period:_____

Question (2)		
Claim 1 (2)		
A. Supporting Evidence (3)	B. Supporting Evidence (3)	
Claim 2 (2)		
A. Supporting Evidence (3)	B. Supporting Evidence (3)	
Analysis (6)		

	Claim *A statement or conclusion that answers the original question/problem.*	**Evidence** *Scientific data that supports the claim. The data needs to be appropriate and sufficient to support the claim.*	**Analysis** *A justification that connects the evidence to the claims. It shows why the data counts as evidence by using appropriate and sufficient scientific principles and vocabulary.*
0	Does not make a claim, or makes an inaccurate claim.	Does not provide evidence, or only provides inaccurate or vague evidence.	Does not provide an analysis, or only provides an irrelevant analysis.
1	Makes an accurate but vague or incomplete claim.	Provides vague evidence and does not include specific data.	Repeats evidence and links it to claim, but does not include specific scientific principles.
2	Makes accurate and complete claim.	Provides correct evidence but does not include specific data.	Connects all evidence to the claims using scientific principles or vocabulary but not both.
3		Provides correct evidence and includes specific data.	Connects all evidence to both claims using scientific principles and vocabulary.

CHECKING UP: Page 284, 1 through 4 (2 points each)

1.

2.

3.

4.

Make a concept map that demonstrates your understanding of minerals. Include the following terms: mineral, element, rock, ore, and compound. (5 points)