

Rubber Chicken Roll with Science Journal

Scientists of a feather flock together for this exploration of motion and sound! This experiment may have a silly set-up, but it explores fundamental concepts of scientific experimentation. You will generate hypotheses, fine tune variables, test, analyze your results, reiterate, and of course, roll on the floor with a bunch of rubber chickens.

Activity Duration: 10-15 minutes

Age Recommendation: 8+

Tools and Materials:

- Smartphone with the Science Journal app
- Protective phone case (recommended)
- An 8.5" diameter foam ball
- Thick poster board (or stiff plastic sheeting)
- Flat piece of craft foam, roughly ¼" thick
- Box knife
- Hot glue gun
- Adhesive velcro dots
- [30+ Squeaky rubber chickens](#)
- Tumbling mat or a soft surface
- Large pillow
- Tape (if not using tumbling mat)

Warning: This activity involves rolling on the ground with the phone. Using a durable phone case is highly recommended.

Key STEM Skills:

- Forming hypotheses; hypothesize what the graphical representations will be for particular actions.
- Defining and testing variables.
- Establishing control groups.
- Data literacy and experimentation; changing actions to produce graphical representations defined by constraints and variables.
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Next Generation Science Standards:

- *3-5-ETS1-2 Engineering Design:* Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
- *MS-ETS1-2 Engineering Design:* Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- *MS-ETS1-3 Engineering Design:* Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

Preparing the Foam Phone Holder:

Note: If you've already made the phone holder ball used in High Tech Hot Potato with Science Journal, you can reuse half of the ball for this activity.

1. Use a box knife to slice the ball in half. You will only need one of the halves.
2. Trace the shape of the phone in the middle of one of the ball halves. Make sure the phone is in its protective casing when tracing, or the indent will be too small.
3. Cut out an indent so the phone lays snugly inside.
4. Lay the ball half down on the poster board or plastic sheet, and trace a circle around the ball. Place the phone in the middle of the circle, and trace its outline. Cut along the lines you have traced.
5. Use the ball half to trace to a circle on the craft foam. Cut out the circle.
6. Hot glue the cut out shapes of poster board or plastic sheet to the flat of the ball half. Set aside to cool.
7. Attach the velcro dots to the flat side of the ball half and craft foam circle. The foam circle will act as a lid, keeping the phone safely inside the ball while rolling.

Experiment:

- Set up a tumbling mat with the large pillow at one end as an end point for the testers. If testing on the floor, use tape to designate the rolling zone with the pillow placed at the end.
- Open the X-axis, Y-axis and sound sensors on the Science Journal app. Secure the phone in the foam phone holder.
- Explain to the tester that they will be using sensors to record their motion and sound on the graph.
 - Demonstrate the accelerometer by moving the phone and showing how the graph peaks.
 - Ask the tester to make noises into the phone to show how their sounds affect the data.
- Let them know that this experiment will be done in two parts, first a control test without the chickens and then experimenting with them.
- Control Test
 - For the first part of the test, the tester will roll over an empty mat or floor. Explain that this is a *control test*. A control test is performed without variables to determine a baseline, which is compared to data from experiments that include variables. Control tests allow you to better isolate results caused by the variables in question by factoring out background data from your control tests. In our case, the tester is looking at what kind of motion and sound shows up on the graphs without the squeaky rubber chickens.
 - Start the recording by pressing the red circle in the app, place the foam on the top and hand to the tester. The tester rolls across the floor or tumbling mat while holding onto the foam phone holder, landing on the large pillow.
 - Meet the tester at the end and stop the recording by pressing the black square. Analyze the results with the tester.
 - Where did the accelerometer detect the most motion?

- Is there a pattern on the graph for either of the accelerometers? How did the way you roll effect the pattern?
- If there was nothing on the mat, why did the sound sensor graph change?
- Chicken Roll Test
 - Add the rubber chickens to the test area. Explain that now they will perform the main test, repeating their control test with the sound-making chickens. Before they perform the main test, they will need to do the following:
 - Arrange the chickens any way they wish on the mat or floor.
 - Make a *hypothesis*, or educated guess, about what their graphs will look like after they roll over the chickens. For example, will the sound sensor show a gradual rise and fall? Will the X-axis accelerometer display an up-and-down pattern? Encourage them to draw from the knowledge they gained during their control test.
 - Once they have stated their hypothesis, it is time to test. Start a second recording, place the lid back on the foam phone holder and give it to the tester. Their goal is to imitate their control test as closely as possible with the addition of the chickens.
 - Stop the recording and analyze the second data set.
 - How close were the results to the tester's hypothesis?
 - How did the results vary from the control test?
 - Where did they make the most sound? The most motion?
 - What kind of outside factors could have affected the test (ex: were there new ambient sounds that were not present during the control test?)
 - Encourage them to continue testing.
 - Adjust the variables by rearranging the chickens in different ways and see how this affects your results. How do these changes relate to your original hypothesis?
 - Create and test additional hypotheses based on previous results.

Further Investigations:

- Chickens are always fun, but this experiment can be replicated with any kind of soft noisemakers that are safe to roll over. Plush dog toys with squeakers work very well, but we recommend buying them new rather than use a furry friend's toy.
- Try this experiment with other types of movement, such as walking on your knees, somersaults or even cartwheels. If both hands are needed for the movement, the phone can be placed in a pocket, but make sure it is in tight so it does not fall out!
- Teamwork is an essential part of STEM. Try working with a partner to arrange the chickens or other noisemakers. Then take turns, performing the test in different ways. For example, one tester can roll while the other somersaults.