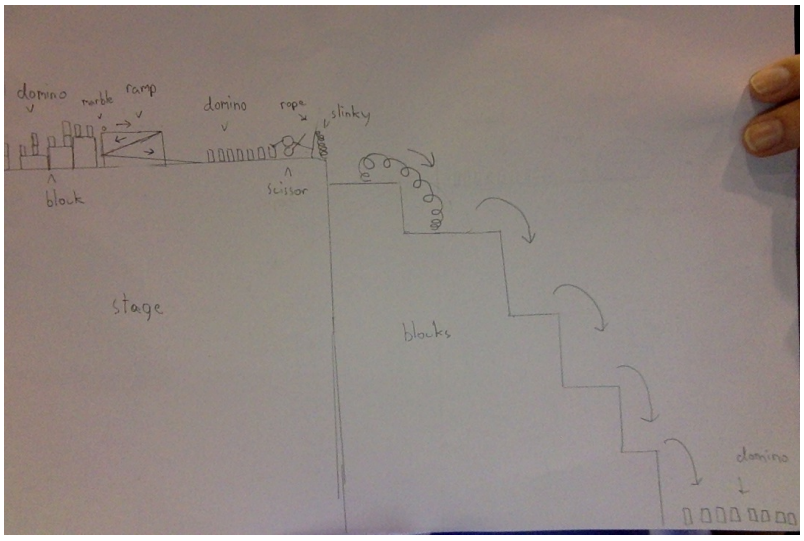
Team 27: De Duck
Team members: Rebecca g6, Pat g7, Jenny g8, Budi g8 and Sign g9

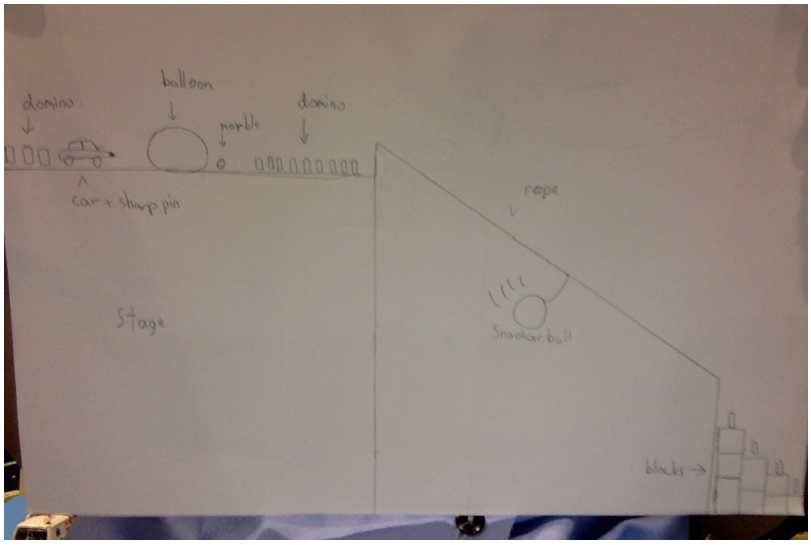
Design brief:
This year in design cycle we are put into groups with the mixture of grade. This year we have to make a rube goldberg machine with the items that the teacher has give us. Alongside with the items that we had brought from home. We were assign with the rectangular box that covers between the stage and the floor. We have to join the rube goldberg machine so that it will flow from the stage down to the floor. The plan for our machine is to have to fit the picture of inspiration so we will have something relating to words somewhere in our machine.

Design specification:
- The machine has to have accuracy.
- We want the machine to work.
- We will start and end with dominos.
- We will have at least 2 kinetics energy in the final machine.
- We will have at least 3 action on our final machine.

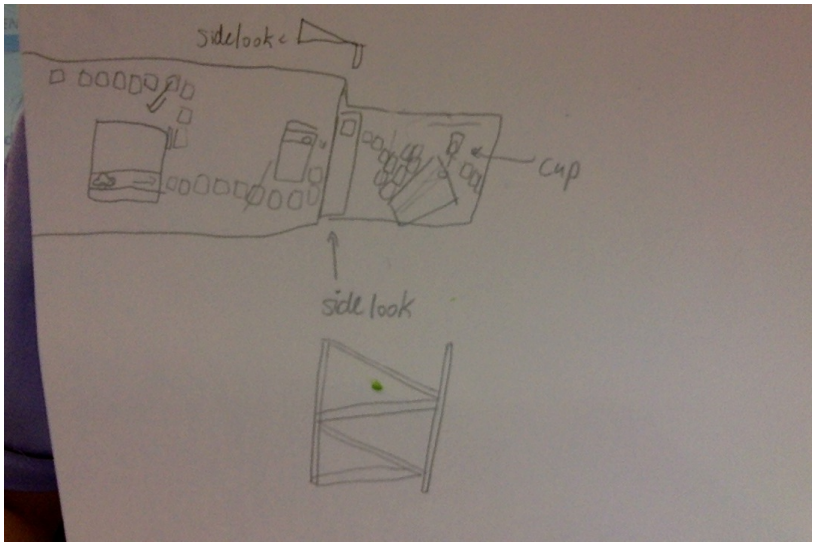
We have made 3 designs so that the ideas can keep improving both inform of accuracy and creativity. These are what the 3 designs look like:
Design 1



Design 2




Design 3

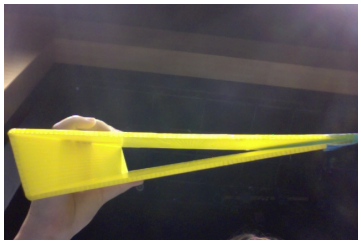



**Tuesday**

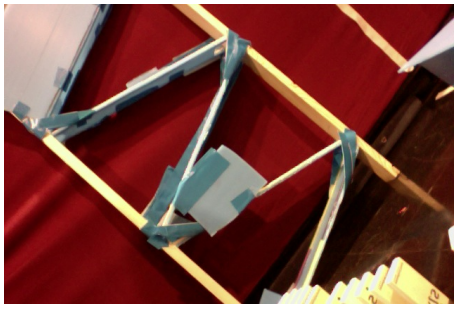
On tuesday we had look on different websites and videos to find information about the rube goldberg. First we had assigns job for each of the members in the group. Rebecca will work on the trail way on the triangular shape box that Budi and Pat will make. Jenny and Sign will work on the machines that brings the marble down the siding steps.

Rebecca's rail (Amount 2 rails)

Budi's and Pat's triangular shaped box (Amount 3 box)



Jenny's and Sign's Zigzag machine (Amount 1 machine)



We made 3 different plans that we thought we could use, we chose one that we all agreed on and that we thought would work the best. We tried it for the first couple of times, but it kept falling when we didn't want it to. At first we put 3 binder looking pieces of cardboard with another piece of , but then when it kept falling we changed it to just three and instead of dominos going all the way through we put a car that will fall and will make the next marble fall. The thing that we used from the start and that we didn't change was the zig-zag ramp (Jenny & sign's zigzag machine).

**Improvement:**

1) Our first design for the third ramp is to use the cups to carry and roll the marble sideway like the video that we found(*75 Rube Goldberg Ideas & Inventions*. *YouTube*. Toothpaste35, 1:34 - 1:38). The problem that we fould is the marble isn't going to where is suppose to be. So we decided to put rails so that the marble will go where we want it to go.

**Wednesday**

On wednesday we have continues our plan. By figuring out the lower part of our machine. On the lower part of the machine we have decide to interpret the theme that we have received. It is a picture of black words and letters on the white block background. We have found an video that has letters on the tracks and the ball will hit the paper and it will push the letters and words down so the they are readable(*75 Rube Goldberg Ideas & Inventions*. *YouTube*. SpriceRGMs, 4:03). So we had decided to interpreate that to the third ramp because we want our machine to end with a sentence, and also we still need to improve the third ramp so that it will work properly.

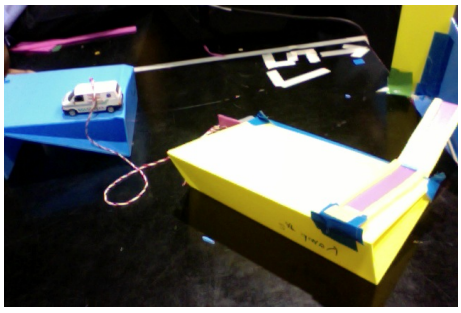
So we have decide to write our team name on the last rail. we wrote “we are team 27”. On the top where the marble start is from right to left, so the letters would show up, from right to left. We decided to make the rail run that way because in our theme the letters and word isn’t put in an order. Some of the letters and words were upside down, the same as the way the letters will pop-up from right to left which is the opposite way of how we normally read.

**Improvements:**

1) In the end of the day if find it very tiring to put the domino up, and not dropping them. So we had thought of an new idea by using strings instead. Instead on using the same idea 2 times with the domino we decided to ties the car with the string and connect it to the cardboard that holds triangular shape box up. This will help us save time when we are setting put the machine.Also it will give us an more rapid kinetic energy, to pull the box shape. Also this has help fix us the problem on having dominos that blocks the marble way.

Before

After



2) We have change it a bit by adding the rails on the middle of the triangle so that the marbles will not fall off the wrong way. The rail that we use are the rails that we put the letter on. We decide to not use the cup because we can’t get the angle of the cup correctly, and instead use the sticks on the side to control the marble so that it will hit the end domino to connect with the next team.

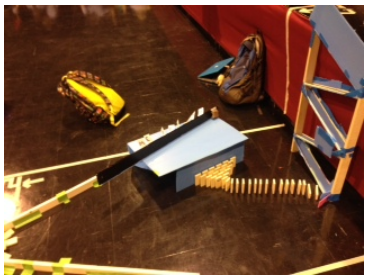
**Thursday**

On thursday we had the consistency test. We did 5 full runs of the machine each. We got ⅖. This was good because we figured what was wrong with the machine. The problem that we found was the domino doesn't alway have enough energy to pull the ramp number three to work properly.

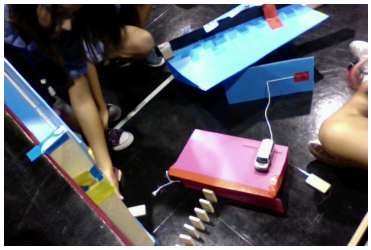
**Improvements:**

The we have thought of a new way to change the power source for the third ramp. We decided to use the a new ramp to make the car run and pull the third ramp (just like in ramp number 2)

Before



After

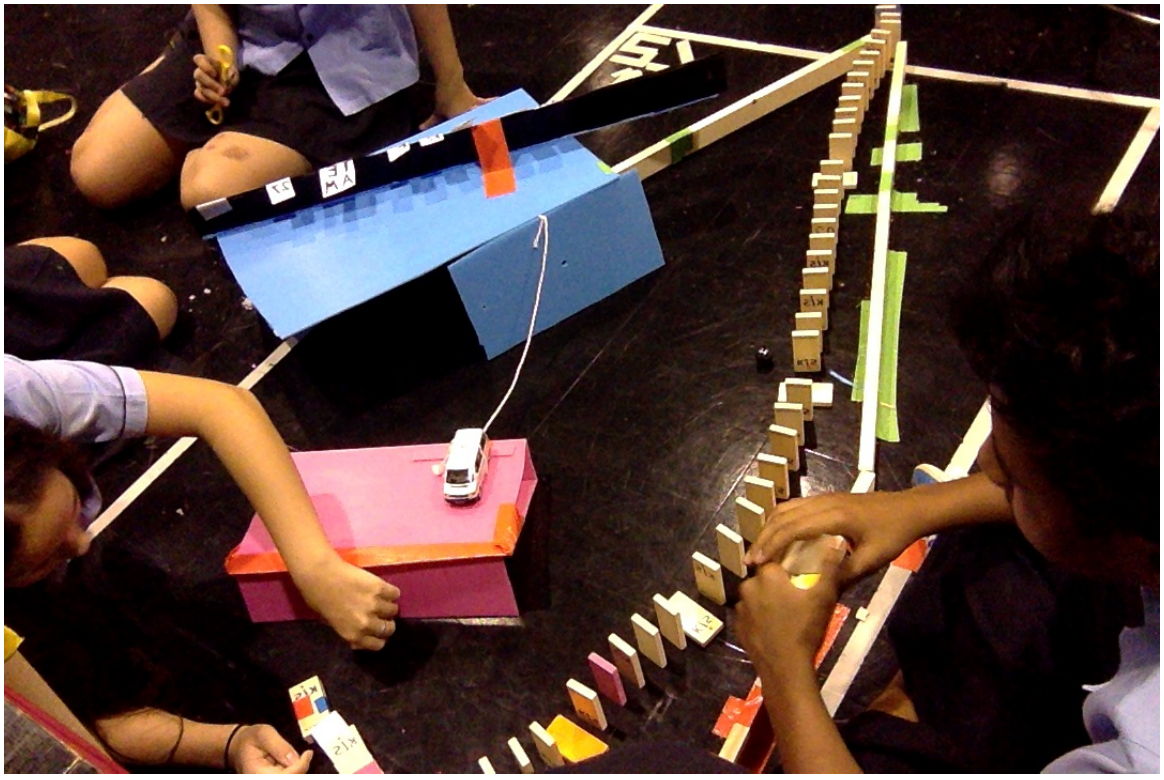


After we changed this, the car could make the ramp topple over much easier than the dominos. It was also easier to keep the huge ramp inside the marked lines, but something we need to watch out for is that we angle the trail towards to dominos or the marble might roll off the wooden blocks and avoid the dominos completely.

**Friday**

On friday we have been working on setting up the machine so that it will work with the best accuracy. The only problem right now with our machine it the way we lay out the dominos because if they were lay with the wrong angle then the domino will not contact each other. If it doesn't contact each other then our machine will stop working right away.

At the end of the day we found out that the domino doesn't push the ramp down because of the angle of the board that is holding the ramp up. So we had improve our machine by adding another domino railway so that the next domino will fall anyway if the ramp didn't work.



**Evaluation**

*How we tested:* We tested our machine in two parts, the first part (on stage) and the second part (on the floor). This helped us pinpoint specific problems without having to set up the whole machine and waste time. We had a few full runs too, but mainly did it separately because the thing that connected the two parts worked perfectly.

We would try each part many times to swee what was going wrong and what we needed to improve.

*How this machine could have been improved:* I think we should have made the machine neater by cutting the board to a more fitting size instead of just using bad scraps. An example is that we had to glue random pieces of board to the zigzag to stop the marble from falling out, and we glued them at different times when it was needed. We should have just made a proper border when we first made it.

The weak point of our machine is the domino because every time we put the domino put it will be different. The difference happens because we are using human to set it up without any mark of where we want the domino to stand. Another weak point is the domino sometimes doesn't have enough kinetic energy to push the board that is holding the ramp up.

Citation:

"10 Brilliant Rube Goldberg Machines." *Cool Material*. N.p., n.d. Web. 12 Nov. 2013. <http://coolmaterial.com/roundup/rube-goldberg-machines/>.

*75 Rube Goldberg Ideas & Inventions*. *YouTube*. SpriceRGMs, n.d. Web. 13 Nov. 2013. <http://www.youtube.com/watch?v=cv5WLLYo-fk>.

*75 Rube Goldberg Ideas & Inventions*. *YouTube*. Toothpaste35, n.d. Web. 13 Nov. 2013. <http://www.youtube.com/watch?v=cVgcmmS0W3Q>.

Hamper, Chris. *Physics: Higher Level (plus Standard Level Options) : Developed Specifically for the IB Diploma*. Harlow, Essex: Pearson Education, 2009. Print.

"Mashable." *Mashable*. N.p., n.d. Web. 12 Nov. 2013. <http://mashable.com/2013/08/21/rube-goldberg-machines/>.