Ground Water

The YAK can live at altitudes of 20,000 feet above sea level and temperatures of -40°.

to the oceans

Run off

2 Precipitation

OCrater

Main Vent

Side Vent 1 Sill

Magma Chamber

Evaporation

Cumulus clouds are white puffy clouds that look like cauliflower. When a cumulus cloud grows into a thunderstorm, the cloud is called a cumulonimbus

cloud.

Cumulus

gave the clouds their

scientific names?

2 miles 3.2 km Cumulonimbus

3 miles

4.8 km

Volcanoes

Magma comes from the mantle of the Earth where it is very hot. From there it takes the path of least resistance as it rises up through cracks and crevices. Magma is the name given molten or liquefied rock below the Earth's surface. Once it breaks through the crust of the Earth it is called **lava**. If it reaches the surface of the earth and hardens there, it is known as an extrusive rock. If it rises into the crust but hardens before it reaches the surface, it is known as an intrusive rock. If it goes into horizontal cracks between sedimentary layers, it forms a sill.

When a volcano suddenly erupts because of a build-up of steam and other gases, volcanic materials and rocks are ejected with great force. Volcanic ash and rocks have been known to be thrown out with so much force that they are shot several miles into the air. The temperature of a lava flow can reach 2,000° Fahrenheit. When Mount St. Helens erupted on May 18, 1980, the explosions were equal to the force of 33,000 atomic bombs.

Microbes



Caves

a volcano surrounded by massive debris called Socompa. At over 19,000 feet, this barren waste is home to the world's highest known community of microbes. Microbes are tiny single-celled creatures.

them)

Inflow

those

into

caves are

which a

stream

sinks

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partly

are only

and

Basic types of caves

Through

caves are

those

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and

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crossed

stream

acces-

sible to

humans

Relict are

without

a flowing

stream, but

may have

ponds or

dripping

water.

those caves

Active or live caves (caves

which have a flowing stream in

Outflow

caves are

those

from

which a

stream

and

are

which

partly

acces-

sible to

humans

emerges

On the border of Argentina and Chile is

Cloud classifications High-level clouds are 20,000 feet and up medium and are made of ice crystal. Their names start with cirro Medium-level or cirrus clouds are between 6,000 (meaning curly). and 20,000 feet. They are

made up of water drops and ice crystals and their names start with alto (meaning high). Low-level clouds range between ground level and 6,000 feet and are the strato clouds made of water drops.

Luke Howard gave the clouds their scientific names in 1803! This British chemist who also enjoyed meteorology gave the names to clouds that we know today: cumulus, stratocumulus, stratus, cirrostratus, and cirrus.

> Stratus Stratus clouds are low altitude grey

clouds that form a rather flat base. Light rain often falls from stratus clouds. When precipitation falls from stratus clouds they are usually called nimbostratus.

1 mile 1.6 km

Nimbostratus



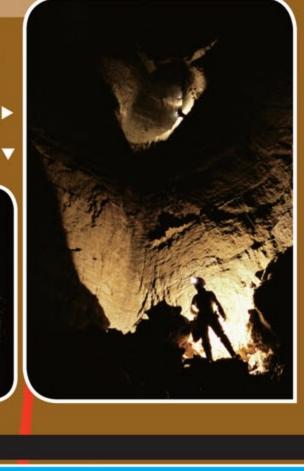
Mexico at 83.264 miles.

accessible to humans. **Record-breaking caves** The longest underwater cave is Ox Bel Ha in

Water table

Republic of Georgia at 7,020 feet 11 inches. The longest cave is Mammoth Cave in Kentucky at 359.774 miles (so far!).

The deepest cave is Voronya Cave in the



balloon flight took Jean-François Pilâtre de Rozier and François Laurent d'Arlandes Tallest buildings in the world up to the dizzying height of 79 feet. Early skyscrapers were constructed in the mid-1880s through 1939 and were originally made of brick, then steel. Innovations like elevators and electric lighting helped make these tall structures feasible. The Chrysler Building and then the Empire State Building in 1930-31 claimed the title, which was held by American skyscrapers until 1998. Burj Khalifa in Dubai

A typical commercial pleasure balloon

level, although flights up to 10,000 feet are

possible. In 1783, the first modern hot air

flight reaches anywhere from about 500 feet

to as much as 3,000 feet altitude above ground

2,717 ft Makah Royal Clock Tower 1,971 ft Hotel in Mecca Taipei 101 in Taipei 1,670 ft Shanghai World Financial 1,614 ft International Commerce 1,588 ft High and low tides are caused

deep can you go

diving.

adults.

Deep Diving

Average limit for casual surface

Recommended

diving limit for divers. Average depth at which nitrogen narcosis (drunk on air) symptoms begin to appear in

Depth at which compressed air

results in an

unacceptable

risk of oxygen

body cells).

2,000 feet/ Navy diver in

610 meters Atmospheric

In March 2012, James Cameron completed a

record-setting

all the water on Earth only about 3 percent is fresh or

"sweet" water. This can be found in places like ponds,

or glaciers, or underground in cave springs and streams as well. The rest of the water accessible is salt water and unusable for most pur-

poses unless it goes through

expensive salt or saline removal processes.

rivers, and lakes above ground, frozen in ice caps

toxicity (oxygen starts to damage

surface light pen-

etration sufficient for plant growth.

Diving System

(ADS) suit.

recreational

Depth

30 feet/

9 meters

100 feet/

218 feet/

660 feet/

200 meters

65 meters

30 meters

pull of the moon. Since the 1890s, companies have used drilling platforms and other technology to access remote underwater oil reservoirs around the globe.

by a raising and lowering of water in the oceans and seas caused by the gravitational

The largest

bivalve, the

percentage of

water on Earth

is fresh or

"sweet"?

water 30.1%

Icecaps and Glaciers 68.7%

Freshwater

are the four

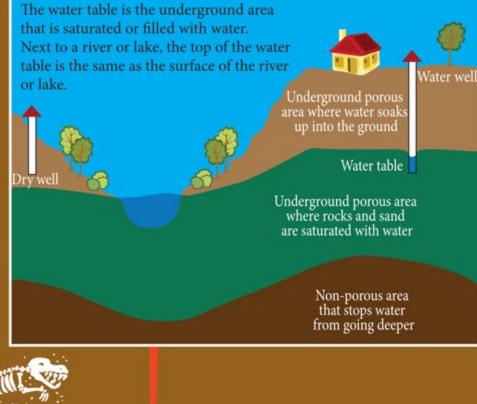
types of algae

named by color?

giant clam, can

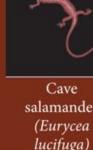
weigh over 500

A tornado is a violently rotating, tall, narrow column of wind that makes contact with the ground, and can reach rotations up to 300 mph. They often form inside severe thunderstorms with large hail.





Typical examples of cave creatures



Cockroach salamander lucifuga)







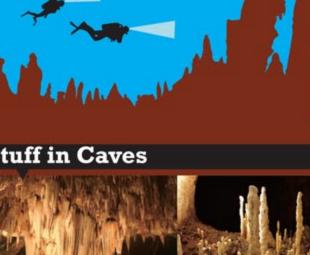


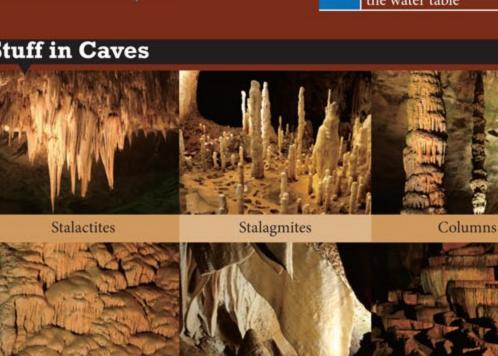
Compoundrelict (fossil caves), which are above the water table Vadose caves, which are active above the water table Water table caves, which are marked at the water table Phreatic caves, which are below the water table

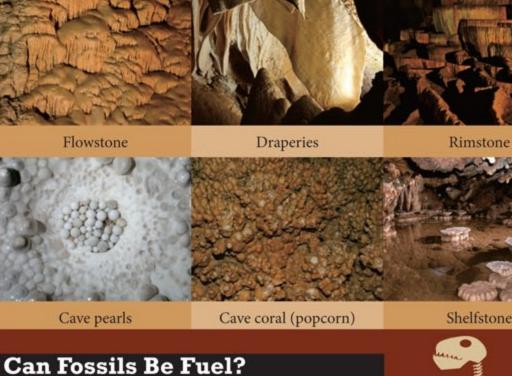
the water table, caves can be:

According to their position in regard to

Stuff in Caves





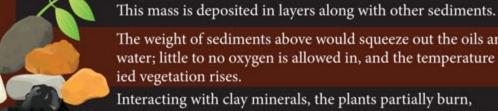


and fossilized remains of plants and vegetation like tree

large masses.

Coal is called a fossil fuel because it is the crushed

bark buried in sediments from catastrophes like the great Flood, which occurred over 4,000 years ago. The vastness of some coal beds suggest this huge event which had to have formed them. The Bible tells us about Noah's Flood in Genesis chapters 6 through 9. Fossil fuels like coal and crude oil can be mined or extracted to be burned in order to heat homes or power machines. **How Coal Is Formed** Huge amounts of vegetation are ripped apart and gathered together in



The weight of sediments above would squeeze out the oils and excess water; little to no oxygen is allowed in, and the temperature of the buried vegetation rises.

Interacting with clay minerals, the plants partially burn, turning into coal, similar to the way charcoal is made today. It doesn't take millions of years to make coal. The eruption of Mount St. Helens helped to show how processes to make coal can happen in just months.

are found worldwide. Oil: Did you know that oil is a common form of stored energy for

people, animals, plants, and even micro-

Around 60 percent of coal mining is

done underground and coal reserves

scopic creatures? Some of the oil found today has always been oil and may have come from algae or plankton. Large amounts of once-living things were buried under layers of sediments during and following the Flood to produce pools of oil and natural gas. How erosion works

much higher than that of land-based drilling. Some of these costs can unfortunately be clean-up efforts if explosions or leaks occur that damage the environment like the 2010 oil spill in the Gulf of Mexico.

Oil's well that ends well

The cost of deep sea drilling for oil or natural gas is

Some offshore drilling platforms have been sunk to form artificial reefs that are ecologically beneficial.

loosened rocks

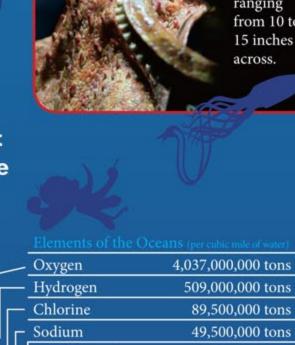
2,800 feet

Oceans

Freshwater 3%

Saline (oceans) 97%

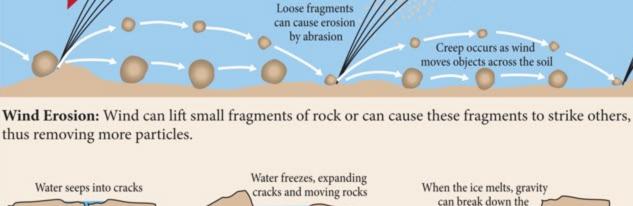
Earth's water



Calcium 1,880,000 tons Potassium 1,790,000 tons 306,000 tons Bromine Carbon 132,000 tons Other* >100, 000 tons *less than 100,000 tons (including gold, which is only Arctic Ocean

Small fragments are pulled loose Wind force and are suspended in the air

erosion by abrasion.



Ice and Gravity Erosion: When water freezes and then melts, it loosens stones, thus allowing

gravity to eventually tear down the rock structures. Stones being Smaller stones being bounced downstream moved downstream

Water Erosion: The force of a river can lift sediment, pushing along stones and causing

Pacific Ocean Indian Ocean Southern Ocean An ocean is the name given to a large body of salt water. The oceans of the world cover just over 70 percent of the Earth's surface, and hold nearly 98 percent of all the water available on the planet. Since 2000, the recognized oceans of the world include the Arctic, Atlantic, Indian, Pacific, and Southern (Antarctic) oceans, all interconnected.

Algae

There are four basic types of algae found in the sea, and named by their color Yellow algae may well be the most abundant form of life on Earth. Red algae are found along rocky coasts of subtropical seas.

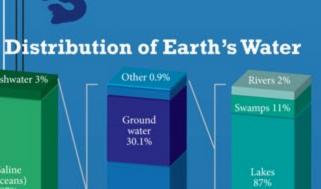
Almost all of the brown algae found in the sea are found along the shores of temperate zones, some growing over 200 feet long. Green algae, the most diverse group of algae, grow along seashores.

Absolute limit for

Research submarines plunge over 3,000 feet deep. solo dive into the deepest place on earth, Trench. use fresh water for drinking,



US Navy nuclear submarines plunge over 800 feet deep. (Beyond that it's classified!)





Fresh surface

water (liquid)



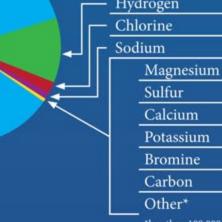
The eyes of the giant squid are the largest in the animal kingdom, ranging from 10 to 15 inches across.

6,125,000 tons

4,420,000 tons

Mesopelagic Zone

can't we drink the water in the ocean?



Atlantic Ocean