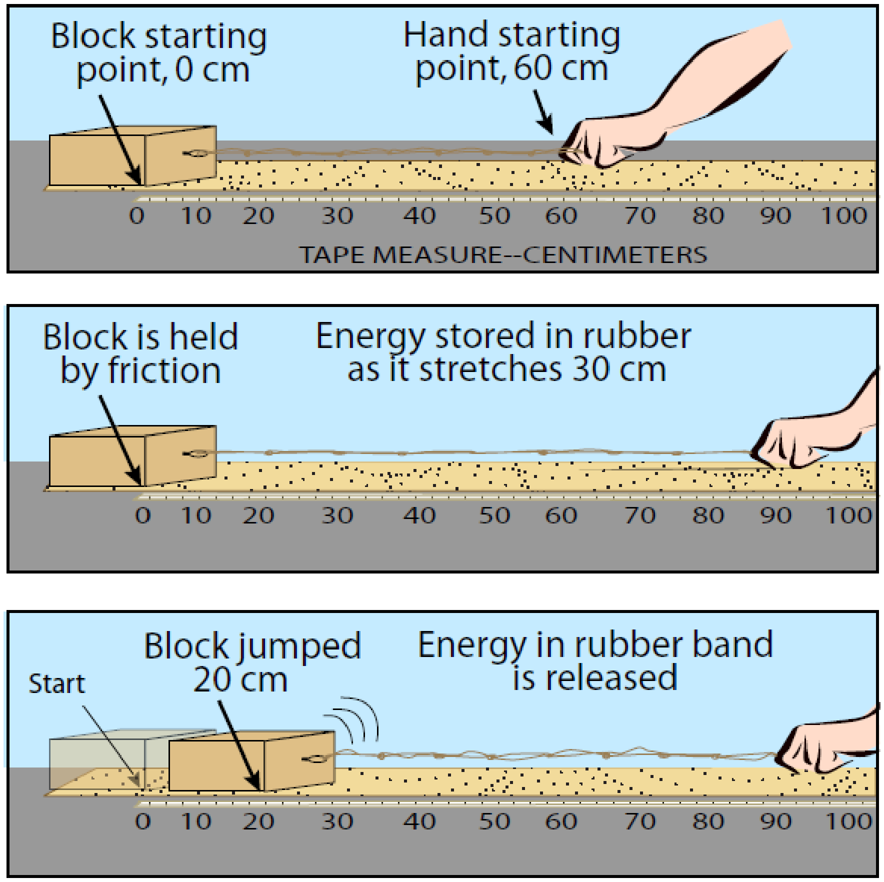
EARTHQUAKE MACHINE

NAME ________________________________

This lab will model the movement of transform boundaries which create earthquakes. You will be slowly stretching a rubber band horizontally until a block "jumps" forward. The two pieces of wood are like 2 tectonic plates rubbing against each other. Usually the friction forces are sandwiched vertically between the plates. In our model, the friciton forces are sandwiched horizontally between the wood blocks. Earth rocks are elastic, even though they don't seem like it. They can be deformed little by little and have potential energy stored in them. When they are pushed to their limit, they quickly snap forward and the potential energy instantly turns into kinetic energy.



Basic "earthquake machine". Hand represents the regional force acting on the plate which, in this case, pulls on a rubber band. The force applied is proportional to the length of the rubber band.

PROCEDURE:

There are 2 measurements that you need to take while doing this procedure. First, you will want to record how far the block moves forward. Be sure to have the front of the block at zero and record where the front of the block ends up. This measurement will be in centimeters. The second measurement you will take is how far the rubber band stretched just before the block jumped. This is also in centimeters. In order to get these measurements, you will need to have at least 2 other team members observing. The 3rd team member records data, and of course the 4th team member is pulling the rubber band. Do four trials so that each team member gets a chance to pull the rubber band.

DATA ——>

	Distance block moved	Distance rubber band stretched
Trial 1		
Trial 2		
Trial 3		
Trial 4		
average		

1. What is the fancy name of “stored” energy? ______________________________
2. Which part of this earthquake model had stored energy? _________________________
3. What is the name for energy that is in motion? _________________________
4. Where is there motion energy in this model? _________________________
5. What is the name of the force that is gripping the block to the sandpaper? _____________________
6. When friction forces are finally overcome, potential energy suddenly becomes _____________ energy.
7. As you pulled the rubberband it deformed and got longer and longer. Only elastic substances can deform, and then go back to their original shape. When a rubber band is stretched, this is called elastic potential energy. If in one trial the rubberband was 20 cm before the block moved, and in another it was 30 cm before the block moved, which one had greater elastic potential energy?

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8. In a transform boundary the sides of tectonic plates exert friction on each other. Put a mark on the picture to show where the friction is. How is the friction location in our model different from actual tectonic plates?

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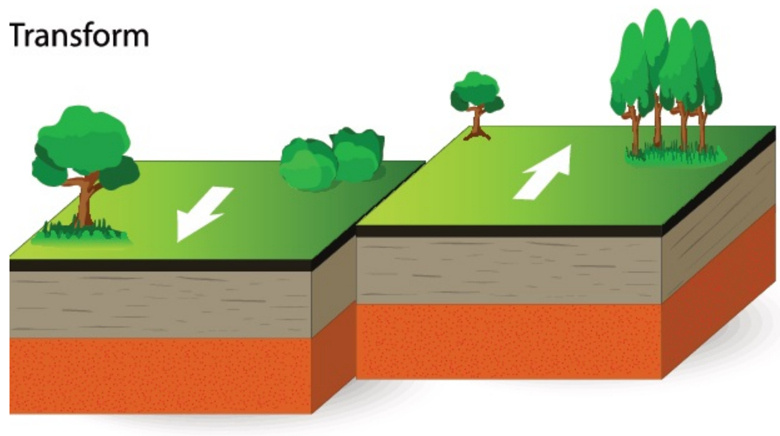

9. What relationship did you notice between how far the rubber band was stretched and how far the block moved?

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10. Fill in the statement: The greater the elastic ______________ energy, the _______________ the kinetic energy.
11. Predict what would happen if we pulled the block along a smooth surface. ____________________

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PART 2

Now you will be putting a “building” on top of the block. Build it according to the picture, also add a “floor” in the same way you made the “roof.” Do several trials while observing how the building moves. Experiment with the building by twisting it 90 degrees at the base.

1. How did that change things? ______________________________

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2. What building modifications could you make to keep the building from wobbling? ____

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3. From falling? ____

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(1) Cut four strips out of the manila folder; two that are ½″ wide and 5″ long (floor and roof), and two that are ½″ wide and 12″ long (vertical uprights).

(2) Fold ½″ on each end of the roof and tape it to the top of the uprights.

(3) Fold ½″ on each end of the floor and tape it inside of the upright about halfway up the structure.