(ENG) You run until you stop

Introduction

Step 1 - Motivational Stage

Step 2 - Investigational Stage

Step 3 - Consolidation Stage

Introduction

#In-class activity #Experiential learning #Simulation #Teamwork

Pupils will use their own body to understand Newton's second law that connects three variables: force mass and acceleration. They will record the results of their own acceleration (both positively and negatively) as well as the attempts of their schoolmates, discussing their similarities and differences.

Learning Objectives

- [ ] define force and motion explain the relationship between force and motion
- [ ] demonstrate understanding of force and motion in activity

ACTIVITY DETAILS

Activity Details

Connection of the activity with Art

Performing, filming

Link to local, national School Curriculum

Accelerated motion and Newton's second law/Relationship between mass, force and acceleration

Equipment required

- Free-fall tube/vacuum tube
- Quarter
- Feather
- Masking tape
- Yardstick or measuring tape
- video camera & editing software

Duration of activity

45 minutes

Sources

Step 1 - Motivational Stage

Make a brief introduction to your pupils regarding Newton's Second Law, stating that acceleration is produced when a force acts on a mass.

The greater the mass of the object, the greater the amount of force needed to accelerate the object. Force can be defined as a push or a pull, which causes a change in the motion of that object. Mass is the quantitative measure of inertia, a fundamental property of all matter. It is, in effect, the resistance that a body of matter offers to a change in its speed or position upon the application of a force. The greater the mass of a body, the smaller the change produced by an applied force and acceleration is the rate of change in the object's speed.

The following activity provides the chance to Pupils to experience Newton's Second Law, using their own body as an experimental device.

The initial experimental device that Galileo used to measure time and distance intervals, was a slop with bells and an iron ball

Nowadays, we can use video analysis tools, in order to have the same results. Photography and video evolution assist scientific experimentation as well as documentation of scientific facts.

More information about this topic can be found at the link

LINK

Step 2 - Investigational Stage

STUDENTS' TASKS

1

Task 1

Firstly connect todays' activity with some prior knowledge. Remind your pupils that Newton's first law of motion states that an object at rest stays at rest, and an object in motion stays in motion at a constant speed and in a straight line, until an outside force affects it. This is otherwise known as inertia. To help pupils

understand the concept of inertia, have them participate in an experiential activity that they will accelerate their own body and record themselves.

2

Task 2

Mark off a ten meter area with masking tape or chalk. Create midway points at two, four, six and eight meters. Use a recording device to have footage of each student's attempt.

3

Task 3

After discussing inertia with the pupils, allow them to run the ten meters to warm up. Begin the activity by allowing each student to run the ten meter corridor. Then ask them to come to a complete stop on both the five and ten meter marks. Record both attempts.

4

Task 4

After the activity is completed, discuss with the pupils about inertia and how it presented itself during their activity. With the help of the footage pupils will be able to understand that their upper body tried to keep moving even though their feet were stopped, thus understanding the concept of inertia and connecting it to their own body weight and the strength they and their schoolmates needed to use to completely stop themselves.

5

Task 5

Additionally, show and discuss the landing on an aircraft carrier video and ask your pupils why the stopping rope is not unwavering

This is a good starting point for the third Newton's Law. The same activity can be carefully applied with a shorter corridor and two pupils keep a straight rope at its end as a breaking measure. The procedure can be videotaped and analyzed second by second using appropriate software. Students can measure distance and time intervals of different attempts and compare their results. If adequate time is provided they can also use a graph to depict them and draw their own conclusions of their shape, according to theory.

Step 3 - Consolidation Stage

Ask your pupils if there is any way to measure their own speed and inertia. Provide them their video footage and let them experiment with the second law equation (F=m*a).

Finally, if your pupils were able to calculate the force that makes them gain and lose speed, ask them about the nature of this force.

End of the activity

EXIT