

Gyroscope Dancing with Science Journal

Gyroscope dancing involves keeping one part of the body completely still while dancing with the rest. In this experiment, testers will wear the phone on their arm and see if they can keep the accelerometers from detecting motion while they move and groove. This experiment is good for young scientists and requires almost no materials, just a smartphone, the Science Journal app and an armband.

Activity Duration: 10-15 minutes

Age Recommendation: 6+

Tools and Materials:

- Smartphone with the Science Journal app
- Protective phone case (recommended)
- Armband phone holder
- Your favorite dance music
- Dance move cue cards (see appendix)
- Dance party decorations (optional)

Key STEM Skills:

- Defining constraints for an experiment.
- Defining and testing variables.
- Data literacy; connecting actions with their graphical representations.
- Forming hypotheses; hypothesize what the graphical representations will be for particular actions.
- Data literacy and experimentation; changing actions to produce graphical representations defined by constraints and variables.

Next Generation Science Standards:

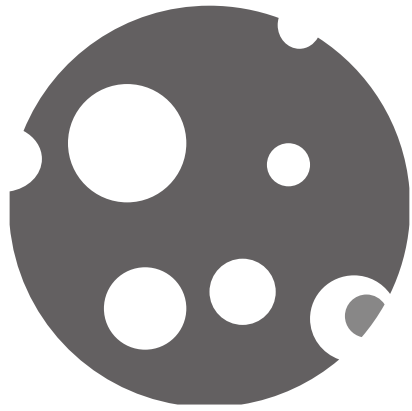
- *3-5-ETS1-2 Engineering Design:* Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
- *MS-ETS1-2 Engineering Design:* Evaluate competing design solutions using a systematic process to determine how well 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.

Experiment:

- Open the X-axis, Y-axis and Z-axis accelerometers on the Science Journal app. Secure phone in the armband.
- Place the armband on tester and explain that they must keep it as still possible while dancing because the accelerometers will pick up the motion. If you are utilizing dance move cue cards, let them know you will be calling out or showing the dance moves on the cards at random during the test.
 - Demonstrate the accelerometer by moving the phone and showing how the graph peaks across the three different axes.
 - Ask them to think about how they can move their body without moving their arm.
- Start the recording by pressing the red circle and call out or show the first dance move. Switch up the dance moves randomly. Here are some of the dance styles included on the dance move cue cards:
 - Moon Walking
 - Disco
 - Chicken Dance
 - Hokey Pokey
 - YMCA
 - Cabbage Patch
- Stop the recording by pressing the black square. Analyze the results with the tester.
 - Which dance moves made the biggest peaks on the accelerometer graphs?
 - Which accelerometer detected the most motion?
 - How did the peaks change as the tester became more tired?
 - How can they change the way they dance to keep all the accelerometers from detecting motion?
- Repeat the experiment as many times the tester would like.

Further Investigations:

- For younger kids, this activity is fun when combined with a freeze game. Challenge them to remember to keep their arm still when they go back to dancing.
- Can you replicate a dance just by looking at graphs? Two or more dancers close their eyes and dance at the same time. Then, they trade phones, analyze the patterns on the graph, and see if they can do a dance that will recreate the other dancer's graph.
- Try the Irish dance challenge! Irish dance involves jumping as high as possible while keeping your arms completely still at your sides. Try to see how high you can make the Z-axis accelerometer graph peak while keeping the X-axis and Y-axis accelerometers from detecting motion.
- Not a fan of dancing? Try doing this activity with kickboxing moves instead.



Moon Walking



Science Journal



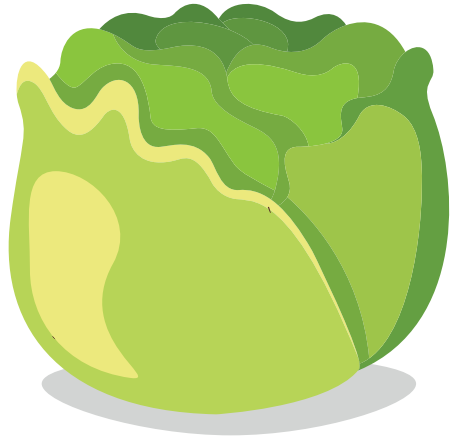
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Disco



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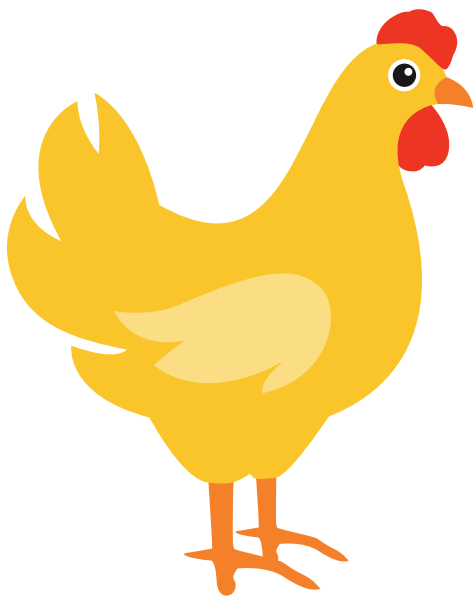
Cabbage Patch



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Chicken Dance



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Hokey Pokey



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YMCA



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