**Joseph Banks Secondary College**

Year 12 Integrated Science: General

****Unit 4 - Task 7

**Assessment type:** Extended Response – Materials used in the manufacture of safety design features in vehicles.

**Conditions**

Period allowed for completion of the task:

* 2 Lessons of class time dedicated to understanding and addressing the listed questions.
* A device (ipad/laptop) may be used to access research material on seqta and on the internet.
* This task is to be completed under test conditions.

Use your prior knowledge from classwork and internet resources to answer the extended response research questions in this booklet. Use the marking guide on the following page as a guide to constructing your response.

The assessment consists of three sections:

* Section A – Composite Materials
* Section B – Road Car Safety Measures
* Section C – High Performance Vehicles

**Task Weighting:**

10% of the school mark for this pair of units

**NAME:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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| Section A: Composites | Marks |
| Explains uses of fibreglass | 3 |
| Explains how fibreglass is produced | 4 |
| Describes two strengths of fibreglass | 4 |
| Describes two weaknesses of fibreglass | 4 |
| Explains uses of carbon fibre | 3 |
| Explains how carbon fibre is produced | 4 |
| Describes two strengths of carbon fibre | 4 |
| Describes two weaknesses of carbon fibre | 4 |
| TOTAL | 30 |
| Section B: Safety Measures | Marks |
| Describes how Anti-lock Brake Systems work | 4 |
| Explains how Anti-lock Brake Systems improve the safety of occupants | 4 |
| Describes how Side Curtain Airbags work | 4 |
| Explains how Side Curtain Airbags improve the safety of the occupants | 4 |
| Describes how Electronic Stability Control (ESC) works | 4 |
| Explains how electronic stability control improves the safety of the occupants | 4 |
| Lists the safety information for each vehicle | 8 |
| Compares the 5-star Mazda 3 and the 1-star Jeep Wrangler | 4 |
| Contrasts the 5-star Mazda 3 and the 1-star Jeep Wrangler | 4 |
| TOTAL | 40 |
| Section C: High-performance Vehicles | Marks |
| Describes the positives of organic brake pads | 3 |
| Describes the negatives of organic brake pads | 3 |
| Describes the positives of carbon ceramic brakes | 3 |
| Describes the negatives of carbon ceramic brakes | 3 |
| Compares similarities between organic brakes and carbon ceramic brakes | 3 |
| Contrasts differences between organic brakes and carbon ceramic brakes | 3 |
| Justifies the choice of brakes in the Formula 1 car | **8** |
| TOTAL | **26** |
| TOTAL | **96** |

**Extended Response Marking Guide**

**Section A – Composites**

***Research and explain the listed composites, providing an explanation of the use of each of the items, how they are made and at least two strengths and two weaknesses of the material.***

1. **Fibreglass**
2. **Carbon Fibre**

**Section B – Safety Measures**

***Explain the operation of the following features and how they increase the safety rating of a family car:***

1. **Anti-lock Brakes (ABS)**
2. **Side Curtain Airbags**
3. **Electronic Stability Control (ESC)**

**6. *Compare and contrast the safety ratings of the 5-star Mazda 3 and the 1-star Jeep Wrangler. Your answer should, at a minimum, contain the basic information for each of the cars including the rating year, vehicle type and the location of the cars airbags.***

**Section C: High performance vehicles**

You have been announced as the new chief racing mechanic for the Red Bull Racing Formula 1 team. As part of your review of the car prior to the start of the 2020 racing season, you notice that the brakes currently used on the car are aluminium brakes. You know that carbon ceramic brakes are a much better choice for a high speed Formula 1 car than organic brakes but you need to convince the team owner. You decide to do some research on the Internet to find some information to support your ideas.

***7. Outline your argument to the team owner why carbon ceramic brakes are better than organic brakes.***

**Additional Response Paper**