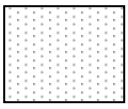
Madison County Groundwater Problem

Name:	Name:

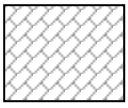
Homeowner of House A has hired you to assess the risk of contamination to their groundwater since a Texaco Gas Station has been constructed across the street from their property two years ago. When constructed the Texaco Company claimed their gas station would not contaminate local groundwater. However, several homeowners in the area have complained that their water has tasted different in the last few months. Construct the three models attached and answer the following questions to assess the situation.

Key for Model Profiles

Topsoil; organic material & sediment. Water can infiltrate; permeable.

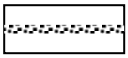


Unconsolidated sand & gravel. Water can infiltrate; permeable



Limestone rock. Water can infiltrate; permeable.

Fine Clay. Water cannot infiltrate; impermeable.



Capillary Fringe. Below this line begins the zone of saturation

1. Owner of House A obtains their water from well #1. What type(s) of rock has well #1 been drilled through?

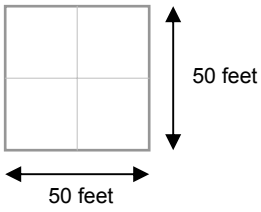
_____.

2. How far (approximately) below the surface is the water in well #1? _____.

3. How deep (approximately) has well #1 been drilled? _____.

4. The Texaco Gas Station obtains their water from well #2. What type(s) of rock has well #2 been drilled through?

_____.



Each grid is 50 by 50 feet and the small blocks are 25 by 25 feet.

The owner of House B has been one of the chief complainers about the taste of water drinking water in the past few months. Though he did not have enough money to contribute to your study your team felt it best to obtain some profile data around his three wells.

5. From your profile of the area are there any layers that are impermeable to water? _____. (If yes, how many?) _____.

6. Which wells seem to draw groundwater from between impermeable layers?

_____.

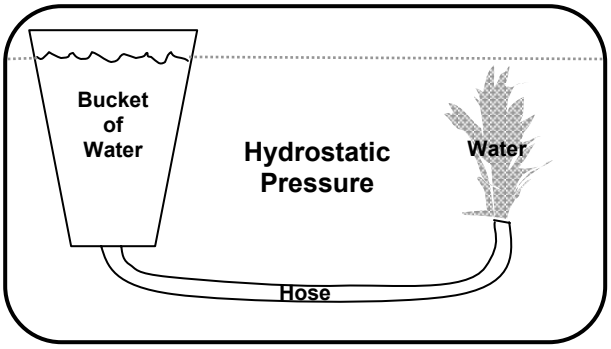
Movement of water on the surface and in the ground is driven by gravity. On the back of this page indicate by drawing one large arrow on the map in the direction you think water flows.

7. A couple of the wells in your study area are unique. Several do not require pumps to pump the water from below out of the well. Instead they have caps over them and water comes out under tremendous pressure. Using the diagram to the right as a helpful hint. Which wells do you think are what we would call Artesian Wells (water under pressure)?

_____.

8. When well #3 was drilled water flowed to the surface however it did not go any higher. What could be the reason for this?_____

_____.



Artesian Wells get their water from Confined Aquifers. A Confined Aquifer is an area of saturated rock sandwiched between two layers of impermeable rock. The water comes out under pressure because of a change in elevation from where the water enters the aquifer.

9. What is the change in elevation (approximately) from the Gas Station to House B? _____ft.

10. Using your model back track from where you think the water for Well #5 infiltrates into the ground. On your map on the back shade this area in and label it **Recharge Zone**. Any water that infiltrates this area will eventually flow to Well's #4,5, and 6.

11. What possible contamination hazards are located in the Recharge Zone?

_____.

12. If the underground fuel tanks were leaking which wells do you think might be effected first? _____.

13. If the used oil container were leaking why would its oil not likely contaminate any of the wells seen on our model?

_____.

14. What further testing might you do to determine if the underground fuel tanks might be leaking?

_____.

Extra Credit. Our Scientist have informed us groundwater moves rather slowly through this Sand & Gravel Aquifer. The rate is about 1 foot in a day. Approximately how long would it take for gasoline to show up in well water of well #6 once the tanks started to leak? _____. If the homeowner of House B notice a change in water taste 2 months ago how long did the tanks last once in the ground before they started to leak? _____.

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