Integrated Science – ATAR Year 11 2018

## Task 3 – Unit 1

**Assessment Type:** Science Inquiry

**Conditions**

Period allowed for completion of the task:

* Time to plan and prepare for your practical.
* 120 minutes in class to complete practical and validation

**Task Weighting :** 10% **Due Date: Score : Part A : /13**

**Part B : /25**

**Total : /38**

Part A: Designing an experiment. **(13 Marks)**

Safety is of the upmost importance in today’s society. We see safety measures put in place at work, when we go shopping, when we see a movie or fly in an aeroplane. Car design is extremely important as many people own cars and most use them almost every day. This means that if they are not designed with safety measures, many people are at risk of injury or death.

Your task is to design your own experiment that tests one safety feature found on a car, this could be type of seatbelt, crumple zone, airbag etc. Before \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ you need to submit the following to your teacher so I can ensure that I have the equipment you need to conduct your experiment.

1. Background – description of 3 safety features in a car **(3 Marks)**

**3 safety features description can be airbag, seatbelt, electronic stability control, antilock braking systems or crumple zone**

1. Aim **(1 Mark)**

**Will depend on what they are test**

1. Variables (independent, dependent, controlled) **(4 Marks)**

**1 mark for independent**

**1 mark for dependent**

**2 marks for controlled 2 controlled variables must be stated.**

1. Hypothesis **(1 Mark)**

**Will depend on what they test must predict the outcome of their experiment.**

1. List of materials **(2 Marks)**

**Complete list for full marks -1 mark if missing one item/ -2 marks if missing more than one item.**

1. Step by step method **(2 Marks)**

**1 mark for repeat trials**

**1 mark for complete method.**

On \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ you will be conducting your experiment and on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ you will be completing a write up of your experiment and an in class validation on momentum, newtons laws and safety features in cars.

Part B: Conducting the experiment **(25 Marks)**

**Results:**

1. Create an appropriate table for the results you have obtained: **(2 Marks)**

**1 Mark for units at top of table**

**1 Mark for repeat trials.**

**Discussion:**

1. What conclusions can be drawn from your results **(4 Marks)**

**1 mark for conclusion and 1 mark for using their data to justify what they have said.**

**2 conclusions made total 4 marks**

1. State two improvements you could make to your experiment design and explain how these improvements would help to increase the accuracy of your results. **(4 Marks)**

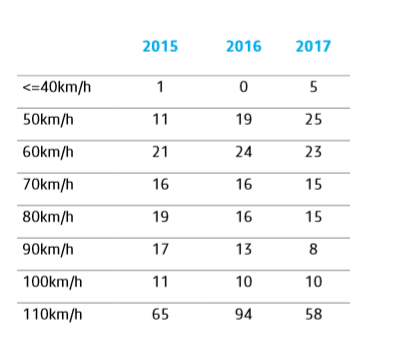
**1 mark for conclusion and 1 mark for how it would increase the accuracy of their results.**

**2 improvements made total 4 marks**

**Validation:**

1. Graph the road fatalities for 2015, 2016 and 2017 shown in the table below for various speeds **(6 Marks)**

Table 1: Fatalities by speed zone



**1 mark for title**

**1 mark for x axis labelled (speed), units and scale**

**1 mark for y axis labelled deaths, units and scale**

**1 mark for key**

**2 marks for graphing (less than 4 points off -1 mark (3 points wrong), more than 4 points wrong -2 marks) -1 mark automatically if not line graph (MUST be a line graph)**

1. Discuss how the safety features below use Newton’s laws in their design. Include in your answer which law is being used. **(9 Marks)**

**Students must discuss how newtons laws are used in their design.**

1. Seatbelt

**Law 1 (1) and Law 3 (1)**

**Seatbelts were designed based on newtons first and third law, his first law is used as an object in motion will continue in motion unless acted upon by an unbalanced force, in this case the unbalanced force is the seatbelt stopping an individual from moving forwards out of the front windscreen. Law three is also used as forces work in pairs, the force of the seatbelt matches the force of the persons body moving forward to stop them.**

1. Airbag

**Law 1 (1) and Law 3 (1)**

**Uses law one as a person will continue in motion airbags use this and protect us from damage as they stop us from hitting the steering wheel by using law 3 an opposing force to stop us moving forward.**

1. Crumple zone

**Law 2- increases the time to stop by crumpling upon impact, results in less acceleration when force is mass times acceleration if the acceleration is decreased then the force on impact is decreased (1)**

1. Antilock braking systems

**Law 3- forces work in pairs when the brakes press on the wheel the friction between them causes the car to slow down, if the friction is reduced the car starts to skid resulting in an increased stopping distance and an increased likelihood of loosing control and crashing. (1) Antilock braking systems pump the brakes to stop the car from skidding keeping the friction and the two opposing forces so the car can slow down. (1)**

1. Electronic stability control

**Law 1 – an object in motion will continue in motion unless acted upon by an unbalanced force, this means if a car has lost control it will continue in the same motion unless acted upon by a force (1), in this case the brakes will apply to specific wheels to slow that wheel and bring the vehicle back into the direction it needs to go. (1)**