Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Managing Water through Slope and Velocity

**Purpose**

Terms to Remember

Slope: The slope of a line is defined as the vertical change (the “rise”) over the horizontal change (the “run”) as one travels along the line.

Velocity: Speed. Distance travelled per unit time.

The purpose of this exercise is to discover the relation between land slope and water velocity.[[1]](#endnote-2)

**Background Information**

When water is removed by ditches, grading, or other structures the process is called “surface drainage”. Excess surface drainage can lead to erosion problems. A surface drainage system that is designed with this in mind can help control and prevent erosion. Three factors that are important to consider when designing drainage systems are slope, velocity, and stabilization of the waterway.

**Procedure**

 **Materials**

1. 4’ x 8’ rain gutter or equivalent
2. Tape or rule to determine percent slope
3. An apparatus to position gutter to set slopes
4. Ping pong ball
5. Stop watch or other timing device
6. Water

**Sequence of Steps**

1. ![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]()Set a gutter to a given slope (rise/run). Calculate the percent slope and record in “observations”.
2. ![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]()Establish a consistent flow of water. Note: flow rate must be the same for each slope.
3. ![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]()Set ping pong ball float at a given starting point, timing its travel to some predetermined end point. Measure distance between starting and ending points and record in “observations”.
4. Using Unit Factor calculations determine the water velocity in feet/minute.

Ex. \_\_\_\_ ft/minute = ft/sec X 60 sec/min

 5. Repeat procedures for additional slopes. Set slopes from 2% to 10%.

**![C:\Users\Angela\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\DRP2N1IJ\MCj04242300000[1].wmf]() Observations**

1. Record your starting slope and calculate percent.

 Rise \_\_\_\_\_\_\_ / Run\_\_\_\_\_\_\_\_\_\_ = \_\_\_\_\_\_\_% slope

2. Record distance between Start and End Points.

3. Determine the water velocity in ft/minute.

 Seconds it took for ping pong ball: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

 \_\_\_\_\_\_ ft/\_\_\_\_\_ seconds Simplify to 1 sec \_\_\_\_\_\_ft/second

 ft x 60 seconds = \_\_\_\_\_\_\_\_\_ft

 Second Minute Minute

Data Table A

|  |  |  |
| --- | --- | --- |
| **Slope in %** | **Time** | **Calculated Velocity** |
| 2% |  |  |
| 4% |  |  |
| 6% |  |  |
| 8% |  |  |
| 10% |  |  |

4. Summarize your observations using complete sentences. What did you discover from this experiment?

5. List at least four reasons why water is an important natural resource in California.

6. Agricultural Application: Based on this study, what do agriculturists need to know about how slope effects water velocity?

7. Agricultural Application: Why is this knowledge important to agriculturists? Brainstorm at least 3 reasons why this information is important.

1. Osborne, Dr. E, & Moss, Dr. J (Eds.). *Physical Science Applications in Agriculture*. Illinois: (FCAE) Facilitating Coordination in Agricultural Education. [↑](#endnote-ref-2)