Name _____ # Mass Movement Lab (C. J. Imperial, Guilderland H.S.)

Pre-lab questions (use textbook, notes, or other resources):

1. What is mass movement? What the forces involved in the process of mass movement?

2. What is creep? What factors could contribute to an increase in creep rate?

Materials

1. Stopwatch or clock	7. Metric Ruler	12. permanent marker
2. 250 mL glass Beakers	8. Duct tape	13. beach sand or sifted soil
3. Storm window plastic sheeting	9. old textbooks (or wood blocks)	14. corn syrup
4. liquid laundry detergent	10. vegetable oil	15. stirring rods
5. tap water	11. small Styrofoam plate	

Teacher Prep: Cut plastic sheeting so it is about 15 cm wide and 120 cm long. Wider and longer pieces will work fine.

Procedure:

1. Use a lab table or move two desks together.

2. Stack four or five books/blocks.

3. Using the ruler, mark (with permanent marker) centimeter increments on the edges of the plastic sheeting. Mark the entire length of the sheeting.

4. Tape one end of plastic sheeting to desk and the tape the other end of the sheeting to the top of the books. Make sure the plastic sheeting is tight and taut. Basically, you should have a right triangle.

5. Measure the height of the book stack and note it here _____.

6. What is the length of the plastic sheeting? _____

7. Fill the beaker to ¾ full of sand. Mix in vegetable oil and/or detergent and/or syrup at your own discretion. You are making a gloppy mixture. Add water and more sand as needed. The mixture should be easily mixed, not stiff, but not with visible puddles. Should be about the consistency of a firm malted. Beaker should be filled to the brim.

8. Double-side a piece of duct tape and attach to the side of beaker. A small plate should be held over the opening prior to start. This beaker will be placed on its side on the books with the open end facing down the slope.

Hypothesis: What is going to happen when the paper plate is lifted (be specific, including rates, velocities, etc.)?

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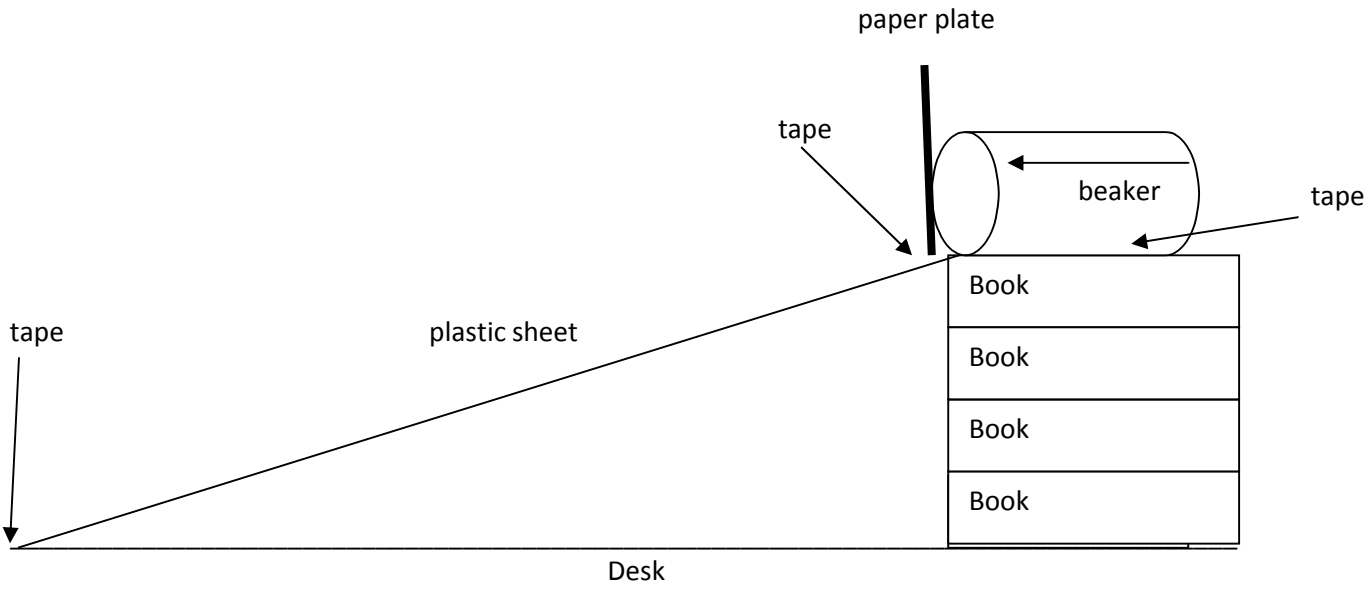

9. When you are ready to begin, lift up the paper plate to allow the glop to flow/creep down the sheeting. At thirty seconds increments, take a measurement of how far the glop has moved. 0 cm is the edge of the beaker. Read the increments that you have already marked on the sheeting. Record your data in the table below. Keep recording for the full 10 minutes. It is OK to slightly tilt the beaker to get a flow started. If needed, make a new mixture and start again.

Time (min)	Distance (cm)
0.0	0
0.5	
1.0	
1.5	
2.0	
2.5	
3.0	
3.5	
4.0	
4.5	
5.0	
5.5	
6.0	
6.5	
7.0	
7.5	
8.0	
8.5	
9.0	
9.5	
10.0	

Analysis:

1. Construct a line graph of this data. Remember that time is the independent variable and should go on the X-axis. Pick appropriate scales so that the data fills at least 2/3 of your graph.

2. a) Using the graph, calculate the slope of the line for the first three minutes: slope= $\frac{\Delta y}{\Delta x}$ (UNITS!!!!)

b) Calculate the slope for the last three minutes.

c) how are the two slopes different? Explain why this is so.

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3. The velocity formula is: $v = \frac{\Delta distance}{\Delta time}$ (UNITS!!!!)

a) Using the data table calculate the velocity of the flow for the first three minutes. Remember that velocity is a vector quantity and has both magnitude and direction.

b) Using the data table calculate the velocity of the flow for the last three minutes.

c) How are the two velocities different? Explain why this is so.

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4. Compare your calculations from questions 2 & 3. Are they the same or different? Explain.

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5. How would your data look differently if your mixture was more watery? more firm? your slope more angled? Walk around the run and look at other constructions and results (some students' mixtures/set-ups will be different than yours).

6. What are the risks (if any) for the following?

a) you build your house on the top of the hill (on top of books) and the area gets a lot of rain.

b) you build your house on slope of a hill (on the plastic sheeting).

c) you build a road at the base of the hill (where duct tape and desk meet) and there is a rainy season.

6. Does the soil/sand need to be moist to flow down the sheeting? Explain.

7. <u>Conclusion</u>: Based on our data, can we accept or reject our hypothesis? Why?

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