**Investigative Science- Rocket Project**

**(80 POINTS)**

**Description:** Understand the physics involved with the dynamics of a rocket.

**Teams:** teams of 2 (1 team of 3 if odd number)

**Parameters:** Teams may only use materials not commercially produced as rocket materials. Only one rocket, propelled by compressed air, may be entered by each team.

**Competition (Raw Score):**

* The rocket to stay in the air the longest and land in operable order will be declared the winner.

**Competition (Prediction):**

* The group to predict how long their rocket will stay in the air the closest (difference between actual and prediction) will be declared the winner.

**Grand Champion:** will the combination of Raw Score Champion and Prediction Score Champion

**Grading:** Questions, Preparation, Presentation of plan, Materials, Testing of Plan, Operation of rocket, Data Chart and Evaluation of project results.

**Pre-Plan Questions (answer the following questions in complete sentences): +16 total**

1. What is a rocket? **+1**
2. What are some different types of rockets? **+2**
3. What physics are involved in launching/ directing a rocket? **+2**
4. What are some uses for rockets? **+2**
5. Define the following words in terms of rocket use: **+9**
   1. Net thrust, impulse, specific impulse, mass ratio, staging, acceleration, thrust-to-weight ratio, drag, energy

**Materials List: +5**

Provide a complete, detailed list of materials used. The air compressor and hose will be supplied as well as bicycle style and spray ends (do not have to be included in this list). All materials must be supplied as a joint effort by the group.

**Responsibility List: +4**

Provide a complete, detailed list of who was responsible for what. Each group member must be listed in this section with equitable responsibilities.

**Construction procedure(s): +10**

* Provide a step-by-step listing of how the rocket will be created (modify to actual construction procedure used). **­+5**
* Provide a detailed sketch of your rocket and its designs. **+5**

**Launch Procedure(s): +10**

Provide a step-by-step listing of how the rocket will be launched from the pad. Include things like, but not limited to the following: water amount, mounting, air pressure, tilt, air release, etc. (modify to actual launch procedure used.

**Reference List: +4**

Provide a complete, detailed listing of all resources, including where you obtained you obtained your information and materials.

**Data Table: +10**

Provide a comprehensive data chart that clearly shows the results of the following: 5+ launches, 2+ variables you manipulated to maximize the launch, hang time goal of the rocket.

**Evaluation Questions: +21**

**Answer the following in complete sentences (be sure to answer all parts).**

* What was the most difficult part of the planning stage? Why? How could this have been made better/easier? **+3**
* What was the most difficult part of the construction stage? Why? How could this have been made better/easier? **+3**
* What was the most difficult part of the testing stage? Why? How could this have been made better/easier? **+3**
* What was your Hang Time Prediction? What was your Hang Time Actual? What was your Difference? **+3**
* With regards to Hang Time Actual, what group performed the best? What was their Actual Hang Time? Think about their rocket, describe one thing about the design and/or operation that helped earn them this top position? **+3**
* With regards to Hang Time Prediction, what group performed the best? What was their Predicted Hang Time? What was their Actual Hang Time? And what was their Hang Time Difference? What did they do to help earn them this top position? **+5**
* Who was the Grand Champion, and what do you feel made them into the Grand Champions? **+1**

***All of the above must be typed, turned in on one document and be in the order presented above.***