# Pre-Lab Information

**Purpose** To model and observe stream processes, including factors that affect erosion and deposition

**Time** Approximately 45 minutes

**Question** What factors affect the power of a stream or river to cause erosion?

**Summary** In this lab, you will use a virtual model to observe stream behavior. You will model five scenarios involving a stream, and investigate the effect of water velocity, water volume, the stream slope, and the size of sediment on sand, pebbles, and various-sized rocks in a stream.

# Lab Procedure

1. **Prepare for the project.** 
   1. Read through this guide before you begin, so you know the expectations for this lab.
   2. If anything is not clear to you, be sure to ask your teacher.
2. **Open the virtual lab.**
3. **Model a low-gradient, low-velocity stream.** 
   1. Read the scenario.

*You are on a research trip to observe pronghorn in the prairie grasslands of Colorado. As you observe a herd grazing next to a nearby stream, you notice storm clouds moving in overhead and feel rain beginning to fall. How does the stream act right now upon the objects in it?*

* 1. Analyze the scenario and characterize the slope of the stream, the amount of rainfall, and the terrain of the area.
  2. Press the “G**o to the model.**” button to open the modeling tool.   
     You can always return to the scenario by clicking the “**?**” button in the top-right corner.
  3. On the left panel, choose the description for each parameter that would correctly model the scenario.
  4. Press the “**Check**” button.
     1. If all your descriptions are correct, proceed to step **f**.
     2. If your descriptions are not all correct, analyze the scenario again and correct your descriptions. Click on the “**Check**” button. Do this step until all descriptions are correct. Then proceed to step **f**.
  5. Observe what happens to the sand and pebbles in the stream.
  6. When ready, press the **“Pause”** button and write your observations in the space below **Low-Gradient, Low-Velocity Stream** in the **Data** section of this guide.
  7. Draw what you see in **Table A**.
  8. Proceed to the next activity.

1. **Model a low-gradient, high-velocity stream.** 
   1. Read the scenario.

*As you continue to observe the pronghorn herd, the rainfall gradually increases until it is falling at a steady pace, causing the stream to flow more quickly. How does the stream act right now upon the objects in it?*

* 1. Analyze the scenario and characterize the slope of the stream, the amount of rainfall, and the terrain of the area.
  2. Press the “**Go to the model.**” button to open the modeling tool. You can always return to the scenario by clicking the “**?**” button in the top-right corner.
  3. On the left panel, choose the description for each parameter that would correctly model the scenario.
  4. Press the “**Check**” button.
     1. If all your descriptions are correct, proceed to step **f**.
     2. If your descriptions are not all correct, analyze the scenario again and correct your descriptions. Press the “**Check**” button. Do this step until all descriptions are correct. Then proceed to step **f**.
  5. Observe what happens to the sand and pebbles in the stream. Compare the erosion of sediment in this scenario and the erosion of sediment in the **Low-Gradient, Low-Velocity Stream** scenario.
  6. When ready, press the **“Pause”** button and write your observations in the space below **Low-Gradient, High-Velocity Stream** in the **Data** section of this guide.
  7. Draw what you see in **Table B** in the **Data** section of this guide.
  8. Proceed to the next activity.

1. **Model a high-gradient, low-velocity stream.** 
   1. Read the scenario.

*You make a second research trip to observe pronghorn in the Colorado Rockies. You are next to a steadily flowing river, observing a local herd, when you start to feel raindrops fall from overhead. How does the river act right now upon the objects in it?*

* 1. Analyze the scenario and characterize the slope of the stream, the amount of rainfall, and the terrain of the area.
  2. Press the “**Go to the model.**” button to open the modeling tool. You can always return to the scenario by clicking the “**?**” button in the top-right corner.
  3. On the left panel, choose the description for each parameter that would correctly model the scenario.
  4. Press the “**Check**” button.
     1. If all your descriptions are correct, proceed to step **f**.
     2. If your descriptions are not all correct, analyze the scenario again and correct your descriptions. Press the “**Check**” button. Do this step until all descriptions are correct. Then proceed to step **f**.
  5. Observe what happens to the sand, pebbles, and rocks in the stream. Compare the erosion of sediment in this scenario and the erosion of sediment in the **Low-Gradient, Low-Velocity Stream** scenario.
  6. When ready, press the **“Pause”** button and write your observations in the space below **High-Gradient, Low-Velocity Stream** in the **Data** section of this guide.
  7. Draw what you see in **Table С** in the **Data** section of this guide.
  8. Proceed to the next activity.

1. **Model a high-gradient, high-velocity stream.** 
   1. Read the scenario.

*As you continue to observe the pronghorn herd, the storm overhead gradually grows and the rainfall becomes a steady flow, increasing the speed of the river. How does the river act right now upon the objects in it?*

* 1. Analyze the scenario and characterize the slope of the stream, the amount of rainfall, and the terrain of the area.
  2. Press the “**Go to the model.**” button to open the modeling tool. You can always return to the scenario by clicking the “**?**” button in the top-right corner.
  3. On the left panel, choose the description for each parameter that would correctly model the scenario.
  4. Press the “**Check**” button.
     1. If all your descriptions are correct, proceed to step **f**.
     2. If your descriptions are not all correct, analyze the scenario again and correct your descriptions. Press the “**Check**” button. Do this step until all descriptions are correct. Then proceed to step **f**.
  5. Observe what happens to the sand, pebbles, and rocks in the stream. Compare the erosion of sediment in this scenario and the erosion of sediment in the **High-Gradient, Low-Velocity** **Stream** scenario.
  6. When ready, press the **“Pause”** button and write your observations in the space below **High-Gradient, High-Velocity Stream** in the **Data** section of this guide.
  7. Draw what you see in **Table D** in the **Data** section of this guide.
  8. Proceed to the final activity in this lab.

1. **Model a low-gradient, high-volume stream.** 
   1. Read the scenario.

*You make a third and final research trip to observe pronghorn in the flatlands. While making your observations, you are caught in a downpour. You hurry away from the nearby river to seek shelter. What will happen to the flow of water in the river, and how will the river act upon the objects in it?*

* 1. Analyze the scenario and characterize the slope of the stream, the amount of rainfall, and the terrain of the area.
  2. Press the “**Go to the model.**” button to open the modeling tool. You can always return to the scenario by clicking the “**?**” button in the top-right corner.
  3. On the left panel, choose the description for each parameter that would correctly model the scenario.
  4. When you are ready, press the “**Check**” button.
     1. If all your descriptions are correct, proceed to step **f**.
     2. If your descriptions are not all correct, analyze the scenario again and correct your descriptions. Click on the “**Check**” button. Do this step until all descriptions are correct. Then proceed to step **f**.
  5. Observe what happens to the sand, pebbles, and rocks in the stream. Compare the erosion of sediment in this scenario and the erosion of sediment in the **Low-Gradient, Low-Velocity Stream** scenario.
  6. When ready, press the **“Pause”** button and write your observations in the space below **Low-Gradient, High-Volume Stream** in the **Data** section of this guide.
  7. Draw what you see in **Table E** in the **Data** section of this guide.
  8. When you have completed the lab, move to the next activity in the Virtual Classroom.

# Data

Record your observations either in your lab notebook or in the space below.

**Low-Gradient, Low-Velocity Stream**

Observations:

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| --- |
| **Table A. Drawing of low-gradient, low-velocity stream** |
|  |

**Low-Gradient, High-Velocity Stream**

Observations:

|  |
| --- |
| **Table B. Drawing of low-gradient, high-velocity stream** |
|  |

**High-Gradient, Low-Velocity Stream**

Observations:

|  |
| --- |
| **Table C. Drawing of high-gradient, low-velocity stream** |
|  |

**High-Gradient, High-Velocity Stream**

Observations:

|  |
| --- |
| **Table D. Drawing of high-gradient, high-velocity stream** |
|  |

**Low-Gradient, High-Volume Stream**

Observations:

|  |
| --- |
| **Table E. Drawing of low-gradient, high-volume stream** |
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