

Title:

Flood Curves

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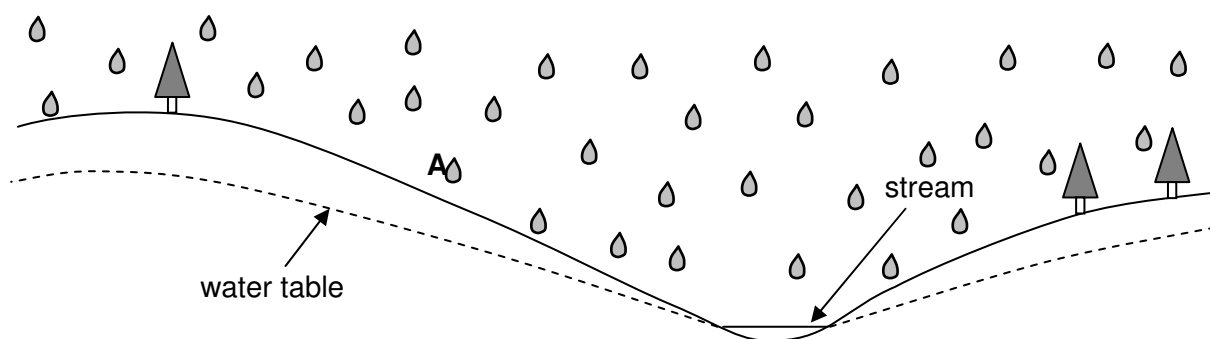
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Part 1: Rainfall

Look at the cross section below showing the ground surface and water table during a short, powerful rain storm.

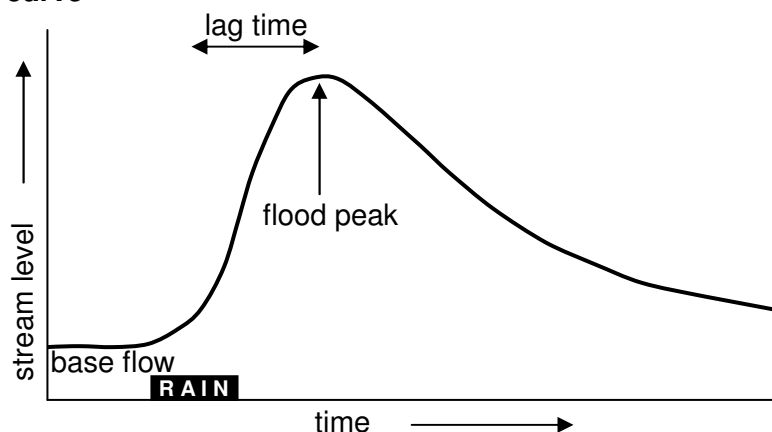
1) What two possible things will happen to Raindrop A when it hits the ground?

2) Draw arrows showing the directions that surface water and ground water are flowing.



3) Where will Raindrop A eventually end up? _____

Part 2: Flood curve



The graph above shows the level of water in the stream above. The black box indicates the duration of the short, powerful rain storm. Rain water reaches the stream by flowing along the ground surface and by soaking into the ground and slowly traveling underground to the stream.

4) Is the flood at its highest during the worst of the rain storm? Yes No

5) What causes the peak of the flood to occur after the peak of the rain?

6) Imagine a scenario where no water soaks into the ground but instead runs quickly off the surface all at once into the stream. Predict how the following features of a flood would change, and explain how you came up with your answers.

a) the length of the lag time longer shorter because...

b) the height of the flood peak higher lower because...

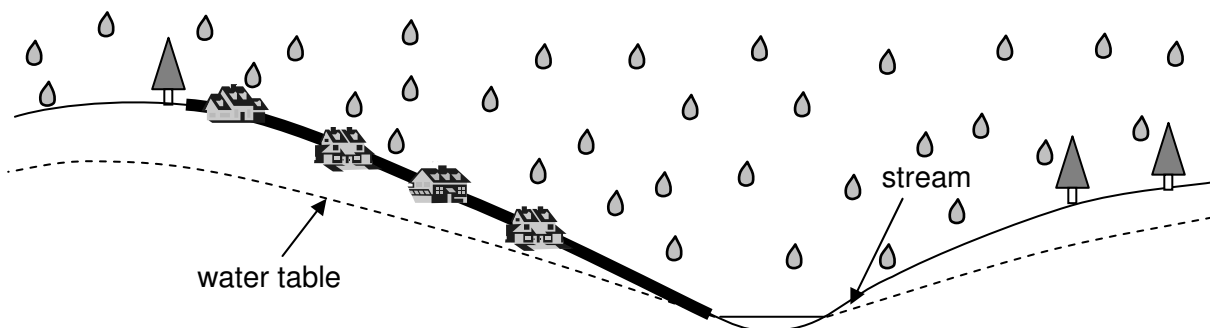
c) the duration of the flood longer shorter because...

7) Two students are discussing how water soaking into the ground affects flooding.

Student 1: *If water doesn't soak into the ground, that means it gets to the stream faster. And all the water would rush into the stream at once, so the flood height will be higher, but the flood will be short, because all of the water arrives at nearly the same time.*

Student 2: *I agree that the lag time will be shorter since the water reaches the stream quickly. But, I think that the higher the flood is, the longer it will last. More water will be in the stream for a longer period of time.*

With which student do you agree? Why?



8) How would building a city with concrete parking lots and roads in a previously undeveloped area affect the amount of water soaking into the ground vs. running off the surface? Explain why.

9) Predict how building a city in a previous undeveloped area would affect (if at all) the following features of a flood:

a) the total amount of water in the flood more not affected less

briefly explain:

b) the length of the lag time longer not affected shorter

briefly explain:

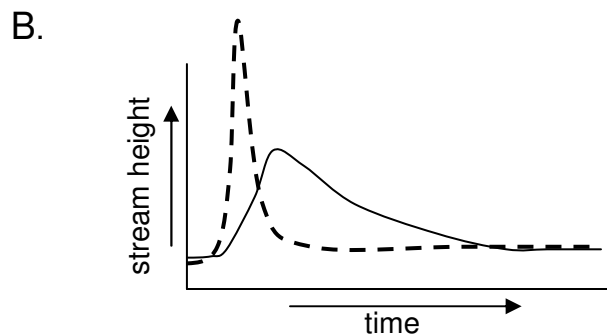
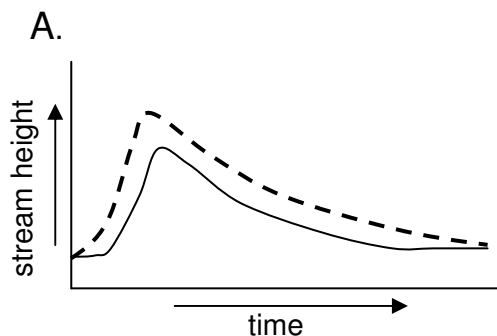
c) the height of the flood peak higher not affected lower

briefly explain:

d) the duration of the flood longer not affected shorter

briefly explain:

10) On the diagrams below, the solid line is a flood curve for a rainstorm in a rural area. Which new curve (dashed) best represents how the curve would change if a city was built in the area?



11) Check your answers to Questions 6, 9, and 10 to make sure that they match.

12) Explain how people, even if they do not alter the stream, make floods worse by building in an area.