Assessment schedule: Physics 91169 Vehicle Crumple Zones

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| Evidence/Judgements for Achievement  | Evidence/Judgements for Achievement with Merit | Evidence/Judgements for Achievement with Excellence |
| The student:* identifies and describes the characteristics of the physics related to the given context
* describes how and/or why the physics applies to this context.

For example, a student who achieved could provide the following information:* speed is related to force through F=ma;
* the faster you are travelling the more speed must be removed in the collision;
* the crumple zone increases the time taken for the collision;
* energy is absorbed preventing transmission to the occupants;
* less rigid parts are included in the structure to absorb the impact and increase the collision time.
 | The student:* identifies and describes in-depth the characteristics of the physics related to the given context
* provides reasons how and/or why the physics applies to this context.

For example, they provide the following information:* as the vehicle mass is constant decreasing the deceleration, decreases the force on the occupants;
* if the time taken for the collision in increased, the deceleration is decreased and therefore the force is reduced;
* energy is used in deforming the metal structures reducing the energy that can be transmitted to the vehicle occupants;
* deceleration and crumpling happen at the same time so crumpling extend the collision time;
* less rigid materials surround a rigid safety cell for the occupants to prevent crumpling of the whole vehicle.
 | The student:* comprehensively identifies and describes the characteristics of the physics related to the given context
* elaborates how and/or why the physics applies to this context
* justifies why the particular physics is well-suited to this context, and/or compares alternatives.

For example, they provide the following information:* a detailed explanation of the relationship between speed and force on the vehicle occupants;
* a comprehensive description of how crumple zones and safety cells are designed and help to protect the occupants;
* a detailed explanation of how the crumple zone increases the time taken for the collision and therefore reduces force on the occupant, gives examples of the differences using quantitative or qualitative relationships;
* a detailed explanation of how the dissipation of energy decreases the potential injury to the occupants.
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Final grades will be decided using professional judgement based on a holistic examination of the evidence provided against the criteria in the Achievement Standard.

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