

# Mathematics Investigation Rubric

## Judging Criteria for Research Papers, Power Point and YouTube Presentation

The following are criteria for judging used by the Illinois Junior Academy of Science. The CPS Exhibition of Student STEM Research uses the same criteria with some modifications where necessary

- ▶ There are usually three scoring levels (low, middle and high) for each factor being examined during the judging procedure.
- ▶ Student experimenters should strive to achieve the top criteria listed below.

### Design/Math Category Overall Impression of Project

#### **Math Processing Skills (1-8 pts)** \_\_\_\_\_ points

- ▶ Exhibits a thorough understanding and the application of the Math algorithm, proof, etc. The student has acquired math skills.

#### **Math Approach (1-20 pts)** \_\_\_\_\_ points

- ▶ Has identified a need or real-world problem. Uses a logical, orderly method for addressing the problem or need. Method was appropriate and effective.
- ▶ Clear performance criteria have been developed to address the features of the product, algorithm, proof, model, etc.
- ▶ A clear plan had been presented using a block diagram, flowchart, or sketch. The design plan shows all the parts and/or subsystems of the design and how all parts of the design work together

#### **Accuracy of Data and Observations (1-8 pts)** \_\_\_\_\_ points

- ▶ An adequate sample size and/or sufficient repetitions were performed to gather enough data to reach a reliable conclusion. Data collected is numerical and metric, if applicable. Observations were carefully recorded and accurate.

#### **Constructing and Testing the Design Prototype (1-8 pts)** \_\_\_\_\_ points

- ▶ Have constructed and tested a prototype of their best design. This may involve targeted users and/or analysis of data sets. (This may or may not include traditional data).

#### **Redesign of the Algorithm (1-2 pts)** \_\_\_\_\_ points

- ▶ Shows evidence that changes in design were made to better meet the performance criteria established at the beginning of the project. Test results may be included in tables, if applicable. Data analysis/validation may be present.

### **Validity of Evaluation/Conclusion (1-8 pts)**

\_\_\_\_\_ points

- ▶ The conclusion accurately reports the successes and failures of the Algorithms, proofs, etc., what changes were made, and how the redesign of the algorithm more closely met the stated problem.

### **Originality (1-5 pts)**

\_\_\_\_\_ points

- ▶ Demonstrates a novel approach and/or idea. Exhibits a creative approach to development of the algorithm, proof, etc. Shows evidence that other algorithms, proofs, etc., were investigated that addressed the same need or problem.

## **Scientific Communication – Power Point**

### **Information: Design (1-4 pts)**

\_\_\_\_\_ points

- ▶ Gives complete explanation of the project. Power point includes tables, figures and diagrams make mathematics clear.

### **Artistic Qualities (1-3 points)**

\_\_\_\_\_ points

- ▶ Power point is neat, organized, and appealing. No spelling errors are present.

## **Scientific Communication – YouTube Presentation**

### **Presentation Quality (1-3 pts)**

\_\_\_\_\_ points

- ▶ Clear presentation; concisely summarizes the project. Information is relevant and pertinent. Student exhibits a thorough understanding of their topic area.

### **Dynamics (1-3 pts)**

\_\_\_\_\_ points

- ▶ Speaks fluently; polite, dynamic, and interested in their project.

## **Written Report**

### **Abstract (0-2 pts)**

\_\_\_\_\_ points

- ▶ Abstract present; contains a concise summary of the purpose, procedure, and conclusion in 250 words or less. The proper IJAS form was used.

### **Safety Sheet (0-2 pts)**

\_\_\_\_\_ points

- ▶ The safety sheet identifies all of the major safety hazards, precautions taken, and any endorsement sheets (if necessary), which describe the use of human or non-human vertebrates or microorganisms, and ensures the safe use of such organisms. The proper IJAS form was used.

### **Title Page/Table of Contents (0-2 pts)**

\_\_\_\_\_ points

- ▶ Title page is clear and concise. The table of contents is complete and includes pagination.

### **Acknowledgements (0-1 pt)**

\_\_\_\_\_ points

- ▶ Credit has been given to those who have helped with the project.

**Problem or Need (0-2 pts)**

- ▶ Described in detail the algorithm, proof, etc.

\_\_\_\_\_points

**Background Research (BR) (0-4 pts)**

- ▶ Background research is in-depth, and the information is pertinent and supports the algorithm, proof, etc. BR is adequately cited using APA format.

\_\_\_\_\_points

**Math Plan (0-3 pts)**

- ▶ The algorithm, proof, etc., is creative and insightful.

\_\_\_\_\_points

**Results of Testing (0-2 pts)**

- ▶ The results are accurate. Logic is complete and clear.

\_\_\_\_\_points

**Evaluation/Conclusion (0-4 pts)**

- ▶ A concise evaluation and interpretation of the algorithm, proof, etc. Was made as it relates to the stated problem.

\_\_\_\_\_points

**Reference List (0-2 pts)**

- ▶ Quality, quantity, and variety of sources (5-12) are adequate for topic. Sources listed are cited within Background Research.
- ▶ Most sources are current.

\_\_\_\_\_points

**Technical Aspects (0-2 pts)**

- ▶ Good grammar and spelling are evident. The student's last name is in the upper right-hand corner of all pages after the table of contents. Font size and type are appropriate.

\_\_\_\_\_points

**Neat and Orderly (0-2 pts)**

- ▶ Is neat and follows the Policy and Procedure Manual order as listed on this judging sheet

\_\_\_\_\_points