



RUNOFF:

When Rain Hits the Land

Vocabulary

Look up if needed and write a short definition.

Erosion

Groundwater

Impervious Surface

Percolation

Pollutant

Porous

Runoff

Introduction

Think about what happens when rain hits the land. What happens to the water as it falls to the ground? Imagine a rainstorm in a wooded area. Grass, leaves, soil, and vegetation act like a sponge, soaking up the water into the floor of the forest. Now imagine the same rainstorm on a road, or in a parking lot. These surfaces are hard and solid, and water has nowhere to go. As it flows, water gains speed and can pick up and carry trash, nutrients, sediment, or chemicals that might be on the land. Soil not protected by vegetation is easily eroded, or washed away, by fast moving water.

In this activity, you will test materials that represent various land surfaces and record your observations.

1. Gather Materials

- water
- pitcher
- small pan to catch water
- stopwatch (you can use a cell phone stopwatch)
- milk/juice carton or plastic water bottle
- scissors
- books or binders
- paper cup (with no holes)
- measuring cup
- rainmaker (paper cup with holes punched in the bottom)
- testing materials (soil, grass, gravel, sand, mulch, straw).

Pick 2 materials. You will need enough to cover the bottom of your container.

2. Hypothesize

You will conduct an experiment to find out how different land surfaces react “when rain hits the land.” Indicate the testing material you predict will produce the fastest and the most amount of runoff.

- | | | |
|--------------------------------|---------------------------------|--------------------------------|
| <input type="checkbox"/> Soil | <input type="checkbox"/> Sand | <input type="checkbox"/> Mulch |
| <input type="checkbox"/> Grass | <input type="checkbox"/> Gravel | <input type="checkbox"/> Straw |

3. Rank the Materials

List the material from 1 (fastest, most runoff) to 6 (slowest, least runoff) and give a brief explanation for your answer.

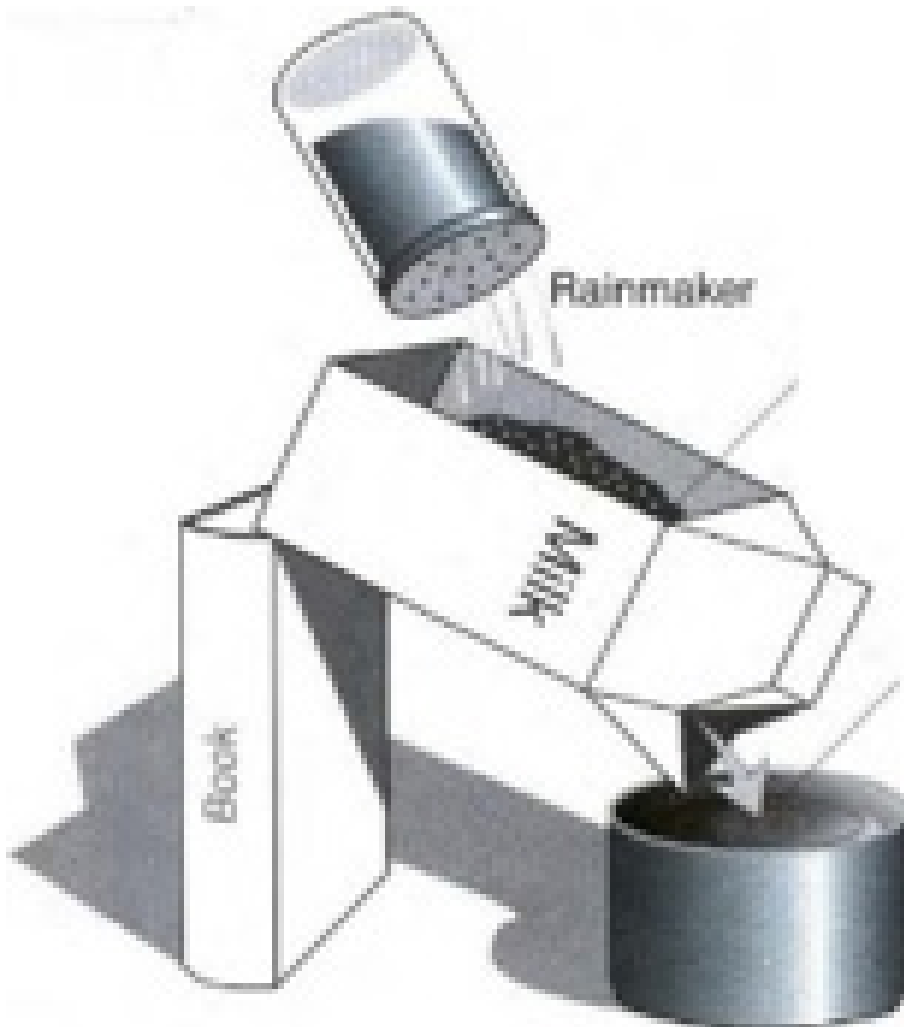
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

4. Explain your answers to #3

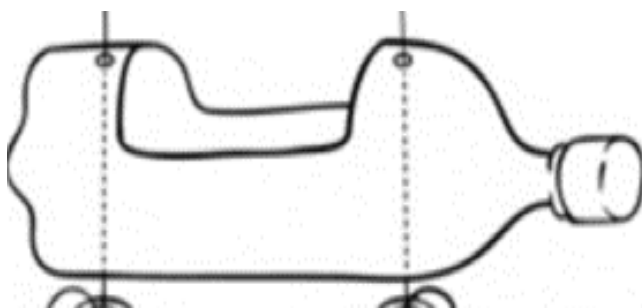
Why did you choose to rank the items the way you did?

5. Build an Investigation Model

Refer to the diagrams below to set up your materials. You may need to ask an adult to help cut your carton or plastic bottle.



If you are using a plastic bottle, this is how to cut the plastic bottle:



6. Set Up

Find a safe place outside to complete this investigation, and have all your materials ready.

7. Test Model without Material

For the first test, use the plain surface of the milk carton or bottle.

What real land surface do you think the bare carton/bottle represents?

- a. Hold your rainmaker (the cup with holes) over the carton/bottle. Check the investigation design image to make sure your container is on an angle.
You may need assistance for steps b through e.
- b. Empty 1 cup (about 250ml) water into the cup to simulate a rainstorm.
- c. At the same time that you start your "storm," have someone start the timer. Make sure the timer is set to show seconds.
- d. When you can count to 3 between water drips, stop timing.
- e. Using the timer, determine how many seconds it took for the water to drain into the pan.
- f. Record your results in the table on the next page.

8. Test Model with First Material

- a. Pick the first material you would like to test. _____
- b. Scoop enough of the material into the bottom of the container to cover the surface.

What do you predict will happen to the water when you empty the bottle over the surface? (Think about how long it will take and what the runoff will look like.)

What do you predict will happen to the water when you empty the bottle? (Think about how long it will take time and what the run-off will look like.)

- c. Repeat steps 6 a through f using the first material.

9. Test Model with Second Material

- a. Pick the first material you would like to test. _____
- b. Scoop enough of the material into the bottom of the container to cover the surface.

What do you predict will happen to the water when you empty the bottle over the surface? (Think about how long it will take and what the runoff will look like.)

What do you predict will happen to the water when you empty the bottle? (Think about how long it will take time and what the run-off will look like.)

- c. Repeat steps 6 a through f using the second material.

RUNOFF DATA

Material	Seconds	Observations (What did your runoff look like?)
Bare Container		
Material #1 _____		
Material #2 _____		

DIVE DEEPER:

What would happen if you changed the angle of your container? Predict how the angle chosen you chose will affect the results of your experiment. Use the space below to explain your prediction.

Look back at the predictions you made in step 2. Were your predictions correct? Use the space below to explain how your predictions differed from the actual results?



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