**Investigate two factors that affect the distance taken for a toy car to stop after rolling down a ramp.**

**This was the marking scheme for a previous investigation**

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|  |  |  | **Guide to mark assignment** |  |
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| **Section**  |  |  |  |  |

 | **Aims** | Total Mark | Investigate two factors that affect the distance taken for a toy car to stop after rolling down a ramp. | H.L. |
| **Introduction**  | Clear statement of the problem/topic to be investigated, background research undertaken in preparation for the investigation: people, books, websites, etc. as sources of relevant information.  | 5  | **Statement / identification of problem / topic to be investigated:** **Research:** Any reference to book / internet (web) / person consulted etc.  | (3) (2)  |
| **Preparation and planning**  | Identification of variables and controls as required List of equipment needed for the investigation List of tasks to be carried out during the investigation  | 20  | **Variables / Controls:** Identify ***five***variables, the **two essential** variables and any **three other** variables, and/or indicate how some of these need to be controlled or held fixed: Possible Variables: * Distance travelled before stopping
* Elevation (vertical height) (slope) (angle) of ramp
* Surface(s) on which the toy car rolls after the ramps
* Length of ramp
* Same ramp
* Starting position on ramp
* Toy car (i.e. use same one or identical ones)
* friction
* K.E. (velocity) of car leaving ramp
* Mass of toy car
* Shape of car (air resistance)

**Equipment needed:** Identify any ***five***pieces of equipment used: * Toy car(s)
* Ramp
* Balance
* Oil
* Meter stick (tape measure)
* Retorts (or other mechanism to elevate ramp)
* Different rolling surfaces
* Any valid piece of equipment pertinent to procedure

**List of tasks:** Identify any ***four***tasks carried out in investigation: * Procure toy car
* Set up ramp
* Set (vary) factor 1
* Set (vary) factor 2
* Clean rolling surface of anything that might interfere with result (dirt or grit)
* Release car
* Measure distance travelled
* Record data
* Graph (if present)
 | (3 + 3) (1 + 1 + 2) (1 + 1 + 1 + 1 + 1) (1 + 1 + 1 + 2) |
| **Procedure**  | Procedure, apparatus, safety, data collection/observations * Safety precautions required for this investigation
* Procedures followed in the investigation
* Recorded data/observations
 | 20  | **Safety**: Identify any ***two* specific** safety precaution followed in conducting the investigation **Procedure**: **State or Show** Identify any ***five***steps taken in conducting investigation: * Set up ramp
* Vary heights (angles) (surfaces) (length of ramp) (starting position on ramp) (mass of car) (air resistance)
* Clean rolling surface of anything that might interfere with result (dirt or grit)
* Release car from fixed point on ramp
* Measure distance travelled
* Repeat to verify
* Repeat for factor 2
* Record data
* Graph (present)

**Recorded Data / Observations:** Identify any ***two***points related to method used: **Factor 1** *versus* **distance** travelled **Factor 2** *versus* **distance** travelled [Table presentation likely]  | (2 + 3) (1 + 1 + 2 + 3 + 3) (2) (3)  |
| **Analysis &** **Conclusions**  | Analysis * Calculations/data analysis
* Conclusion(s) and evaluation of results(s)
 | 20  | **Calculations / Data analysis:** ***One***relevant comment analysing data **or** calculation or graph Limited manipulation of data **OR** Good manipulation of data **OR** Excellent manipulation of data **Conclusion**: ***One***relevant conclusion drawn **or** evaluation of results obtained Limited treatment **OR** Good treatment **OR** Excellent treatment  | (4) (7) (10) (4) (7) (10)  |
| **Comment**  | Comments (e.g. refinements, extensions, sources of error etc.)  | 10  | ***Two***comment on **refinement** / **extension** / **source of error** reliability of data / how process could be improved / sources of error / possible reason for unexpected result / possible extension of the investigation Limited comprehension **OR** Good comprehension **OR** Excellent comprehension  | (1 + 1) (3 + 3) (5 + 5) |
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