Pre-test – Oscillatory motion (before the lesson cycle)

Part A – Closed questions

1. Which of the following phenomena are examples of oscillatory motion? (you may select more than one answer)

a) A swing swinging back and forth

b) A car driving on the motorway

c) A guitar string set into vibration

d) Leaves falling from a tree

2. The amplitude in oscillatory motion is:

a) The time of one complete oscillation

b) The maximum deviation from the equilibrium position

c) The centre of oscillatory motion

d) The speed of the body in motion

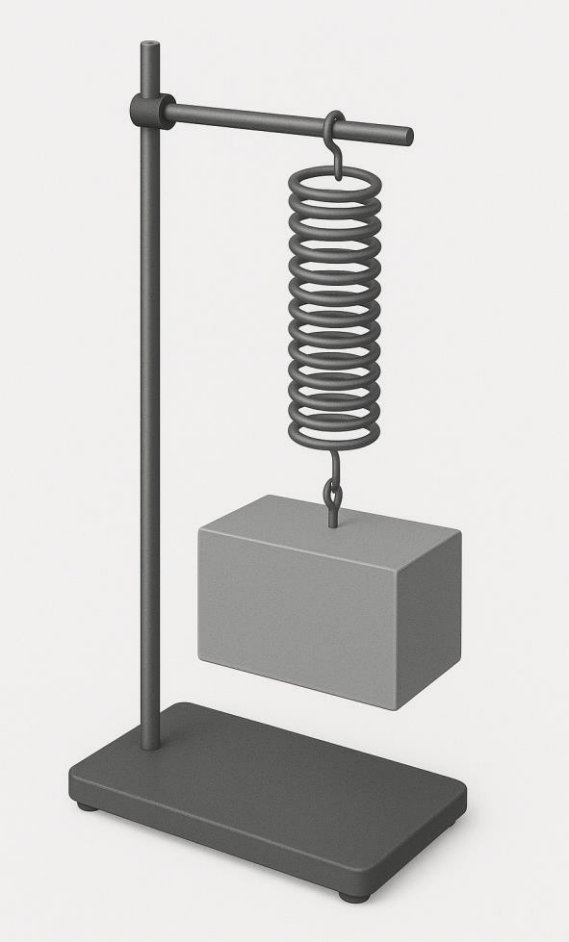
Part B – Open-ended questions / short answers

3. Draw a graph of the oscillatory motion of a pendulum and mark on it: the equilibrium position and maximum deflections.

4. Give an example of oscillatory motion that you have observed in everyday life. Describe what you consider to be the equilibrium position in this case.

5. Two different pendulums are shown below.
Mark where the following are located:

- maximum deflection
- the equilibrium position
- Can they be used to determine the value of gravitational acceleration? Justify your answer.



1. What is the speed of the pendulum at the point of maximum deflection?

a) It is maximum

b) It is zero

c) It is average

d) Cannot be determined

The period of oscillation of a mathematical pendulum depends on:

a) The mass of the pendulum

b) The amplitude of the oscillations (for small deflections)

c) The length of the pendulum

d) Earth's acceleration/gravitational acceleration

Post-test – Oscillatory motion and data analysis (after the lesson cycle)

Part A – Closed questions

1. How does the speed of the pendulum change at the point of maximum deflection? Describe the speed of the pendulum at the point of maximum deflection.

a) It is maximum

b) It is zero

c) It is average

d) Cannot be determined

2. The period of oscillation of a mathematical pendulum depends on:

a) The mass of the pendulum

b) The amplitude of the oscillations (for small deflections)

c) The length of the pendulum

d) Earth's acceleration/gravitational acceleration

Part B – Graph analysis

3. Based on the graph of changes in the position of the pendulum over time, draw and:

a) Mark the equilibrium position and maximum deflections

b) Show how to read the period of oscillation and calculate the frequency of oscillation of this pendulum

c) Discuss in which position of the pendulum the velocity is greatest and in which it is zero

4. Why is the graph of the changes in the distance between the pendulum and the sensor shifted ("raised") and why is the position of the equilibrium point not on the X-axis?

Part C – Open-ended questions / short answers

5. What system can be considered a mathematical pendulum? Justify your answer.
When can a pendulum be considered a mathematical pendulum?

6. How does the speed of the pendulum change as it moves from its equilibrium position towards its maximum deflection and vice versa?

7. If the length of the pendulum and its period of oscillation are known, how can the value of gravitational acceleration be determined?

8. Data from the sensor has been obtained: the time and distance of the pendulum from the sensor.
Draw a graph of the position and velocity (or velocity coordinate) of the pendulum as a function of time (you can use graph paper or a graphing programme). Mark all characteristic points: equilibrium position, maximum deflections, zero velocity points, maximum velocity points. The position of the pendulum when it has zero velocity and maximum velocity at a given moment.