

Do Now (2 minutes)

4/4

K

What I know about
Sedimentary Rocks

1.

2.

3.

W

What I want to find out
about Sedimentary Rocks

1.

2.

3.

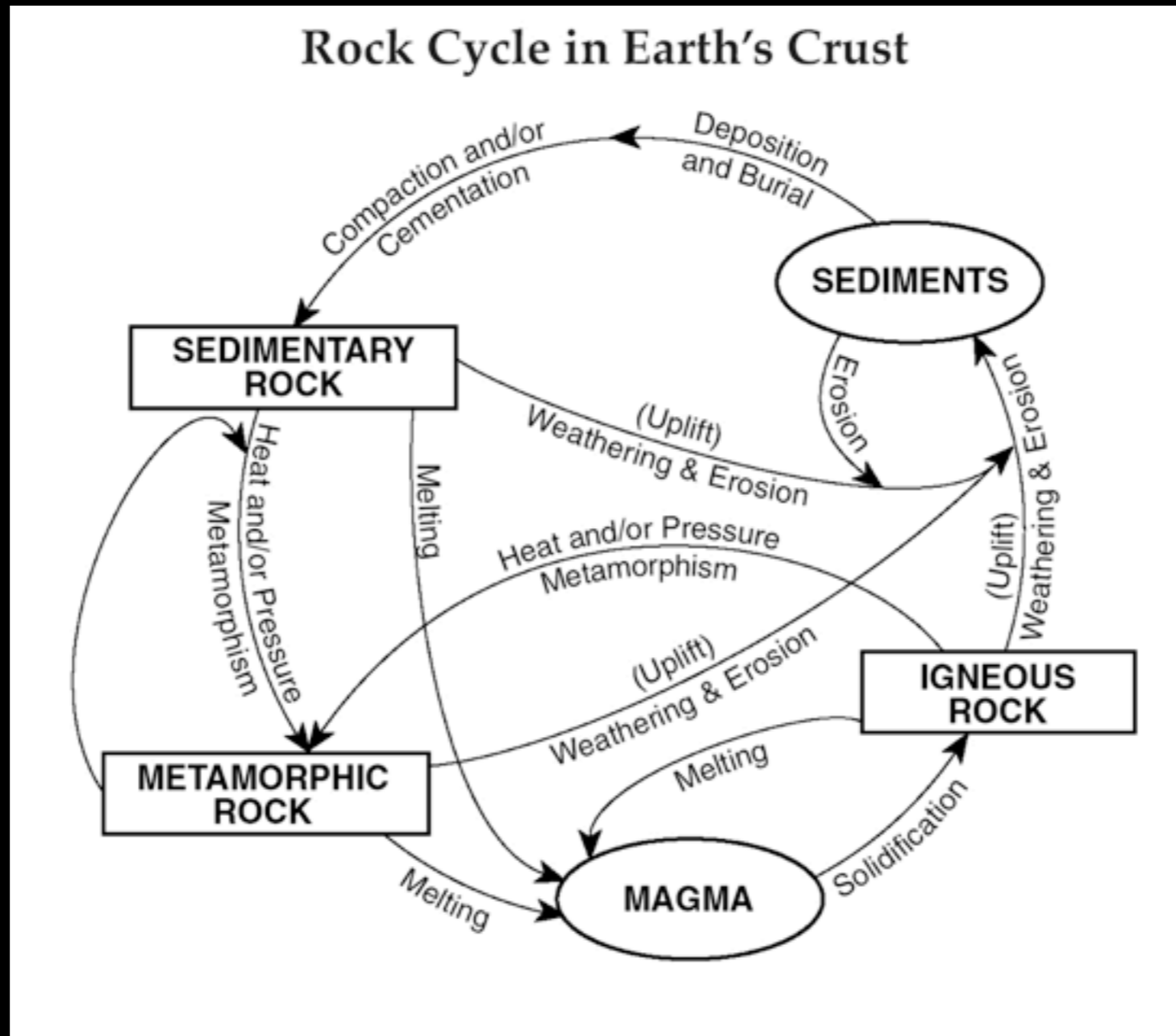
2:00

The Rock Cycle

What is the rock cycle and how do rocks interrelate?

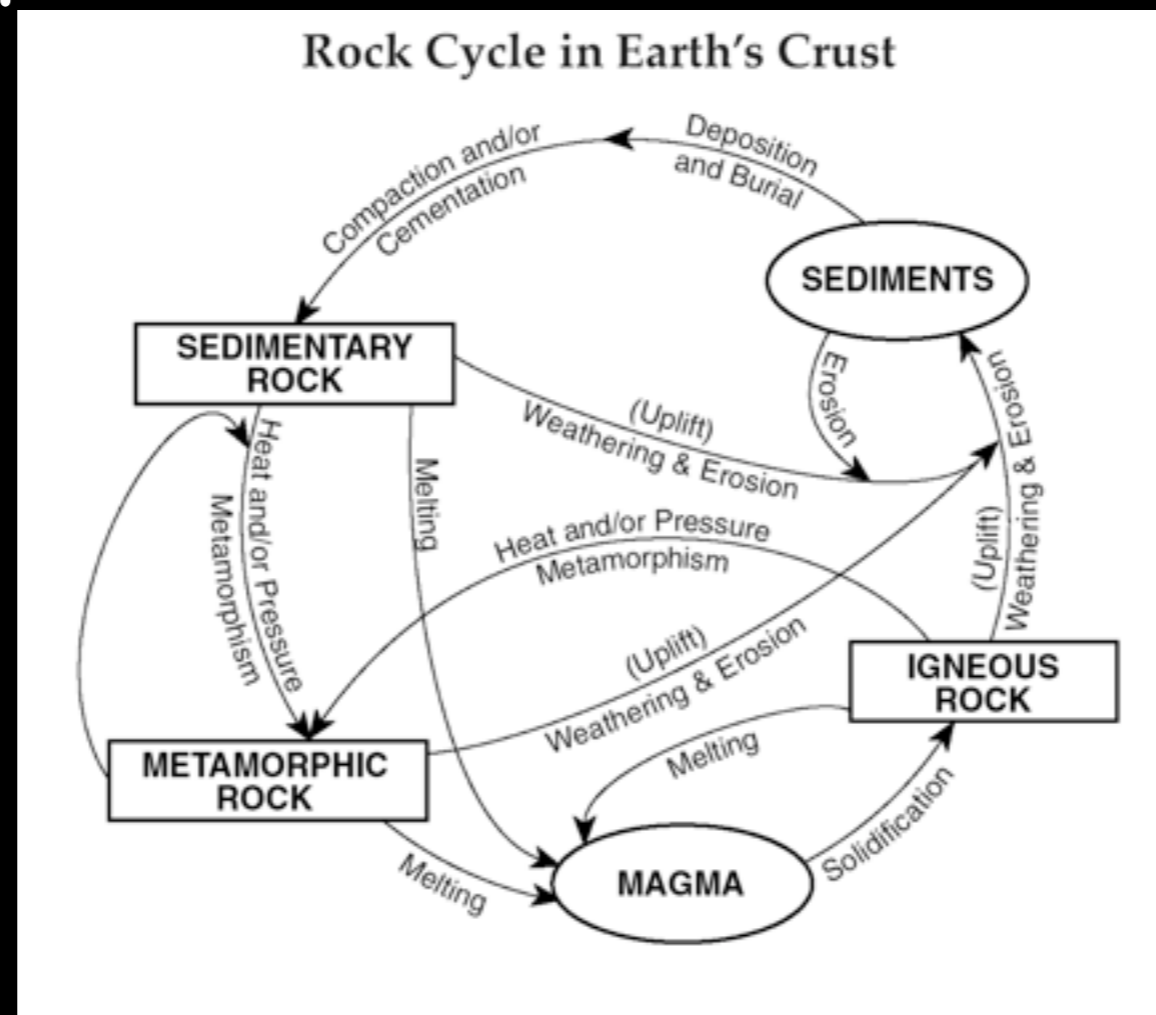
Rock Cycle

Model that is used to show how the different rock types are interrelated and the processes that create them



Rock Cycle

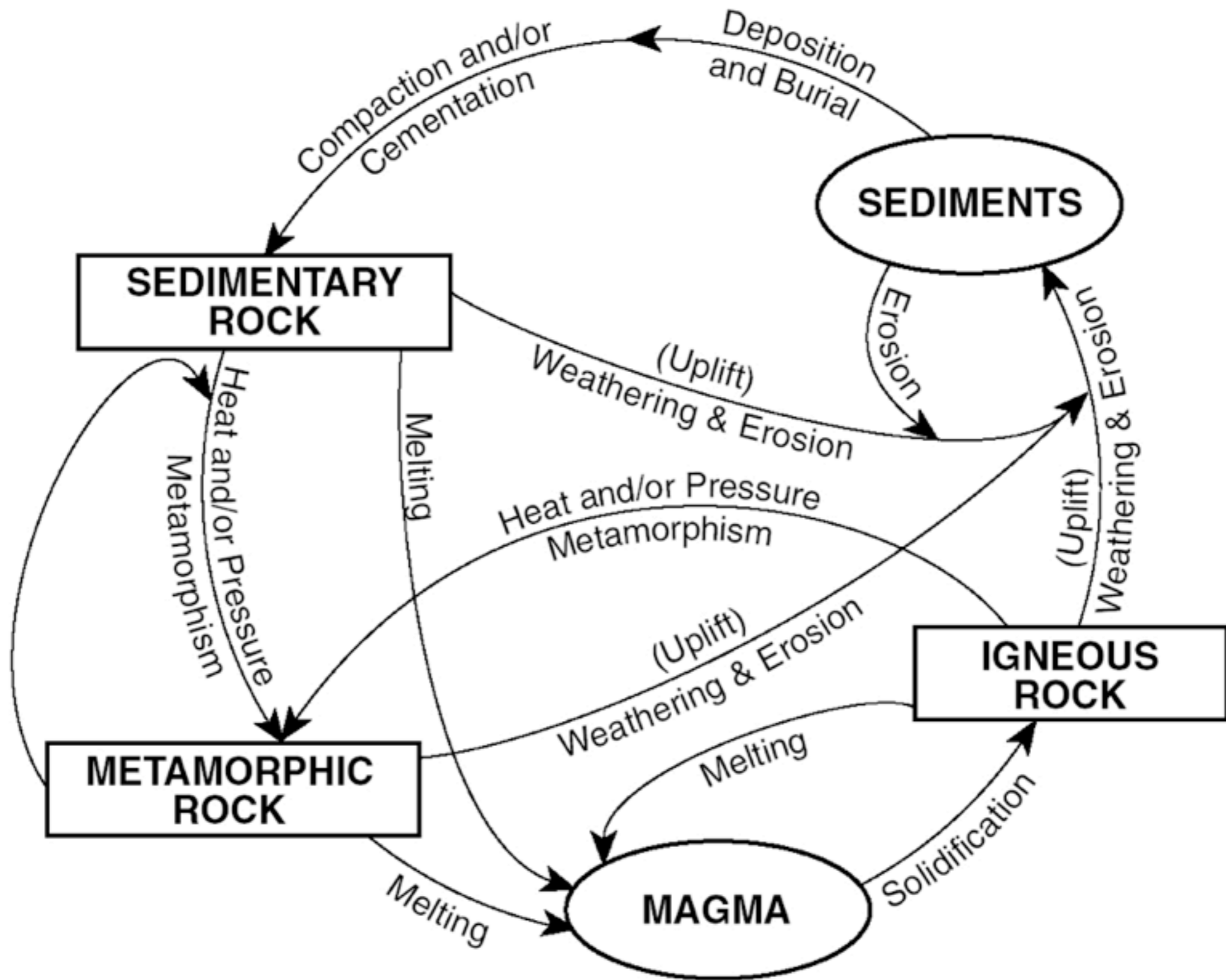
- Any rock type can change into another rock type
- Therefore any rock could contain materials that were once part of another rock



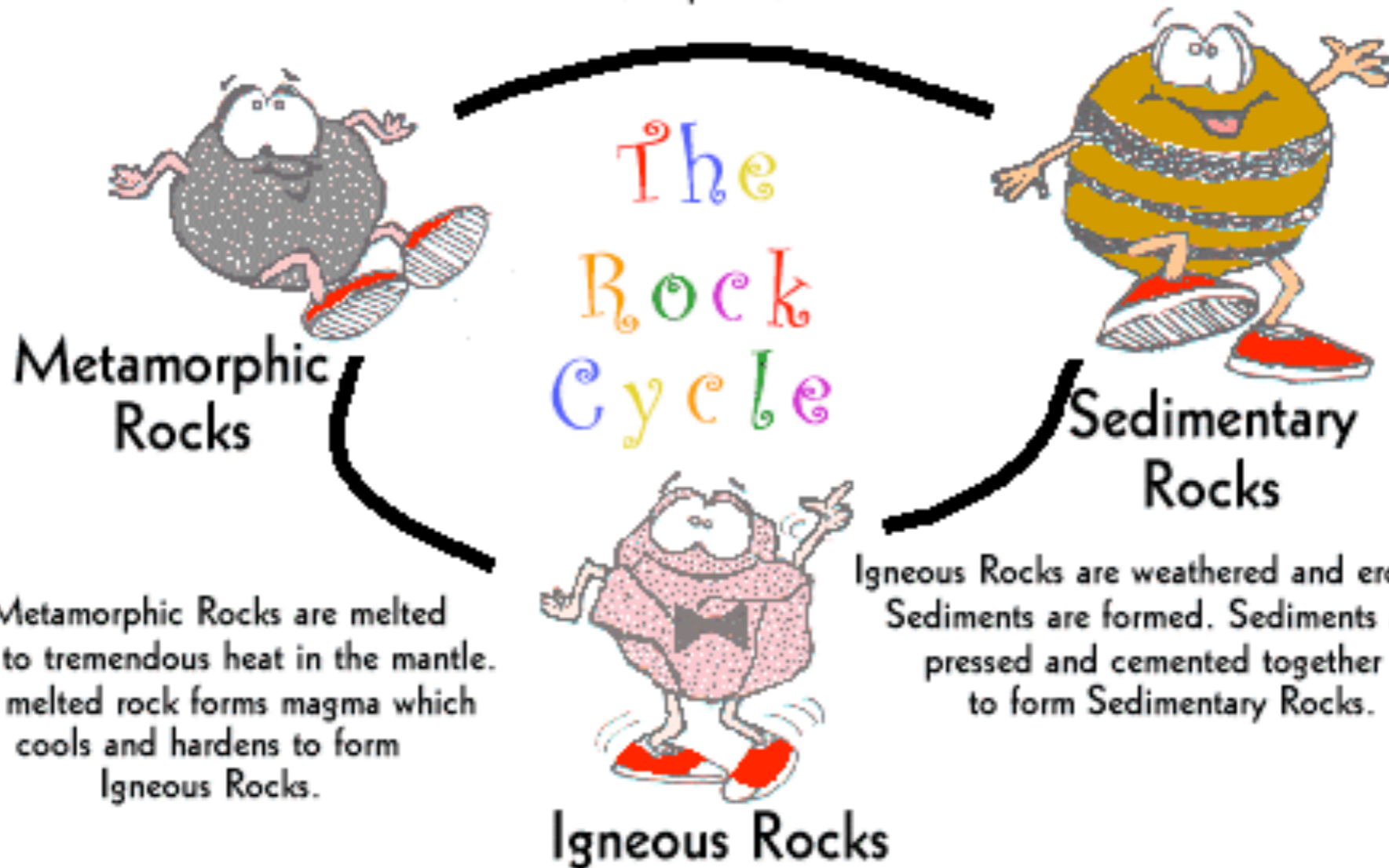
Rock Cycle

- **Igneous Rocks** – formed from melting and solidification
- **Metamorphic Rocks** – formed from heat and pressure
- **Sedimentary Rocks** – formed from fragments held together by cementation, compaction, or chemical action

Rock Cycle in Earth's Crust



Sedimentary Rocks undergo tremendous heat and pressure and form Metamorphic Rocks.



Rock Cycle









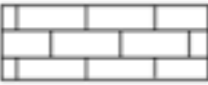

Driving Forces - the processes that create uplift, weathering, erosion, pressure, and melting to form the different rock types

1. Earth's Interior
2. Insolation from the Sun
3. Gravity

Sedimentary Rocks

What are sedimentary rocks and how do we classify them?

Scheme for Sedimentary Rock Identification

INORGANIC LAND-DERIVED SEDIMENTARY ROCKS					
TEXTURE	GRAIN SIZE	COMPOSITION	COMMENTS	ROCK NAME	MAP SYMBOL
Clastic (fragmental)	Pebbles, cobbles, and/or boulders embedded in sand, silt, and/or clay	Mostly quartz, feldspar, and clay minerals; may contain fragments of other rocks and minerals	Rounded fragments	Conglomerate	
			Angular fragments	Breccia	
	Sand (0.006 to 0.2 cm)		Fine to coarse	Sandstone	
	Silt (0.0004 to 0.006 cm)		Very fine grain	Siltstone	
	Clay (less than 0.0004 cm)	Compact; may split easily		Shale	
CHEMICALLY AND/OR ORGANICALLY FORMED SEDIMENTARY ROCKS					
TEXTURE	GRAIN SIZE	COMPOSITION	COMMENTS	ROCK NAME	MAP SYMBOL
Crystalline	Fine to coarse crystals	Halite	Crystals from chemical precipitates and evaporites	Rock salt	
		Gypsum		Rock gypsum	
		Dolomite		Dolostone	
Crystalline or bioclastic	Microscopic to very coarse	Calcite	Precipitates of biologic origin or cemented shell fragments	Limestone	
Bioclastic		Carbon	Compacted plant remains	Bituminous coal	

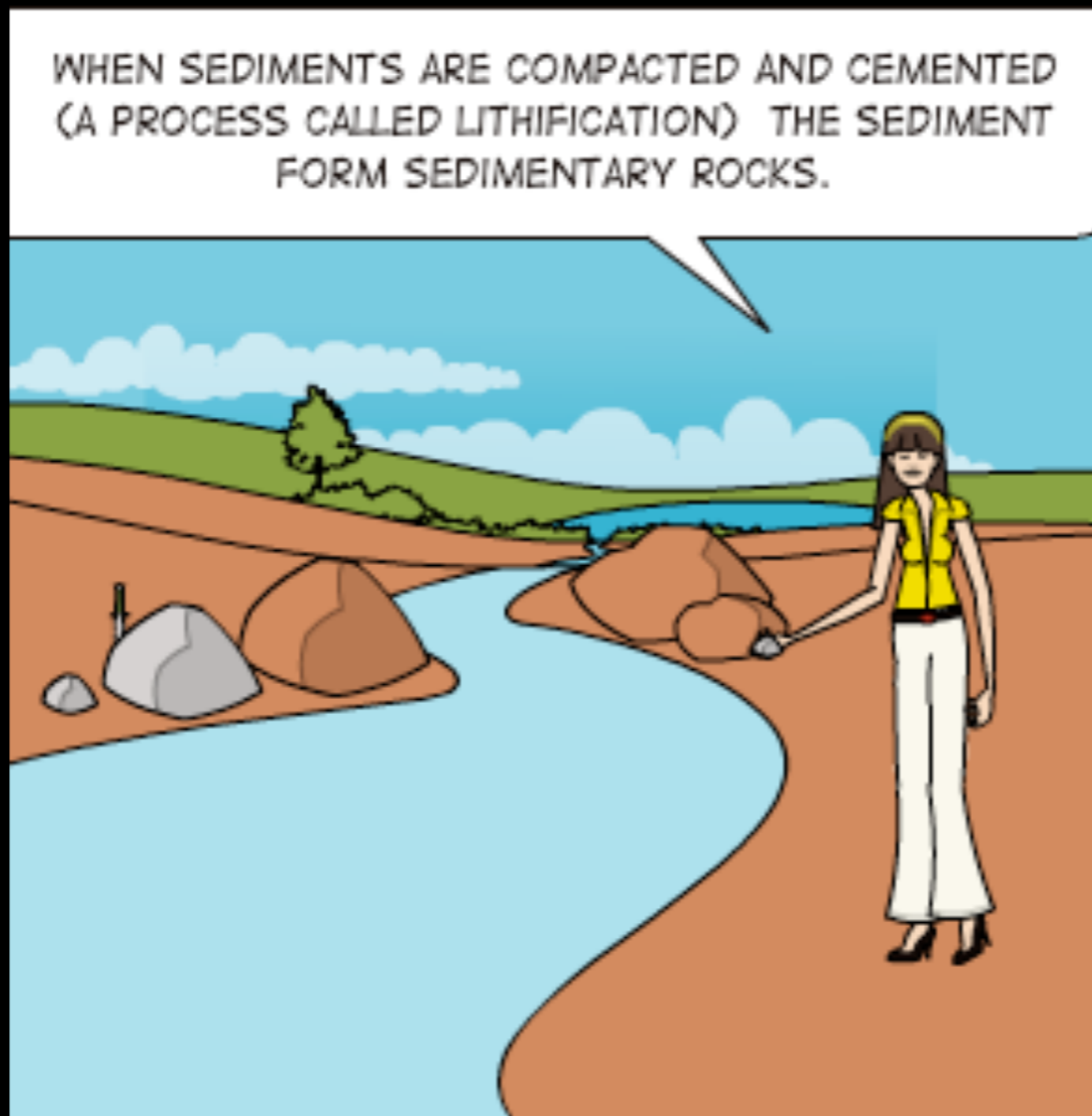
Sedimentary Rocks

Sedimentary Rocks - rock type that forms from an accumulation of sediment derived from preexisting rocks and or organic material



Sedimentary Rocks

Lithification - the process by which sediments are compacted or cemented to form a sedimentary rock.



Sedimentary Rocks

Methods to classify sedimentary rocks:

1.

2.

3.

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Sedimentary Rocks

Methods to classify sedimentary rocks:

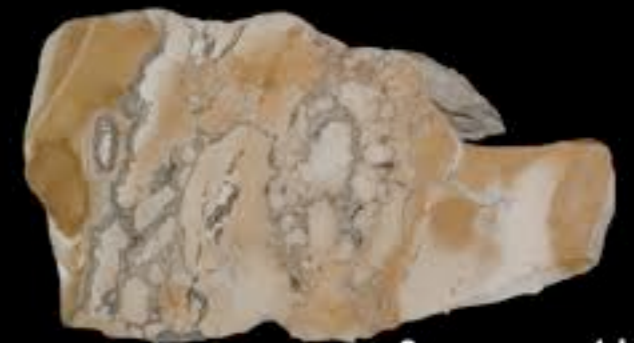
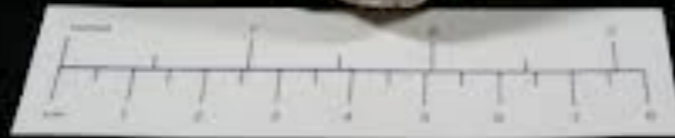
1. **Texture** – The size, form, and orientation of the clasts or pieces in a rock

Texture is the main factor in sedimentary rock identification



Sedimentary Rocks

Clastic - rock that formed from the fragments or pieces of other rocks and can be identified by size



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Sedimentary Rocks

Sediment comes in all sizes
Grain Size

Scheme for Sedimentary Rock Identification

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Bioclastic		Carbon	Compacted plant remains	Bituminous coal	

ESRT

Sedimentary Rocks

Crystalline - rock that formed from mineral grains that fall out of solution by evaporation



Sedimentary Rocks

Bioclastic – rock that formed from the remains of plants and animals



Sedimentary Rocks



**Clastic
Conglomerate
Rounded Fragments**



**Clastic
Breccia
Angular Fragments**

Sedimentary Rocks

Composition

Scheme for Sedimentary Rock Identification

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ESRT

Sedimentary Rocks

2. Formation - How the clasts of a sedimentary rock are held together

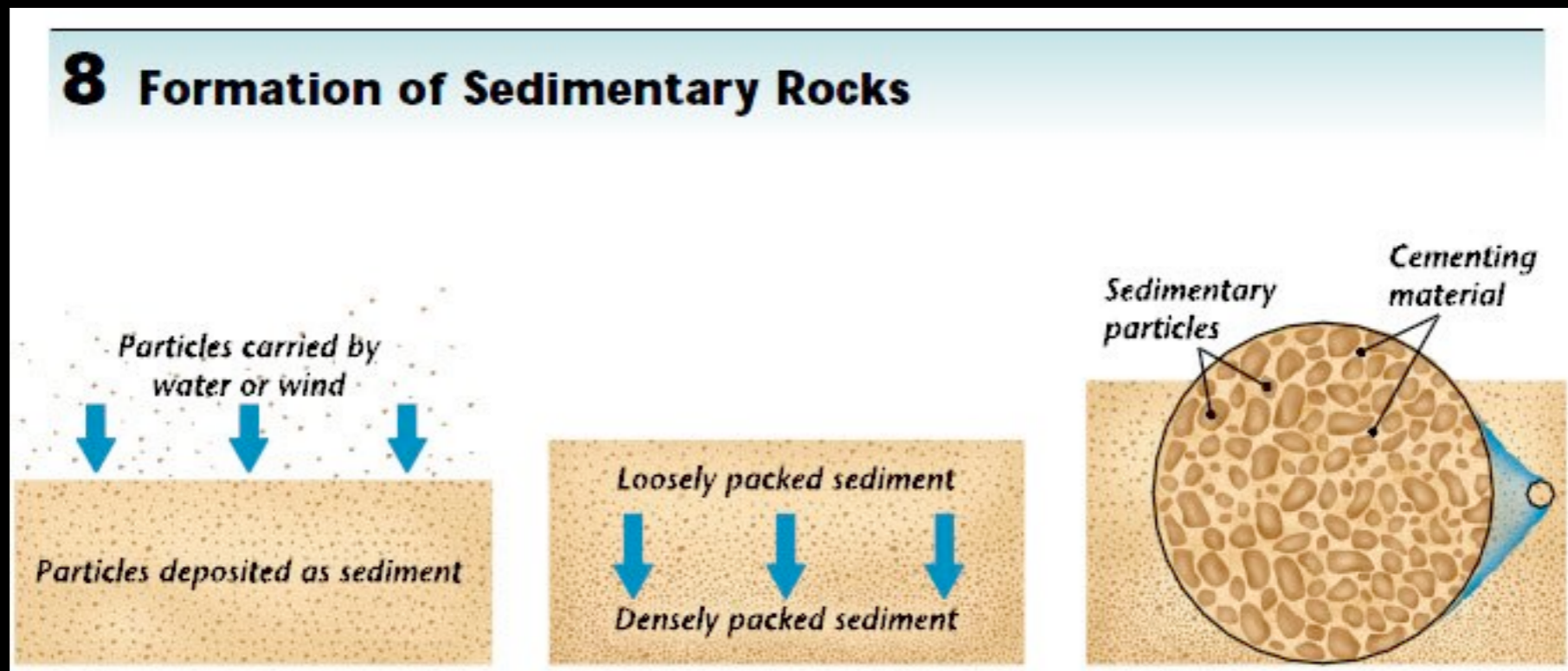
Most sedimentary rocks form under large bodies of water by the following:



Sedimentary Rocks

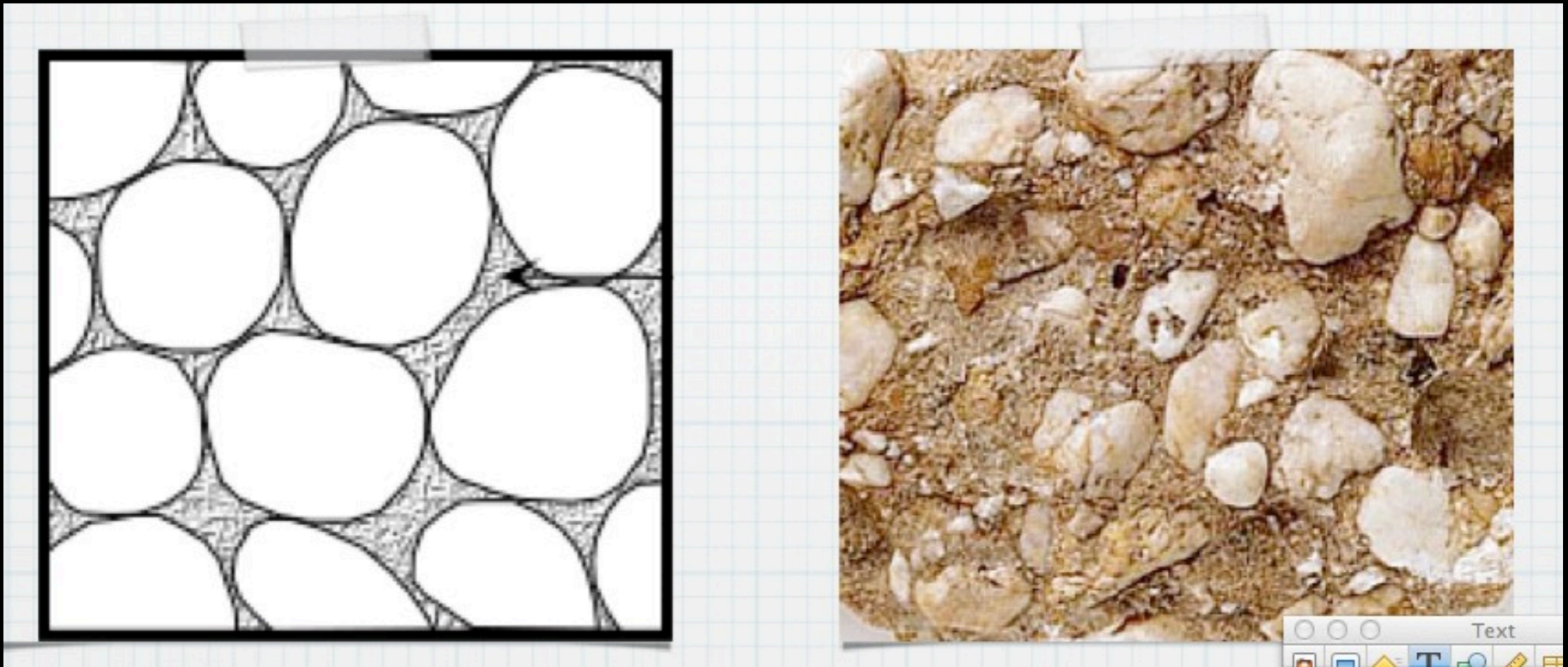
Cementation – often clasts such as clays, sands, and silts are glued together

Occurs as water between sediments dissolve and the remaining material hold the clasts together



Sedimentary Rocks

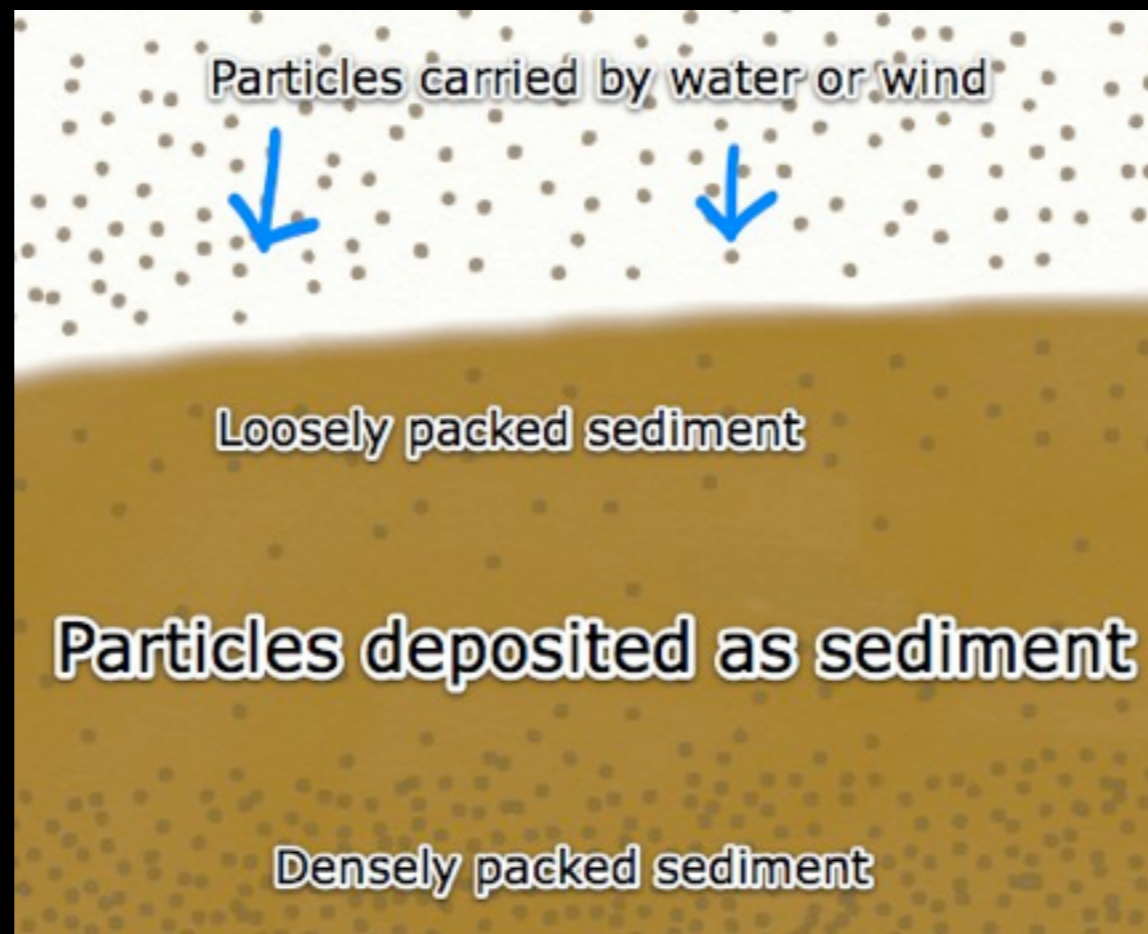
Formation



Sedimentary Rocks

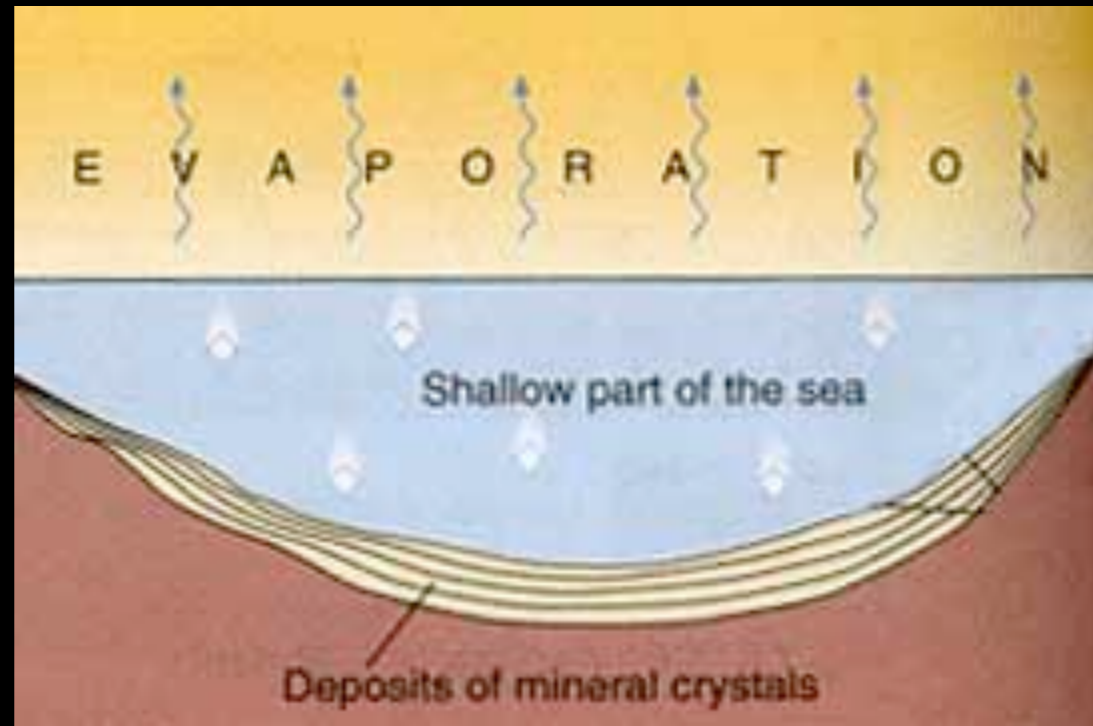
Compaction – a reduction in volume of sedimentary layers due to increasing weight of overlying sediment

Usually results in a decrease in pore space and sediments becoming more tightly packed



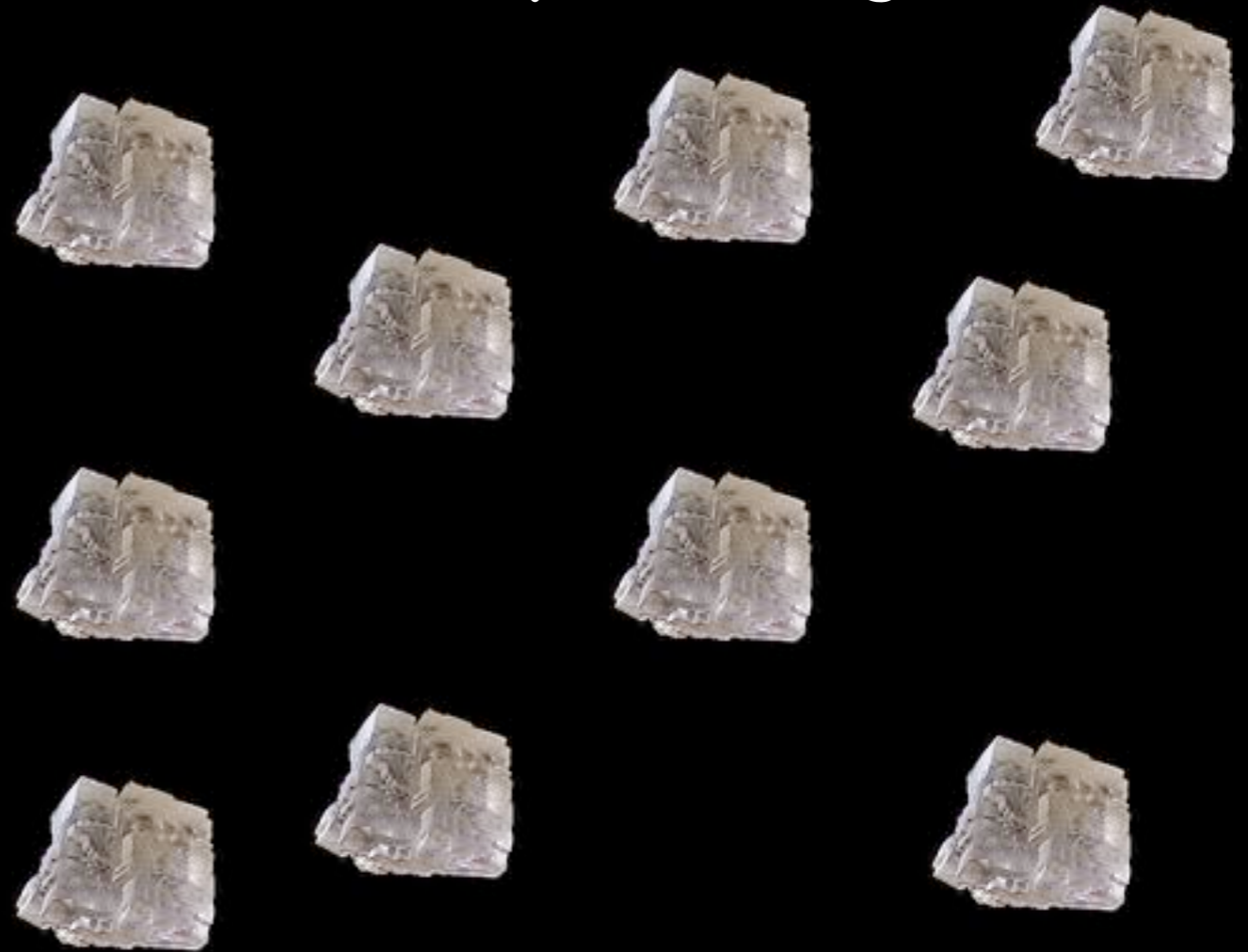
Sedimentary Rocks

Formation



Sedimentary Rocks

Chemical Action - a rock formed when dissolved minerals in water form a crystalline mass of ingrown mineral crystals after evaporating



Sedimentary Rocks

Formation



Sedimentary Rocks

3. Characteristics - The properties and traits that may help identify a sedimentary rock



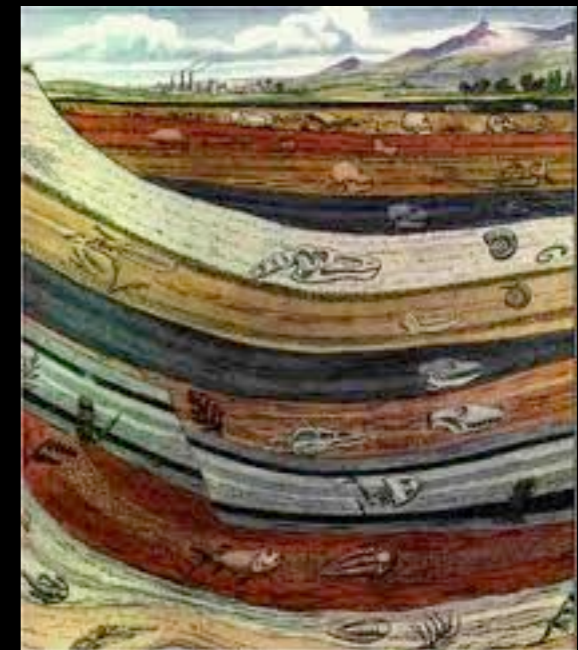
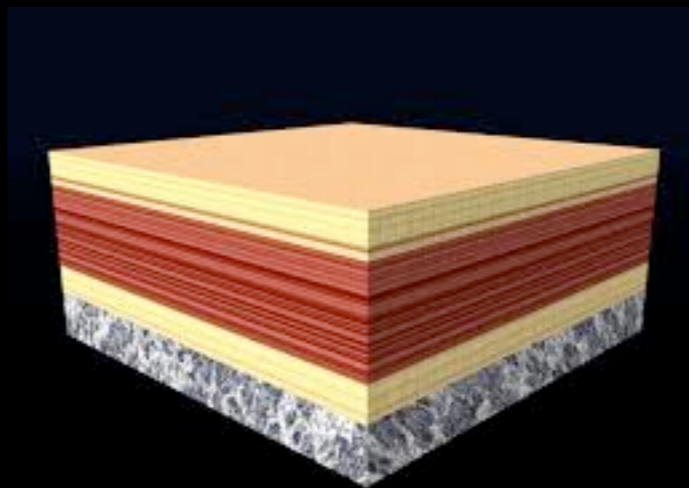
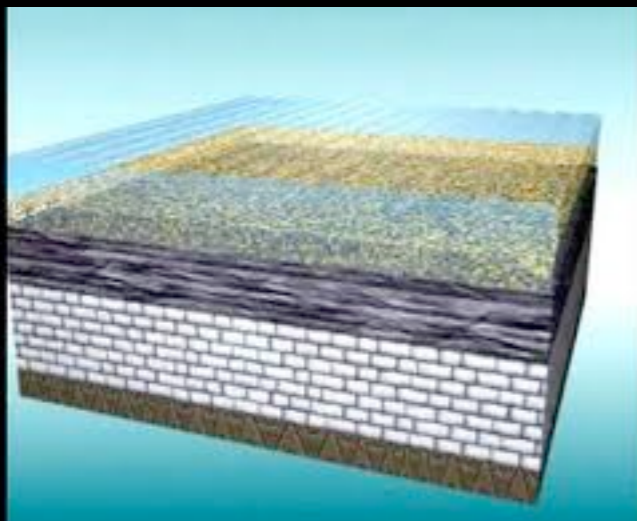
Sedimentary Rocks

Form at or near Earth's surface where weathering can break down rocks into pieces



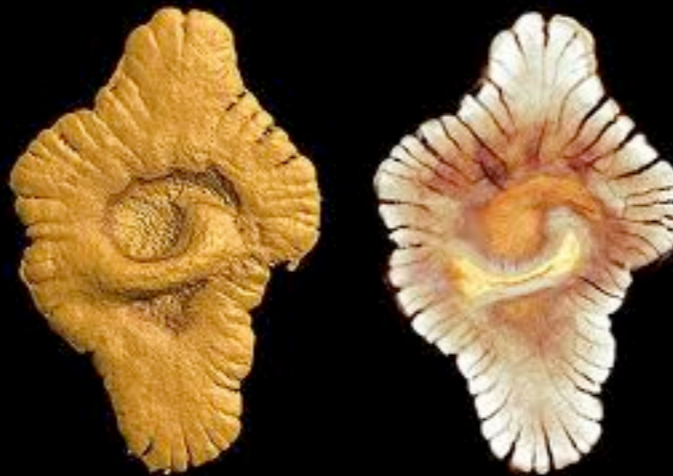
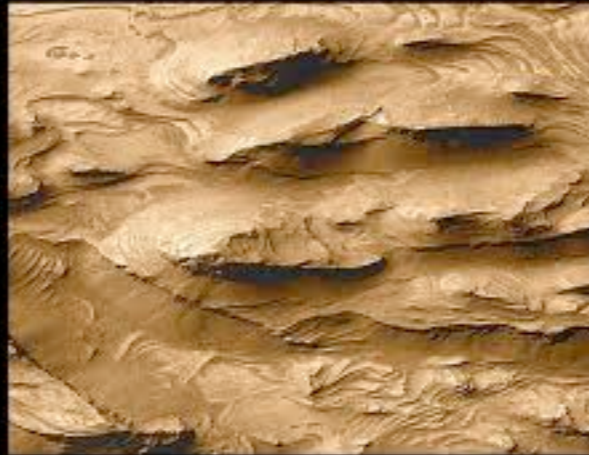
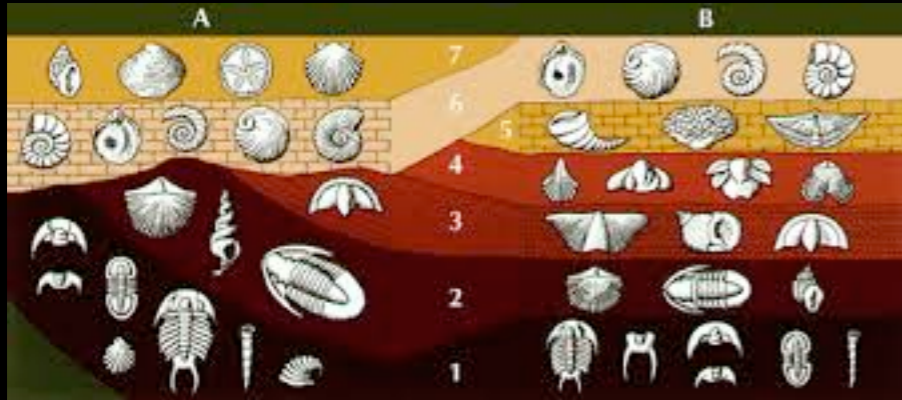
Sedimentary Rocks

Forms in horizontal layers

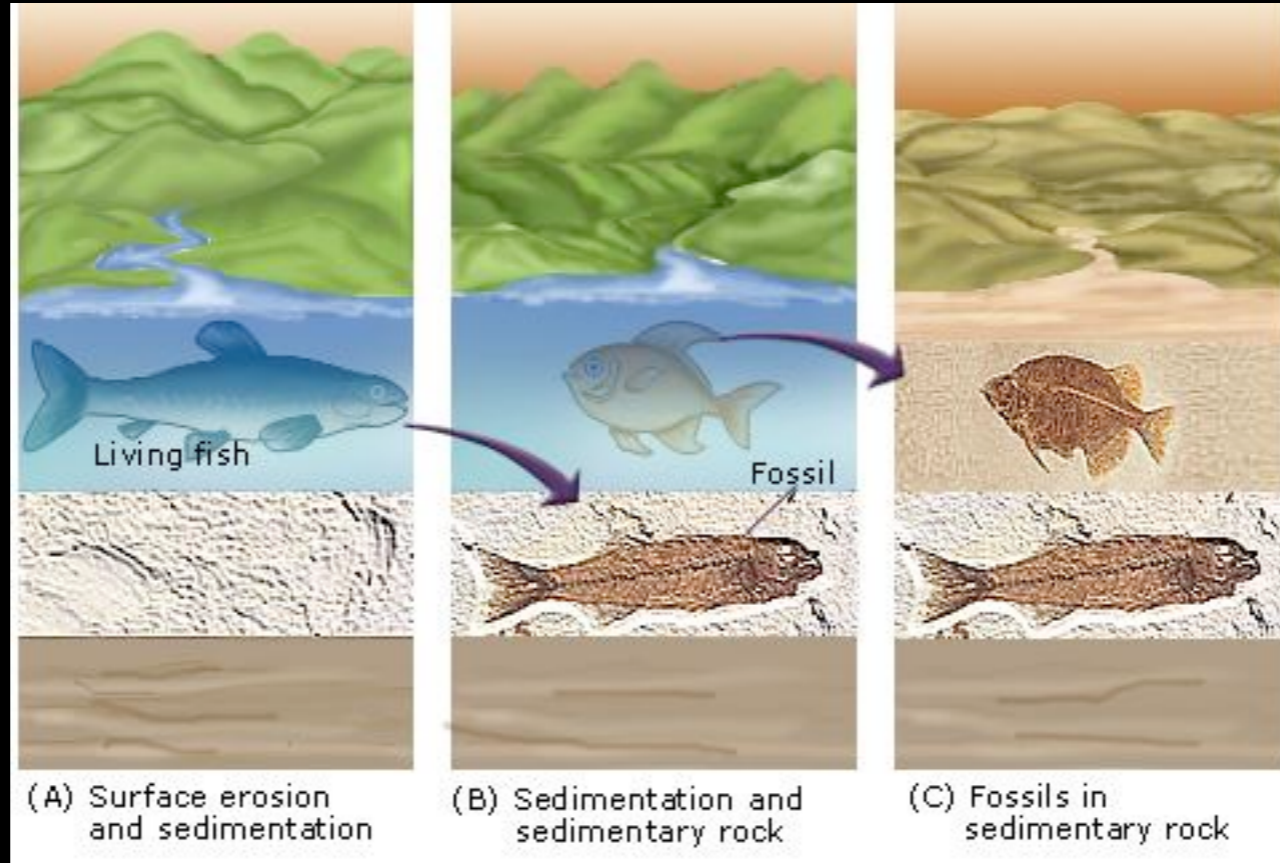


Sedimentary Rocks

May contain fossils





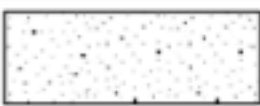


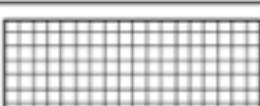




Sedimentary Rocks



Sedimentary Rocks

- Earth Science Reference Tables
- Texture
- Grain Size
- Composition
- Comments
- Map Symbol

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Generalized Bedrock Geology of New York

Bedrock Geologic Map of New York Map & Chart #15

Multi-colored maps illustrating rock type, faults, contact lines, and structure with explanatory text, in a detailed, 5 sheet format @ 1:250,000 scale.

Niagara & Finger Lakes, 36"x36";
Hudson-Mohawk, 36"x48"
Adirondack & Lower Hudson, 40"x60"
\$15.00/sheet; \$75.00/set



Available from:

Office of Cartography & Publications
New York State Museum
3126 CEC
Albany, N.Y. 12230
Tel. 518-486-2013
FAX 518-486-2034
email: nysmpub@mail.nysed.gov

Time Span of Rock Record in New York in millions of years ago

- ca. 80 m.y.a. Cretaceous: consolidated gravels, sands, clays
- 245 to 208 m.y.a. Triassic: conglomerates, red sandstones, red shales, diabase
- 360 to 285 m.y.a. Carboniferous (Late Mississippian through Pennsylvanian): conglomerates, sandstones, shales
- 418 to 360 m.y.a. Devonian: limestones, dolostones, shales, sandstone, some conglomerates
- 440 to 418 m.y.a. Silurian: limestones, dolostones, shales, sandstones, salt, gypsum, hematite
- 489 to 440 m.y.a. Ordovician: } limestones, shales, sandstones, dolostones
- 543 to 489 m.y.a. Cambrian: }
- Cambrian through Late Ordovician: sandstones, shales, limestones, dolostones
- Cambrian through Late Ordovician: quartzites, marbles, schists
- Late Proterozoic ? through Late Ordovician: sandstones, shales, slates, graywackes, rare limestones of Taconic overthrust
- 1,000 m.y.a. } Middle Proterozoic quartzites, marbles
- (regional metamorphism about 1,000 m.y.a.) } anorthosite rocks



Cartography
J. Skiba

I know a rock is Sedimentary if:

- 1. I see layers of sediment cemented together**
- 2. I see ripple marks**
- 3. I see mud cracks**
- 4. I see fossils**
- 5. I see cobbles, pebbles, and sand grains cemented together**

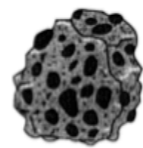
Sedimentary Rocks: Important Information

- Rocks on the surface are exposed to _____ which breaks them down.
- The broken down, smaller fragments of rock are called _____.
- Sediments often get _____ and _____ together forming a sedimentary rock.
- _____ sedimentary rocks form from sediments compacted and cemented together.
- _____ sedimentary rocks form when dissolved minerals crystalize.

SEDIMENTARY ROCKS

Clastic

Crystalline



A
Conglomerate



B
Breccia



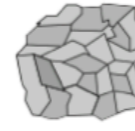
C
Sandstone



D
Shale



E
Limestone



F
Rock salt

Sedimentary Rocks

Particles cemented together and/or uniform layers of similar minerals and/or Fossils present (SEDIMENTARY ROCKS)	Pebbles (Coarse)	Rounded Pebbles	CONGLOMERATE	
		Angular Pebbles	BRECCIA	
	Fossils may be present	Sand Sized	Many colors	SANDSTONE
		Silty/ muddy sized particles	Often grey, red, or black	SILTSTONE
		Clayey particles (Fine) (‘earthy’ smell when wet)	Usually grey or black Sometimes contain fossils	SHALE
		“fizzes” in HCl	Usually ranges from dark to light grey	LIMESTONE

Lab 5: Classifying Sedimentary Rocks

Problem:

What are the characteristics of Sedimentary Rocks?



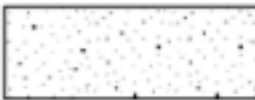


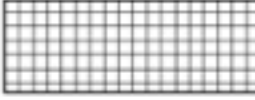


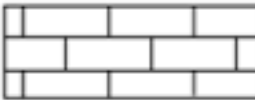
1. You can pick any 7 rocks from your box
2. Please put the rocks back in the correct spot

Rock List:

- | | |
|-----------------|---------------------|
| 1. Conglomerate | 6. Siltstone |
| 2. Breccia | 7. Shale |
| 3. Sandstone 1 | 8. Rock Salt |
| 4. Sandstone 2 | 9. Limestone |
| 5. Sandstone 3 | 10. Bituminous Coal |

- (1) Regents questions due Monday (Read & Annotate)
- (2) Class note packet due Tuesday
- (3) Sedimentary Rock Test - Wednesday

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