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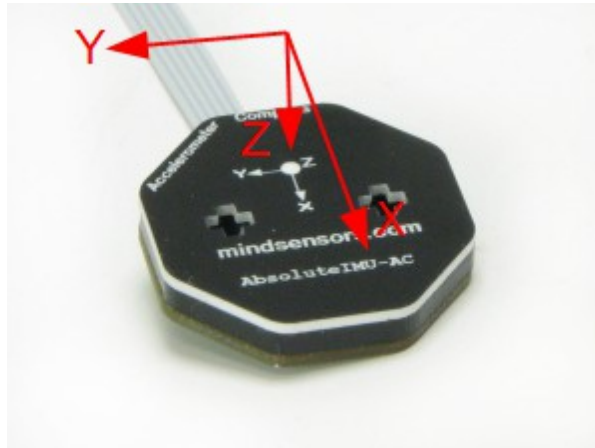
## Measure Acceleration when stationary

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The AbsoluteIMU Accelerometer provides acceleration readings along three axes, X, Y and Z.

When stationary, the accelerometer will measure the component of gravitational acceleration acting on each axis.

- Download the sample program that reads acceleration values from AbsoluteIMU and shows on NXT Screen.
- Attach the sensor to Port 1 and run the program.
- Note the values seen on screen.



When AbsoluteIMU is held stationary with its Z axis pointing towards the center of Earth (as in above picture), the Z reading will be approx 1000 milli-G.

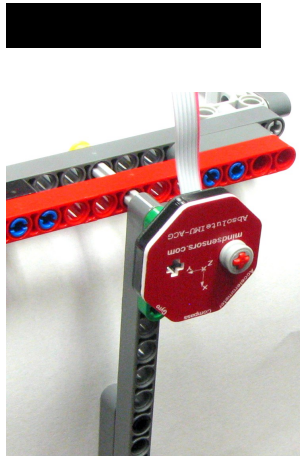
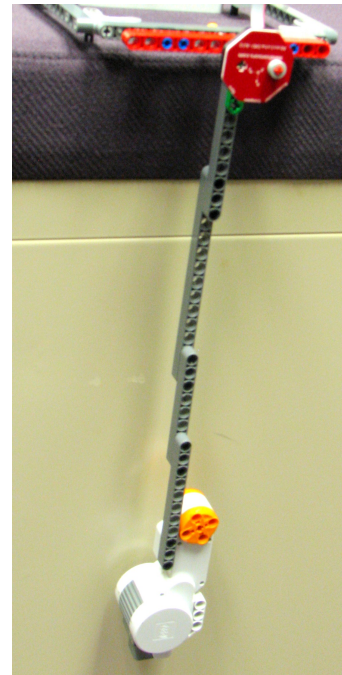
Keep the Y axis horizontal, and tilt the X axis towards center of Earth, and note the change in values.

## Data-logger to log data of a pendulum

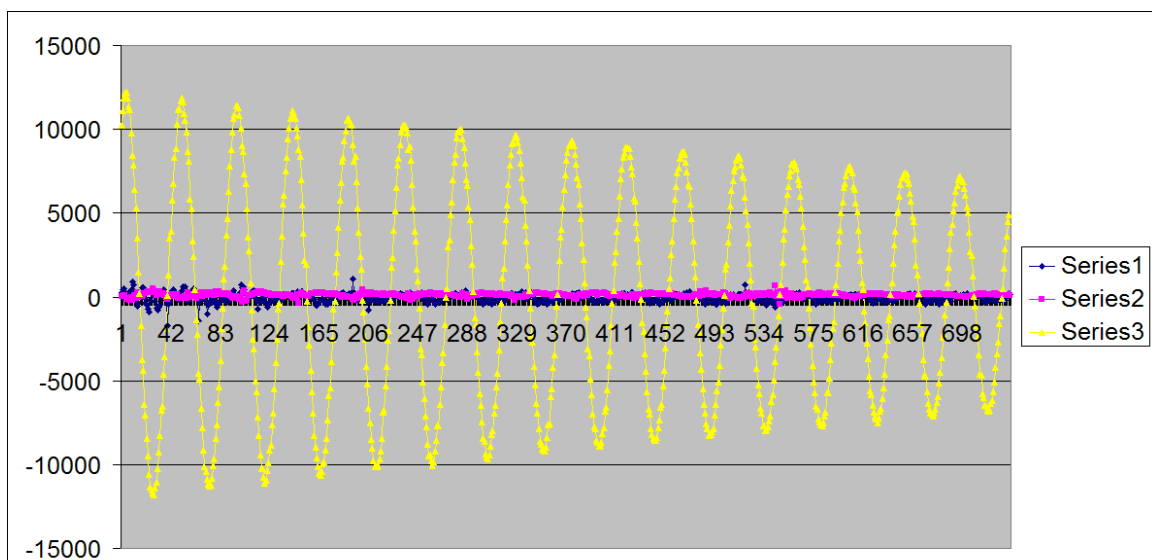
Write a program that will log the X, Y and Z Gyro readings to a file on NXT. While writing to file, log the readings separated by comma. Import the log file on PC, and open the file in Microsoft-Excel as a CSV, (Comma Delimited) file.

Chart the Data.

Create a pendulum with AbsoluteIMU-ACG mounted at the fulcrum.



Example chart of pendulum data:



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## Detect Gravity

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Gravitational acceleration is acting on any object on Earth. And Accelerometer will report that acceleration, even when it is stationary.

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## **Relationship between Acceleration and rate of change of velocity**

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What is the relation between Acceleration and rate of change of velocity?

Create an experiment to prove that relationship.

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## Detect Freefall

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During freefall, the gravitational acceleration component will be negated by the acceleration of falling object. Effectively the object will 'feel' absence of gravity.

Create an experiment in which NXT will play a sound (may be a screaming sound?) when it encounters a free fall.

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## Measure centrifugal force

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Accelerometer can be used to measure the centrifugal force acting on the device.

Create an experiment, where the Accelerometer is spinning and measure the centrifugal force being exerted on the device.

To prevent cables from tangling while spinning, design the contraption such that motor axle is mounted to a rigid base and NXT with motor and AbsoluteIMU is spinning around that axle.

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## More Experiments

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Measure acceleration and forces acting on a swing in motion

Detect highest and lowest points of a swing in motion

Compute length of a swing based on accelerometer readings

Create a pedometer

Compute tilt of the device

Maze Solver Robot using terrain mapping technique

Detect impact (similar to car-crash)

Detect Vibration

Apply Kalman Filter technique to detect bump on a smooth surface