GLACIER LAB

NAME _____HR__ /25

BACKGROUND INFORMATION:

We know that glaciers flow across land, like a slow motion river. Why is that? Why doesn't the ice just freeze to the ground and stick there? They are so heavy and huge, how is it that this great mass can slide across the rocky surface of Earth?

SCIENTIFIC QUESTION:

What causes glaciers to be able to flow across land?

HYPOTHESIS: I THINK…. _____

EXPERIMENT 1:

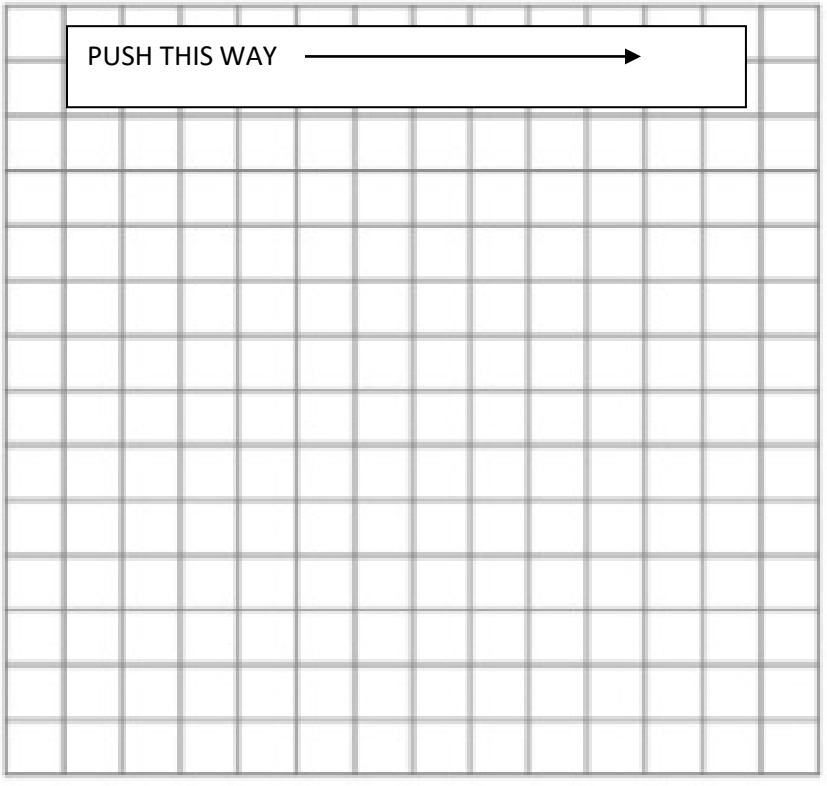
Obtain 2 pieces of ice that are approximately the same size. Put them both on the table about 30 cm apart (about 1 ft) with a piece of paper towel under each. This should help with keeping them from sliding on the table. On one, place a heavy book to simulate pressure, and leave the other one alone. Set the timer for 3 minutes and make observations during that time. If the book slides off, put it back on and hold it in place if necessary. Pay careful attention to the amount of meltwater from each ice block and/or the final size of each piece of ice.

OBSERVATION DATA: (2pts)

Ice with no weight on it	Ice with extra weight

EXPERIMENT 2: (2pts)

Get a piece of clay and roll it into a ball. Now make the bottom of the ball flat and place it on the grid paper below. Draw a circle around the area that the clay covers. Now press down as hard as you can with the palm of your hand and push the clay to the right until the clay stops moving. Do this only once. Now draw a new line around the ball of clay. (Don't pick it up and relocate it.)



EXPERIMENT 3: (3pts)

Get a deck of cards and stack them neatly. Place your palm on the deck and push it forward across the table. Does the deck stay together? _____ Where do the top layers end up compared to where the deck started? _____

Where do the bottom layers end up compared to where the deck started? _____

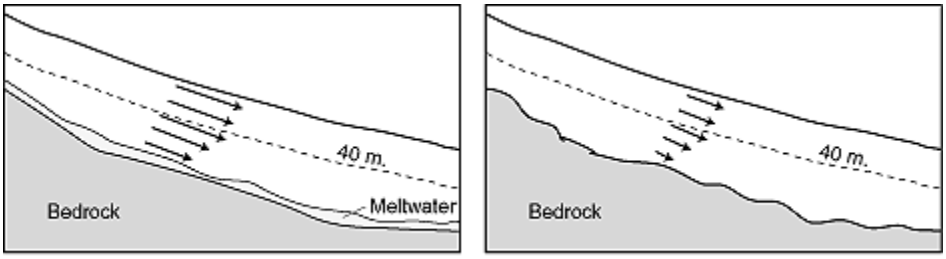
READ:

Scientists say that glaciers can move in one of 2 ways.

1] **internal plastic deformation**, (or **internal flow** or **ductile flow**), occurs when the glacier's weight becomes too much to support itself. This results in the slippage of ice layers within the glacier, so the glacier moves downhill, as if it is being spread like a deck of cards with the top layers moving more quickly than the bottom layers. This spreading happens because the lower layers are subjected to friction due to contact with the land, which slows their movement.

2] **basal sliding** -- With basal sliding, we see the entire glacier move as a single unit due to melting at its base. Pressure at the base of the glacier causes a thin layer of ice to melt. This reduces friction, allowing the entire glacier to slide downslope as a single mass, kind of like it's on a water slide. Basal sliding is greatest on steep slopes, where the reduction in friction allows the glacier to succumb to the pull of gravity.

- **Dry glaciers**: In colder climates, basal melting is minimal or absent, and flow is entirely through internal plastic deformation.
- **Wet glaciers**: In warmer climates, basal slip can predominate.



Wet glacier Dry glacier

ANALYSIS:

1. Which piece of ice melted faster?
2. Which piece of ice had more water flowing underneath of it?
3. If you were to have these 2 pieces of ice on a tilted notebook, which would slide downhill better?
4. If the area where a glacier is is below freezing, how does water form underneath it?
5. How would water flowing underneath a glacier help it flow across land? What would it reduce?
6. Did the top of the clay ball move the same as the bottom?
7. In the end, where was the top located on the graph? When you were done, where was the bottom located?
8. In this lab, the clay represented what?
9. In this lab, your hand pushing represented what?
10. As the cards spread across the table, this represented what (advancing or retreating?)
11. Which layers of a glacier advance the most?
12. Why are the arrows in the wet glacier picture longer?
13. Why are the arrows in the dry glacier different lengths?
14. Where are dry glaciers usually found?
15. Where are wet glaciers usually found?

CONCLUSION:

16. What 2 ways do glaciers flow across land? (2pts)