



EduTrend Contents

EDUTECH · SCIENCE · MIDDLE SCHOOL

The Pendulum Puzzle

Which factors change how long a pendulum takes to swing?

Ages 11–14

Level: Intermediate

60 minutes

Groups of 3 · up to 30

Activity 03

Inside: activity at a glance · step-by-step session plan · facilitator notes · 3 student worksheets · assessment checklist

ACTIVITY 03 · AT A GLANCE

The Pendulum Puzzle

Students predict which factor changes the time a pendulum takes to swing: string length, mass of the bob or release angle. Each group tests one factor while keeping the others the same, timing ten swings three times. Groups share data and the class decides which factor really matters.

Learning outcomes

By the end of the session students can:

- plan a controlled investigation;
- reduce timing error;
- present data in tables and graphs;
- evaluate predictions with evidence.

KEY WORDS

pendulum · period · independent variable · control · timing error · mean

CURRICULUM LINKS

Maths: means and graphs. History: pendulum clocks. Technology: timing devices.

1**OBSERVE**

Look closely

2**QUESTION**

What do we want to know?

3**PREDICT**

What do we think?

4**TEST**

Fair and repeated

5**ANALYSE**

What does the evidence show?

6**SHARE**

Explain and discuss

Materials (per group)

- Clamp stand
- String
- Masses
- Protractor
- Stopwatch
- Worksheets 1, 2 and 3

Before the session

- Set up stands.
- Cut strings of various lengths.
- Assign factors to groups.
- Print worksheets.

SAFETY

Clamp stands firmly to benches. Keep swinging masses clear of faces.

ACTIVITY 03 · SESSION PLAN

Step by step

Timing ten swings and dividing by ten reduces reaction-time error.

Time	What happens	Say or ask
0–8 min Predict	Demonstrate a pendulum.	<i>“What changes the swing time?”</i>
8–15 min Plan	Plan one factor per group.	<i>“What stays the same?”</i>
15–40 min Test	Time ten swings three times.	<i>“How can we reduce error?”</i>
40–52 min Pool	Groups share data.	<i>“Which factor made a difference?”</i>
52–60 min Conclude	Evaluate predictions.	<i>“What surprised you?”</i>

CHALLENGE CARD (print or copy onto the board)

Investigate one factor, collect repeated measurements and use class data to decide which factor affects a pendulum’s swing time.

ACTIVITY 03 · FACILITATOR NOTES

The science know-how in brief

For small swings, a pendulum's period depends mainly on its length: a longer string gives a longer period. The mass of the bob has very little effect, and for small angles the release angle has little effect too.

Timing many swings and dividing reduces the effect of reaction time. Calculating a mean of repeated readings gives a more reliable value and helps spot anomalies.

Common ideas to listen for

- "Heavier bobs swing faster." Mass has little effect.
- "A bigger push always means a faster swing." Not for small angles.
- "Stopwatch readings are exact." Reaction time adds error.

Adapting the activity

Support

Give a results table with columns ready.

Stretch

Plot period against length and describe the pattern.

WORKSHEET 1

Plan

Name: _____

Class: _____ Date: _____

Plan your investigation.

Plan

Part	Our plan
Factor we change	
What we measure	
Control variables	
Prediction	

WORKSHEET 2

Results

Time for ten swings.

Results

Value	Trial 1 (s)	Trial 2 (s)	Trial 3 (s)	Mean period (s)
1				
2				
3				
4				
5				

WORKSHEET 3

Evaluation

Use class data.

Which factor matters and how we know

FOR THE TEACHER

Assessment checklist

Use during the session. One sheet covers up to eight students; copy as needed.

Student	Controls variables	Reduces error	Evaluates predictions

Suggested codes: W = working towards · E = expected · G = greater depth

ABOUT THIS ACTIVITY

The Pendulum Puzzle is a sample activity from the EduTrend Contents Edutech Science programme (middle school, level: intermediate). Every activity in the programme follows the same format: a practical challenge, a clear session plan, facilitator notes and ready-to-print worksheets, so that teachers, club leaders and parents can run it without extra preparation.

Full 15-, 20- and 32-week programmes are available from EduStore at edutrend.org.

© 2026 EduTrend Contents. This activity may be printed and copied for use with students in your own school, club or home. It may not be resold or published elsewhere. Photos: Vitaly Gariev / Unsplash.