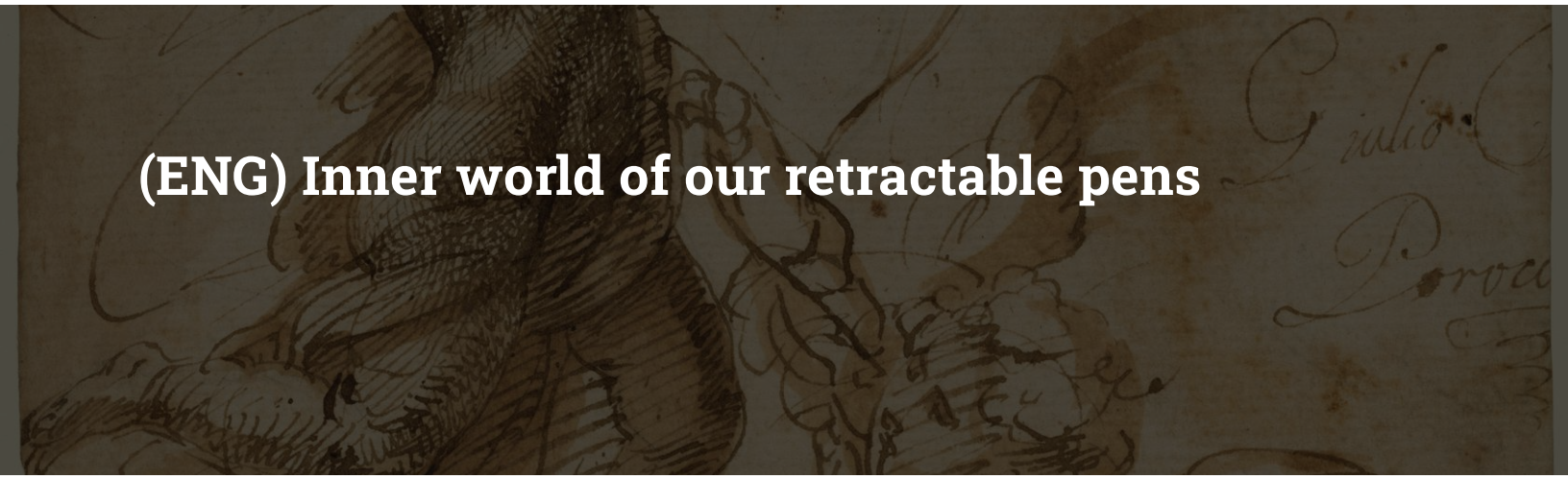

(ENG) Inner world of our retractable pens

Introduction

#Online activity #In-class activity #Experiential learning #Artwork #Theatre

This activity will guide pupils to understand how forces act toward different objects. Through everyday life experience, they will understand that some objects return to their initial state after being exposed to a force and some objects don't.

They will also learn how we measure forces using spring balance and how to draw a graph of extension as a function of force and explain it, and read the relevant data from the graph.

Pupils will experiment and find that the extension of the spring is directly proportional to the force, which acts on the spring, and can therefore be used as a measure of the magnitude of the force.

Learning Objectives

- [ ] recognize different materials and how force acts towards them
- [ ] interpret the graph
- [ ] experiment with different objects

ACTIVITY DETAILS

Activity Details

Connection of the activity with Art

Drawing, puppet video

Link to local, national School Curriculum

Forces/Spring balance

Equipment required

- Retractable pen,
- spring,
- two hooks,
- tape,
- (bigger) ruler,
- paper,
- plasticine,
- few items of different weights

Duration of activity

45 minutes

Sources

Beznec, B., Cedilnik, B., Gulič T., Lorger J., Vončina, D. (2019). Moja prva fizika 1, samostojni delovni zvezek za fiziko v 8. razredu osnovne šole

Grubelnik L., Zupan D., Gosak M., Markovič R., Ketiš B., Repnik R., Jug, M. (s.a.), Fizika 8, i-učbenik za fiziko v 8. razredu osnovne šole.
Retrieved from: https://eucbeniki.sio.si/fizika8/index.html

Photo credit:
Photo 1
own
Photo 2
Giulio Cesare Procaccini (1574–1625)
Cupid
pen and brown ink with brown wash
16.8 x 16.8 cm
Public domain
National Gallery of Art, London, Great Britain
Julius S. Held Collection

> https://www.nga.gov/collection/art-object-page.65765.html

Step 1 - Motivational Stage

Ask pupils to search their school accessories for a retractable pen. Ask them to retract and extend the ink cartridge several times.

You can ask the following motivational questions to encourage brainstorming in class

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"Have you ever opened a retractable pen?"

"What is inside?"

"What makes a retractable pen retract and extend so smoothly?"

"Would this function work as well if we put a little piece of plasticine inside the pen?"

Step 2 - Investigational Stage

STUDENTS' TASKS

1

Task 1

Ask pupils to take a spring and pull it from both sides.

Ask them to observe what happened to the spring when they were pulling it and when they released it.

Ask them to observe what happens when they pull the spring slightly and when they pull it stronger.

Now, ask the pupils to pull a piece of plasticine.

Ask them to observe what happened to the plasticine when they were pulling it and when they released it.

Ask the pupils:

"If we would like to measure a force, which of these materials would be more appropriate to use?"

"Why?"

Explanation: Spring is flexible, therefore, an appropriate material to measure forces. An item for measuring forces is called spring balance.

2

Task 2

Ask pupils to watch the video below, where Oto will show how the spring balance is used:

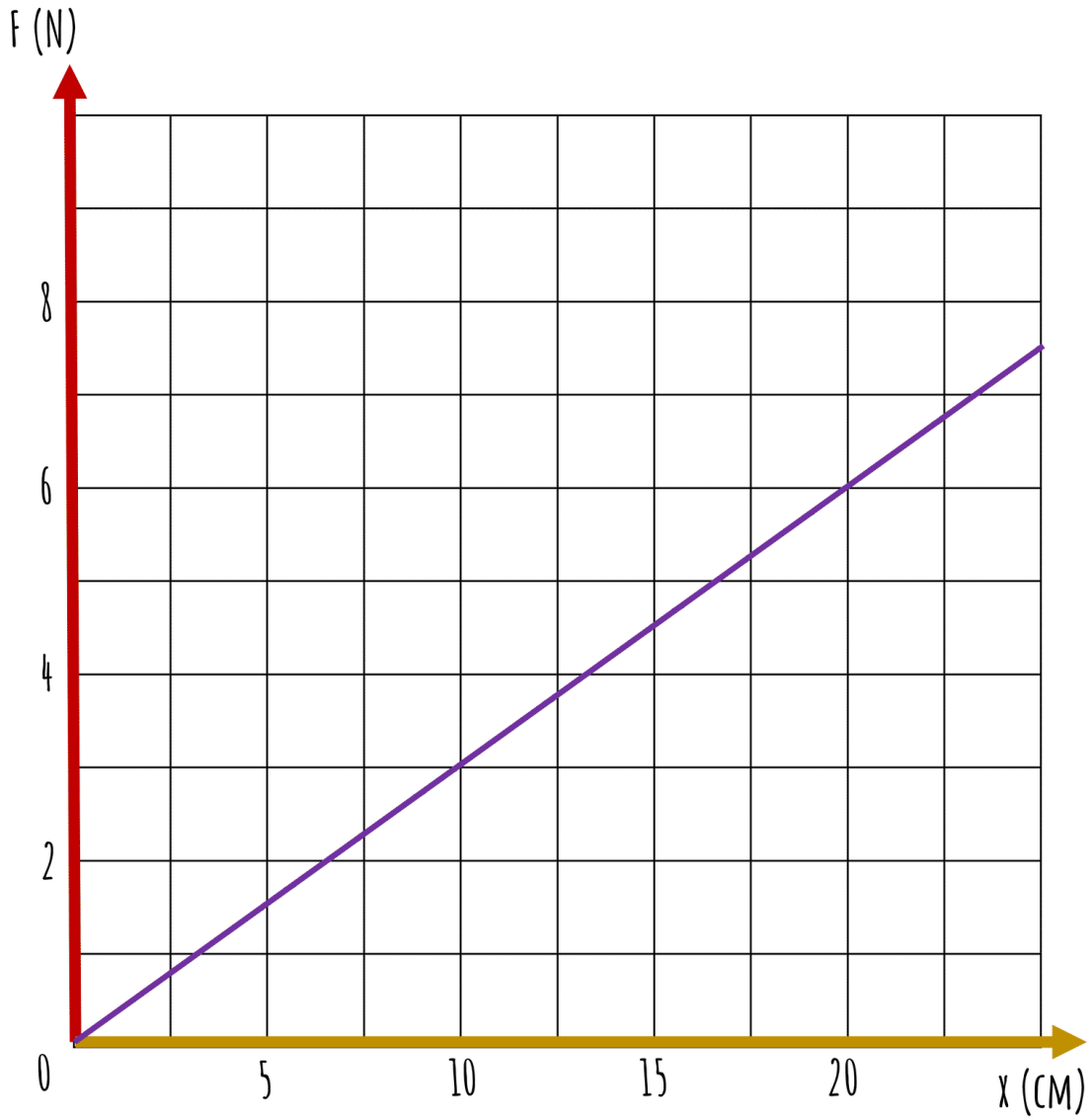
Explain to the pupils:

The graph Oto drew is a calibration curve. It shows that the force and extension are growing evenly.

> **Hooke's law:** the force is proportional to the extension.

3

Task 3



F (N)	X (CM)
0	0
1,5	
	10
4,5	
	20
	30

Ask the pupils to observe the graph and fill in the table with correct data they can read from the graph.

4

Task 4

Ask the pupils to make their own spring balance, one like Oto made for himself. They have to measure the force of several objects.

5

Task 5

Ask the pupils to make notes on their findings and fill in the table and draw a graph

Step 3 - Consolidation Stage

Show pupils the drawing below:

Giulio Cesare Procaccini, Cupid, pen and brown ink with brown wash, National Gallery of Art, London, Great Britain, Julius S. Held Collection

This is a drawing of a Cupid.

The motive of Cupid is a popular motif in art. Cupid is the god of love in Roman mythology. Sometimes Cupid is called Amor. Roman mythology took inspiration from Greek mythology, where the god of love is called Eros. In depictions from art, Cupid is often shown as a young boy, sometimes with wings. His attributes are bow and arrow.

Ask the pupils:

"Are you familiar with the saying: To be struck by Cupid's (Amor's) arrow? What does it mean?"

"Is the bow a flexible or nonflexible object?"

"Describe the function of a bow"

"What type of force do we use on a bow?"

"Is there a limitation on the magnitude of force that can be used on a bow without permanently deforming it?"

"Does this apply to the spring as well?"

Ask the pupils to create a drawing of a flexible object of their choice. They may use only their retractable pen and should take a drawing of a Cupid for inspiration.

End of the activity

EXIT