Sedimentary Rocks

NAME: _____

KICK OFF ACTIVITY	☐ Comparing Sedimentary and Igneous Rocks **(Pg. 2)**

Must Do All

THE FOUNDATION	☐ Sedimentary Rocks Reading with Questions **(Pg. 3-6)** ☐ Scheme for Sedimentary Rock Identification **Video (Mr. White's website)** **Questions (Pg. 7-8)**
HANDS-ON	☐ Sedimentary Rock Identification Lab **(Pg. 9-11)**

Do At Least 2

TUNE-UP ACTIVITIES	☐ Crossword Puzzle **(Pg. 12)** ☐ Flashcards **(In Classroom)** ☐ Sedimentary Rocks ESRT Practice **(Pg. 13-14)** ☐ Online Self-Check Quiz **(Mr. White's website)** ☐ VIDEO: In-Depth Sedimentary Rock Review **(Mr. White's website)**

If you didn't get 100%, do more tune-ups!!!

CHECK FOR UNDERSTANDING QUIZZES	SCORE: Quiz 1 _____ Quiz 2 _____ Quiz 3 _____ ***You must get a 100% on a quiz to move on to extension activities.** ***A 100% on a quiz will earn you a grade of 80% for the workbook.**

EXTENSION ACTIVITIES	☐ Online Sedimentary Rock Identification **(Pg. 15)** **5 Pts.** ☐ Fossils Prezi **(Pg. 16-17)** **10 Pts.** ☐ Exploring Coal **(Pg. 18-19)** **10 Pts.** ☐ Regents Diagrams - What are they telling me? **(Pg. 20-21)** **5 Pts.** ☐ Sedimentary Rocks and Ancient Environments **(Pg. 22)** **5 Pts.**

Comparing Sedimentary and Igneous Rocks

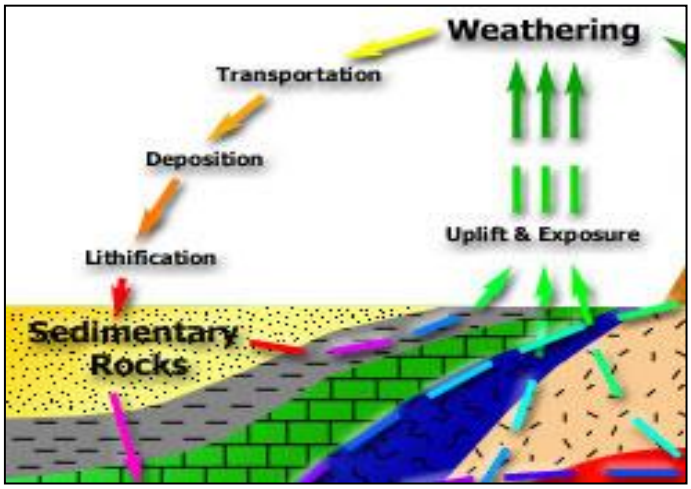
Kick-Off Activity

- Sort your container of rocks into 2 groups: Igneous & Sedimentary.
- Use observable characteristics (what you see) to help you sort them.

Igneous *Record observable characteristics that help you identify these rocks as igneous.*	**Sedimentary** *Record observable characteristics that could make these rocks sedimentary.*

Sedimentary Rocks Reading

Sedimentary rocks tell us what the Earth's surface was like in the geologic past. They can contain fossils that tell us about the animals and plants that lived in the past or show the ancient climate in an area. Sedimentary rocks are also important because they may contain water for drinking or oil and gas to run our cars and heat our homes.



QUESTIONS:

1. How do sedimentary rocks tell us about Earth's past?

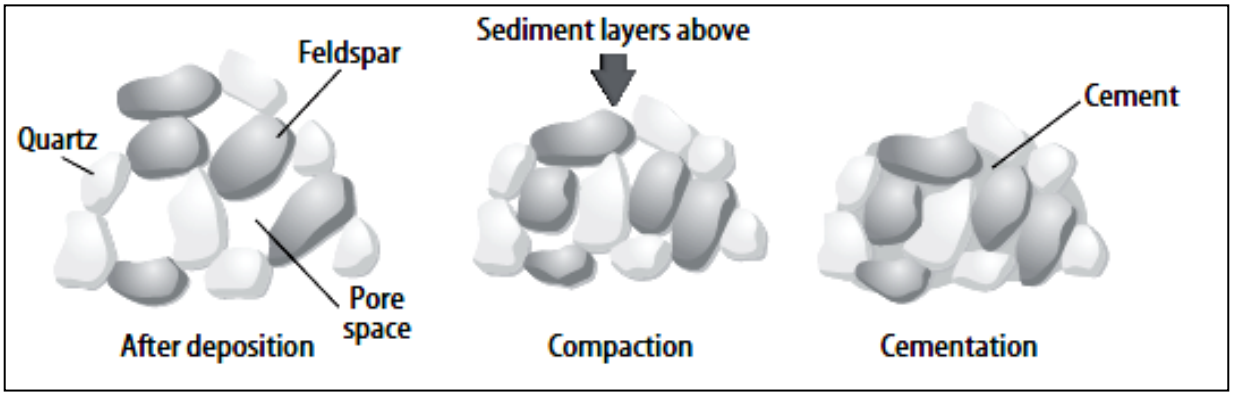
   _____

   _____

How do Sedimentary Rocks Form?

Any rock exposed at the Earth's surface can become a sedimentary rock. The forces of wind, rain, ice, and chemicals combine to break down or dissolve rocks exposed at the surface. In time, these rock pieces (sediments) can become part of sedimentary rocks. When the particles are buried by layers of sediment above them, they can be smashed together with such great force that they stick together. The force is caused by gravity pulling down on the sediments. This process is called **compaction**.

Water moving between the particles carries dissolved minerals that can act as cement. Common minerals that act as cement include quartz, calcite, hematite, and clay. When minerals slowly precipitate out of water and fill the spaces between the particles, **cementation** occurs. *Compaction* and *cementation* work together to make most sedimentary rocks, as shown below.



QUESTIONS:

1. Which rocks can become sedimentary rocks?

   _____

2. Define the terms compaction and cementation.

   _____

   _____

   _____

Types of Sedimentary Rocks

Sedimentary rocks have a wide variety of sediment sizes, textures, and compositions. To help organize these rocks, they are classified into three groups: **clastic** sedimentary rocks, **chemical** sedimentary rocks, and **bioclastic** sedimentary rocks.

Ripple marks in sandstone

Clastic Sedimentary Rocks

For clastic sedimentary rocks to form, preexisting rocks need to be weathered, which is the breakdown of rocks into pebbles, sand or clay sediments from exposure to wind, ice, and water. These sediments (inorganic clasts) then need to be *compacted* and *cemented* together to form a rock. Clastic sedimentary rocks may also contain fossils or features such as ripple marks, mudcracks, and raindrops that can indicate the type of climate that existed when the rock formed. Clastic sedimentary rocks are classified according to the **grain size** of the sediment particles they are made from.

Examples of Clastic Sedimentary Rocks

	Conglomerate	Breccia	Sandstone	Siltstone	Shale
Grain Size	Pebbles, cobbles, and/or boulders embedded in sand, silt, and/or clay (Rounded Fragments)	Pebbles, cobbles, and or boulders embedded in sand, silt, and/or clay (Angular Fragments)	Sand (0.006 to 0.2cm)	Silt (0.0004 to 0.006 cm)	Clay (less than 0.0004 cm)
Picture					

QUESTIONS:

1. How do clastic sedimentary rocks form?

   _____

   _____

2. How are clastic sedimentary rocks classified?

   _____

   _____

3. What is the difference between conglomerate and breccia?

   _____

   _____

4. What is the difference between sandstone and siltstone?

   _____

   _____

Chemical or Crystalline Sedimentary Rocks

Some sedimentary rocks form through the action of chemicals in water. If water has more dissolved minerals than it can hold, some of the minerals can **precipitate** or settle out of the water. These crystals build up to form new rock. Rock Salt, Rock Gypsum and Dolostone are produced in this way. Dissolved minerals can also form rocks when water **evaporates** leaving Rock Salt or Rock Gypsum behind.

Salt mine in New York State

Coal

Bioclastic Sedimentary Rocks

Bioclastic sedimentary rocks contain the remains of organisms. Limestone is a bioclastic rock made of the calcium carbonate shells and skeletons of dead marine animals. Coal is a bioclastic rock that is made almost entirely of the carbon that remains after plants are compressed and heated underground.

Limestone

QUESTIONS:

1. How do chemical/crystalline sedimentary rocks form?

   _____

   _____

2. How are bioclastic sedimentary rocks different from clastic sedimentary rocks?

   _____

   _____

   _____

3. Where does the carbon in coal come from?

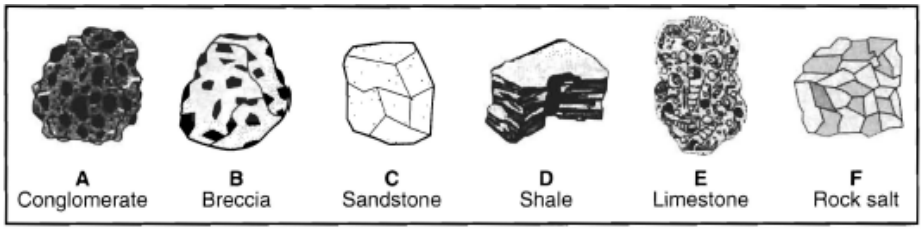
   _____

   _____

Scheme for Sedimentary Rock Identification

DIRECTIONS: Watch the video, *Scheme for Sedimentary Rock Identification*, on Mr. White's Website and then answer questions 1-10 below.

Base your answers to questions 1 through 3 on the drawings of six sedimentary rocks labeled *A* through *F*.



1. Most of the rocks shown were formed by

   (1) volcanic eruptions and crystallization
   (2) compaction and/or cementation
   (3) heat and pressure
   (4) melting and/or solidification 1_____

2. Which two rocks are composed primarily of quartz, feldspar, and clay minerals?

   (1) rock salt and conglomerate
   (2) rock salt and breccia
   (3) sandstone and shale
   (4) sandstone and limestone 2_____

3. Which table shows the rocks correctly classified by texture?

(1)

Texture	clastic	bioclastic	crystalline
Rock	A, B, C, D	E	F

(2)

Texture	clastic	bioclastic	crystalline
Rock	A, B, C	D	E, F

(3)

Texture	clastic	bioclastic	crystalline
Rock	A, C	B, E	D, F

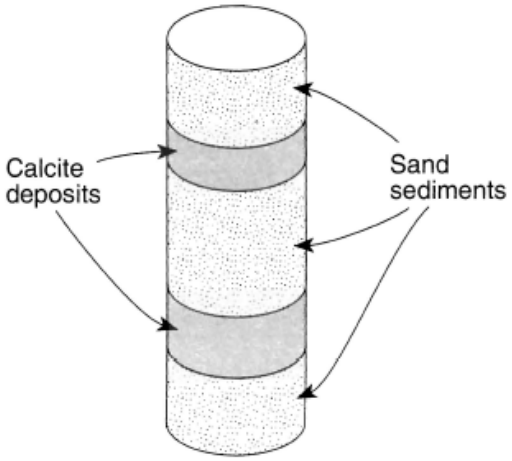
(4)

Texture	clastic	bioclastic	crystalline
Rock	A, B, F	E	C, D

3_____

OVER →

4. The diagram below shows a drill core of sediment that was taken from the bottom of a lake.



Which types of rock would most likely form from compaction and cementation of these sediments?

(1) sandstone and limestone
(2) shale and coal
(3) breccia and rock salt
(4) conglomerate and siltstone 4_____

5. Which rock was organically formed and sometimes contains fossilized plant impressions?

(1) rock gypsum
(2) phyllite
(3) breccia
(4) bituminous coal 5_____

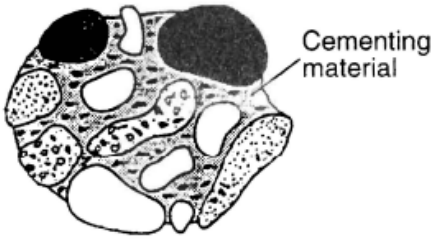
6. Which rock is made up of the largest particles?

(1) conglomerate
(2) sandstone
(3) shale
(4) rock salt 6_____

7. Which type of rock most likely contains fossils?

(1) scoria
(2) gabbro
(3) schist
(4) shale 7_____

8. The rounded pebbles of this rock have been cemented together to form



(Actual size)

(1) granite, an igneous rock
(2) conglomerate, a sedimentary rock
(3) siltstone, a sedimentary rock
(4) gneiss, a metamorphic rock 8_____

9. Give the processes to form a sedimentary rock.

_____

10. What sedimentary rock is made from the cementation and/or compaction of sediments that are 0.03 cm to 0.1 cm in size? _____

Sedimentary Rock Identification Lab

Introduction: Sedimentary rocks dominate the bedrock of Western New York State. Their existence shows that this region was once covered by a shallow sea hundreds of millions of years ago. Sedimentary rocks can be ***Clastic*** (particles), ***Crystalline*** (chemical evaporites), or ***Bioclastic*** (once living matter). Only sedimentary rocks contain fossils. In western New York State, the fossils are marine, further supporting the idea that this region was once covered by a shallow sea. Common features of sedimentary rocks are: fossils, embedded fragments, cross-bedding, and ripple marks.

Materials: ESRT, sedimentary rock samples

Procedure:

1. You will be identifying 7 different sedimentary rocks in this lab. You must have your *EARTH SCIENCE REFERENCE TABLES* ready before you can get your rock samples.

2. You will fill in a data table with the correct properties for rocks 1-7. You will then use those properties, and your ESRT, to identify the rocks.

3. Answer all questions.

*The following is a list of ways that you can **improve** your science lab write-ups.*

- ☐ I used complete sentences when appropriate.
- ☐ I answered all questions with complete ideas.
- ☐ I am neat, including using a pencil to erase mistakes.
- ☐ I reviewed the lab to make sure all questions are answered correctly.
- ☐ I asked the teacher for help when needed.

Identification of Sedimentary Rocks Data Table

Rock #	Texture	Grain Size	Rock Name	Comments (From ESRT)
1	Clastic			
2				
3				
4				
Why are rocks 1-4 considered sedimentary?				

5	Bioclastic			
6	Bioclastic			
7	Crystalline			
Why are rocks 5-7 considered sedimentary?				

Answer the questions on the next page!

Questions:

1. If Sandstone and Siltstone are both clastic sedimentary rocks and are composed of the same minerals (quartz, feldspar, and clay minerals), why are they considered **different rocks**?

   _____
   _____
   _____

2. How do **clastic** sedimentary rocks form? _____
   _____
   _____

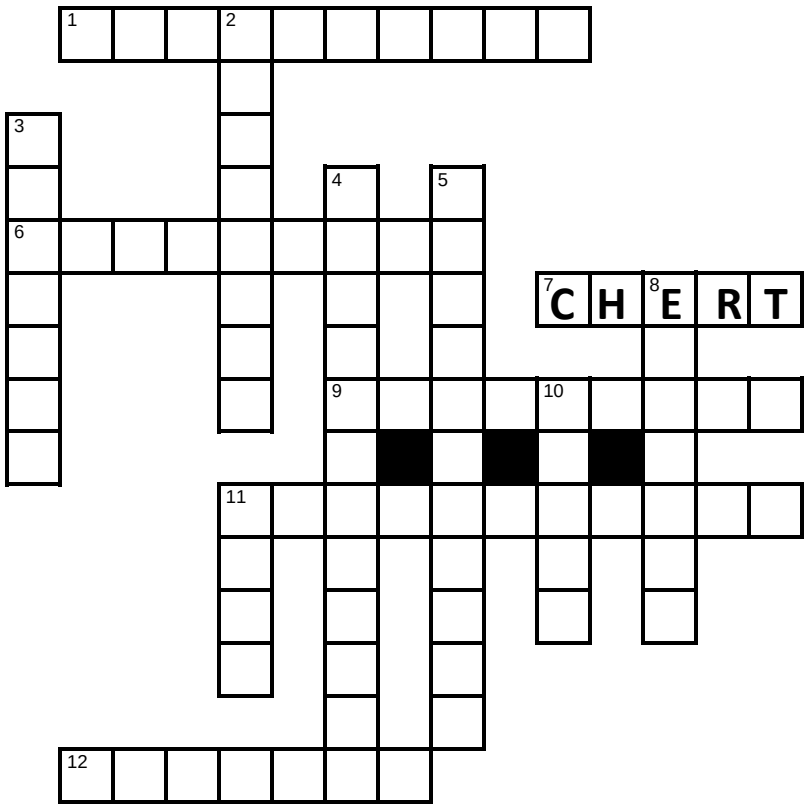
3. Rock Salt and Dolostone are classified as chemical precipitates and evaporites. What can you conclude about their **environment of formation**?

   _____
   _____

4. Bituminous coal is found in the ground in Antarctica. What does this tell you about Antarctica's **climate** in the past?

   _____
   _____
   _____

SEDIMENTARY ROCKS CROSSWORD



Across

1 The process where sediments are forced together by pressure. (10)

6 Sedimentary rock composed of small grains of sand (quartz and feldspar). (9)

7 Very hard sedimentary rock that often forms inside limestone. (5)

9 Sedimentary rock composed of the mineral calcite, which comes from evaporated seabed and animal shells. (9)

11 The process where sediments are glued together by minerals. (11)

12 Stratified. (7)

Down

2 This builds up as layer after layer of sediments pile on top of each other. It is necessary for the process of compaction. (8)

3 Something paleontologists often find in sedimentary rocks. (7)

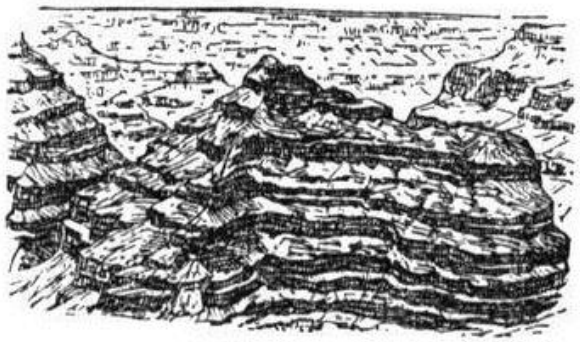
4 Sedimentary rock made from large sediments like rocks and pebbles. (12)

5 Rocks formed from sediment deposits. (11)

8 The process of breaking apart rocks by wind, rain, and temperature. (7)

10 Sedimentary rock composed of compacted clay. (5)

11 A fossil fuel created from plant deposits millions of years ago. (4)



Sedimentary Rocks ESRT Practice

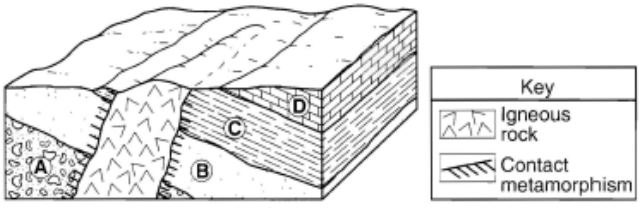
11. Which sedimentary rock may form as a result of biologic processes?

(1) shale (3) fossil limestone
(2) siltstone (4) breccia 11_____

12. Dolostone is classified as which type of rock?

(1) land-derived sedimentary rock
(2) chemically formed sedimentary rock
(3) nonfoliated metamorphic rock
(4) foliated metamorphic rock 12_____

13. The block diagram below shows a portion of the Earth's crust. Letters *A*, *B*, *C*, and *D* indicate sedimentary layers.



Which processes produced rock layer *B*?

(1) subduction and melting
(2) uplift and solidification
(3) heat and pressure
(4) compaction and cementation 13_____

14. Which sedimentary rocks are clastic and consist of particles that have diameters smaller than 0.005 centimeter?

(1) conglomerate and sandstone
(2) siltstone and shale
(3) bituminous coal and breccia
(4) fossil limestone and chemical limestone 14_____

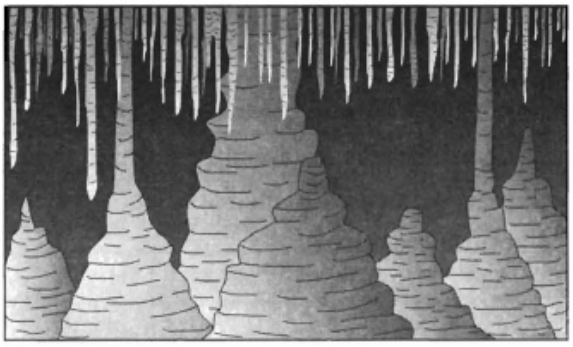
15. Most rock gypsum is formed by the

(1) heating of previously existing foliated bedrock
(2) cooling and solidification of lava
(3) compaction and cementation of shells and skeletal remains
(4) chemical precipitation of minerals from seawater 15_____

16. Evaporite deposits could be composed of which minerals?

(1) garnet and pyroxene
(2) mica and feldspar
(3) hornblende and olivine
(4) halite and gypsum 16_____

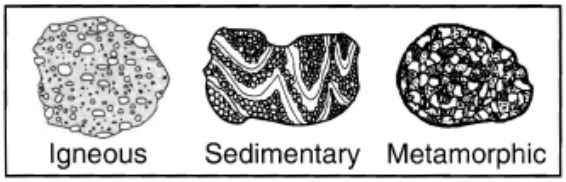
17. The diagram below shows some features in a cave.



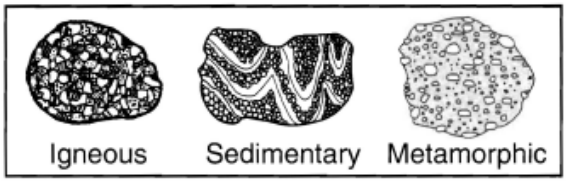
Which type of rock was chemically weathered by acidic groundwater to produce the cave and its features?

(1) siltstone (3) quartzite
(2) basalt (4) limestone 17_____

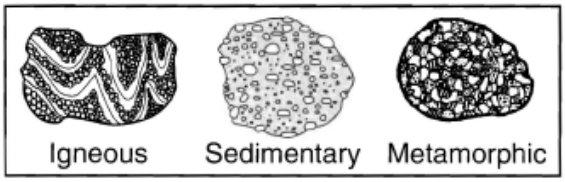
18. In which set are the rock drawings labeled with their correct rock types?



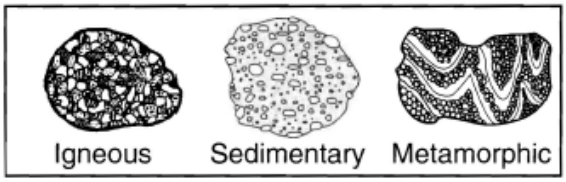
(1)



(3)



(2)

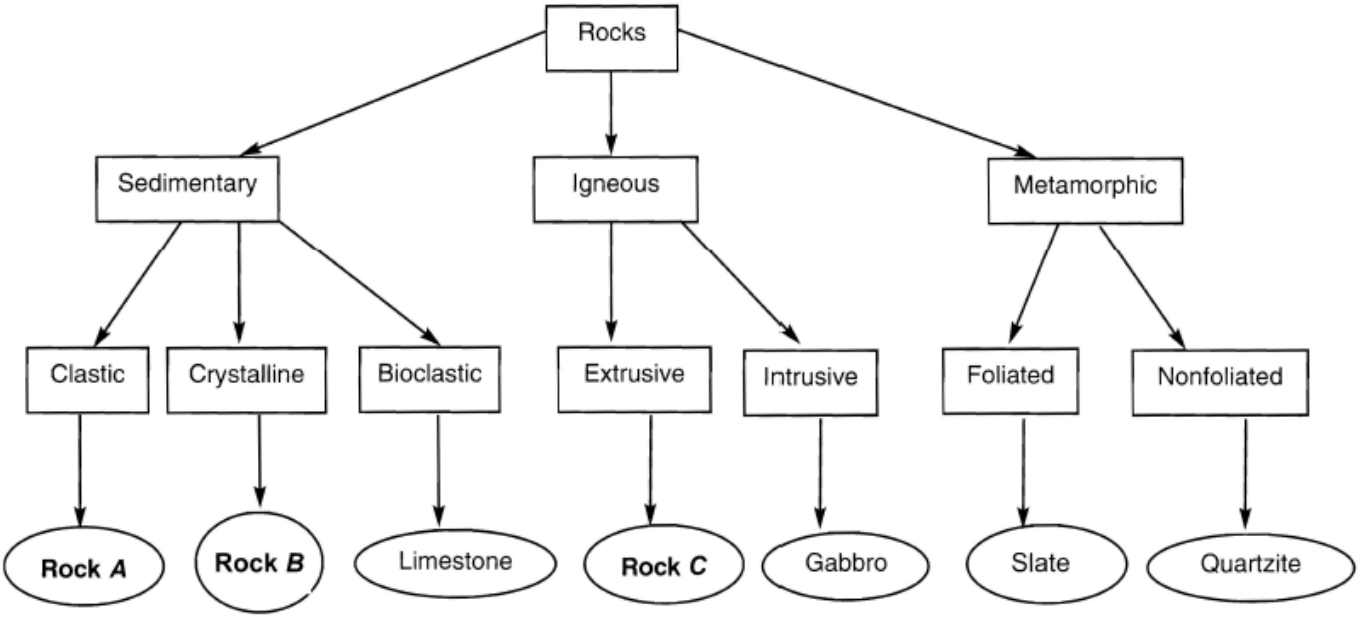


(4)

18_____

Base your answers to questions 19 and 20 on the Rock Classification flowchart shown below. Letters *A*, *B*, and *C* represent specific rocks in this classification scheme.

Rock Classification Flowchart



19. Rock *B* reacts with hydrochloric acid. State the name of Rock *B*. _____

20. Rock *A* is composed of fine-grained quartz and feldspar particles 0.008 cm in diameter. State the name of Rock *A*. _____

Online Sedimentary Rock Identification Extension

How to access the activity…

Go to the teachers Earth Science website. Under "Sedimentary Rocks Online Resources" click on **Online Sedimentary Rock Identification Extension.**

When you get the webpage open…

When you get to the webpage, read through the introduction paragraphs. Clicking on the underlined words will take you to pictures showing the different textures of sedimentary rocks. These pictures will help you later when you try to identify the different sedimentary rocks.

Identifying the sedimentary rocks…

At the bottom of the main webpage you will find samples rocks 1 through 12 to identify. After examining each sample, write the correct rock name in the spaces provided below.

Rock Names

(there can be repeats…)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____

Fossils Prezi

How to open the activity…

Go to the teachers Earth Science website. Under "Sedimentary Rocks Online Resources" click on **Fossils Prezi.**

When you get the webpage open…

When you get to the Prezi, make it full screen and use the arrows at the bottom to advance through the presentation.

What to do now…

Explore the **Fossils Prezi** *by watching the videos and reading the slides. Navigate through the Prezi to learn more about fossils. Re-watch the videos and reread the Prezi as needed to complete the extension.*

Fossils Prezi Writing Response

Write a summary paragraph about fossils by answering the questions below. ***The paragraph should be at least 10 sentences to earn credit.***

- *What is a fossil?*
- *How do fossils form and which type of rock are they found in?*
- *What do fossils help scientists to do?*
- *What are the different types of fossil preservation?*

Write your response on the next page. Use the first half of the page to take notes on the questions above as you explore the Prezi. Use the second half of the page to write your response. If you need more space, attach a separate sheet of paper.

Fossils Prezi Notes

What is a fossil?	*How do fossils form and which type of rock are they found in?*	*What do fossils help scientists to do?*	*What are the different types of fossil preservation?*

Fossils Prezi Response

Exploring Coal Extension

To start with…

Obtain a **COAL** *reading from the teacher or access it online. Read all parts of the handout and highlight important ideas.*

What to do now…

After reading all parts of the Coal Reading, complete the activity below.

Exploring Coal Writing Response

RESPONSE THOUGHT QUESTION – *How has coal had an impact on human society?*

Write a summary paragraph answering this question. ***The paragraph should be at least 10 sentences to earn credit.*** *To support your answer, include a brief description of the following:*

- *What is coal and how does it form?*
- *Where is coal found and how is it mined?*
- *How is coal used by humans?*
- *What are the positive and negative effects of using coal as an energy source?*

Write your response on the next page. Use the first half of the page to brainstorm answers the questions above as you read. Use the second half of the page to write your paragraph. If you need more space, attach a separate sheet of paper.

Exploring Coal Brainstorming

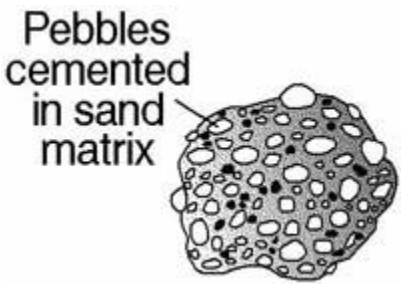
What is coal and how does it form?	*Where is coal found and how is it mined?*	*How is coal used by humans?*	*What are the positive and negative effects of using coal as an energy source?*

Exploring Coal Response

Sedimentary Rock Regents Diagrams - What are they telling me?

For each of the following diagrams, give an explanation of what you think the diagram is showing. Then write one question the Regents exam might ask you based on the diagram.

Diagram #1



Explanation:_____

_____

_____

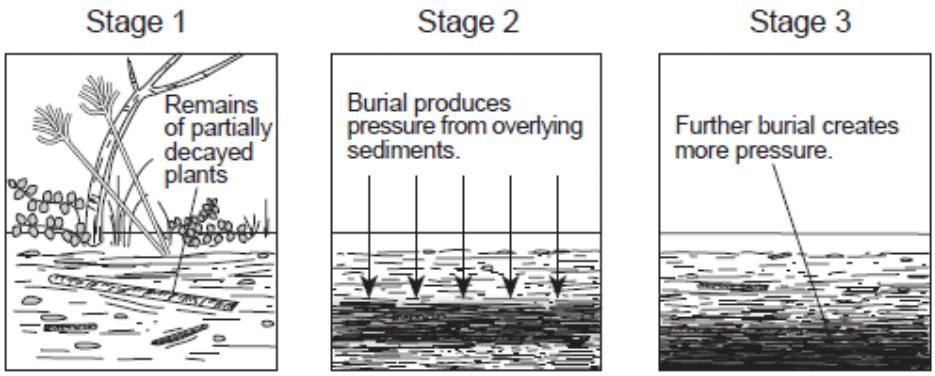
Question:

_____

_____

Diagram #2

The diagram below shows three stages in the formation of a specific rock.



Explanation:_____

_____

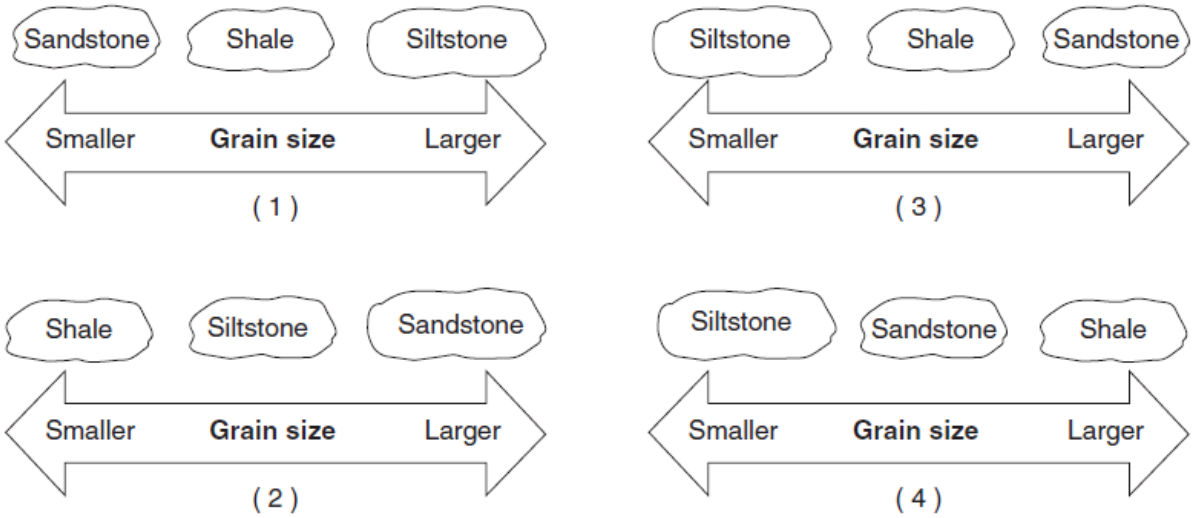
_____

Question:

_____

_____

Diagram #3



Explanation:_____

_____

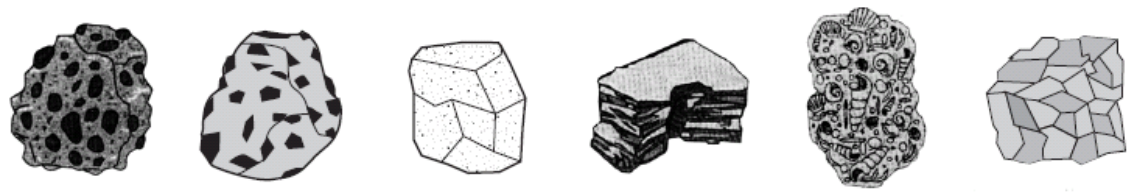
_____

Question:

_____

_____

Diagram # 4



A Conglomerate | **B** Breccia | **C** Sandstone | **D** Shale | **E** Limestone | **F** Rock salt

Explanation:_____

_____

_____

Question:

_____

_____

Sedimentary Rocks and Ancient Environments

DIRECTIONS: Access this extension through the **Sedimentary Rock Online Resources** on Mr. White's website. Click on the extension link to view the page titled *Sedimentary Rocks Contain Clues to Ancient Environments* and then complete the table below.

Environment	**Sediment Size**	**Structures/Features**	**Rock Formed** *(click the pictures and read the captions to identify the sedimentary rock that formed in each environment)*
Lake	Mud (clay)	Thin layers called laminations. Sometimes mud cracks	Shale