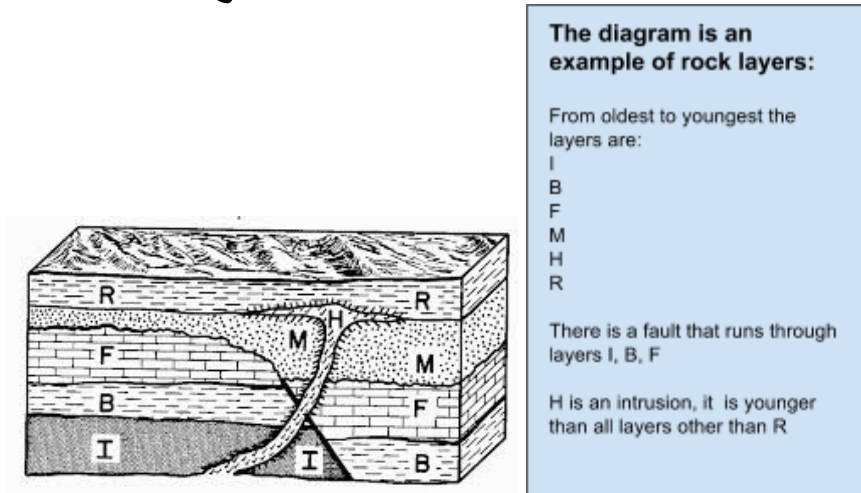


Geological Time Scale Unit Notes

Approximately 4.6 Billion years ago the earth was formed. It was not how it is now and over time slowly changed into what you see today. Scientists have developed the "Geologic Time Scale" to explain the changes of the earth related to time periods. How has the earth changed over time? How do scientist classify these different time periods?

Two types of time dating:

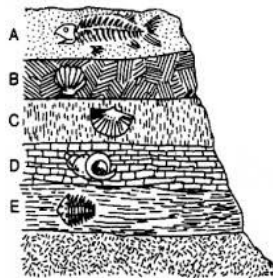
Relative Dating:



Relative Dating tells us the sequence in which events occurred, not how long they occurred.

***Fossils provide help. Looking at animals present in the layers help scientists estimate age.

They can use Index Fossils: fossils that are in different layers that can be compared to determine one rock layers age in relation to another's.



**Law of Superposition: the law that states that the older rock is on the bottom and the younger rock is on top.

Relative Dating Continued...

ROCK LAYERS ARE NOT ALWAYS UNDISTURBED:

ways the layers are disturbed:

Earthquakes	flooding
Faults	erosion
Flooding	volcanic activity

unconformity: a gap in the rock sequence that happens because...

1) Agents of erosion (wind, water, glaciers) move layers or parts of layers away

-or-

2) because no deposition occurs in that area (deposition does not evenly distribute sediments- higher areas may not get as much lower etc..)

-or-

3) earthquakes/plate movement has caused ground to be uplifted

other ways the rock layers are disturbed:

1) Intrusions: must be younger than the rock they pass through. (you cannot go through something unless it was there first)

2) Faults: they cause layers to shift up or down. *** See diagram included in the relative dating definition

Absolute Dating: any method of measuring the age of an event or object in years. The actual age of a rock or mineral

The way scientists do this is by using radioactive dating

***radioactive dating: uses the half-life of atoms to figure out the age of the rock layers the atoms are in (Determines absolute age)

SCIENTIFIC DATING

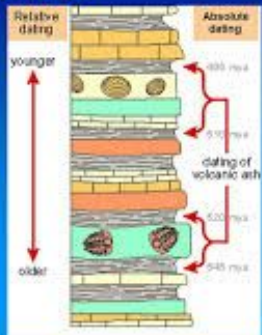
Absolute Dating: numerical dating to give rocks an actual date or date range, in number of years

Relative Dating: compare how old something is in comparison to something else.

used to put rocks and geological events in correct chronological order.

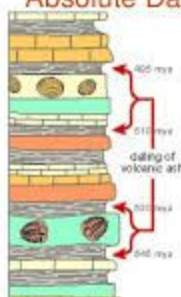
HOW?

- Use sedimentary rocks
- Use fossils
- Study strata



Absolute Dating

- When scientists want to determine the age of a fossil more precisely, they use absolute dating to get an exact age
- **Absolute dating:** method of measuring age of object in years



Vocabulary:

(see also the definitions of dating at the beginning of the notes)

1. Eon: the largest division of geologic time
2. Epoch: a subdivision of geologic period
3. Era: a unit of geologic time that includes two or more periods
4. Geologic Time Scale: the standard method used to divide the Earth's long natural history into manageable parts
5. Cenozoic Era: era that began about 65 million years ago, known as the "Age of Mammals"
6. Extinction Rate: the rate at which species die off
7. Mass Extinction: occurs when a large proportion of the earth's species go extinct in a relatively short period of time
8. Mesozoic Era: era that began 245 million years ago and lasted for almost 300 million years.
9. Paleozoic Era: era that began about 544 million years ago and lasted for almost 300 million years.
10. Period: a subdivision of the eras in geologic time
11. Extinction: the evolutionary termination of a species caused by the failure to reproduce and the death of all remaining members of the species; the natural failure to adapt to environmental change
12. Fossil: evidence of past life preserved in rock
13. Fossil record: the complete body of fossils that shows how species and ecosystems change over time
14. Index Fossil: a fossil found in a narrow time range but widely distributed around the earth; used to date rock layers

Geologic Timescale:

*The largest sections are called "eons"
 **"Eons" are divided into "eras" (2nd largest section)
 ***"Eras" are divided into "periods"
 * Then "periods" are divided into "epochs"
 * Usually the oldest sections are shown on the bottom and the most recent sections are shown on the top

GEOLOGIC TIME SCALE						
EON	ERA	PERIOD	EPOCH			
Phanerozoic	Cenozoic	Quaternary	Holocene	Present		
			Pleistocene	0.01		
		Tertiary	Neogene	Pliocene	1.6	
				Miocene	5.3	
				Oligocene	23.7	
				Eocene	36.6	
			Paleogene	Eocene	57.8	
				Paleocene	66.4	
				Mesozoic	Cretaceous	144
					Jurassic	206
	Triassic	245				
	Paleozoic	Cambrian	Permian	286		
			Pennsylvanian	320		
			Mississippian	360		
Devonian			408			
Silurian			438			
Ordovician			505			
Precambrian	Proterozoic	Cambrian	570			
		Archean	2500			
		Hadean	3800			
				4550		

Age in millions of years before present

How is Time Divided into these different eons, eras, periods, epochs?

- Major changes in Earth's history mark the boundaries between the sections
- Most sections have been divided because a major organism developed or went extinct

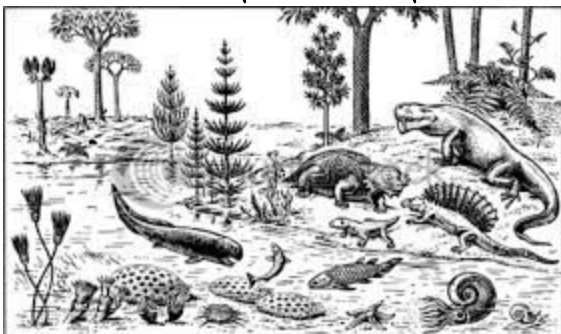
Precambrian Time

- Time from the formation of the Earth (4.6 Billion years ago) to 542 million years ago
- The earth was very different
- At first, there was no oxygen or living things
- Then the first organisms appeared in the oceans 3.6 billion years ago
- They were called prokaryotes (one celled, no nucleus, organisms)
- After another 1 billion years, more complex organisms developed called eukaryotes (many cells, with a nucleus)



Paleozoic Era

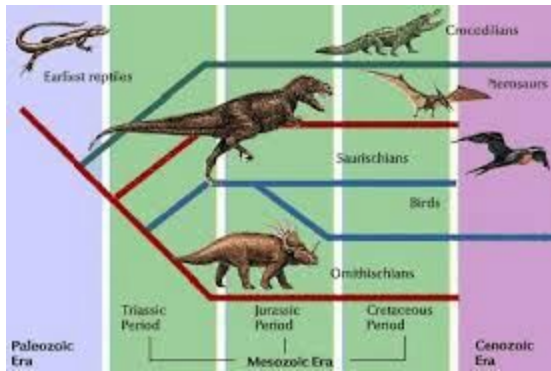
- Began 542 mya and ended 251 mya
- Divided into 6 periods
- Many new life forms appeared during the 1st period, Cambrian Period= Cambrian Explosion
- For the first time on Earth, organisms had hard parts (shells, exoskeletons)
- Some organisms that were alive during this period still exist today (ferns and salamanders)
- PERMIAN EXTINCTION: The largest mass extinction happened 251 mya
 - ~ it marked the end of the paleozoic era and the start of the Mesozoic Era
 - ~ scientists are not sure what caused the mass extinction (maybe Climate change & volcanoes)
 - ~ 90% of ocean life and 78% of land life died
 - ~ reptiles and amphibians survived!



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Mesozoic Era

- Began 251 million years ago
- Surviving reptiles and amphibians evolved into many other species (like dinosaurs) = "Age of Reptiles"
- CRETACEOUS-TERTIARY EXTINCTION: another mass extinction happened 65 million years ago
 - ~ marked the end of the Mesozoic Era and the beginning of the Cenozoic era
 - ~ scientists think an asteroid hit earth, the dust clouds blocked out the sun, plants died, then herbivores, then carnivores.



Cenozoic Era

- Began 65 million years ago and continues today
- Scientists know the most about this Era because the fossils are in the top rock layers and are easier to find
- Land & climate has changed a lot

