



Feb 2016

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What is the NSE?

- The **National Science Experiment** is a mass-participation event among students where they would use a device called **SENSg** to collect data from their surrounding.
- Through participation in the NSE, students can **understand the roles and functions of sensors** in providing vital information about our environment.
- **Beyond the NSE phase**, participating schools may utilize the SENSg in **classroom curriculum**.

SENSg: Lab on a lanyard



NSE Classroom Experiments

- 6 Primary lessons
- 6 Secondary lessons
- 5 Junior College lessons

Classroom Experiments

- 1) **Primary**: Change of temperature due to the cooling effect of evaporation
- 2) **Lower Sec**: Change of air pressure in a pressure jar
- 3) **Upper Sec**: Estimation of distance using an accelerometer

Primary

Time : 2 periods (1 h 10 min)

Topic : Evaporation

Sensor : Ambient temperature

Learning objectives:

- 1) Understand that a cooling effect is produced due to evaporation
- 2) Interpret the change in temperature with time
- 3) Be aware of other examples of evaporation in daily life



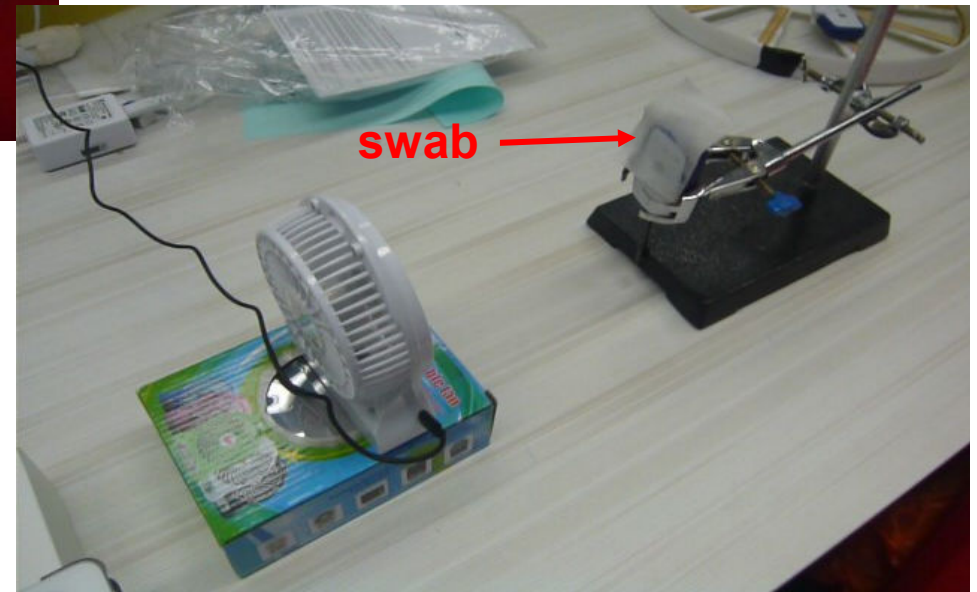
SENSg

Cooling effects from evaporation



Before adding alcohol swab

After adding alcohol swab



Cooling effects from evaporation

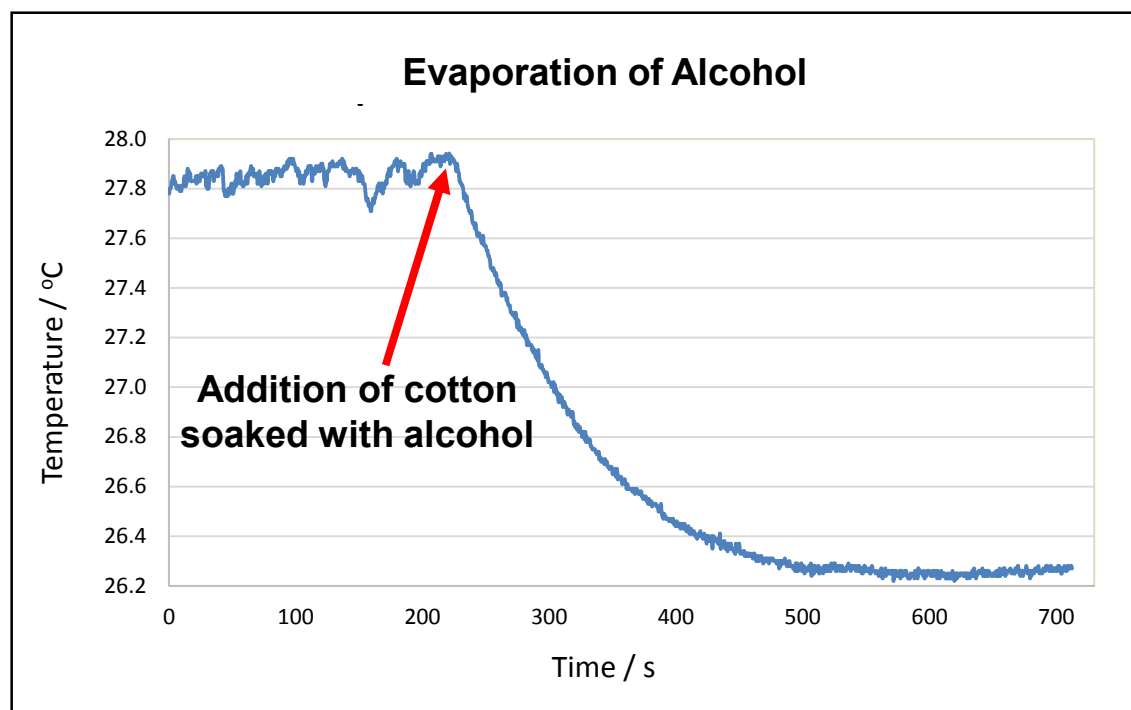


Recording of temperature as alcohol evaporates

Primary

Activity:

- 1) **Understand** the evaporation process and that it involves the removal of heat thereby creating a cooling effect
- 2) **Apply** knowledge to real life events such as sweating during physical activity and drying of clothes



- 3) **Interpret** a graph of temperature against time over the course of evaporation
- 4) **Analyse** the results of the temperature decrease

Lower Secondary

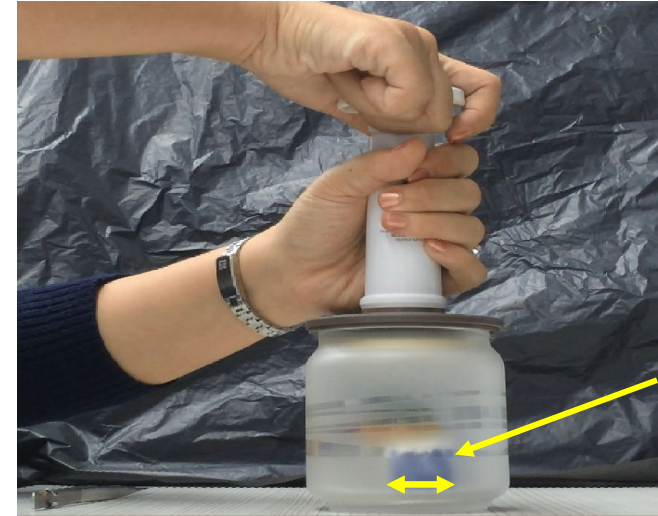
Time : 2 periods (1 h 10 min)

Topic : Pressure

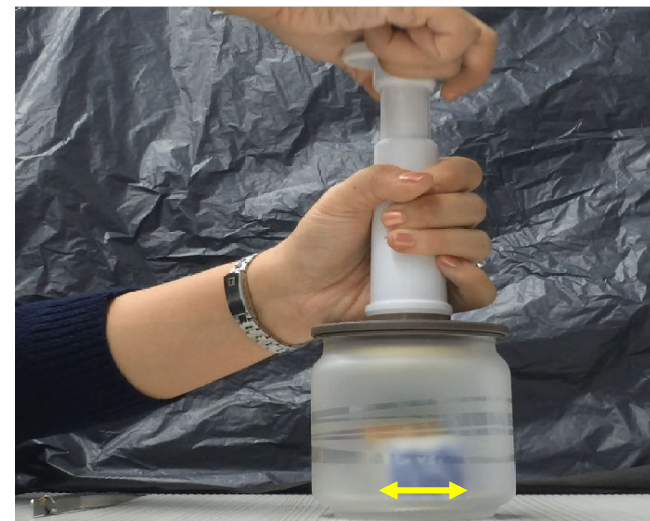
Sensor : Air pressure

Learning objectives:

- 1) Understand that air particles in a jar causes air pressure
- 2) Understand that the removal of air particles results in a lower air pressure
- 3) Interpret the change in air pressure with time



SENSg



Change of air pressure in a pressure jar



Before pumping out air

After pumping out air



Change of air pressure in a pressure jar

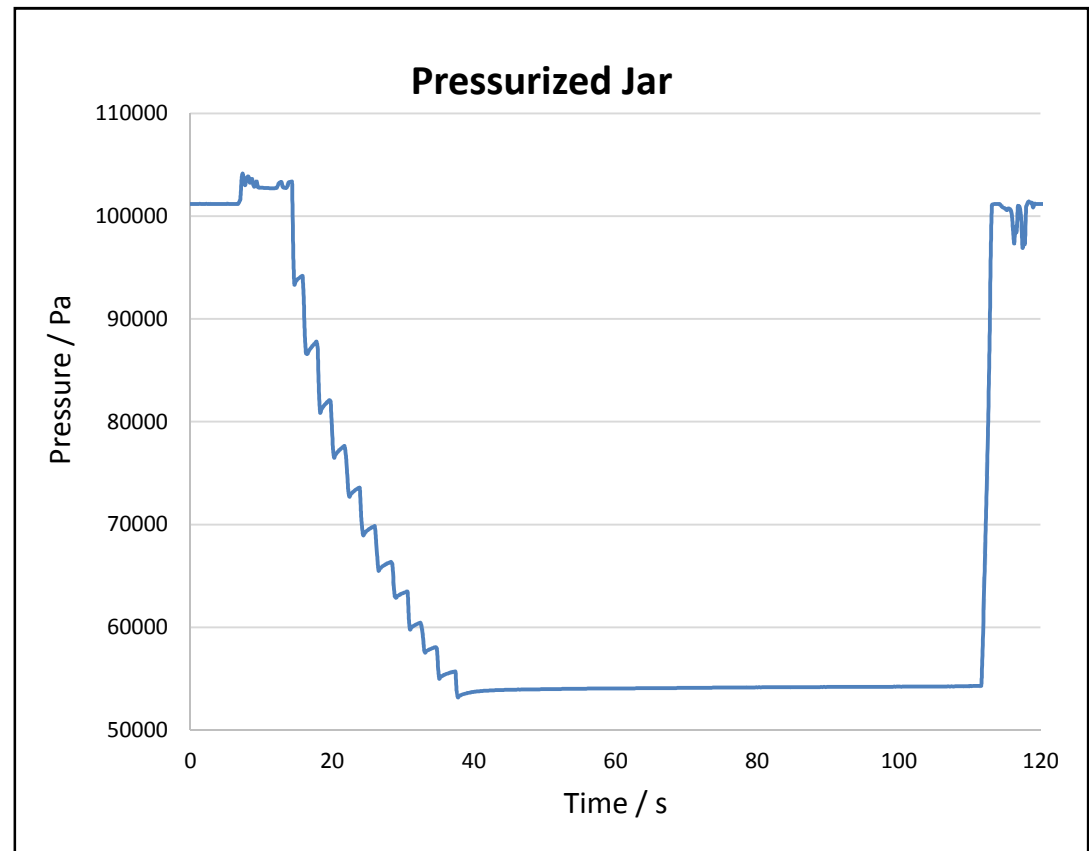


Recording of air pressure as air is being pumped out

Lower Secondary

Activity:

- 1) **Understand** what atmospheric pressure is and how air pressure changes as air particles are removed from a jar
- 2) **Apply** knowledge of kinetic model of matter to explain change in air pressure
- 3) **Interpret** the change in air pressure with time



- 4) **Analyse** the results to understand pressure change

Upper Secondary

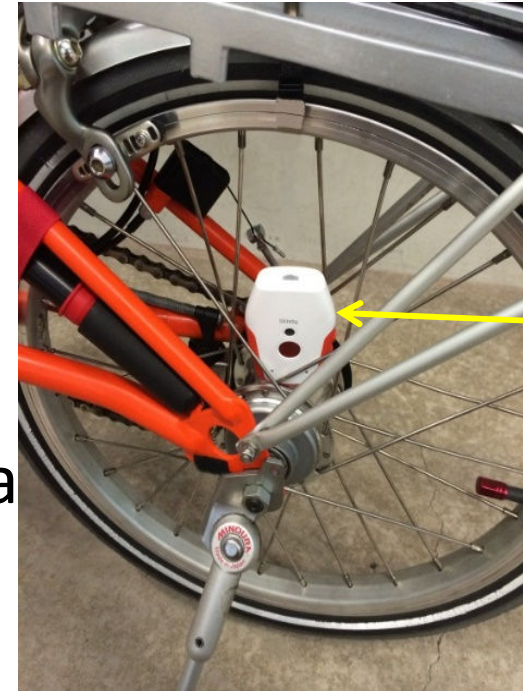
Time : 2 periods (1 h 10 min)

Topic : Kinematics

Sensor : Accelerometer

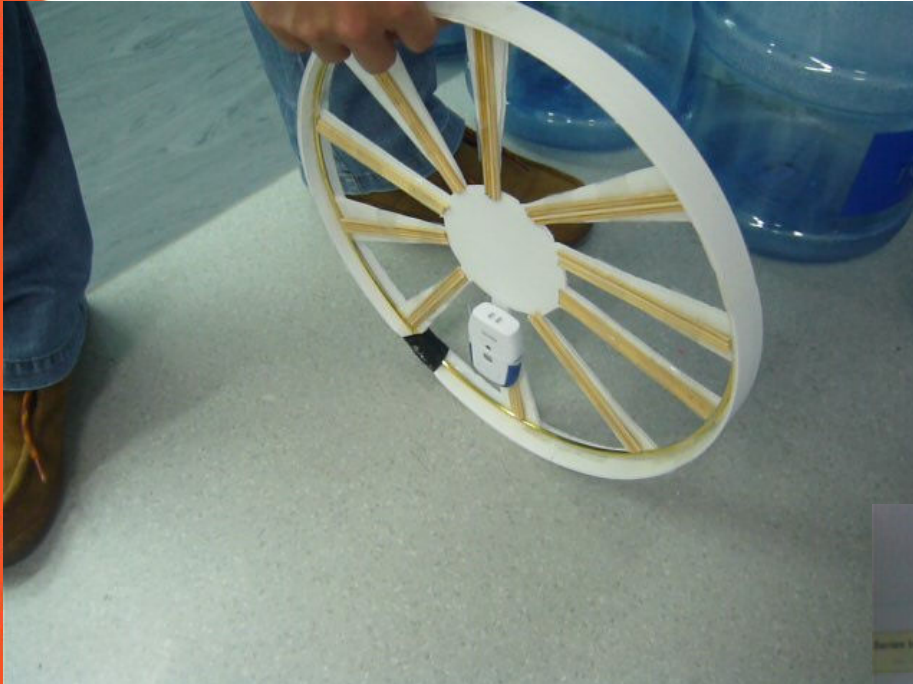
Learning Objectives:

- 1) Understand that acceleration is a vector which involves direction, and its relation with gravity.
- 2) Interpret simple acceleration-time (a-t) graphs
- 3) Be aware of alternative methods to carry out measurements.



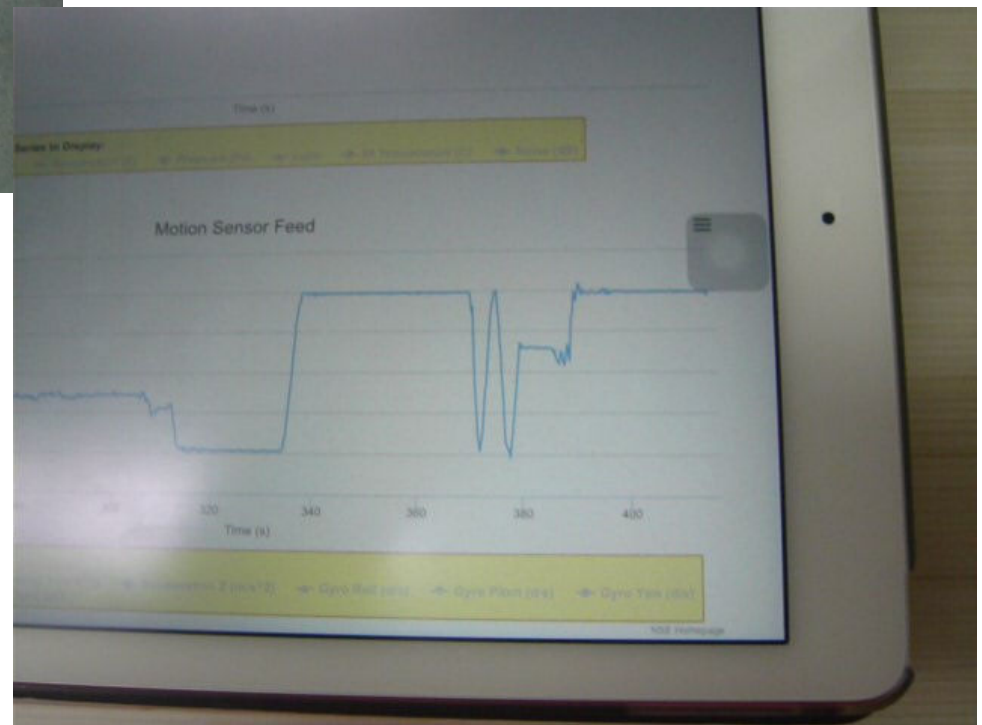
SENSg

Estimating distance with accelerometer

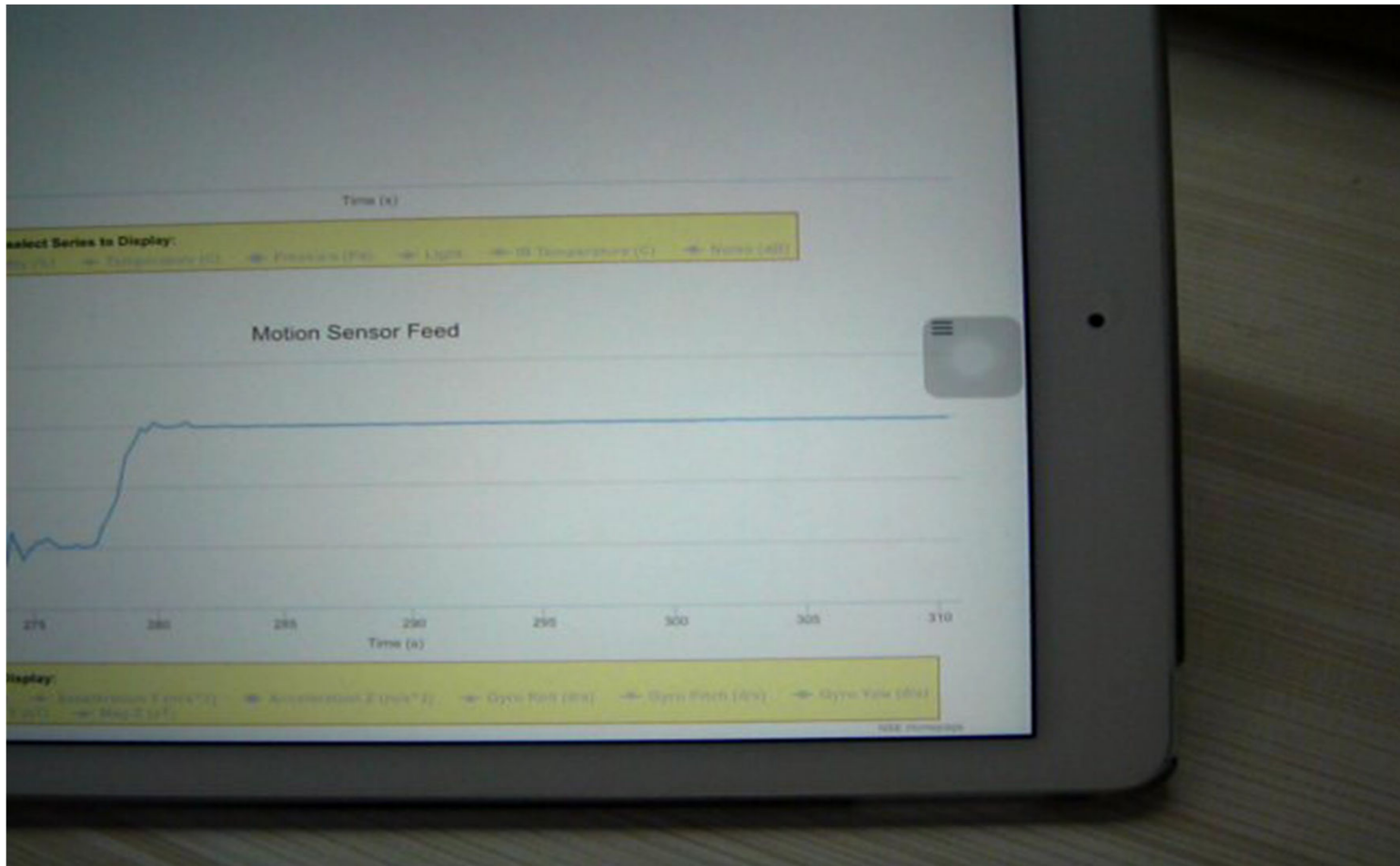


SENSg attached to the spokes of a wheel

Graphical representation of motion



Estimating distance with accelerometer

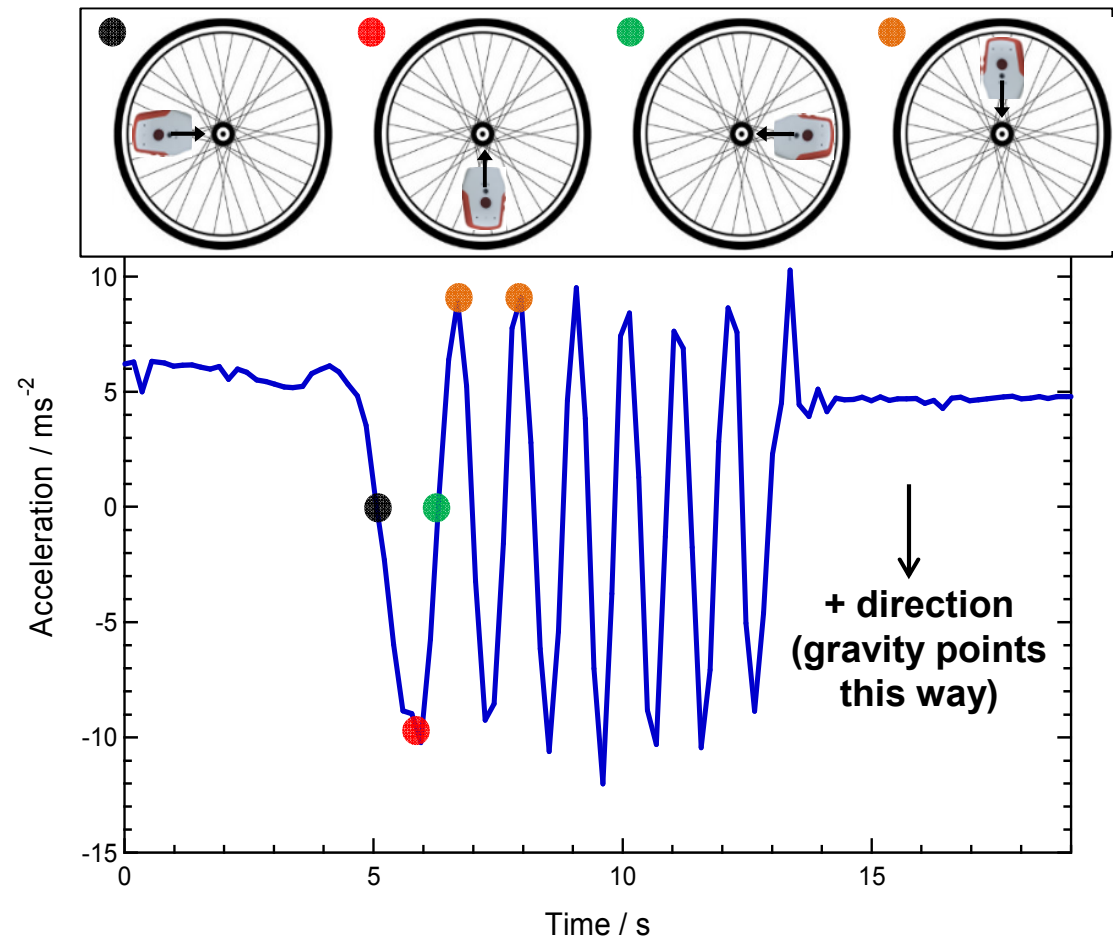


Recording of number of revolutions as wheel is being rotated on the ground

Upper Sec

Activity:

- 1) Understand the acceleration due to gravity and how to measure it with an accelerometer
- 2) Apply circular measure to estimate distance
- 3) Interpret an $a-t$ graph of an accelerometer



- 4) Analyse the results to understand the motion of object