Partner names: _____

Calculating Stream Velocity and Discharge and Drawing a Stream Profile

Measuring Stream Velocity

1. One student stands 5 meters downstream from another student in a straight section of the stream.
2. As a student starts a timer, the upstream student drops a floating object into the fastest area of flow.
3. The student stops the timer when the object reaches the student 5 meters downstream and records the number of seconds.
4. Student teams repeat the process five times and find an average water velocity.

Table 1.1 Stream velocity measurements

Observation	Distance travelled (m)	Time elapsed (sec)	Water velocity (m/sec)
1	5		
2	5		
3	5		
4	5		
5	5		
		Average water velocity (m/sec):	

5. Calculate the water velocity for each observation using the formula below. Units are meters/sec (m/s).

$$\text{velocity} = \frac{\text{distance travelled}}{\text{time elapsed}} = \_\_\_\_\_$$

6. Calculate the average velocity of all observations and fill it in the bottom right box.

Measuring Stream Discharge

1. Using a measuring tape, the team will measure the width of the stream at the sample section.

Stream width: _____

2. Using a measuring tape to measure increments and a meter stick to measure depth, the team will measure the depth of the stream at 50 cm (or 1 m) increments from bank to bank. Choose your interval to make sure the team has at least 10 measurements across the river. At each increment, record depth and bottom description (sand, rock, gravel, woody debris, leaves, etc).

Table 1.2 Stream depth measurements and observations

Observation	Bottom description	Depth (m)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
	Average depth (m):	

3. Calculate the average depth of all observations and fill it in the bottom right box.

4. Calculate the average cross-sectional area of the stream using the formula below. Units will be meters squared (m^2).

   cross sectional area = average depth * width = _____

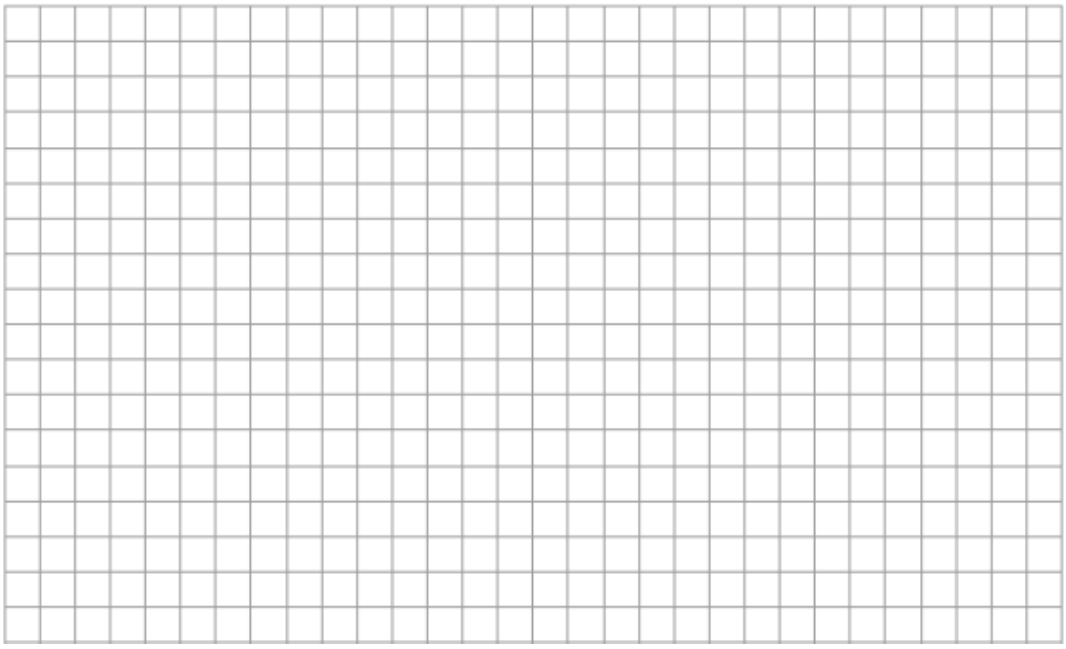
5. Calculate the stream discharge using the formula below. Units will be cubic meters per second (m^3/s).

   stream discharge = cross sectional area * velocity = _____

6. The United States Geological Survey (USGS) reports stream discharge in cubic feet per second (cfs) instead of cubic meters per second. There are 35.3 cubic feet in one cubic meter. Convert your result to step 5 into cfs using the formula below.

stream discharge in ft^3/s = stream discharge in m^3/s * 35.3 = _____

7. Using your depth observations above, draw a stream profile on the graph below. Depth will be on the y-axis and distance across the stream will be on the x-axis. Label the thalweg of the cross-section on your graph.



Analysis questions

1. What are three potential sources of error of your stream discharge calculation?
   a.

   b.

   c.

2. With your knowledge of stream ecosystems, what would three potential impacts be of excessive stream discharge (a flood)?
    a.

    b.

    c.

3. With your knowledge of stream ecosystems, what would three potential impacts be of insufficient stream discharge (a drought)?
    a.

    b.

    c.

4. One way that communities can address flooding is to allow a river room to spread widely across a flat area, often called a flood plain. Building and development are restricted in a flood plain so if a flood does occur, there is limited effect on the community.
    a. What would this do to the water velocity during a flood?

    b. Why is this an effective way to address flooding?

    c. What would be the disadvantages for a community of using flood plains to address future flooding events?