

Prep Instructions

This activity is a simulation of a nuclear fission reaction. Atoms in this simulation are represented by a mousetrap, two golf balls and a pivoting coffee stirrer (**Figure 1**).

The golf balls (representing neutrons) are released, triggering two more mousetraps (atoms), which each release two golf balls, triggering two more mousetraps, and so on. This is analogous to the process that occurs in a nuclear fission reaction.



Figure 1

Part I - Assembling Each “Atom” in the Reaction:

The following items will be required for the prep of this part of the activity:

- one Bic Round Stic pen
- scissors
- craft knife
- three coffee stirrers
- two elastic bands
- one 1/4 in. x 1 in. bolt
- foam playmat
- drill
- ruler
- one Victor mouse trap
- hot glue gun
- two large washers

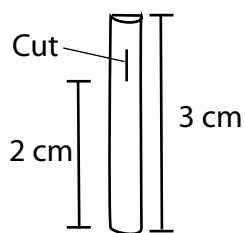


Figure 2

Step 1

Remove the cap, tip and ink from the Bic pen so that only the white tube is left. Cut a 3 cm piece from the tube. At 2 cm from the end of this segment, cut two 6-7 mm long slits, opposite one another with a craft knife (**Figure 2**).

Nuclear Mousetraps - Prep Instructions

Step 2

Cut a coffee stirrer so that it has a length of 11 cm. Push the stirrer halfway through the slit in the pen (**Figure 3**).

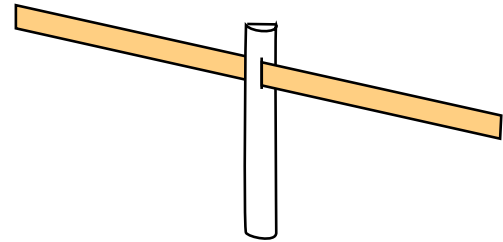


Figure 3

Step 3

Cut two more coffee stirrers to 11 cm. Place one on either side of the pen. Wrap an elastic band around each end of the group of stirrers (**Figure 4**).

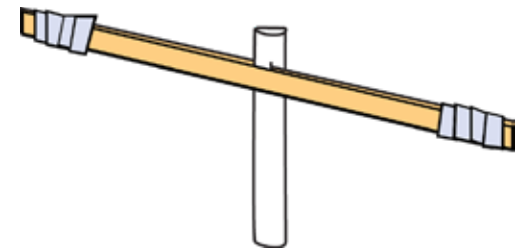


Figure 4

Step 4

Drill a 1/4 in. hole through the centre of the play-mat. Push a 1/4 in. x 1 in. bolt through the hole.

Step 5

Draw a line parallel to the edge of the play-mat 9 cm from the bolt (**Figure 5**).

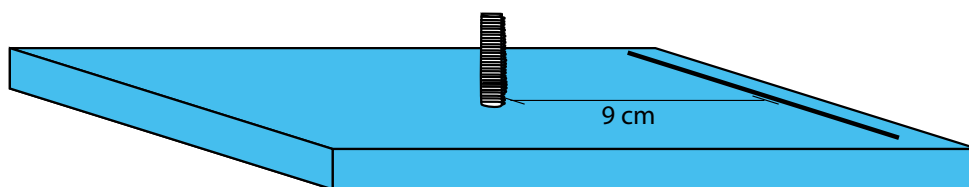


Figure 5

Step 6

Using a hot glue gun, glue a mouse trap along the line. Keep the center of the trap in line with the bolt (**Figure 6**).

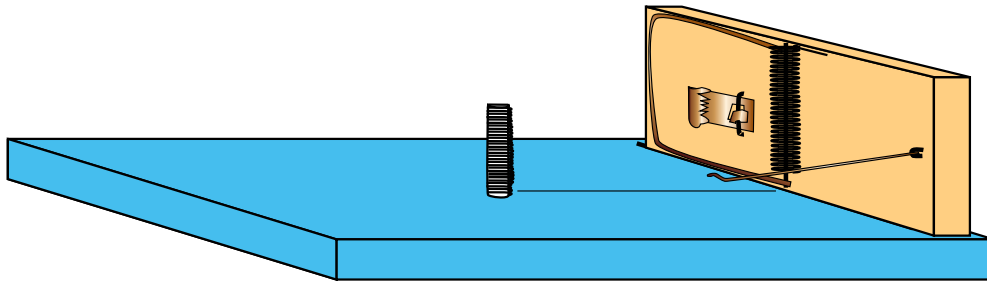


Figure 6

Step 7

Place the section of pen from Step 3 onto the end of the bolt. Make sure the stirrers are on top (**Figure 7**).

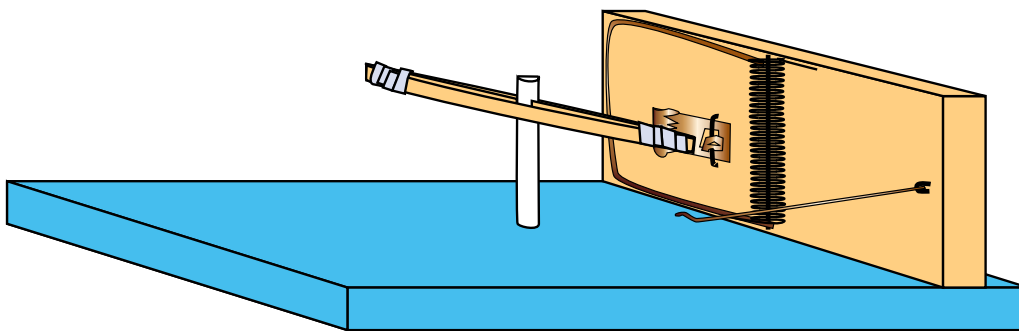


Figure 7

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Step 8

Glue washers to the play-mat with the centres 5 cm away from the bolt. Place one of the washers as close as possible to the bar of the deactivated mouse trap (while maintaining the 5 cm distance from the bolt) and the other directly opposite it with respect to the bolt (**Figure 8**). The golf balls will be placed on these washers.

Step 9

Repeat Steps 1-8 to construct each "atom."

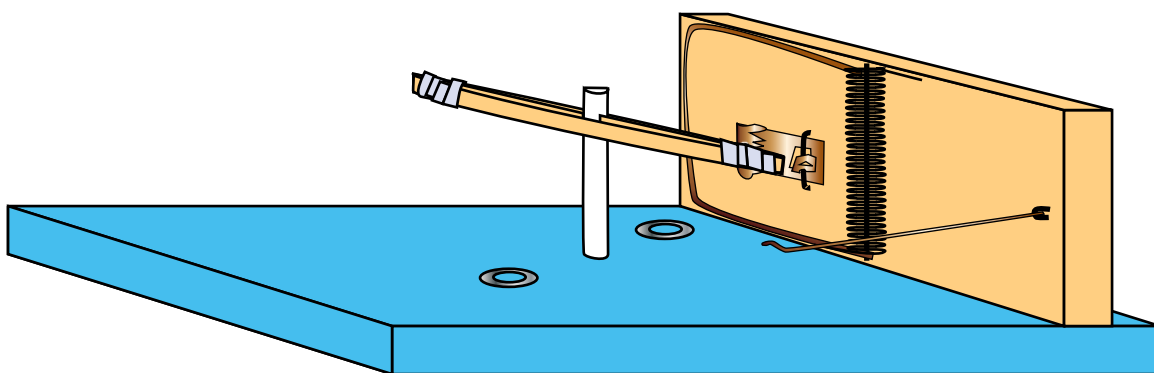


Figure 8

Part II - Laying Out a Chain Reaction

Laying out a large chain reaction can be tricky and tedious. For these reasons it is helpful to draw a diagram of the reaction before physically constructing and laying out a chain reaction. A diagram of a suggested layout is provided in **figure 9**. Feel free to use all, part or none of this layout. The quantity of materials required to construct a chain reaction depends, obviously, on the size of the desired reaction. The following directions outline the general rules for laying out a successful chain reaction.

Rule 1

Place a mousetrap 12 1/2 cm from the bolt of the mechanism that will eventually trigger it. Align the mousetrap so that its centre lines up with the line drawn from the bolt.

Rule 2

Place the mousetrap such that the catch that holds the arm against the bar is above the arm itself. **Figure 10** illustrates the correct orientation and **figure 11** illustrates the incorrect orientation.

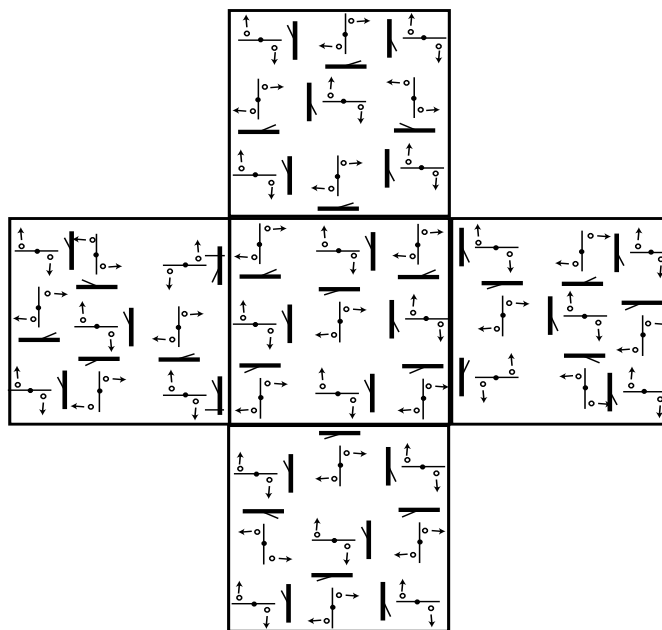


Figure 9



Figure 10



Figure 11

Nuclear Mousetraps - Prep Instructions

Rule 3

Glue the traps and the washers so that the balls will be struck early on in the rotation of the stirrers. Check that the balls are rolling where they are expected to. For example in **figure 12**, the center mouse-trap is set off first, launching the balls with the red arrows, which set off the next two traps. These two launch the balls marked with orange arrows, causing the next set of traps to go off. Those launch yellow which then cause green to launch.

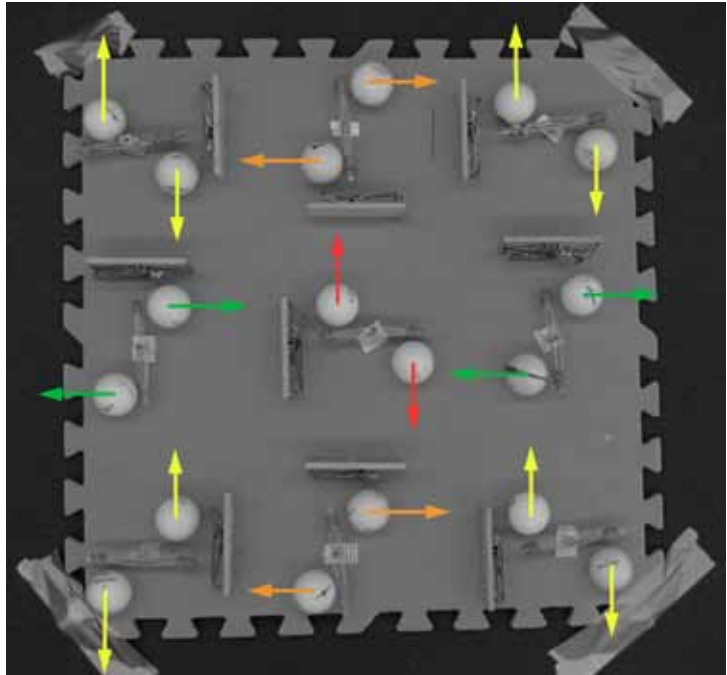


Figure 12