

(ENG) Everyday life

Introduction

Step 1 - Motivational Stage

Step 2 - Investigational Stage

Step 3 - Consolidation Stage

Introduction



#In-class activity #Inquiry-based learning #Experimental learning #Artwork #Teamwork

Pupils will design and videotape a short video regarding the effects of forces on mass, using Free-Body Diagrams. The video will be based on a scenario made by the pupils, a narrative of a simple everyday interaction (e.g. taking a can from a supermarket's shelf).

It has to be explanatory on the depiction (draw) of forces and the accomplished results.

Pupils will work in groups, creating the scenario first. It has to be simple to follow and time effective, with a duration less than 3 minutes.

Afterwards, pupils will pick roles in order to implement their idea and record it.

Learning Objectives

☐

Relate force and motion

☐

Explain use and elements of Free-Body Diagrams

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Represent forces with Free-Body Diagrams, respecting all their characteristics

ACTIVITY DETAILS

Activity Details

Connection of the activity with Art

—

Collage , Video



Link to local, national School Curriculum —

Forces/ Drawing forces



Equipment required —

- Cardboard
- Large pieces of colour paper
- Strings



Duration of activity —

45 minutes



Sources —

- <https://www.youtube.com/watch?v=Yfc6rAFOl4I>
- <https://www.youtube.com/watch?v=wAs1TliF7A0>
- <https://ophysics.com/t2.html>
- https://web.physics.ucsb.edu/~jatila/papers/Bookchapter_preprint.pdf
- https://www.youtube.com/watch?v=lvUU8joBb1Q_
- <https://www.youtube.com/watch?v=zZG9B07Aabc>

Step 1 - Motivational Stage



i Define what force is.

Tell the pupils that forces are vectors (because they have magnitude as well as direction) and basically come in two forms: those that are in contact and those that are not in contact – sometimes called field forces. Give examples of contact forces (i.e. friction, normal, tension, etc.) and field forces (i.e. magnetic, electric, weak, (maybe call these two the electroweak force); and GRAVITY).

Remind pupils that vectors are used to help find certain quantities that involve magnitude and direction. Tell them that to solve problems where forces are acting on an object, a diagram, called a free-body diagram, is often used to help visualize the forces involved.

It is customary in a free-body diagram to represent the object by a box or a small circle and to draw the force arrow from the center of the box or circle outward in the direction in which the force is acting.

Step 2 - Investigational Stage



STUDENTS' TASKS

1

Task 1 - Preparation

Provide the materials to pupils (cardboard, large pieces of colour paper, strings) and divide them into small groups.

Show your pupils the first two videos in the source section.

Discuss in the class the use of vectors, representing forces. Although it can not be seen, the depiction of the forces with vectors is quite reasonable, since it depicts all the necessary information (direction, magnitude).

2

Task 2 - Developing a story

Give them 10-15 minutes to create their story regarding the effect of force(s) to an object from their everyday life. The story has to provide sufficient information regarding the effect of the forces.

3

Task 3 - Recording the story

The next step is the team to assign roles to all its members, in order to start recording their story.

For the filming pupils can use their mobile, using the cardboard as background and the other materials to outline objects and forces.

Their film should respect the following guidelines:

- Depict the object under consideration; it does not have to be artistic. At first, you may want to draw a circle around the object of interest to be sure you focus on labeling the forces acting on the object. If you are treating the object as a particle (no size or shape and no rotation), represent the object as a point.
- Include all forces that act on the object, representing these forces as vectors. Consider the types of forces described in Common Forces—normal force, friction, tension, and spring force—as well as weight and applied force. Do not include the net force on the object.
- If there are two or more objects, or bodies, in the story, draw a separate free-body diagram for each object.

Step 3 - Consolidation Stage



Evaluate pupils based on the short films they have produced. You also have to keep in mind the role of each team member, the involvement in every phase of the procedure and the sufficiency of the force depiction.

End of the activity

EXIT