Science physics essay

Formulation of questions explicitly linked to science knowledge| Formulation of questions informed by science knowledge | Formulation of questions that can be investigated scientifically| Statements of questions | Safe, directed use of equipment in given investigations| PART B METHOD(*)| Concise description of methods designed to control and accurately measure variables and systematically collect data, | Description of methods designed to control and accurately measure variables and systematically collect data, | Description of methods designed to control and measure variables and collect data, | Description of methods used to collect data in given investigations| | PART A , B & SURVEYANSWERS TO QUESTIONS (***)| Comprehensive analysis of trends in data to explain relationships between variables and to develop justified conclusions| Significant analysis of trends in data to describe relationships between variables and to develop supported conclusions| Analysis of trends in data to identify relationships between variables and to develop conclusions | Description of trends in data and statements of conclusions| Listing of data and superficial statements of conclusions| COMMENT PART A: AIMThe purpose of this experiment is to use dynamic trolleys and plasticine dummies to model the effect inertia has on the impact of a car accident. RESULT: TROLLEY A DUMMY| The dummy in trolley A was propelled forward when it collided with trolley B. | TROLLEY B DUMMY| When trolley A hit trolley B the dummy in trolley B was jolted backward when the trolley stopped all of the sudden. | DISCUSSION QUESTION ANSWERS: 1. What happens to the dummy on trolley A during the collision? Explain why this happened. The dummy in trolley A slid forward slightly as the trolley moved down the ramp. This displays how inertia allows the dummy to move forward even without being pushed directly.

When the trolley collided with trolley B the dummy was thrown forward and landed in front of the collision. The fact that the dummy continued to travel forward also displays the principle of inertia. 2. What happens to the occupants of a moving car when it collides with a stationary car? The occupant of a moving car that has just collided with the back of another car would usually be thrown forward due to the principle of inertia. This is why most modern cars have seatbelts and airbags.

By having these safety features the unfulfilled momentum caused by the sudden stop is not so harmful. 3. What design features of a car reduce the risk of injury in this type of collision? Brakes would be the most successful way of preventing injury but if the accident is unpreventable a seat belt would prevent the occupant from being thrown forward and hitting their head on the steering wheel or windscreen.

Air bags would also prevent this from happening by adding a cushion like surface for the occupant to land on. If the occupant were to hit their head on the steering wheel or smash the windscreen the results could be fatal. 4. What happened to the dummy on trolley B? Explain why this happened. When trolley A hit the back of trolley B the dummy in Trolley B was also jolter backwards and off of the trolley. The force of the other trolley pushed trolley B out from underneath the dummy causing it to land behind the impact of the collision.

5. What happens to the occupants of a stationary car hit from behind by another car? If a car travelling down a hill was to hit a stationary car the occupants of the stationary car would be jolted forward by the initial impact

then thrown backwards depending on the force of the collision. This is because the car was pushed forward unexpectedly and the body would have been forced back against the chair.

Depending on the severity of the hit the occupants may receive neck or back injuries. 6. What design features reduces the risk of injury in this type of collision. Seatbelts, headrests and seats would reduce the chance of an occupant injuring themselves by being propelled forwards and backwards unexpectedly.

Seatbelts stop the occupants of the car being thrown forward and hitting their heads whereas headrests and seats reduce the chance of back and neck injuries. PART B AIM: The purpose of this experiment is to use dynamic trolleys and plasticine dummies to model the effect inertia has on the impact of a car accident. METHOD SUMMARY (4 sentences) 1. A wooden block was placed 30cm from the base of the ramp. 2. A 1cm plasticine block was placed on top of a small model car at the top of the ramp. 3.

The car was released and the dummy was thrown forward, over the wooden block. 4. The distance between the dummy and the block was then measured and then recorded. RESULT (INSERT EXCEL TABLE AND GRAPH)Measurement| Test 1| Test 2| Test 3| Test 4| Average| 100cm| 79cm| 60cm| 107cm| 96cm| 85. 3cm| 80cm| 77cm| 52cm| 67cm| 42cm| 59. 5cm| 60cm| 47cm| 64cm| 55cm| 51cm| 54. 25cm| DISCUSSION: QUESTION ANSWERS 1. The higher the trolley was from the base of the ramp, the higher the impact speed was.

This was because when the trolley was higher up the ramp it had longer to develop speed. As there was nothing to limit or object to the effect inertia has on a moving object the trolley continued to gain momentum up until it collided with the wooden block. 2. The connection between the impact speed and the distance the dummy was thrown was that the faster the impact speed was, the further the dummy was thrown. The further up the ramp the trolley was, the more momentum and speed the trolley is able to develop, hitting the other trolley with more force. 3.

If we had of tested the dummy from the twenty centimeter mark I believe it would have landed between 40 and 50 centimeters judging from the averages of the other twelve tests. After seeing how versatile the results were in the other test it is difficult to make a reasonable assumption but there seems to be a steady decrease in the distance of each projection. 4. In order to make the experiment more reliable and predictable more tests could have been conducted. You could also test from every 10cm mark, rather than 20cm.

Another way of making the experiment more appropriate would be to make sure that the dummy was the same shape and size each time. To make the reaction more accurate a human shaped dummy would also make a difference. It the size and shape is altered at all it could affect how far it roles or how it land. Each time the trolley is released the person letting go should be extra careful not to push it slightly as this can increase its speed. ANSWERS TO SURVEY 1 a. At the beginning of the week, there were fewer deaths in the morning compared to the afternoon. On Tuesday there were

fewer deaths when compared to Monday and there was no dramatic difference between the deaths in the morning and afternoon.

On Wednesday the number of total deaths stayed the same as Tuesday but the deaths occurring between 4 pm to 2 am have risen compared to the day before. The number of deaths on Thursday increased again, compared to the rest of the week, and from the hours of 2 am to 4 pm there were only 37 deaths, whereas that night there were a total of 59. On Friday, there were more than 40 deaths from 2 am to 4 pm, and a huge 86 lives lost during the hours of 4 pm to 2 am. On Saturday the total number of deaths is slightly lower than Friday and on Sunday, the number of deaths decreased again. The number of deaths from 2 am to 4 pm has risen to 54, and the deaths from 4 pm to 2 am decreased to 52. b. The results from the graph show that most of the accidents can be linked to the times in which people are either tired or intoxicated. On Monday and Tuesday there are fewer deaths when compared to the rest of the week, with more occurring in the morning which indicates that they were either tired from the nights before or still slightly intoxicated from a long night.

On Wednesday and Thursday the number of deaths in the later hours of the day was higher than those between 2am to 4pm. This indicates that Thursday late night shopping is taking a toll on the concentration of driver. This may also be a result of an increase in partying further throughout the week. Friday had a significant rise in the number of deaths from 4pm to 2am. This may be because they were tired from shopping the night before or intoxicated from parting.

Saturday and Sunday also have an extremely high death rate from 4 pm to 2 am. The fact that there are much less deaths at the beginning of the week can be linked to the fact that people have schooling or work to attend to and can’t party or attend events involving alcohol. ANSWERS TO SURVEY 2 a. Were any drivers killed when the speed was less than 20 km/h? Two drivers were killed as a result of fatal injuries when the speed was less than 20km/h. This indicates that it doesn’t matter how slow a car is travelling, you should always wear a seatbelt. This can also be proven by looking at the number of deaths that occur when a driver is wearing a seatbelt and travelling at less than 20km/h.

There were fatal injuries. b. At what speed did the highest percentage of accidents occur? How many people were seriously injured or killed in these accidents? The highest percentage of accidents occurred when drivers were travelling between 20 and 40 km/h. five people had fatal accident and fifty people were seriously injured out of the 7943 accidents that occurred. c. Based on the data, at what speeds should seat belts be fastened to prevent serious injury or death? Based on the information in the tables provided, seat belts should be fastened before the driver begins moving. People are having fatal crashes before they even exceed 20km/h whereas when a seatbelt is worn no one risks death until they reach about 100km/h.

d. What was the lowest speed at which a driver was killed? The data in the tables provided shows that the lowest speed before someone was fatally injured and killed when wearing a seat belt around 100km/h. There were only 3 belted drivers that had fatal injuries or died from accidents while travelling

at around 100km/h out of a total 354 accidents that occurred at this speed. e.

At what speed did the highest percentage of accidents occur? How many people were seriously injured or killed in these accidents? The speed in which the highest percentage of accidents occurred, involving belted drivers happened between 20 and 40km/h. There were only 19 serious injuries as a result of these accidents but no fatal injuries or deaths occurred for belted drivers. f.

Consider the speed you chose in Q e. Why do you think that seat belts improve the chance of not being seriously injured or killed at that speed? The higher the speed of a car, the more force it is likely to have on another. By putting a seatbelt on the occupants of a car you are reducing the chance of them being throw forward and injuring their head, neck and inner organs. Conclusion: Write a conclusion about the survey results that shows your awareness of the risks to you as a future driver of a car.

Judging from the results above more than 37% of accidents are either fatal or cause serious injuries. This means that every twenty accidents, seven people are in some form of harmful car accidents when they are not wearing a seat belt. Those who wear seat belts reduce the risk of being in a fatal accident or ending up with a serious injury by 13%. This shows how important it is for drivers and passengers to wear seat belts.

The table shows that when a car is travelling above 100km/h a person that is not wearing a seatbelt is three times more likely to die than someone

wearing one. This value is quite disturbing and should definitely encourage drivers as well as passengers to wear seatbelts at all times.