

Exploring Momentum Lesson Plan (1 Hour)

Grades K – 3 (Groups of 3 – 4 students)

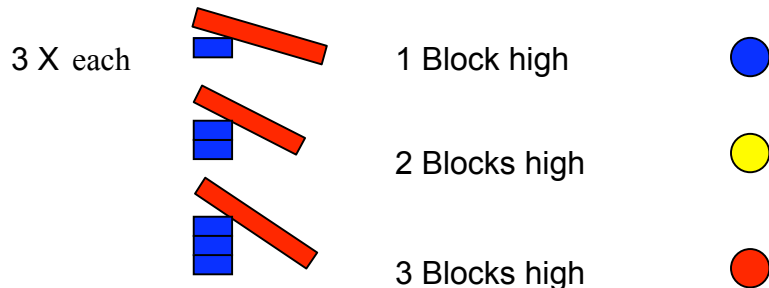
Group Discussion (outside of lab on floor with easel if needed)

- What do **scientists** do?
- **Scientific Method** – How to do a science experiment
3 steps to answering a **question** –
 1. **guess**
 2. **test**
 3. **tell**
- Does anyone know what a **ramp** is?
- Today's question is: how far will a ball roll as you make a ramp higher?
- Have students get into up to 8 groups of 3 students each.
(If the class has more than 24 - then have some groups of 4 and add extra stickers to those baskets so that each ramp height is done 4x instead of 3x to allow each student a chance to roll at each height.)

Experiment

With younger students (2nd or younger), it is too hard for them to manage sitting on the stools so have them stand or if they are not tall enough to reach the tabletop stand on the round rail of the stool so that they can see the tabletop. You may need to move one stool to the end of the table for shorter students to steady the ramp from behind.

On the board have a table showing the ramp set up and the color of sticker to be used:



Each time a team rolls a ball, there are three jobs:

1. Steady the ramp.
2. Roll the ball being careful not to push the ball but just release it.
3. Guess how far down the table the ball will roll and place sticker where ball actually stops. How close was your guess?

Rotate jobs so each person gets a chance at each one as you roll the ball down the first ramp three times.

Build the next height of ramp and roll the ball three more times and place the yellow stickers and so on.

- Stress the importance of not pushing the ball down the ramp – it is very difficult to push the same amount each time and you want nothing to change except the height of the ramp. Also discuss that you want the position of the ramp to stay the same and give you as much room as possible.

Students do the experiment. If some groups finish a bit early, each person can try something different with the ramp and see what happens.

Group Discussion (can wait until after the graphs are done)

What happened? What were your results?

- The higher the ramp, the further the ball rolled.
- The table top is like a graph of your results! Graphs are pictures of what happened in your experiment that are easy for others to read and figure out what happened.
- Which ramp (color dot) made the ball roll the farthest, least far?
- Did the ball always roll to the same spot? Why or why not?
- Can you think of another question about balls and ramps?

Additional activities

- Hand out graphing sheets/stickers, pencils and tape measures. (one graph per group ~ 2nd grade, one graph per student 3rd grade – check with teacher look and/or how much time is left.)
- Have the students measure the distance for each of their nine points.
- Where do you want to start measuring? End of the ramp, beginning of the ramp? Which end of the measuring tape?
- Point out that the tape measures are 150 cm long – the last line is under the metal piece at the end and does not show so the last visible # is 149. So when they use more than one tape measure, add 150 to the # on the second tape (usually for the yellow and red dots).
- Once they have measured their points, they can put the stickers from the table onto a sheet from the easel and make a class graph (1st - 2nd grade) and/or they can make an individual graph just like on the table to take home, coloring in each data point up to the distance the ball travelled with the highlighter pens (Small colored stickers are available instead if the students have difficulty.)
- If they are making individual graphs, when they have finished measuring, talk about the numbers on the lower axis of the graph – distance along the bottom is 10 cm per box, so big divisions are worth 100 cm, and each box along the side is for the height of the ramp, one block, two or three. [If the group is really sharp, done a lot of science, they can measure the height in cm of the ramps and add that to the side axis.]
- Collect the tape measures and pencils. Collect the graphs and give to the teacher with post-activity and evaluation sheet.