AGRISCIENCE EXERCISE

ENVIRONMENTAL RESOURCE SYSTEMS/STREAM STUDY

Key Concept: Water Resources

Agricultural Application: Water is an important component in many agriculture related industries.

Exercise: **Measuring the Velocity of a Stream**

Applied Principle(s): Technique for determining velocity of the stream and the mathematical computations needed.

Goals:

1. Practice using a tape measure and stop watch.
2. Compute the velocity using the correct mathematical methods.
3. Discuss the various velocities in different parts of the stream channel.

Materials:

- 100 ft. tape measure
- several oranges
- stop watch
- clipboard
- student information sheet

Teacher Preparation Notes:

- Locate a shallow stream in your area with a mild current.
- Make arrangements for a field trip - including permission slips and transportation.
- Discuss safety with students before going on the trip.

Procedures for Conducting the Activity:

1. Divide the class into groups of four students, and provide each with a data sheet and the necessary materials for this exercise.

2. Instruct the students to complete the activity as directed on their data sheets. You may wish to monitor their progress as they work; however, it is suggested that the students be left to follow the instructions and complete the activity on their own.

3. Once all groups have completed the exercise, discuss the answers to the discussion questions as a class. Be sure to make note of the practical agricultural applications of the principles demonstrated.

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Measuring the Velocity of a Stream

STUDENT DATA SHEET

1. Measure and mark a section of the stream. The length you use may be determined by the area in which you are working, but one hundred feet would be ideal. If you do not have that much room, try fifty feet. Mark the bank of the stream clearly so seeing your beginning and end mark is easy for you.

2. Station one person at each end of the marked area. Have one person stand on the bank with the stopwatch and clipboard. The last person will walk downstream, along the bank, following an orange when it is released.

3. Give the upstream person in the water an orange. Have him release it just before the mark. The person who is following the orange needs to say “start” to the person with the stopwatch when the orange passes the first mark, and “stop” as it passes the second mark. The person with the stopwatch needs to record the time on the data sheet. The group member at the downstream mark needs to catch the orange.

4. Repeat the procedure to achieve three reading at each location starting near the left bank, center, and near the right bank. Record all of the information. Draw a sketch of your section of the stream.

	time in seconds		
location	trial 1	trial 2	trial 3
near right bank			
center			
near left bank			

total length of section measured

Sketch of stream section used. ↑N

5. Copy your three readings for “near right bank” into the spaces provided below. Add the three times together and then divide by three to obtain the average.

_____ + _____ + _____ = _____ Sec. ÷ 3 Trials =
_____ Sec. Average Time

6. Repeat the above procedure for “center” and “near left bank” readings.

center

_____ + _____ + _____ = _____ Sec. ÷ 3 Trials =
_____ Sec. Average Time

near left bank

_____ + _____ + _____ = _____ Sec. ÷ 3 Trials =
_____ Sec. Average Time

7. Using your average times, divide the distance that the orange traveled by each average.

near right bank

_____ Number of feet traveled ÷ _____ Sec. Average time =
_____ Ft./Sec.

center

_____ Number of feet traveled ÷ _____ Sec. Average time =
_____ Ft./Sec.

near left bank

_____ Number of feet traveled ÷ _____ Sec. Average time =
_____ Ft./Sec.

8. We normally look at speeds in miles per hour. Convert your readings into miles per hour using the formulas below.

near right bank

_____ Ft. / 1 Sec. x 1 Mile / 5280 Ft. = _____ Miles / Sec.

_____ Miles / Sec. x 3600 Sec. / 1 Hour = _____ Miles / Hour

center

_____ Ft. / 1 Sec. x 1 Mile / 5280 Ft. = _____ Miles / Sec.

_____ Miles / Sec. x 3600 Sec. / 1 Hour = _____ Miles / Hour

near left bank

_____ Ft. / 1 Sec. x 1 Mile / 5280 Ft. = _____ Miles / Sec.

_____ Miles / Sec. x 3600 Sec. / 1 Hour = _____ Miles / Hour

9. Looking at the results you obtained above, where was the water moving the fastest?

Where was the water moving the slowest?

10. Look at the diagram you made of the stream channel. What relationship do you see between the shape of the channel and the velocity of the water?