2019 Year 11 Physics

Task 12: Evaluation and Analysis

Forces and Motion of Cars

Increasing safety while on the road

Name:

**Background: - In 2016 there were 1,290 road fatalities in Australia, this is down from 3,978 deaths from when road fatalities were first recorded in 1978. The number has fallen despite the fact that the overall population has increased (from 14.4 million to 24.1 million), this is due to a number of advancements in both vehicle and road design increasingly the likelihood of you surviving a crash.**

**Task: -**

Research changes to cars and road design over time, and identify how they increase the likelihood of surviving an accident **with reference to physics concepts such displacement, energy, impulse, inertia and acceleration**.

**Focus questions to consider:**

* How do new types of road barriers (flexible, semi rigid and rigid) serve to increase the likelihood of surviving an accident?
* How have the addition of bicycle lanes to road infrastructure made it safer to ride a bike?
* How do crumple zones increase the safety of the passengers in a car?
* Why are there temporary localised speed limits around schools and areas with high pedestrian numbers?

**Resources:**

<http://www.nova.org.au/technology-future/physics-speeding-cars>

<https://www.ktbs.com/news/dotd-to-install-cable-barriers-on-i/article_21910ee8-8105-11e7-a3eb-67c7a17986ff.html>

<https://plastics-car.com/Todays-Automobiles/Automotive-Safety/Physics-in-the-Crumple-Zone-2.html>

**Further information to consider:**

* When answering these questions, ensure that you are talking about the **physics concepts** relating to **motion, force, energy** and **impulse**.
* Include **your own** diagrams where appropriate to demonstrate the concepts
* Ensure you **reference** your work correctly

**Factsheet Marking rubric:**

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| --- | --- | --- | --- | --- |
|  | **Excellent (4)** | **High (3)** | **Satisfactory (2)** | **Limited (1)** |
| **Scientific Content** | All focus questions answered fully and in detail. | Most focus questions answered fully and in detail. | Some focus questions answered. Little detail or explanation. | Little focus questions answered. No or little detail and explanation. |
| **Communication** | Provides clear and detailed explanations of complex scientific models, using appropriate scientific terminology. | Provides clear and detailed explanations of scientific models, using appropriate scientific terminology. | Provides clear explanations of simple scientific models, using scientific terminology. | Provides simple descriptions of events, using some scientific terminology. |
| Supports explanations with the use of relevant examples and clear and detailed labelled diagrams. | Supports explanations with the use of examples and clear, labelled diagrams. | Supports explanations with the use of everyday examples and labelled diagrams. | Includes sketchy diagrams, but does not refer to them. Examples are often incorrectly linked to explanations. |
| **Science Inquiry** | Provides a detailed and well-organised reference list, consistently adhering to given referencing conventions. | Provides a relevant reference list, adhering to given referencing conventions. | Provides evidence of background research in the form of a reference list. | Provides evidence of background research. |
| **Presentation** | A maximum of 4 marks will be awarded for general presentation of the report, including use of headings, diagrams and referencing outside the resources provided | | | |
|  | Total: 20 | | | |

# Research segment Due: Your assignment must be submitted via Connect

Note: on this date students will sit a validation quiz that contributes 50% of the overall mark of this assessment.