

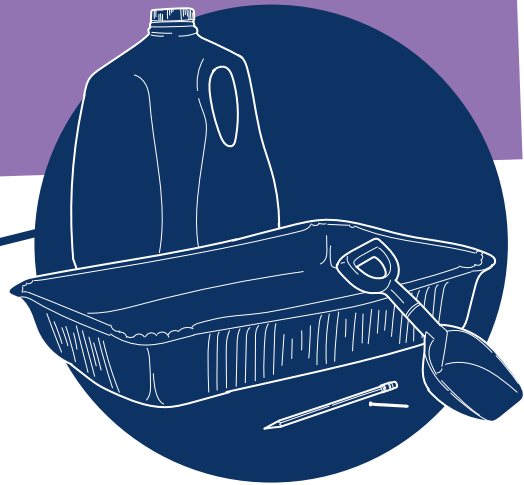
NOT-SO-GRAND CANYONS

What factors affect how a river erodes the land?

MATERIALS

You will need:

- One disposable foil baking pan at least 30 cm (12 in) long and 5 cm (2 in) deep
- Enough dirt to fill the baking pan twice
- Small shovel
- Gallon jug and water
- Pencil and a nail for poking holes
- Scrap wood, bricks, or other materials to prop up the pan
- Video camera (optional)



MAKE THE LAND

This lab should be done outdoors since it will involve dirt and mud. Poke a pencil-sized hole near the middle of one end of your baking sheet, then fill the foil pan to the rim with loose dirt that is mostly free of rocks, leaves, twigs, and other debris. Smooth and flatten the dirt.

Prop the baking pan so that one end is 5 cm (2 in) higher than the end with the hole.

MAKE A STREAM

Poke a small hole in the side of an empty gallon milk jug that is about the size of this dot. →●

Fill the jug with water. Water should flow smoothly from the hole. Place the full jug slightly above the high end of the baking pan. The flow of water from the jug should land near the middle of the high side of the dirt in the pan as shown on the left. The jug should take 5 to 10 minutes to become half-empty.

Let the water flow for 10 minutes, watching the changes. If available, set up a camera to record.

Be ready to do this at least once more for the bonus challenge on the next page.




JOURNAL:

13 Record your observations in your science journal. Include at least one drawing or photo of the results and write a brief description of the changes you noticed in the dirt.

14 It's possible for two people to get different results when performing this lab. Which of these do you think might have a noticeable affect on the results? Check one or more.

 The type of dirt used
 The time of day
 How packed down the dirt was
 The size of the hole in the jug
 How tilted the pan was
 Whether a camera was used

15 Predict what will happen if you make the pan flatter. Will the "canyon" formed by the stream be shallower or deeper than before? Explain why.

16 Test your prediction above. Perform the same steps, but instead of placing the high end of the pan 5 cm up, place the high end about 1 cm (about half an inch) up. Do your best to keep everything else the same. Record the new results in your journal as before.

Was your prediction correct? Explain.


BONUS CHALLENGE:

17 One of the best ways to learn science is by doing science on your own. That means exploring new ideas and testing them.

We could write a whole chapter full of ideas to test for this lab, but since not everyone likes playing with dirt and mud, we decided that was a bad idea. If you don't mind getting dirty, test one or more of your own ideas, or one of the variations in question 14.

RIVERS

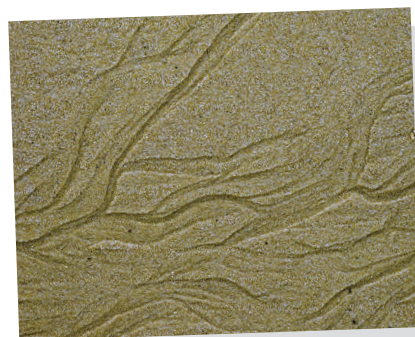
When rain falls, the water that doesn't soak into the ground flows downhill. Tiny trickles of water connect to form brooks, creeks, and streams which flow together to form rivers. Small rivers join to form larger ones.

Rivers have shaped some of Earth's most incredible features.

- 18** The Amazon River in South America carries more than 12 times as much water to the ocean as North America's largest river, the Mississippi River. Like all major rivers, the Amazon is formed by a system of connected streams and smaller rivers that flow together. Trace the path of each drop on the map to show how it travels to reach the mouth of the Amazon River and flows into the ocean.



- 19** The image on the right shows the tiny channels formed by water running across fine sand. Draw an arrow to show which direction the water flows. How can you tell?



- 20** You are going rafting on a fast-flowing river. Explain why it is impossible to take a raft trip that travels in a circle, ending in the same place it started.



- 21 Some parts of river valleys are called canyons or gorges. Based on these images, give one or more words that describe how canyons and gorges look different from more typical parts of river valleys like the Truso Valley shown below.



Colca Canyon, Peru



Taroko Gorge, Taiwan



Truso Valley, Georgia

- 22 Flowing water carries sediment through valleys. When will flowing water make a valley deeper?

When it picks up more sediment than it drops

When it drops more sediment than it picks up

- 23 Do the parts of a river that form gorges and canyons usually flow faster or slower than other parts of the river? Explain.

 RESEARCH:

- 24 Many slow-flowing rivers carve large turns called meanders. Search “stream table meanders” to find videos that model the formation of these curves. Research how they form and describe in writing and diagrams why slow rivers almost always carve these curvy channels.

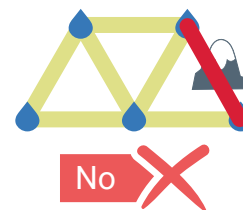
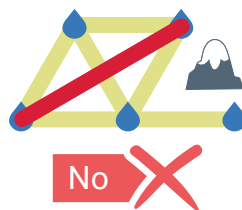


RIVER BASIN PUZZLES

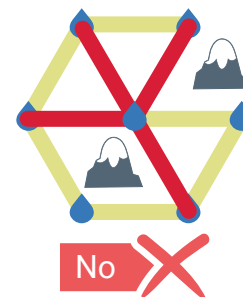
Small channels of flowing water connect with others to form larger and larger channels, forming a pattern that resembles a tree. An area of land where all of the water flows into the same channel is called a **river basin** or a **watershed**.

In a River Basin puzzle, the goal is to connect all of the raindrops (💧) to show how all of the water will flow to the sea (🌊) with the following rules:

- Raindrops can only be connected by river segments along the given paths, and not if there is a mountain (🏔️) between them.



- No raindrop can connect to more than three other raindrops. In other words, rivers can only fork into two streams.

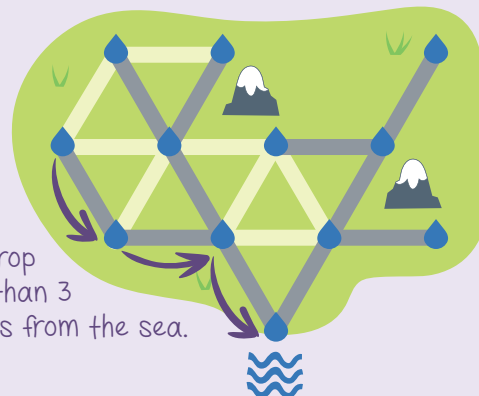
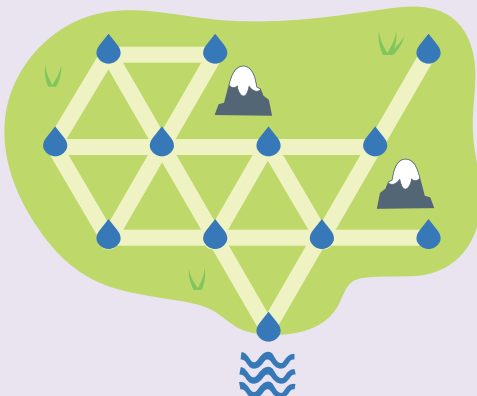


- The maximum river length is given in each puzzle. This is the longest distance (in river segments) that it takes any raindrop to reach the sea.

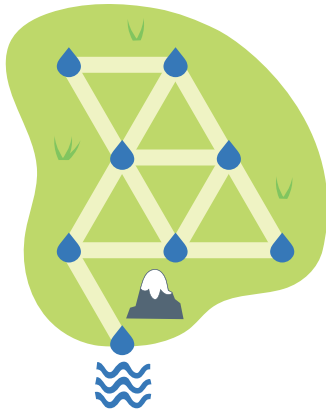
PRACTICE:

Complete the River Basin puzzle below so that no raindrop has to travel more than 3 segments to reach the sea.

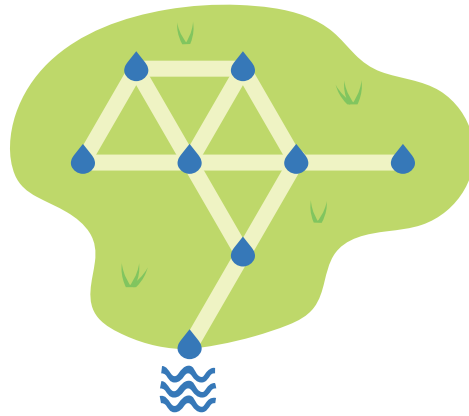
Ex.



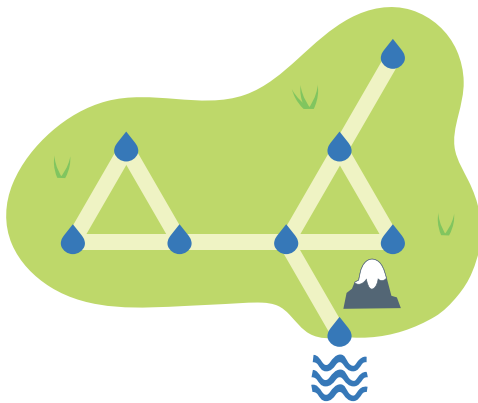
25 Max length: 3 segments



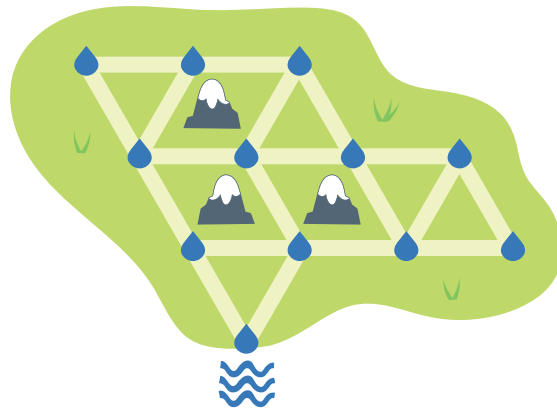
26 Max length: 3 segments



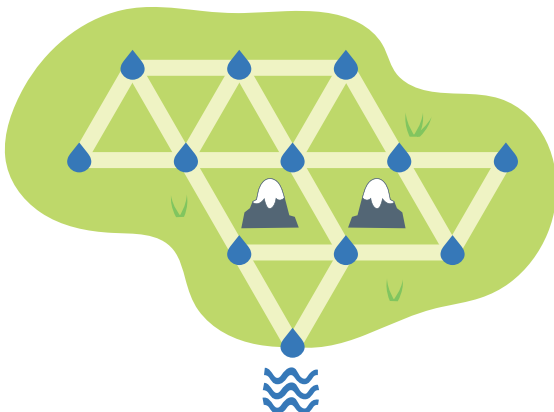
27 Max length: 3 segments



28 Max length: 3 segments



29 Max length: 3 segments



30 Max length: 3 segments

