**Speed and Motion 2**

**Measuring the speed of a moving object**

**Assessed Criteria**

Criteria C: Processing and Evaluating

Criteria E: AIE

**Research Question**

“How can we measure the speed of a moving object”

**Background Information**

The speed of an object can be calculated if the distance it has travelled and the time taken are known. The velocity of an object is its speed in a particular direction. Speed is a scalar quantity, velocity is a vector quantity as it has both size and direction.



Acceleration is the rate an object changes speed, we can use a speed time graph to show how an object changes speed over time. The steeper the gradient the higher the acceleration. To calculate acceleration you can use the following formula. 

 Where;

a - acceleration

v - final velocity

u - initial velocity

t - time taken

When an object moves against another object it can be opposed by frictional forces, friction makes it harder for things to move. Moving objects can also be affected by air resistance, this is the opposing frictional forces of the air against the object. Both of these forces can slow moving objects.

**Objective**

To measure the speed of an object as it moves down a slope, calculate the acceleration and plot a speed time graph of the results.

**Hypothesis**

I think that as the trolley rolls down the slope it will **(complete your hypothesis, remember to include scientific evidence).**

**Method**

1. Use books or wooden blocks to support one end of the runway and make the runway slope. The slope should be big enough for the trolley to gently increase in speed as it travels down it.
2. Place rulers along the length of the runway.
3. Let the trolley start from rest (standstill). Time the trolley, as well as you can, over the first 25 cm it travels. Time it over the second 25 cm, over the third 25 cm, and so on.
4. Repeat the measurements twice again. See how much variation there is in your measurements.
5. Write all your measurements in a table. Work out the average (mean) time for the first 25 cm, for the second 25 cm, and so on.
6. Divide the distance by the time. That will tell you the mean velocity of the trolley during each part of its journey. Plot this in a speed time graph, calculate the acceleration for each part of the trolleys journey.

**Results (Insert your table here)**

**Calculations (Remember to include sample calculations)**

**Conclusion**

**Remember to refer to the pattern of your graph and use data from your graph. Explain why this happened, using Science. Does this agree with your hypothesis?**

**Evaluation**

**Are your results valid or reliable? If not why not? Make sure you give at least two valid improvements if you were to repeat this investigation.**

**References**

Practicalphysics.org. (2017). *Timing a trolley on a slope*. [online] Available at: http://www.practicalphysics.org/timing-trolley-slope.html [Accessed 4 Apr. 2017].

Bbc.co.uk. (2017). *BBC - GCSE Bitesize: Acceleration*. [online] Available at: http://www.bbc.co.uk/schools/gcsebitesize/science/add\_gateway\_pre\_2011/forces/accelerationrev1.shtml [Accessed 4 Apr. 2017].