Practical lesson 9.6 Displacement-time and velocity-time graphs for a ball on an incline

Recommended teaching time for this lesson: 1 x 60 minute period

• 25 minutes of explicit teaching (including suggested classroom activities)

• 35 minutes of practical work

• 15 minutes homework

Curriculum links

Science inquiry

* Investigate situations that involve displacement–time and velocity–time graphs.

Advice for teaching this lesson

Things to know before you start teaching

A risk assessment and lab technician notes are available for this practical.

Risk assessment

Lab technician notes

A video demonstration is also available.

Video demonstration

Preparation

Consult with your lab technician on the minimum time required by your school prior to teaching this lesson, as materials may need to be ordered or prepared.

Ask students to read through the practical and risk assessment as homework prior to the practical class. You may also ask students to watch the video demonstration.

Potential difficulties

* Students will often feel that they don’t need to practice with the stopwatch before gathering data, however students will improve at starting/stopping on time so they should get this practice done first.

Expected results

As displacement increases the average time should increase in an exponential curve. The steeper the angle the faster this will increase. For displacement vs velocity the increase in velocity should be proportional to the square root of displacement. The velocity vs time graph made at the end should be linear.

Practical alternatives

Using digital carts can be an acceptable substitute for a rolling ball. This removes human error.

Starter activity: Practical overview

Approximate time: 5 minutes

**Activity placement:** Place directly above “Aim”

**Activity summary:** An overview of the purpose of the practical.

Notes for the teacher

Read the aim out loud and relate it to the science understanding subject matter students have been learning about.

Instructions for students

* Think about what you will learn by doing this practical activity.

Practical: Method and safety discussion

Approximate time: 10 minutes

**Activity placement:** Place directly above “Method”

**Activity summary:** A run through of the practical method and discussion of any safety considerations.

Notes for the teacher

Run through the method with students.

Students should have reviewed the risk assessment as homework prior to this lesson. Ask them to identify the safety considerations. Prompt students until all considerations have been identified.

Remind students of best practice to ensure safety in the laboratory or classroom.

Instructions for students

* Listen to your teacher run through the practical method.

Discussion questions

1. What are the key safety considerations for this practical?
2. What measures should you take to protect yourself and others?
3. What are the disposal methods for the materials you will be using?

Helpful hints

* Refer to this practical’s risk assessment to help you answer the questions.

Risk assessment

Answers

1. Rolling objects should roll away from where people are standing.

Practical: Results discussion

Approximate time: 10 minutes

**Activity placement:** Place directly above “Discussion”

**Activity summary:** A class discussion about the results.

Notes for the teacher

Instruct students to complete the discussion questions in their logbooks.

During the last five minutes of class come together to discuss the results of the practical, including identification of errors, mistakes and anomalies, and clarification of any misconceptions.

Assign any incomplete questions for homework.

Instructions for students

* Answer the Results and Discussion questions.
* Consider your results and identify any suspected errors, mistakes and anomalies.
* Discuss these with the rest of the class.