



National Certificate of Educational Achievement
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2008

Internal Assessment Resource

Subject Reference: **Science 1/1**

Internal assessment resource reference number:
Sci/1/1_CC2

Watch that car go

Supports internal assessment for:

Achievement Standard 90186 v3

Carry out a practical science investigation with direction

Credits: 4

Date version published:

April 2008

**Ministry of Education
quality assurance status**

For use in internal assessment
from 2008

Teacher Guidelines:

The following guidelines are supplied to enable teachers to carry out valid and consistent assessment using this internal assessment resource. These teacher guidelines do not need to be submitted for moderation.

Context/setting:

This assessment resource is based on planning, carrying out, processing and interpreting, and reporting of a practical investigation that is a **fair test** investigation. The teacher directs what type of investigation the students are to do and changes the planning sheets and student instructions accordingly.

Conditions:

This assessment activity is to be carried out in four parts that lead to the production of an investigation report.

The specific conditions should be stated on the student instruction sheet. e.g. equipment and materials available.

The students need sufficient time for:

- trialling and planning
- carrying out
- processing and interpreting data
- writing a report

The time allowed will depend on the particular investigation chosen. State this time on the student instruction sheet.

Any special safety requirements **must** be stated on the student instruction sheet.

Teachers need to be aware of the credit value of this standard when determining the time needed to carry out the investigation.

Resource requirements:

Students will need to be provided with the materials and equipment required for trialling and carrying out the investigation.

The Investigation

Part 1: Developing a Plan

- The student is provided with a *Planning Sheet* (included) and will work independently to complete this. The planning sheet may need to be modified, related to the task chosen, to allow sufficient space for students to write.
- The student should be given the opportunity to conduct trials to develop their method, eg. to establish a suitable range of values for the independent variable for a fair test or the sample selection for pattern seeking. A record of this trialling needs to be mentioned on the template or in the final report.
- The student uses the planning sheet and trial results to write a detailed, step-by-step method. The Planning sheet (or other check sheets) may be used to self-evaluate that the method is workable.

Part 2: Collecting and Recording Data

The student follows their written method to collect their own data. The method may be modified but these modifications must be included in their final report and indicated to the assessor.

Part 3: Processing and Interpreting Results

The student must process the data collected into a form that shows a pattern or a trend or absence. This may be achieved by averaging, using a table or using a graph.

Part 4: Presenting a Report

The student, working independently, presents the report of the investigation following the directions/format given in the student instructions.

Teacher Resource Sheet

Prior teaching will need to occur on the scientific method and how to design a practical that involves **'fair' testing**.

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Watch that car go

Supports internal assessment for:

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Carry out a practical science investigation with direction

Credits: 4

Student Instructions Sheet

School/Institution	
Student Name	
Teacher or Class reference	
Date of completion	

Background Information:

Watching children play with their toy cars students noticed that the cars seemed to go faster and further the steeper the slope they were released on.

In this investigation you are to develop and carry out an investigation. You will plan, collect, process and interpret information, and present a report to find out how the slope of a ramp affects the distance the car goes along the flat (table or floor) This investigation is a **fair test** investigation.

Conditions:

This assessment activity is to be carried out in four parts that leads to the production of an investigation report. This investigation must be carried out individually.

Times: Total time will take a minimum of 1 week e.g.

- trialling and planning 1 period
- carrying out and processing data 1 period
- interpreting the data and 1 period
- writing the final report 1 period

Equipment:

You have been given books, a ruler, ramp, and a car.

Part 1: The Plan

1. State the purpose of your investigation
2. Identify the key variables involved:
 - the independent variable (the variable that is to be changed)
 - the dependent variable (the variable that will be measured)
 - controlled variables (significant or relevant variables that will need to be kept the same to make your results more reliable)
3. Describe a suitable range of values to be used for the independent variable and how these values will be changed. Trialling will help you establish this range.
4. Describe how the dependent variable will be measured.

Controlled variables: (things you will need to keep the same)

1. Identify any other variables that might influence your investigation and describe how they will be controlled or kept the same to make your results more accurate.
2. Describe how you will ensure that your results are reliable and that you have enough data.

Now write a detailed **step-by-step method** that you will use.

You may change your method as you carry it out as long as you describe any changes made to the method in your report.

Part 2: Collect and Record Data

- Follow your method to collect data and record the results in a table or another appropriate way.
- Remember to record any changes to your method and reasons for the changes as you go.
- Record any difficulties with equipment, gathering your data or your method.

Part 3: Process and Interpret Results

- Process your results so that you can show the trend (or lack of) or pattern in your data. This will usually involve some calculations (e.g. averages) and/or a graph.
- Record the relevant trend or pattern; this is your interpretation.
- Relate the trend or pattern to your purpose; this is your conclusion.

Part 4: Present a Report

Present a report on your investigation. This will include your:

- Trialling and planning sheet
- detailed step-by-step method, including any changes made during your investigation
- recorded data
- processed data
- interpretation of results
- conclusion that links your interpretation to the purpose of the investigation evaluation of the conclusion in terms of the method used. In this you may comment on the
 - reliability of data (repeats / outliers etc)
 - Validity of the final method chosen.
 - Way your results reflect the science ideas related to the investigation.

Planning Sheet

Student name:

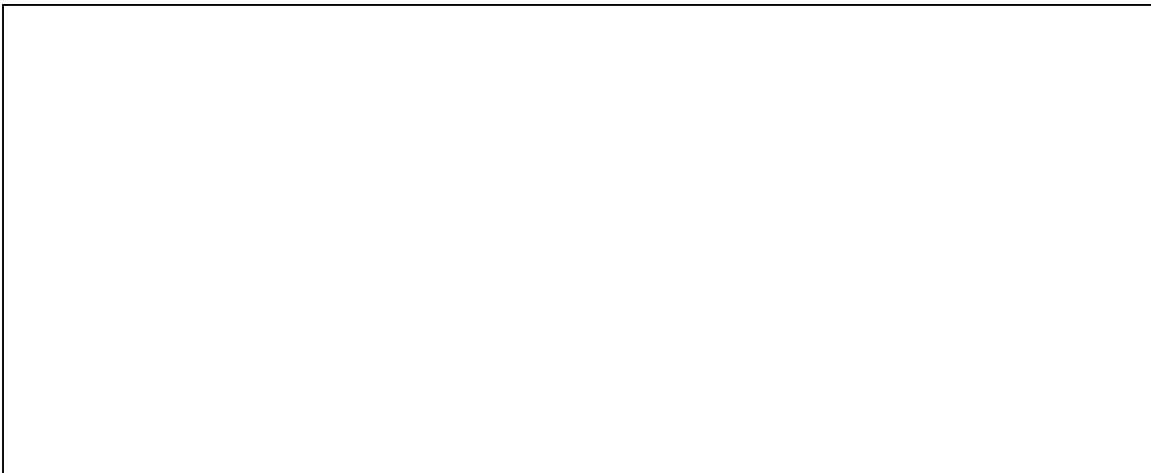
1. Purpose of investigation (this may be an aim, testable question, prediction or hypothesis)	
2. FAIR TEST Which variable will be changed? (This is the independent variable) How will the independent variable be changed? Give a suitable range of values for this variable	
3. FAIR TEST Which variable will have to be measured or observed in order to get some data or information from the investigation? (This is the dependent variable) How will the dependent variable be measured or observed?	
4. Other variables that need to be controlled to make your results more accurate.	
Other Variables	Describe how this variable will be controlled or kept the same?
5. How will you ensure that your results are reliable?	
6. Notes from your trials.	

Now use the information on this planning sheet to write a detailed step-by-step method.

Method



Changes made to the method after the investigation started.



Report Sheet

Recorded data:

Processed data:

Interpretation of Data:

Conclusion:

Evaluation of the Method and Data and / or Science ideas

Assessment Schedule: Sci/1/1_CC2 - Watch that car go

Evidence	Achievement	Merit	Excellence
Report contains	Statement of purpose <i>Eg: To see what effect the height of a ramp above the floor has on the distance travelled by a car.</i>	(as for achievement)	(as for achievement)
Report (planning sheet and or method)	Identify range for independent variable. <ul style="list-style-type: none"> • <i>The height of the ramp above the floor. Only 3 heights chosen.</i> <p>and</p> <ul style="list-style-type: none"> • Measurement of dependent variable. <i>Distance travelled from the ramp.</i> 	a valid method (easily followed by another student) is required that includes: <ul style="list-style-type: none"> • A valid range of the independent variable. <i>Eg: At least 4 independent variables (height), preferably 5, is the minimum recommended range for Merit grade. Eg: heights of 5cm, 10cm, 15cm, 20cm</i> • Description of and control of other key variables <i>Eg: same ramp, same position released on the ramp, same area of bench / floor, same car.</i> • Consideration of other factors <i>Eg: how the car released.</i> <p>and</p> <ul style="list-style-type: none"> • Measurement of dependent variable. <i>Distance travelled from the</i> 	As for merit

		<i>ramp in cm.</i>											
Report (Recorded data, processed results)	<p>Collect, record and process data relevant to purpose.</p> <p><i>one investigation on each height. Distance recorded in follow able format. Graph showing trend.</i></p> <p><Possible results></p> <table border="1"> <thead> <tr> <th>Height (cm)</th> <th>Distance travelled (cm)</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>3.4</td> </tr> <tr> <td>10</td> <td>12.3</td> </tr> <tr> <td>15</td> <td>33.5</td> </tr> <tr> <td>20</td> <td>46.0</td> </tr> </tbody> </table>	Height (cm)	Distance travelled (cm)	5	3.4	10	12.3	15	33.5	20	46.0	<p>Collect, record and process data to enable a valid pattern or trend (or absence)</p> <p><i>More than two repeats (to establish validity) on chosen heights. Results correctly averaged</i></p> <p><i>Distance accurately measured.</i></p> <p><i>Averages recorded in a way that allows the valid trend to be shown and/or correctly labelled graph-showing valid trend that supports collected data.</i></p>	(as for merit)
Height (cm)	Distance travelled (cm)												
5	3.4												
10	12.3												
15	33.5												
20	46.0												
Report (Interpretation and conclusion)	<p>A conclusion based on the processed data collected.</p> <p><i>The greater the height of the slope the greater the distance the car travelled.</i></p>	<p>A valid conclusion that links to the purpose.</p> <p><i>The greater the height of the ramp and therefore the steeper the slope the greater the distance travelled by the car.</i></p>	(as for merit)										

<p>Report (evaluation)</p>		<p>Evaluation to justify the method used to reach the conclusion. <i>One of Method</i> <i>The final method chosen gave results that were repeatable. This also allowed us to see aberrant data and this data could be removed from our calculations. Reliable data.</i> <i>We took enough reading to allow a valid trend. We repeated each trail until we got 3 recordings that were similar.</i></p> <p>Science ideas <i>Example</i> <i>Our results supported the science idea that</i> <i>The higher the ramp the more gravitational potential energy the car had and the more that was converted to kinetic energy, therefore the further the car went before it came to a halt.</i></p>
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To determine the overall level of performance all judgements within a column must be met. For each judgement, evidence can be obtained from anywhere in the report.