

# TEACHER NOTES

## Science: Physics

### Motion & Force: Speed, Velocity & Acceleration

### Contextual Summary

This resource is for students at key stage 4 and relates to the 'Motion and Forces' part of the Science National Curriculum, focusing on acceleration caused by forces, the quantitative relationship between acceleration, change in velocity and time.

The tasks link to various activities at Robin Hill, specifically to the Toboggan Run.

Tasks are designed to appeal to students at key stage 4 working at lower, medium or higher abilities.



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<b>SUBJECT</b>	
Science: Physics	
<b>UNIT</b>	
Motion & Force	
<b>OPPORTUNITIES FOR USE</b>	
<ul style="list-style-type: none"> <li><input type="checkbox"/> Pre-Visit</li> <li><input checked="" type="checkbox"/> On-Site Activity</li> <li><input type="checkbox"/> Post-Visit</li> </ul>	
<p><b>CURRICULUM / SYLLABUS</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> National Curriculum 2014</li> <li><input checked="" type="checkbox"/> Curriculum for Excellence</li> </ul>	

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Students can complete an 'Acceleration' worksheet that relates to the students' experiences of their experiences of the various activities. Students can also use data to calculate the acceleration of the Toboggan Run. Some students can then apply their knowledge of the Toboggan Run to complete a velocity-time graph.

Ideally, teachers will have introduced students to the concept of velocity as a vector quantity.

The optional post-visit aspects of the task enable students to work together to investigate how the design of a toboggan will affect its acceleration.

### Ability Levels

This resource is suitable for students in key stage 4.

There are 3 variants of the resource: one resource for lower ability students, one for medium ability students and one resource for higher ability students.

Teachers could adapt the content for students' needs by simplifying instructions where appropriate, or adding more complex tasks.

### Key skills practised in this unit:

- ▶ Carrying out calculations
- ▶ Transposing formula
- ▶ Application of knowledge
- ▶ Manipulating data into a graphical form
- ▶ Working scientifically
- ▶ Recording and using data

S4-S5

**Applies to Resources numbered:**

1	0	5	0	9	1
1	0	5	0	9	2
1	0	5	0	9	3

## Relationship to Curriculum

The above skills are required to be taught and practised as per the National Curriculum, for key stage 4 Science, and the Curriculum for Excellence.

## Learning Opportunities

### Pre-Visit

- ▶ It is suggested to teachers that students be introduced to velocity and acceleration prior to the trip.

### During the Visit

- ▶ Students complete the Science resource/s linked to this document: *Motion & Force at Robin Hill!*

Resource ID: **105091** (KS4 low ability) **105092** (KS4 mid ability)

**105093** (KS4 high ability)

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After their visit students can practise their 'Working Scientifically' skills by carrying out a practical investigation into their experience of the Toboggan run - they could investigate the acceleration of various model toboggans.

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## Enrichment Opportunities

- ▶ Opportunities exist for students to gain valuable practice in the area of working scientifically.
- ▶ Particular attention can be made to the need for accuracy and repeatability to produce reliable results.
- ▶ Students will need to identify independent, dependent and control variables.

## Learning Outcomes

- ✓ Students will use the equation **acceleration = change in velocity (m/s) ÷ time taken for the change (s)** to carry out their calculations.
- ✓ Students will apply their knowledge to complete velocity-time graphs.

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