



SCENARIO		
Title	The principle of conservation of mechanical energy.	
Summery	The goal is to familiarize students with the principle of conservation of mechanical energy.	
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Didactic objectives			
General objectives:			
- familiarizing students with the content of the principle of conservation of mechanical energy,			
- analyzing energy changes in everyday situations.			
Specific lesson objectives:			
Students will be able to:			
- name the energies possessed by a given body at a given moment,			
- explain how the energies of the body change during ascent and descent,			
- indicate examples from the environment of changes taking place,			
- analyze energy transformations occurring in various situations,			
- Determine when energy reaches maximum and when minimum values.			
Physics ⊠ Mathematics□ Information Technology□ Robotics□ Programming□			
Education Level: 10-12 years □ 12-14 years ⊠			
Problem Statement			
When is mechanical energy saved?			
How does mechanical energy change during free fall?			
What energy losses will occur?			

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#### **BOM (Bill Of Materials needed)**

- Computer position
- SCRATCH environment or Internet access installed
- mathematical pendulum
- rubber ball,
- screw toy toy car.

# **Activity description**

#### Lesson flow:

- 1. Organizational and organizational activities
- 2. Introduction to the topic a reminder of news on energy and various forms of energy.
- 3. Introduction and explanation of the concept of isolated body system.
- 4. Discussion of free fall,
- 5. Introduction of the principle of conservation of mechanical energy
- 6. Discussion of other possibilities of energy transformation.
- 7. Performing an experiment showing the transformation of potential energy of a falling body into other forms of energy.
- 8. Discussion of energy losses occurring during the decline.
- 9. Simulation in free fall SCRATCH environment.











```
when F clicked
    h1 ▼ to 0
     loss[%] ▼ to 0
 set size to 50 %
 go to x: (-180 )y: (-100
 ask Enter the height and wait
     h ▼ to answer
     Give energy loss (%) and wait
 set loss[%] v to
                  answer
 broadcast komunikat1
 when I receive komunikat2
                                                   100 - loss[%] / 100
                                                                               for 2 secs
                                            h1
       join Thep hysical body will rise to height
 when I receive komunikat1
 go to x: (43) y: (-160
10. Problem solving.
```

11. Summary and end of the lesson.

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```
when I receive komunikat1
set size to (40)
              %
set g ▼ to 10
set t ▼ to 0
forever
  go to x: (70 y:
                  g * (t) * (t) / -2
  change h ▼ by
  change t ▼ by 0.01
  set height to sqrt of y position + 150 * y position + 150
      touching Duszek ▼ ? then
    forever
      go to x: (70) y:
                           150
                                y position
                                            + 150
                                                       y position
                                                                  + 150
      set height v to sqrt v of
      change h v by (g * (t ) * (t ) - (g * (t )
      change t ▼ by (-0.01
                           h1 * (100 - loss[%] / (100 - 150
             y position >
                                                                   then
         broadcast komunikat2
         stop all ▼
```

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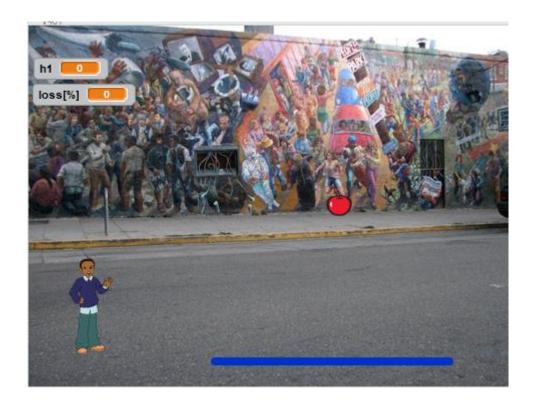






#### Resources

- computer stadion
- SCRATCH environment installed or Internet Access



## **Students' Evaluation**

The student will be assessed for commitment and proper performance of experiments.

## **Bibliography**

Spotkania z fizyką - Podręcznik do fizyki dla klasy siódmej szkoły podstawowej

Authors: Grażyna Francuz-Ornat, Teresa Kulawik, Maria Nowotny-Różańska

https://scratch.mit.edu

## **Scalability**

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Script modification and improvement.

## More information

Solving tasks using the program.

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