

# Wiimote Football Lesson Plan

**Subject Area:** Elementary Physical Education

**Lesson Title:** Introduction to Nintendo Wiimotes and Physical Fitness: Wiimote Football

**Grade Level:** 5th Grade

**Time Required:** 60 minutes (Two 30 min. class periods)

**Engineering Connection:** Application of sensor technology to physical education and lifelong fitness.

## Educational Standards:

**PE Standard 2:** Demonstrates understanding of movement concepts, principles, strategies and tactics as they apply to the learning and performance of physical activities.

**PE Standard 4:** Achieves and maintains a health-enhancing level of physical fitness.

## Learning Objectives:

- Students know that a Wiimote measures motion.
- Students have an idea about what acceleration is and how it relates to motion.
- Students have been shown that the Wiimote measures acceleration in three dimensions and how those measurements are affected by gravity.
- Students have used a Wiimote to collect informative motion data during physical fitness.
- Students are able to associate the data from different axes with different football motions.

## Materials:

- One Wiimote
- Two AA batteries, if the Wiimote does not have them already.
- One USB Bluetooth Dongle (if your machine does not already have Bluetooth capabilities)
- Duct Tape
- Inexpensive foam football (you are going to cut it open)
- Laptop (or Desktop) with Microsoft Windows
- Overhead Projector
- Wiimote Physics Application

## Cost and Availability

- WiiMote ~\$20
- USB Bluetooth Dongle ~\$10
- Wiimote Physics FREE (distributed under Microsoft Public License)

Both Wiimotes and USB Bluetooth Dongles are easy to find online or in electronics or department stores.

Wiimote Physics can be found online at [www.wiimotephysics.codeplex.com](http://www.wiimotephysics.codeplex.com). Information about Wiimote Physics can be found online at <http://wiiphysics.site88.net>.

## Safety and Precautions

- Be sure that no part of the Wiimote football or any bodies come crashing down on a laptop.
- Never throw a Wiimote when it is not bundled securely in the nerf football.
- Be sure that the batteries are good (and you may want to have spare batteries available).
- Setup and test the Wiimote, laptop, Wiimote Physics, and projector and modify the nerf football on a day before the first day of class to be sure you won't run into any problems and work with your IT representatives if you do.
- Allow plenty of time to setup and test the Wiimote, laptop, Wiimote Physics, and projector before the first class begins (and you may want to have a backup plan in case of one or more unexpected problems).

## Procedures/Instructional Strategies:

### 1. Setup

- a. Setup your projector, insert the USB Bluetooth dongle into a USB port of the laptop, and logon to Windows on the laptop.
- b. If you do not have Wiimote Physics installed.
  - i. Copy from disk or download from the internet with a with a network and internet connection from [www.wiimotephysics.codeplex.com](http://www.wiimotephysics.codeplex.com).
  - ii. Place Wiimote Physics on the desktop.
- c. If you have never connected to a Wiimote before and your machine does not have onboard Bluetooth capability.
  - i. Insert the USB Bluetooth dongle.
  - ii. Connect to the network and internet and the drivers should install for you.
  - iii. You may also choose to install the drivers from compact disk, if necessary.
- d. Connect to the Wiimote(s).
  - i. Find your Bluetooth devices.
  - ii. Search for a device (if connecting to more than one Wiimote, be sure to connect to them one at a time to be sure which Wiimote you are connecting to, otherwise they will all show up at once).
  - iii. After a moment you should see devices show up. After a bit longer, the device you are looking for should show up as a Nintendo device.
  - iv. Choose the Nintendo device.
  - v. Choose to pair without using a code.
- e. Run Wiimote Physics.
- f. Stop, start, and stop the Wiimote using the A button to test.
- g. If the graph isn't showing properly during the test, reattempt the above, or troubleshoot.
- h. Disable total acceleration (unless you want this feature). The graph must be stopped before for you can do this.
- i. If the nerf football hasn't been modified.
  - i. Carefully cut open a nerf football. Cut it only enough so that the Wiimote fits securely inside.
  - ii. Wrap the football in duct tape to be sure the Wiimote is secure inside.

### 2. Day 1

- a. Explain what a Wiimote is, what it measures, and how it is measured.
- b. Demonstrate Wiimote movements and the associated acceleration data in Wiimote Physics using the overhead projector.
- c. Explain how different movements affect the acceleration of the different axes.
  - i. Demonstrate moving along each axis, one at a time, relating the position, orientation, and translation of the Wiimote to the appropriate color on the graph.
  - ii. Demonstrate rotating around each axis, one at a time, relating the position, orientation, and translation of the Wiimote to the two appropriate colors on the graph.
- d. Place the Wiimote inside of the foam football.
- e. Teacher will demonstrate throwing a football and observe a real time data collection on the overhead.
- f. Discuss the chart and the relationship to motion of the football.

### 3. Day 2

- a. Review what a Wiimote is and what the data on the chart means.
- b. Have several students throw the football and observe their data on the overhead projection.
- c. Students will discuss with the teacher concepts such as the axes and acceleration.
- d. Students will review their data and discuss what it means.
- e. Graph data and compare students data with each other.
- f. Discuss how this data could help coaches improve someones performance.

## Modifications/Extensions:

- Provide additional Wiimotes and possibly laptops during the demonstration and have students make the motions with you and see the motions graphed.
- Implement the collection, graphing, and discussion of motion data for other physical education units. Examples: badminton and bowling.
- Collect data for the year and compare different activities to each other.

## Notes

- Wiimote Physics
  - The A button on the Wiimote starts graphing.
  - The 1 button on the Wiimote pauses graphing. Pressing A after the 1 button resumes the graphing.
  - The 2 button on the Wiimote stops the graph. Pressing A after the 2 button discards the old graphs and begins new graphs.

## Troubleshooting

- If you are unable to connect to a Wiimote after a Wiimote has disconnected from a laptop, try removing the Wiimote device and connecting again. You may need special permissions for this. If you have to do this and do not have the permissions, be sure to get the permissions before using the Wiimote in class.