

# #23 Groundwater and Aquifers

POST QUIZ – This FRIDAY 10/25  
Water 1 Test – Wed 10/30



# So lets draw a model representing a River basin

## The Body

Since a vast majority of water on our planet is salt water. It only makes sense that a vast majority of your body represents the ocean

## The space in between fingers:

The spaces between fingers represent watersheds. Watersheds are the areas of land in which the tributaries flow down.

## The fingers:

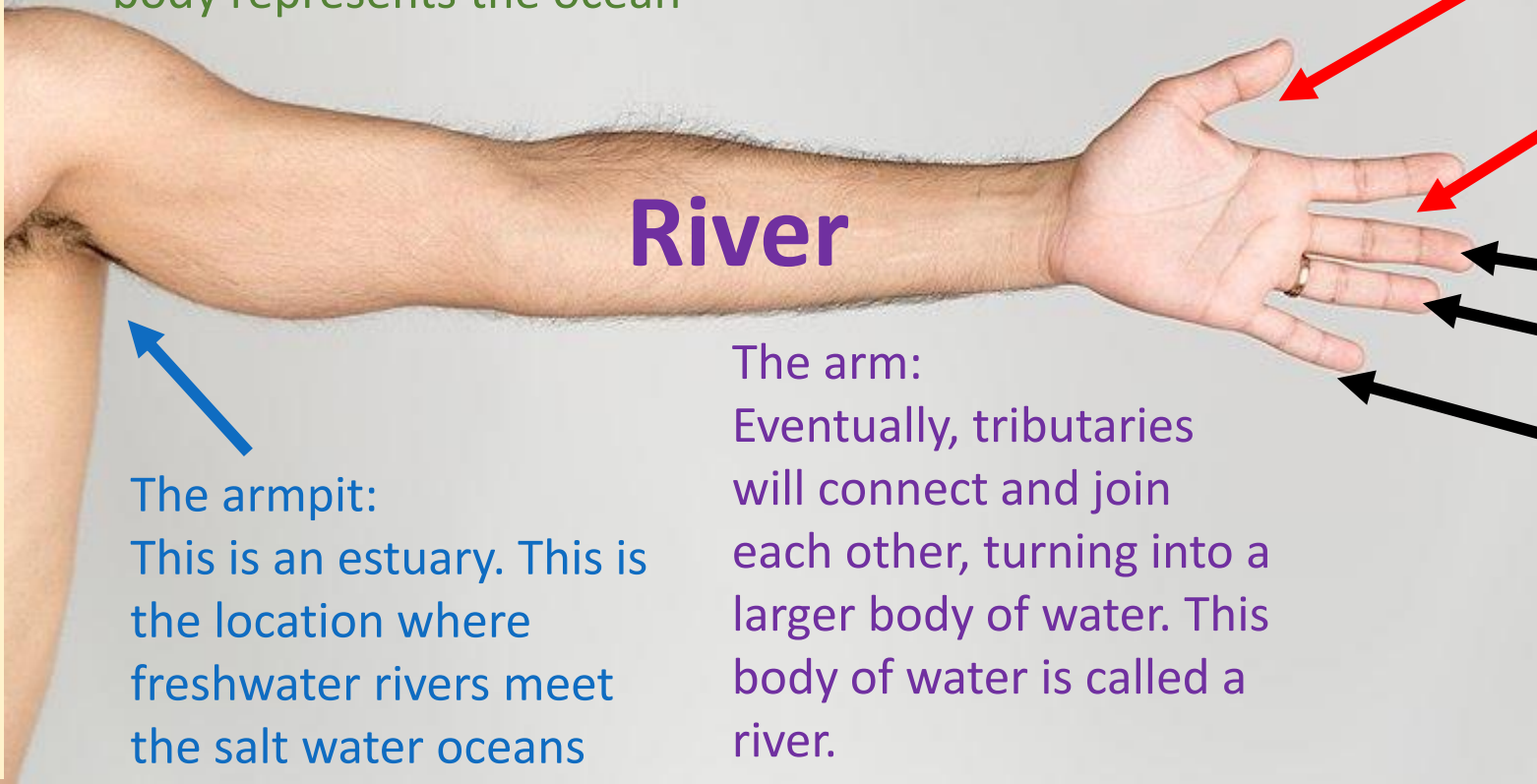
They represent the tributaries. They are small bodies of moving water flowing off the mountain. You will find numerous tributaries within river basins. This is true because there are multiple ways water flows off mountains

## River

The arm:  
Eventually, tributaries will connect and join each other, turning into a larger body of water. This body of water is called a river.

The armpit:  
This is an estuary. This is the location where freshwater rivers meet the salt water oceans

O  
C  
E  
A  
N





As water falls on land, we've learned that it doesn't always get absorbed in to the ground. Sometimes it travels from a higher to lower elevation in hopes of making it to the ocean. The entire area of land which water is drained by the river and its tributaries is called a river basin.

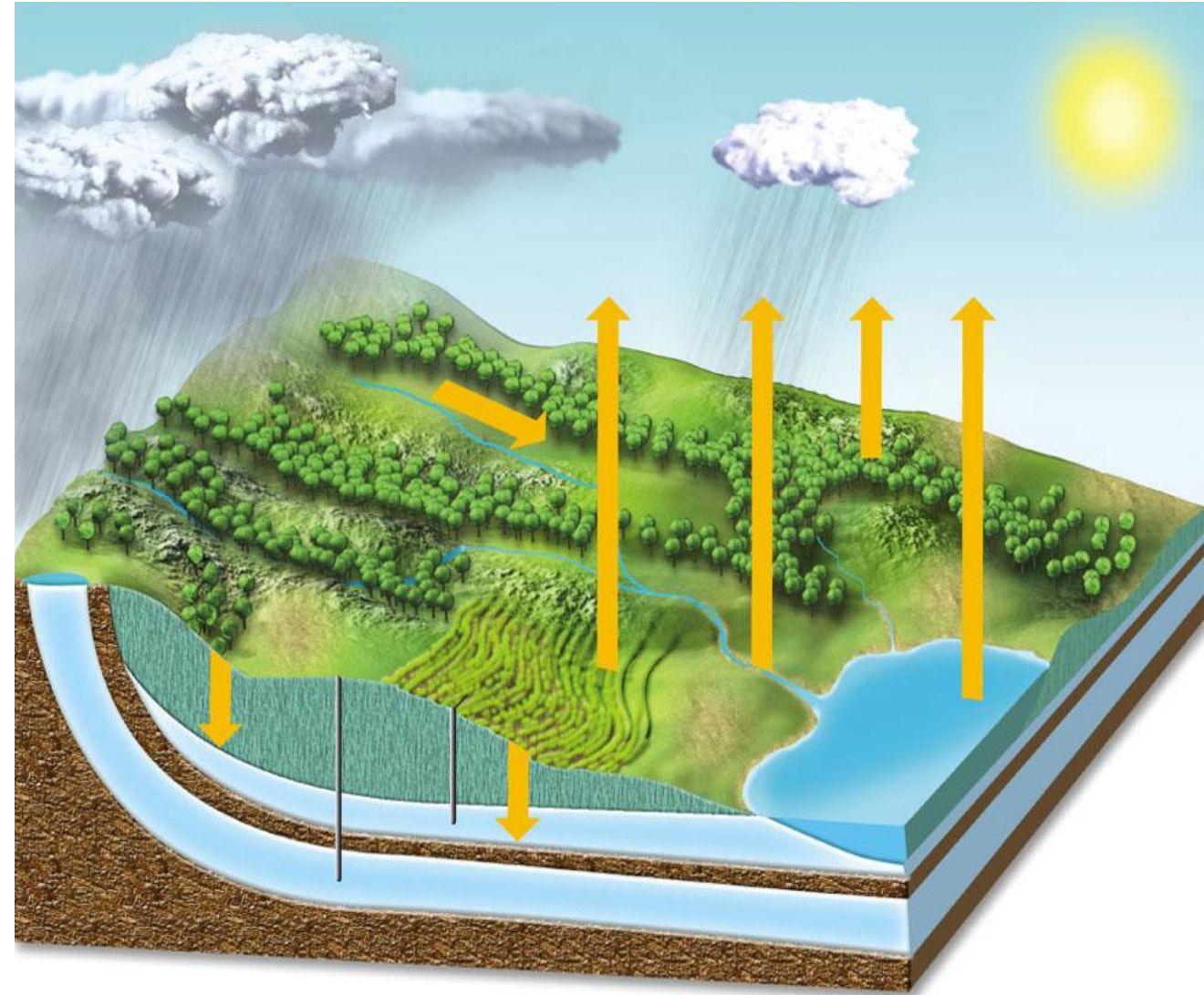
But what about the water that gets absorbed in the ground?

What is happening to it?

Today's lesson will focus on ground water and how it moves and collects underground.

\*Groundwater is found almost everywhere under the ground. Groundwater fills in spaces between sand, rock, and soil.

\*Groundwater collects underground in permeable soil known as aquifers.



Groundwater flows down through porous permeable soil and rock until it reaches an impermeable rock layer

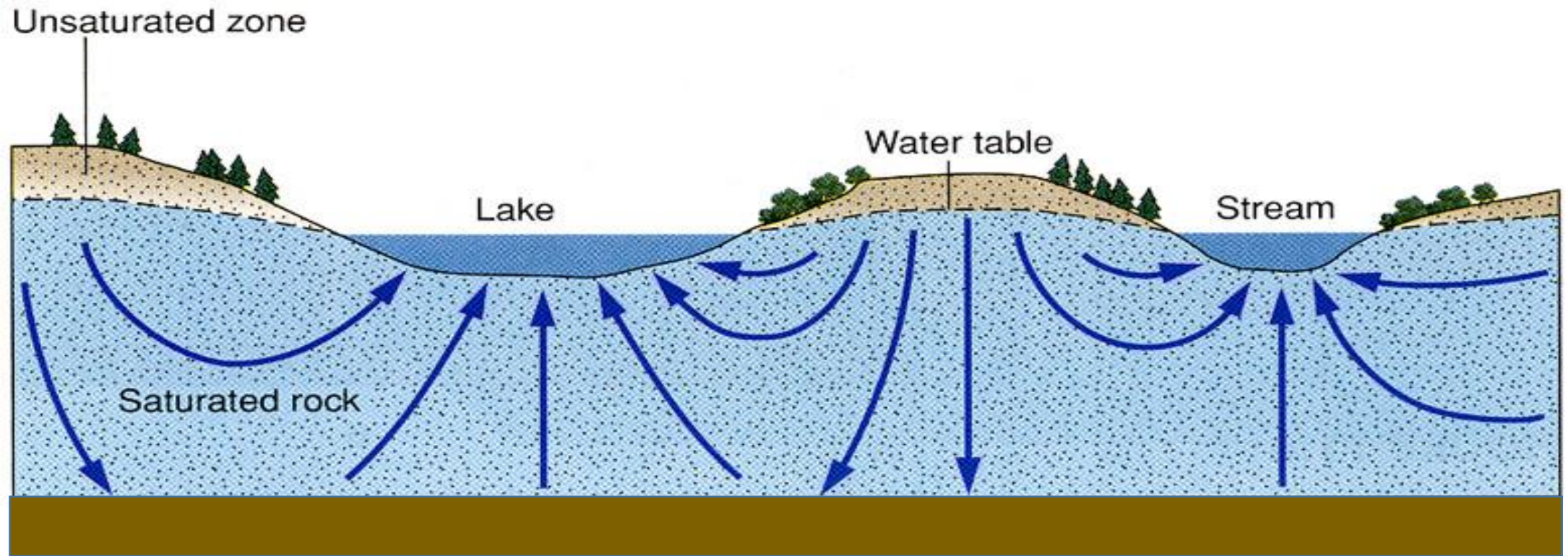
**\*Permeable** -A substance that liquids can flow through.

**\*Impermeable** - A substance that liquids cannot flow through.



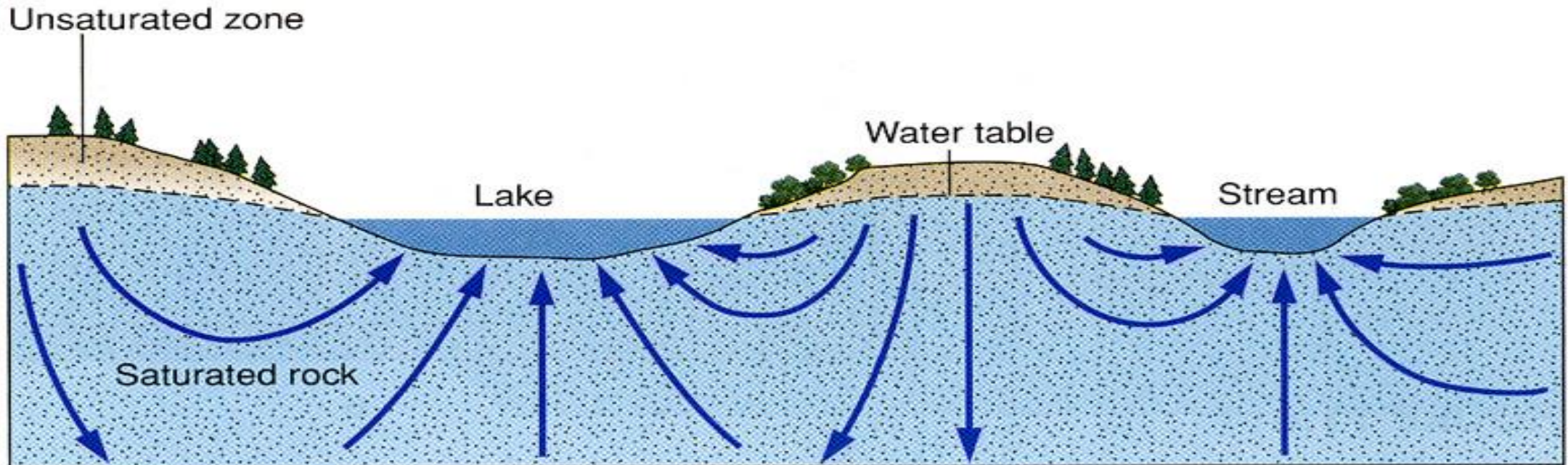
## \*Unconfined aquifer

An unconfined aquifer allows water to seep down into the ground directly through permeable rock until it reaches an impermeable rock layer.



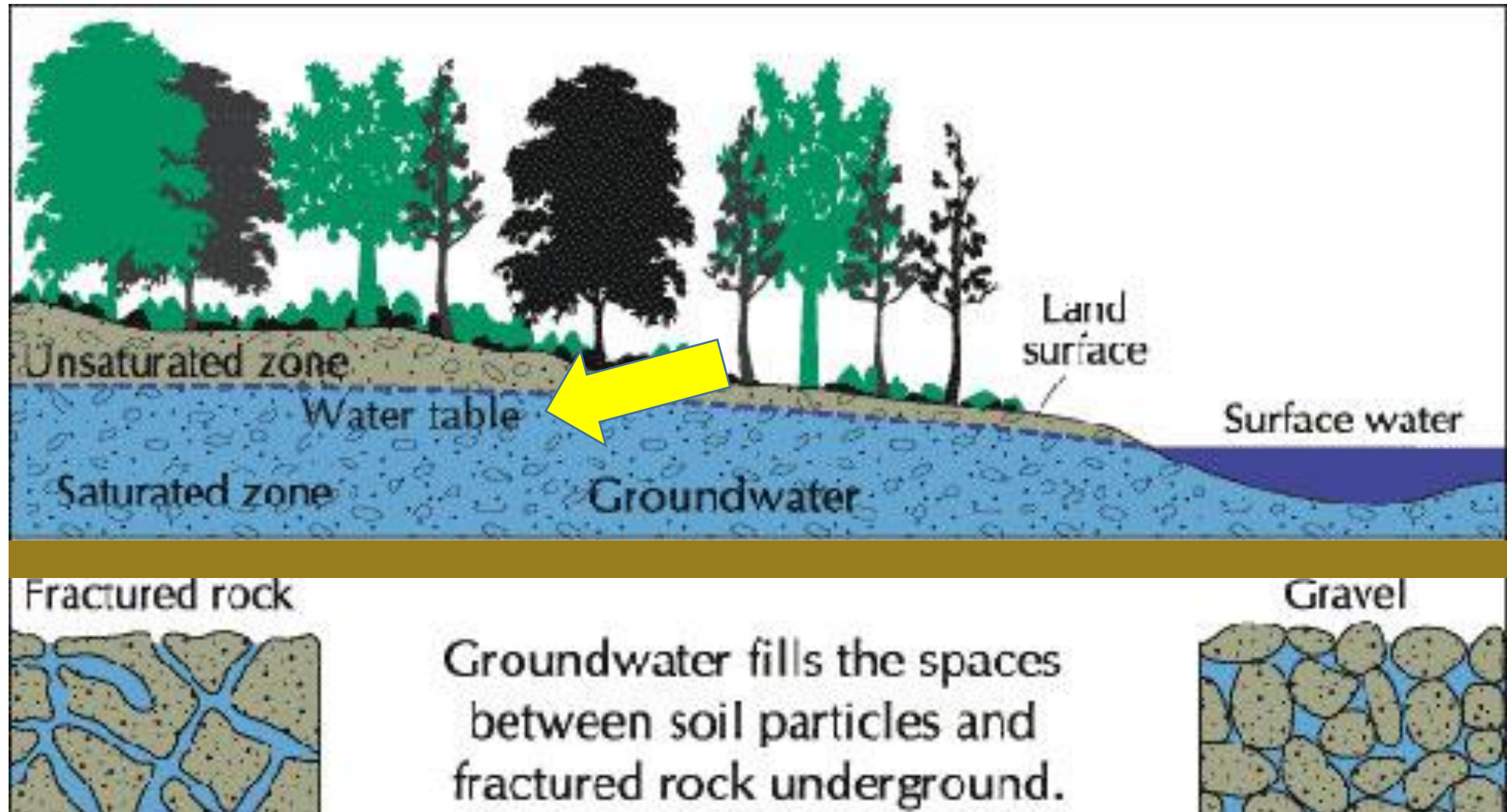
\*Any permeable rock layers that are filled with water are called **saturated rock**.

\*The **unsaturated zone** is immediately below the land surface where rock contain open spaces where water passes through, but water is NOT currently being stored





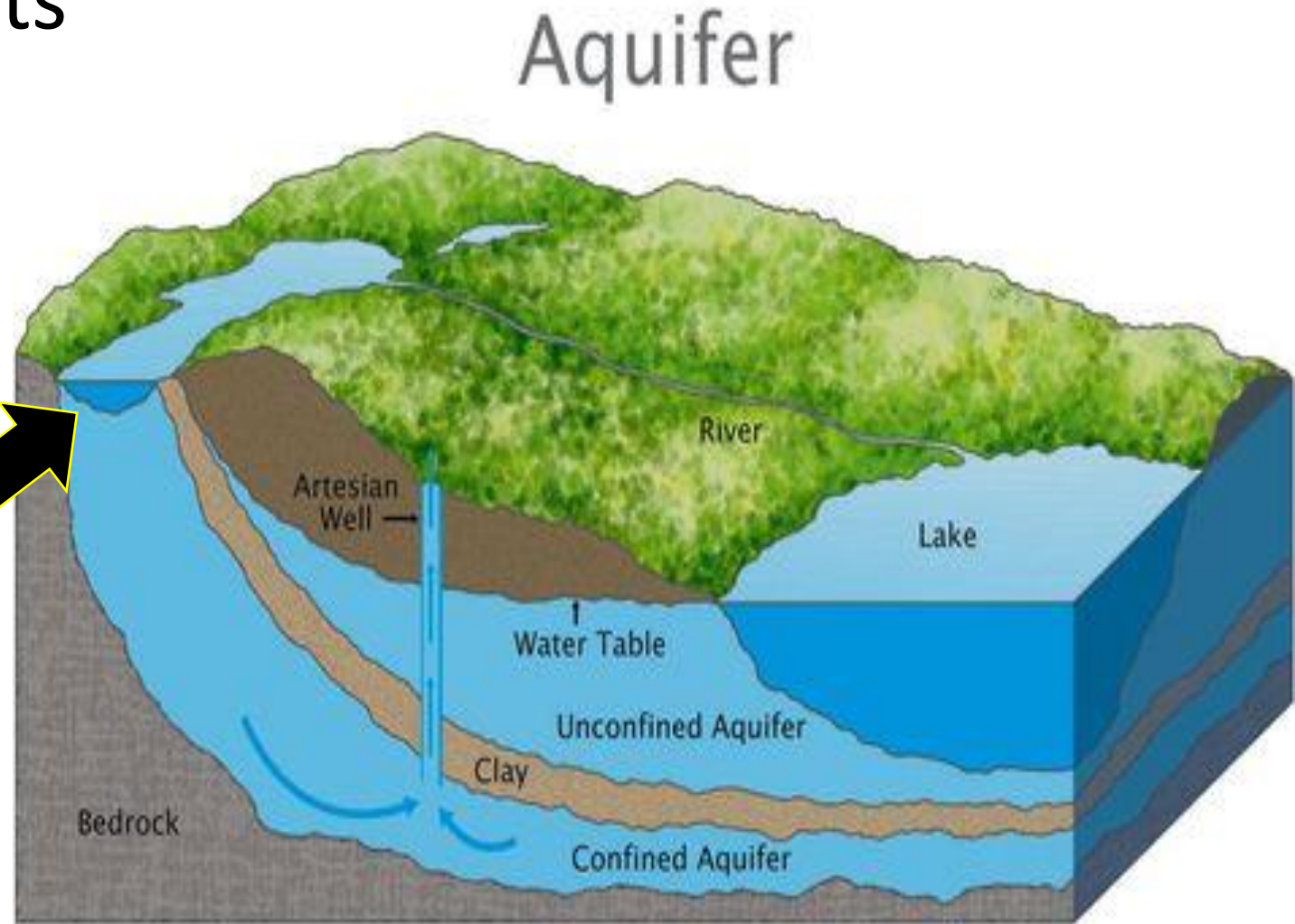
**\*The water table** is the highest point in which water fills underground



# \*Confined aquifer

Confined aquifers consists of water under a lot of pressure that is sandwiched in between two impermeable rock layers.

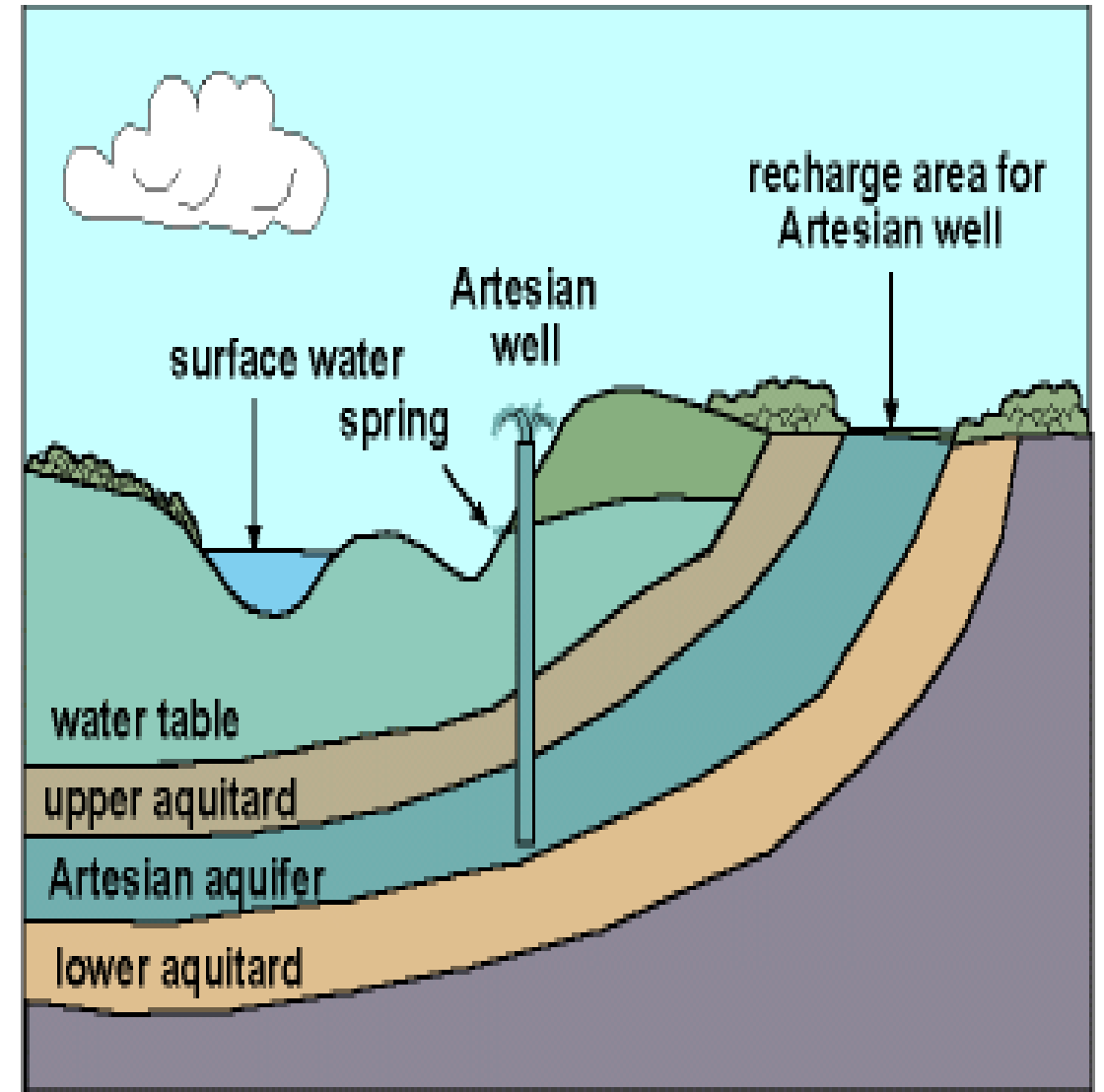
Water enters confined aquifers at the recharge zone



- Groundwater recap
- [https://www.youtube.com/watch?v=oNWAerr\\_xEE](https://www.youtube.com/watch?v=oNWAerr_xEE)

# \*Ways to get groundwater to surface

1. **Man-made Well** – pipe dug into ground to extract water from aquifer
2. **Artesian Well** – water flows naturally to surface because it's under pressure

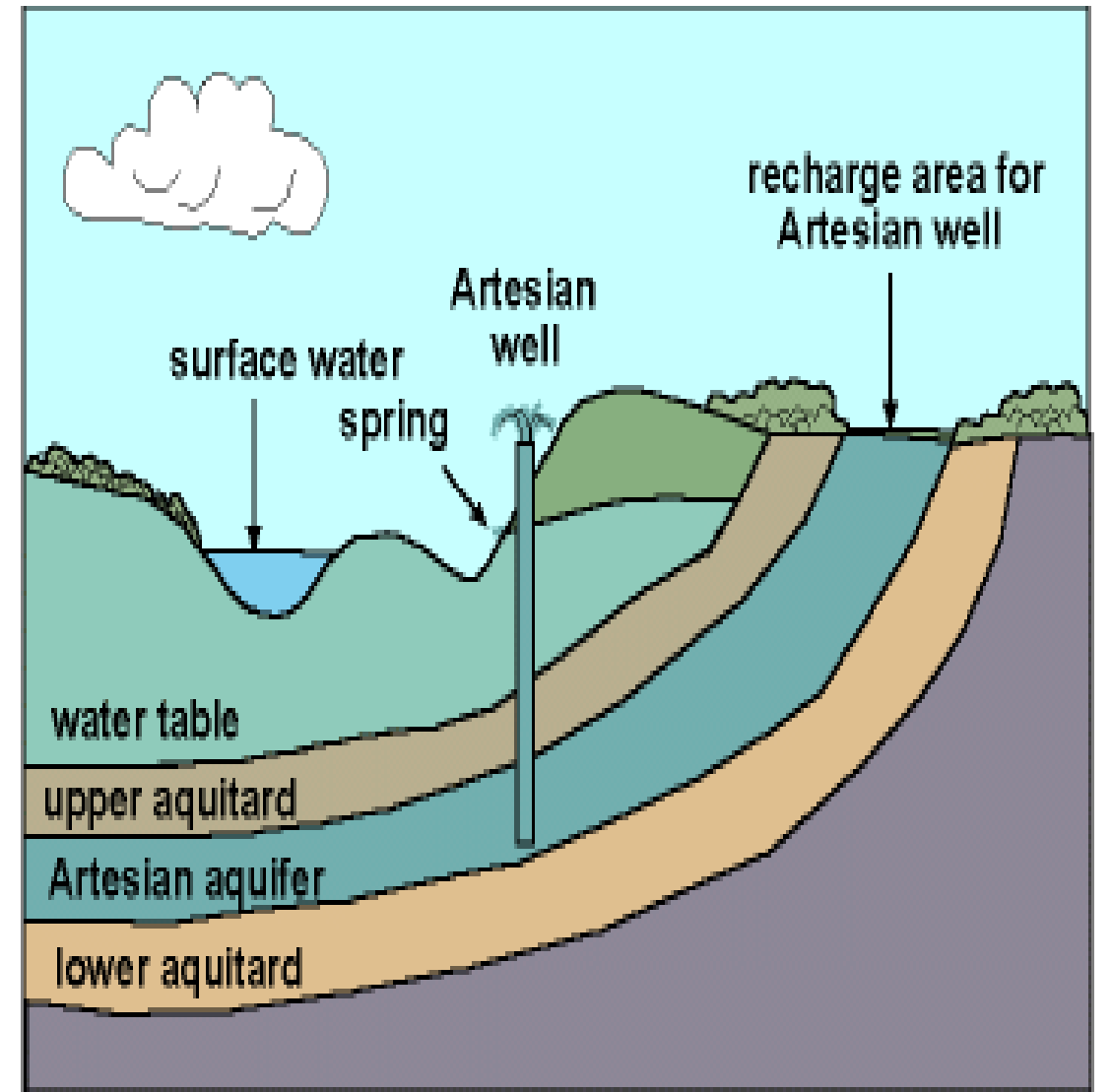


CROSS SECTION OF EARTH SHOWING PARTS OF AN AQUIFER



# \*Ways to get groundwater to surface

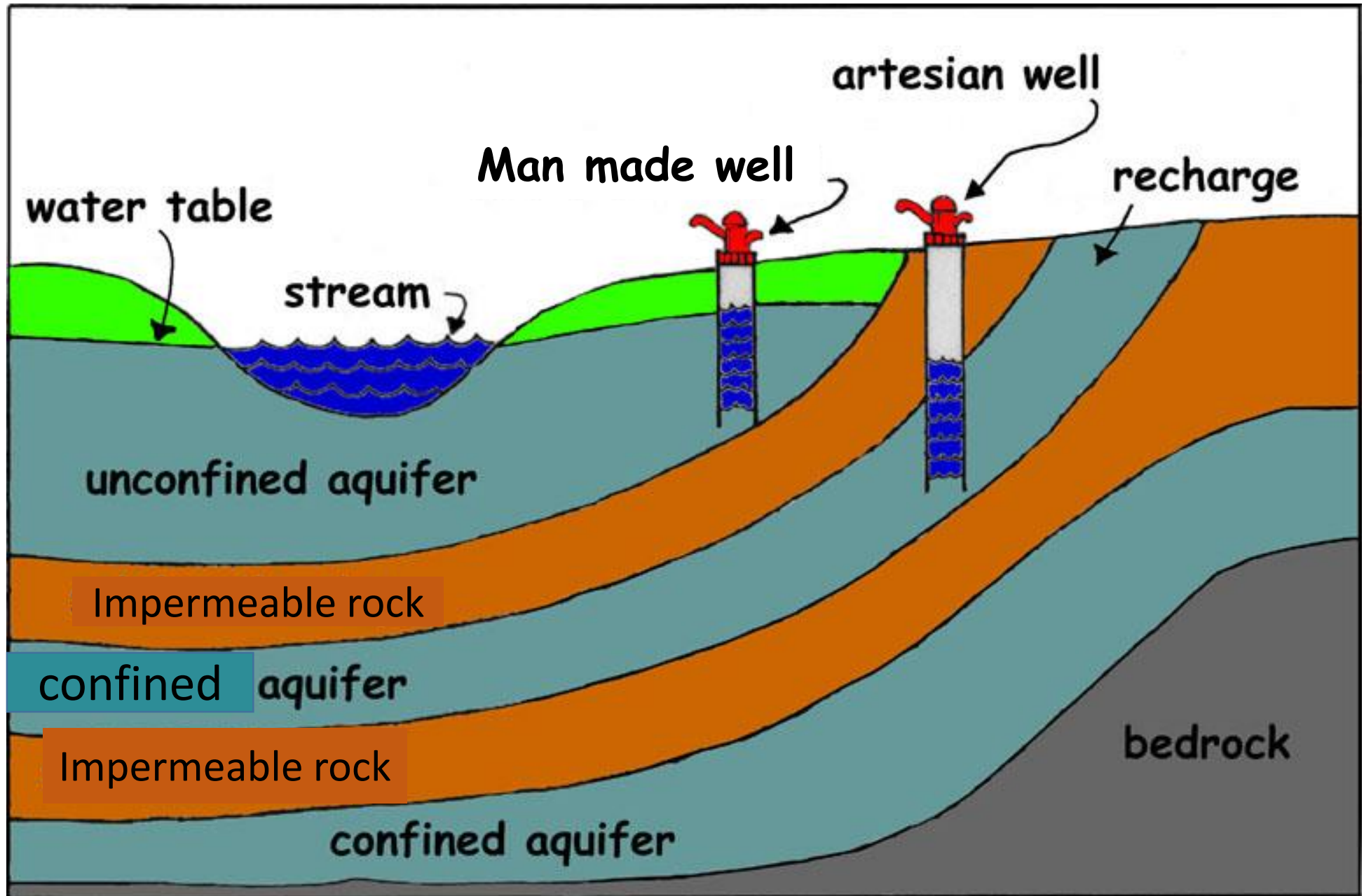
1. **Man-made Well** – pipe dug into ground to extract water from aquifer
2. **Artesian Well** – water flows naturally to surface because it's under pressure
3. **Spring** – water flows to surface because surface of land dips below water table
4. **Hot Spring/Geyser** – water heated up by rocks, pushes up to surface due to pressure



CROSS SECTION OF EARTH SHOWING PARTS OF AN AQUIFER



Here's other examples of springs that must be holding back some water beyond this impermeable rock





# Videos

- Groundwater song
- <https://www.youtube.com/watch?v=uQRvN6MUajE>
- 3:34

## Contaminated Water (AEIOU Video)

- [https://www.youtube.com/watch?v=DKi9\\_jMSITI](https://www.youtube.com/watch?v=DKi9_jMSITI)
- Watch the first 10 mins

# #24 Groundwater A-E-I-O-U and questions

8.E.1.1

# A-E-I-O-U

- Grab a copy of the AEIOU Chart
- You will be filling this out as we watch the video clip on Wake County, NC well-water

<b>A – AIM</b> (What is the purpose of this video? How does it relate to what we are learning?)	
<b>E – EMOTION</b> (describes how a part of the video made you feel)	
<b>I – INTERESTING</b>	
<b>O – OH!</b> (A fact or something said that surprised you.)	
<b>U – UMM?</b> (a question you may still have after watching the video)	

Go to <https://learn.concord.org/>

- Click login in the top right corner. Sign-in by hitting **G+** icon
- Click student and enter class-word:

Block	Classword
Red	Smartred19
Yellow	Smartyellow19
Green	Smartgreen19
Blue	smartblue19

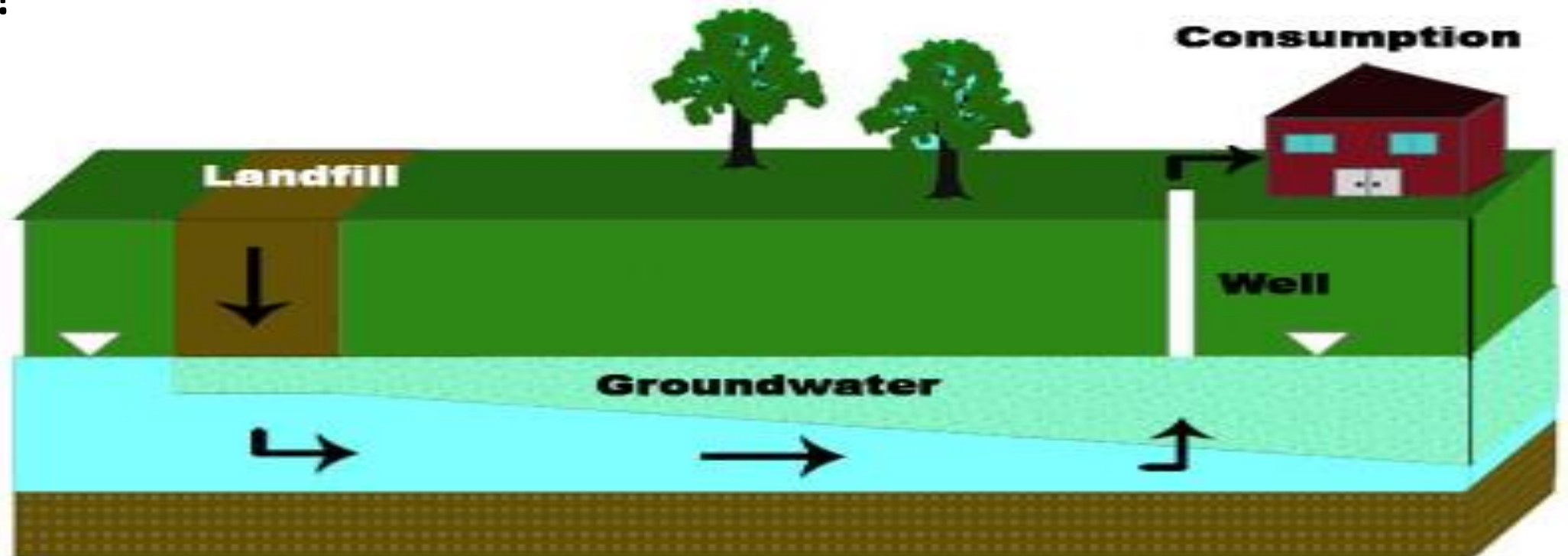
- Click do by myself and then Complete Activity #2 – Availability of fresh water

Go to <https://learn.concord.org/>

- Finish completing Activity #2 – Distribution of water
- Click the menu dropdown on the top left corner and click the section within activity 2.
- Next complete activity #4 – Groundwater Movement

- <https://www.youtube.com/watch?v=UfgyJkmZgK8>
- 5:50 mins

1. Is the land above a water table permeable or impermeable? How do you know?
2. Water will trickle down within the spaces of rock until it reaches what?
3. According to this diagram, how do we access groundwater?
4. Explain what the diagram is trying to environmentally warn us about?



Extras....



## Tiered Reflection Questions

1. What is ground water?
2. When does water stop sinking into the ground?
3. What is the difference between permeable and impermeable?
4. What is the water table?
5. What is an artesian well?
6. Draw a diagram that shows how water collects underground.
7. Use the picture on page 31C to answer the following question. Why does water shoot out of old faithful with such great force?
8. Where does water flow and collect underground?
9. What prevents ground water from sinking further into the ground?
10. What is the difference between a spring and a well?
11. Is a raincoat permeable or impermeable? Explain why.
12. What causes water to rise out of the ground in hot springs and geysers?
13. What makes water flow up out of an artesian well?
14. Is a T-shirt permeable or impermeable? Explain why.
15. Would you expect to find a spring on the very top of a hill? Why or why not?

# In textbook

- Read pages C24-31
- Answer question #1-5 on a separate sheet of paper

# Warmup

- Explain where and how we access majority of our drinking water. Minimum of 4 sentences

# Porosity demo

\*If time permits

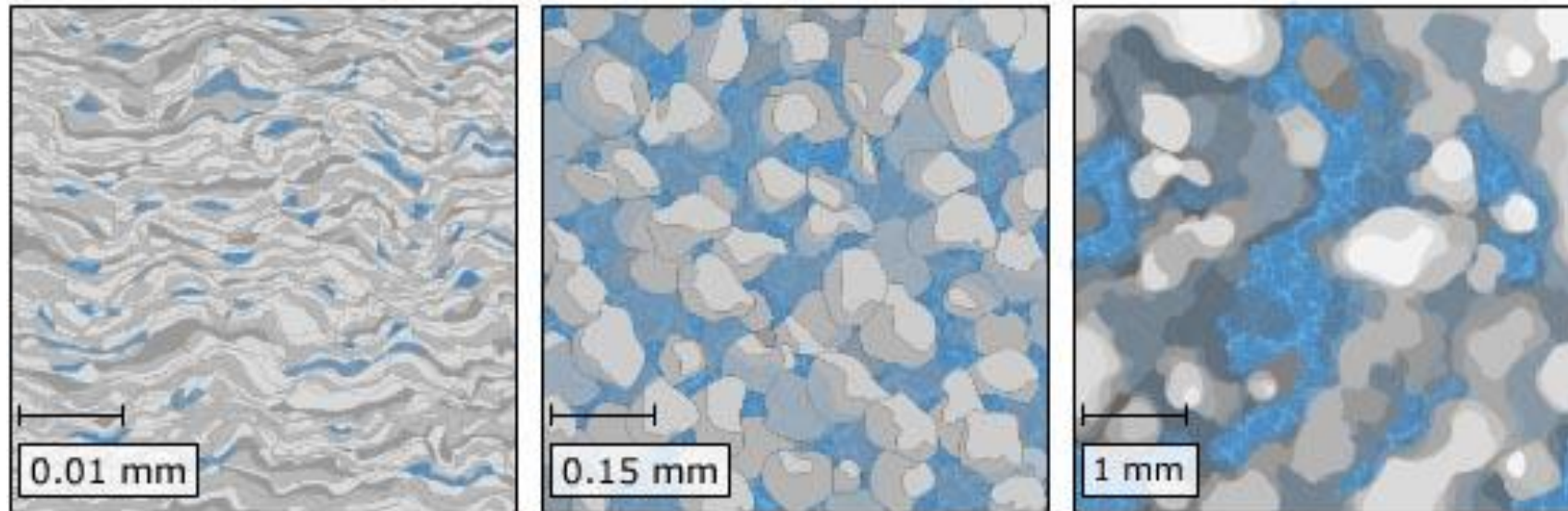
# A-E-I-O-U

- Copy the chart for your warm-up. Write only what's in parenthesis if you don't know the term.
- You will be filling this out as we watch the video clip on Wake County, NC well-water

<b>A – ADJECTIVE</b> (describes something you saw or learned)	
<b>E – EMOTION</b> (describes how a part of the video made you feel)	
<b>I – INTERESTING</b>	
<b>O – OH!</b> (makes you say “oh” or a part that you thought a little longer about)	
<b>U – UMM?</b> (a question you may still have after watching the video)	

# Fresh Earth under our feet can be measured 3 ways:

1. grain size (size of the bits)
2. porosity (space between the bits)
3. permeability (how fast something passes through)



# Make a quick table

<b><u>substance</u></b>	<b>grain size</b> (large, small, super fine)	<b>porosity</b> (high, medium, low)	<b>permeability</b> (fast, slow, none)
<b>gravel</b>			
<b>sand</b>			
<b>clay</b>			

## Questions to answer

- Which sample was more permeable to water?
- Which sample was least permeable?
- Why did water move faster through some materials than others. GIVE FULL EXPLANATION
- If I were trying to create an aquifer, in what order would these materials be arranged? Explain
- What did you learn from this demo?



## You should have this...

<b><u>substance</u></b>	<b>grain size</b> (large, small, super fine)	<b>porosity</b> (high, medium, low)	<b>permeability</b> (fast, slow, none)
<b>gravel</b>	large	high	fast
<b>sand</b>	small	medium	slow
<b>clay</b>	super fine	low	not permeable (none)