**GENERAL INTEGRATED SCIENCE– UNIT 4**

**TASK 10 – Physics in life**

**NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ WEIGHTING: 7.5 %**

**DATE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ MARK: /43 = %**

**Physics can make anything possible!**

The world of physics is complicated, but physics principles are used to design and create many things that exist in our lives. Physics principles are also used to improve existing pieces of equipment to turn them into something new. For example physics principles are being used to design a new form of space craft that can travel to mars without the use of an engine once in space but rotate so it can create gravity to enable the astronauts on board to say alive.

Your task is to research existing designs of one thing, which is of particular interest to you, and the physics principles that are used in its production. You are then going to come up with a way to improve the design so you can make a product that you would want to buy or see work. The way you would improve the design must be based on physics principles. Examples of things you could look at creating are:

* Gun that has the fastest muzzle velocity (bullet speed)
* Sport shoe (soccer or football) that helps the player run faster
* Trebuchet or cannon that has the fastest and heaviest projectile
* Roller coaster that is the fastest possible while also being safe to ride
* Aeroplane that is the fastest possible while also able to hold lots of people

**Part A – Research the following to help you create your design (16 marks)**

1. Outline the history of your thing
   1. How was the first one created? (3 marks)
   2. Choose two elements of the design (e.g. for aircraft you could look at wing shape, wingtip devices, material) and summarise how they have changed over the years (4 marks)
2. Description of Newton’s laws of motion (2 marks)
3. Explanation how these laws of motion are relevant to your product design. (3 marks)
4. Explanation of other physics concepts/factors that your thing uses in its design (4 marks)

For example:

* + Weight
  + Aerodynamics
  + Friction
  + Propulsion
  + Gravity

**Part B – product design (12 marks)**

1. Choose two design elements/physics principles to focus on that you are going to change to improve your design.
2. Explain how the elements impact on the existing design (4 marks)
3. Explain how changing those elements will change the design into the product you want (4 marks)
4. Describe how your two changed design elements will impact your new product (4 marks)

**Part C – validation (15 marks)**

1. In test conditions you have one hour to:
   1. Draw a labelled diagram of your design on the paper provided. More detail in your labels and diagram will lead to higher marks.
   2. Identify how the changed elements have been incorporated into your design.
   3. Explain how the changed elements are going to change the original design into the product you wanted.

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**Validation 15 marks**

1. Name your design:

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1. Draw a diagram of your design on the A3 paper. You will be marked on tidiness and detail.

(3 marks)

* 1. In your diagram, include details of the below: (6 marks)
     1. Direction of forces acting on your product (e.g. Weight, aerodynamics, friction, propulsion, gravity, thrust etc)
     2. The design elements you have changed
     3. Any other information relevant to your design (e.g. angles, lengths, etc)

1. Describe the changes you made (2 marks)
   1. Design element one:

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* 1. Design element two:

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1. Explain how your changes to the 1st design element improves the original design (2 marks)

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1. Explain how your changes to the 2nd design element improves the original design (2 marks)

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