



LESSON PLAN

Lesson 4: Reaction times (experiment)

.....

UNIT TITLE: Safer by Design - Investigating Forces, Motion and Road Safety



LEVEL

Years 9-10



LESSON NUMBER

4 of 9



LESSON LENGTH

60 minutes



VICTORIAN CURRICULUM 2.0 CONTENT DESCRIPTIONS

- **Physical sciences:** Newton's laws of motion can be used to quantitatively analyse the relationship between force, mass and acceleration of objects. (VC2SI0U17).



VICTORIAN CURRICULUM 2.0 ACHIEVEMENT STANDARDS

- **Science:** Students use Newton's laws to describe and predict the motion of objects in a system. (Level 9 & 10).

LESSON PLAN

Lesson 4: Reaction times (experiment)

.....



KEY VOCABULARY

- **distraction** – anything that draws attention away from the task at hand, such as a phone while driving
- **attention** – the mental focus directed toward a specific task or object
- **stimulus** – something in the environment that triggers a response (plural: stimuli); e.g. a red traffic light
- **field of view** – the total area visible to a person at any given moment without moving their head
- **variables** – factors in an experiment that can change; the independent variable is deliberately changed, the dependent variable is predicted to change and is measured, control variables are kept constant
- **fair test** – an experiment in which only one variable is changed at a time while all others are kept the same



MATERIALS REQUIRED FOR THE LESSON

Student

- Reaction Times Experiment Worksheet (Resource 4.1) – 1 per student, printed
- Rulers – one between two, at least 30 cm long, up to 1 m can be used

Teacher

- Supporting Slide Deck – as needed, display on screen or use a document camera or write on whiteboard
- Teacher Workbook – as needed for reference, including for display on screen or with a document camera



LEARNING OBJECTIVE

- We will conduct a simple experiment to explore factors that affect human reaction times.

SUCCESS CRITERIA

- I can calculate reaction times using the ruler drop distance.
- I can conduct an experiment following the method provided.
- I can analyse and reflect on results from the reaction time experiment.



TEACHING CONSIDERATIONS

- Further resources: The following may be useful to supplement the material in this lesson:
 - [Conversation article on touch screens in cars](#)
 - [Conversation article on driver distractions](#)
-

LESSON PLAN

Lesson 4: Reaction times (experiment)

.....

Structure of lesson:

1

INTRODUCTION



TIMING: 5 mins

Activate prior knowledge

- **Show** students Slide 26 of the Supporting Slide Deck. **Explain** that these are just some examples of articles in the media focussed on the dangers of drivers being distracted. **Emphasise** that distraction is really a lack of attention, or attention being focussed on things other than driving the car. **Ask** students to work in pairs to answer the questions on the slide. **Check for understanding** by sampling all student responses. Use questioning to support students to elaborate on their thinking and make connections. **Respond** by addressing errors, clarifying any misconceptions and reteaching if necessary.

Introduce learning objective

- **Show** the learning objective.
 - **Explain** how students can achieve this through the success criteria.
-

2

CONDUCTING THE EXPERIMENT



TIMING: 30 mins

Explanation and modelling

- **Distribute** the Reaction Times Experiment Worksheet (Resource 4.1) to students (or if using the Workbook, direct students to page 34).
- **Explain** that we are going to conduct an experiment to explore factors that affect human reaction times. Referring to the worksheet, explain to students the background, aims and equipment that will be used in the experiment. Preview that the experiment involves one person dropping a ruler, and the other reacting to catch it.
- **Show** students Slide 27 of the Supporting Slide Deck. With reference to the slide and the worksheet, explain the simple theoretical model of what happens when we react. Provide students with opportunities to respond to ensure they are engaged.
- **Explain** the process for calculating reaction time from the ruler drop using the explanation provided in the worksheet. Model the calculation using the worked example provided. **Check for understanding** by having students complete the calculation for a 15cm drop in the space provided. Ensure that you sample all student responses, and address errors or misconceptions, including reteaching if necessary.
- **Ask** students to turn to the method and results section of the worksheet and read it through once independently. Guide students through the method by thinking aloud as you read through it. **Check for understanding** frequently to ensure all students know what is required and how to conduct the experiment.

** continued overleaf*

LESSON PLAN

Lesson 4: Reaction times (experiment)

.....

Guided and independent practice

- **Instruct** students to work in pairs to collect the required equipment and conduct the experiment.
 - **Monitor** student progress by circulating the room frequently, observing how students are working and using questioning to check in on their progress with the experiment.
 - **Ensure** students are clear on the amount of time available for the experiment, providing a reminder 5 minutes before completion.
 - **Enable** students by prompting them to revisit the details in the worksheet where applicable.
 - **Extend** students by promoting them to consider a range of possible variables for part 4, and to justify their selection of a variable to test that is highly relevant to likely distractions drivers may encounter.
-

3

ANALYSING AND EVALUATING THE RESULTS



TIMING: 20 mins

Explanation and modelling

- **Explain** to students that they need to calculate the average ruler drop distance for each set of trials. Enable students by providing an example of an average calculation if necessary.

Guided and independent practice

- **Instruct** students to complete the calculations to fill out the last two rows of the results table. **Ask** them to complete their calculations individually and check their results with their partner. **Explain** that they should also check if their results are reasonable and feasible, and that this may help uncover any calculation errors.
- **Guide** students in the collation of whole class results into the data collation table. Explain that this process will allow us to see what the distribution of results look like for the whole class, and how that compares across the different conditions.
- Use a suitable method for collating results such as students adding their data to a table on the whiteboard, talking through the table and using hands up to count how many results fall into each range, or using a digital tool. Ensure that students simply collate a count of how many results in each range, not the actual numbers, to keep the process straightforward.
- Only collate the results for part 4 if all students tested the same additional variable.

Explanation and modelling

- **Explain** to students that having completed the data collection and calculations, they can then analyse the data and reflect on the experiment. Instruct students to work independently through the analysis, reflection and discussion prompts in the Reaction Times Experiment Worksheet.

Guided and independent practice

- **Monitor** progress while students complete the worksheet, circulating the room as applicable. Prompt students with additional questioning and address any errors or misconceptions that you notice.
-

LESSON PLAN

Lesson 4: Reaction times (experiment)

4

CONCLUSION



TIMING: 5 mins

Reflection on learning

- **Show** the learning objectives and success criteria.
 - **Show** students Slide 29 of the Supporting Slide Deck which repeats the question prompts in the discussion section of the Reaction Times Experiment Worksheet. Guide students in a whole class discussion of their responses to these questions. Use a range of suitable techniques to ensure that you sample responses from all students. Prompt students to elaborate or extend their thinking, and to make connections to what others have shared. Address any errors or misconceptions.
-

