Elementary Science Fair and Project Guidelines

2015 – 2016

Revised Fall 2015
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**PHILOSOPHY**

An elementary science fair motivates students to discover how their world works, and is an opportunity to demonstrate mastery of the Science Investigation and Reasoning skills. Students develop science literacy and critical thinking as they answer questions, solve relevant problems, and use evidence to defend their thinking. This type of systematic problem solving is essential for success in the 21st century workplace.

**PURPOSE**

The ultimate purpose of the PfISD Elementary Science Fair is to support the learning goals outlined in the Texas Essential Knowledge and Skills, or TEKS.

Students are expected to:

- Ask their own questions
- Plan and implement investigations to answer those questions
- Consider safe practices and use of appropriate tools to support investigations
- Collect data through observation and/or testing
- Use critical thinking to organize, analyze, and evaluate their data
- Communicate their learning

These expectations are scaffolded over the progression of Kindergarten to 5th grade.

**CAMPUS SCIENCE FAIR COORDINATOR**

Each PfISD elementary designates one Campus Science Fair Coordinator.

Responsibilities:

- Attend PfISD science fair organizational meeting(s)
- Support the PfISD Science Fair / Project Guidelines and Safety Rules
- Inform appropriate faculty of guidelines and information
- Provide / maintain necessary paperwork
- Organize and lead a **campus-based science fair committee**
  - Plan logistics of campus fair
  - Finalize projects advancing to regional level
- Complete all registration requirements for campus entry in the Austin Energy Regional Science Festival
  - Register school, projects, volunteers, judges and advancing projects
  - Register advancing students through **online process**
  - Submit all required Austin Energy paperwork by entry deadline
- Work with campus administrators to secure purchase order for payment of registration fees
  - School Fee (published yearly on the AERSF website)
  - Elementary Division Project Fee (published yearly on the AERSF website)

**Campus Science Fair Coordinators are not responsible for student projects or classroom instruction. Classroom teachers follow instructional guidelines within the PfISD Elementary Science Curriculum in order to teach the required TEKS.**
GRAD LEVEL PROJECT EXPECTATIONS

**Kindergarten, 1st and 2nd Grades**
- **Campus discretion** for each class to produce a class project and present during campus science fair
  - These class projects would result from regular instruction of Investigation and Reasoning TEKS
- All projects that will be judged must present the project on a display board
- Must use **project display board** for any project that will be **judged** in the campus science fair
- Project categories: **Collection with Classification** (GR K – 1) or **Exhibit** (GR K - 2)
  - Category descriptions – see page 14 in Appendix
- Individual / Team projects – **are optional and allowed per campus discretion**
  - Can do an experiment
  - Student(s) responsibility to complete independently outside of class
- Kindergarten, 1st and 2nd grades **DO NOT advance** to Austin Energy Regional Science Festival

**3rd Grade**
- **Campus discretion** for each class to produce a class project* and present during campus science fair
  - These class projects would result from regular instruction of Investigation and Reasoning TEKS
- Must use **project display board** for any project that will be **judged** in the campus science fair
- Project categories: **Exhibit, Comparative Investigation, or Experimental Investigation**
  - Category descriptions – see page 14 in Appendix
- Individual / Team projects – **optional** – **inclusion in campus fair per campus discretion**
  - Student(s) responsibility to complete individual/team projects independently outside of class
- **3rd grade individual and team projects are eligible to advance** to Austin Energy Regional Science Festival. *Class projects are NOT eligible to advance to the regional event.

**4th Grade**
- Mastery of Investigation and Reasoning TEKS is required as part of grade level curriculum instruction
- These process skills may be demonstrated through preparation of an individual science fair project
  - **Campus discretion to allow team projects**
- **Optional to have projects judged and to enter these projects in campus science fair**
  - Projects NOT being judged may display as a power point or a completed packet (report)
  - **Campus discretion on how to display projects NOT being judged at the campus fair**
- All projects that will be **judged** in the campus fair **must present** the project on a display board
- Project categories: **Comparative Investigation, Experiment, or Engineering Project**
  - Category descriptions – see page 14 in Appendix
  - Project must have a testable (investigable) question
  - Use data to support a hypothesis
- **4th grade projects judged at the campus fair are eligible to advance** to Austin Energy Regional Science Festival

**5th Grade**
- Mastery of Investigation and Reasoning TEKS is required as part of grade level curriculum instruction
- These process skills may be demonstrated through preparation of an individual science fair project
  - **Campus discretion to allow team projects**
- **Optional to have projects judged and to enter these projects in campus science fair**
  - Projects NOT being judged may be completed as a power point or a student packet (report)
  - **Campus discretion on how to display projects NOT being judged at the campus fair**
- All projects that will be **judged** in the campus fair **must present** the project on a display board
- Project categories: **Comparative Investigation, Experiment, or Engineering Project**
  - Category descriptions – see page 14 in Appendix
  - Project must have a testable (investigable) question
  - Use data to support a hypothesis
- **5th grade projects judged at the campus fair are eligible to advance** to Austin Energy Regional Science Festival
PROJECT CATEGORY COMPONENTS

PIUSD Science Fair Experiment Projects mirror requirements of the Austin Energy Regional Science Festival* in order to provide a seamless transition from campus and district science events and support TEKS learning.

**Collection with Classification:** (Kindergarten / 1st Grade)
*Grades K and 1 DO NOT advance to regionals.

A collection is a set of objects, which have been placed into groups according to similar properties.

Assessed on the rubric:

- Title
- Research Report
- Classification Scheme
- Conclusions
- References and Acknowledgements

**EXAMPLES:**
Fabric types by textures
Objects that sink or float
Rocks by shape
Buttons, classified by color, material, shape, etc.

**Exhibit: Demonstration, Model, or Display (2nd and 3rd Grade)**
*Grade 2 DOES NOT advance to regionals.
Grade 3 individual or team projects may advance to Regionals.

A demonstration or model describes how or why something works. A display reveals details about the topic.

Assessed on the rubric:

- Title
- Research Report
- Exhibit Explanation
- Conclusions
- References and Acknowledgements

**EXAMPLES:**
The Brain
The Life of Bees
Hurricanes
What are Gluten Free Foods?
Orcas
How Do Magnetic Trains Work?
It’s a long Way to the Top! (food chains / webs)
What is a Solar Eclipse?
**Experiment (Testable Questions: 4th and 5th Grade)**

*Grades 4 and 5 are eligible to advance to Regionals*

An experiment uses a fair test designed to answer a question to which you do not already know the answer.

Assessed on the rubric:

- Title of Experiment
- Problem / Question
- Definitions
- Hypothesis
- Background Information
- Experimental Materials
- Experimental Procedure
- Results (Data)
- Conclusion
- References and Acknowledgements

**EXAMPLES:**

*Testable Questions:*

How does temperature affect the strength of magnets?
How does freezing popcorn kernels affect the number of kernels that pop?

**WEAK Testable Question:**

Do frozen popcorn kernels pop? (a yes/no answer – does not indicate what is being tested)

**NOT a Testable Question:**

How do magnets work? (Only provides information – so this is a question for an Exhibit)

**Comparative Investigation: (Investigable Questions: 4th and 5th Grade)**

A comparative investigation asks a question that compares different things or conditions

Same rubric as Experiment (above)

**EXAMPLES:**

*Investigable Comparative Questions:*

Which battery band will last the longest?
Which diaper brand holds the most liquid?
Detergent War! (Which detergent gets the stains out best?)

**Engineering Project: (Engineering Process – Question/Problem: 4th and 5th Grade)**

The engineering design process is a series of steps to solve a problem. This often involves designing a product or apparatus that performs a specific function, testing it and redesigning to improve the results.

Same rubric as Experiment (above)

**EXAMPLES:**

*Engineering Design Questions:*

How can a model car be built that will run using only rubber band power?
What is the best tower design to withstand high winds?
What blade design for a wind turbine produces the most electrical voltage?
SAFETY RULES

All projects (fair or classroom instruction) must follow safety rules and guidelines for project topic choice and display. The Campus Science Fair Coordinator may remove any project or project materials from the fair that are prohibited or do not meet safety guidelines. Teachers will have students discontinue prohibited projects at the initial safety review.

Students are NOT allowed to do any project that involves:
- Growing bacteria or mold of any type
- Firearms, explosives, or discharge air pressure canister devices (potato guns or rockets)
- Causing pain, suffering, sickness or death of an animal
- Activities and substances presenting a danger to student or environment – such as hazardous chemicals or radioactive materials

These projects cannot be judged, displayed at campus fair, or advance to Austin Energy Regional Science Festival.

Project Display Safety and Guidelines: Applies to any items displayed on the board or with a project at the fair
- Display board options: standard tri-fold board, poster board, created tri-fold board.
- Size: 15” deep, 48” wide, and 72” high (measured from floor to top of board)

- Items PROHIBITED from being displayed: (The following types of objects will be removed before judging)
  - Living or preserved plants or animals
  - Human/animal parts or body fluids
  - Food
  - Liquids
  - Safety hazards: poisons, chemicals, activities or devices
  - Glass
  - Sharp objects
  - Soil, dirt, waste products
  - Open top batteries
  - Pressurized containers
  - Photos of surgeries, dissections or necropsies

- Encouraged on display:
  - Photographs, drawings and artificial models of prohibited items (Ex: stuffed animals, plastic fruit)

- MUST HAVE on display:
  - Acknowledgement of any assistance received
  - Label indicating who took photographs EX: “Photos taken by Mom/student/teacher/parent”
  - Label(s) indicating source of online materials or photos – website/webpage: date and where accessed

CAMPUS SCIENCE FAIR TIMELINES / SUPPORT

- Campus Science Fair Date:
  - Allow time to complete fair and register for Austin Energy Regional Science Festival

- Prepare campus/classroom timeline:
  - Initial safety review of projects
  - Periodic check – in dates
  - Final due date

- Non-judged projects:
  - Follow campus timeline for completion.
  - Display options – Campus discretion:
    - Class Projects: Classroom / Hallway / with overall Campus Science Fair projects
    - Individual Projects: with overall Campus Science Fair projects / separate area
LOGISTICS OF THE SCIENCE FAIR EVENT

Date / Time
- Campus reviews Campus Science Fair Calendar and selects fair date
  - Campus Science Fair Coordinator records Campus Fair Date and their name on provided Google Doc
  - Up to 3 campuses may schedule their fair on the same calendar date
- Judging process may take from ½ to a full day

Location
- Campus determines event location
  - Gymnasium
  - Cafeteria
  - Hallways
  - Classrooms

JUDGING

Campus responsibilities:
- Determine number of judges needed:
  - Number of total projects
  - Time available for judging/student interviews (more judges = less time)
- Obtain volunteer judges for their Science Fair event
  - Send out letters if desired (see model letters in Science Fair folder)
  - Identify and confirm judges early in the planning process.
  - Provide process to help judges avoid judging projects of family members/close friends
  - Provide short orientation on interviewing and rubric (district power point)
  - Provide supervision by “campus staff” so that these judges do not need to complete volunteer form/screening (all regular volunteers must complete screening process)
- Provide sample question sheet (laminate or protector for multiple uses)
- Prepare rubrics for Campus Science Fair judging
  - Projects not advancing or not requesting consideration for advancement to regionals
    - Require one judge
    - Copy on white paper
  - Grades K through 2 cannot advance to Austin Energy Regional Science Festival
    - Projects requesting consideration for advancement to Austin Energy Regional Science Festival
      - MUST HAVE previously declared this intent and obtained parental signature on the “Request to be Judged – Intent Form”
      - Require two judges – these judges do not need to judge together
      - Copy on color paper – to assist Selection Committee with organizing project paperwork

Judging Process:
- Report on time to campus
  - Sign in at front office through the Raptor system
  - Obtain required badge
- Participate in short Judges Orientation
- Judge all assigned projects, using appropriate rubric
  - Student projects are judged against a rubric rather than other projects.
    - Flexible process
    - Can judge multiple grade levels/categories
- Include brief comments – highly encouraged
  - Specific feedback
  - Enhances learning
RUBRICS / GRADING

Rubrics
- Ask teachers to be sure projects are in the correct judging category: Experiment or Exhibit
- PISD Elementary Science Project Rubrics are required to be used to assess all judged projects
  - The PISD rubrics are based on the Austin Regional Science Festival project rubrics, which helps prepare students for the regional event.
  - Teachers may utilize the rubric for classroom assessment at any time during the year, if desired.
- A copy of the rubric will be provided to students so that they may –
  - Review specific feedback from “Judges Comments”
  - Reflect on their learning of science processes and content

Assessment of projects is a campus decision.
- Possible teacher assessment options:
  - Completed individual components:
    - Provide feedback and assess understanding of experimental design process
  - Completed project:
    - Judges scores should NOT be converted to a “grade”
    - Overall project assessment by teacher (can use rubric to support evaluation)
    - Written conclusion with data evidence support
    - Written reflection based on teacher’s guiding question or Reflection page in packet
      - This “Reflection” section is NOT part of Project Board

AWARDS / RECOGNITION

Volunteer judges score projects against the appropriate project rubric.

Science Fair Awards:

- **Experiment Rubrics** scoring between 38 and 47 on the rubric earn “gold level”
- **Experiment Rubrics** scoring between 28 and 37 on the rubric earn “silver level”
- **Experiment Rubrics** scoring between 18 and 27 on the rubric earn “bronze level”

- **Exhibits** scoring between 18 and 22 on the rubric earn “gold level”
- **Exhibits** scoring between 14 and 17 on the rubric earn “silver level”
- **Exhibits** scoring between 10 and 13 on the rubric earn “bronze level”

- **Classifications** scoring between 18 and 22 on the rubric earn “gold level”
- **Classifications** scoring between 14 and 17 on the rubric earn “silver level”
- **Classifications** scoring between 10 and 13 on the rubric earn “bronze level”

*Any project scoring below “bronze” level earns a participation award.*

1st place, 2nd place, and 3rd place, or similar, can be substituted for “gold, silver, and bronze”

No points may be deducted if the student is not present during the time of judging due to reasonable circumstances; however it is acknowledged that components of the rubric involve sharing learning and therefore may affect the score.

Campus decides award presentation process. Possible awards ceremony options:
- After public viewing: acknowledge entire group of winners at each “place” level
- In school function: POPS rally or on announcements
- In individual classrooms

**NOTE:** Awards are NOT placed on student projects for display.
PARENTS AND COMMUNITY

Instruction on Scientific Investigation and Reasoning occurs throughout the school curriculum and is part of the Texas Essential Knowledge and Skills (TEKS) for every grade level science course. This learning supports students in their preparation of a science project for their classroom or science fair.

- At-home project work may be required to complete project elements, testing and/or board preparation.
- Awards will not be on display during public viewing of projects.

- How to support learning during this process:
  o Allow learners to think through and develop the project as independently as possible
  o Read and discuss the rules and safety guidelines
  o Ensure the child’s safety during project work
  o Select projects which are appropriate for the child’s age and grade level
  o Plan and manage project work times and clean up times
  o Visit the school or public library for research
  o Listen to the student’s oral explanation of their project

Note any assistance given on the project board in the Acknowledgements section on the board. Photographs on the board require a label to indicate who took the photo.

- Only one label is needed to list everyone who took the included photos.
- Example: Photos taken by Mom

DETERMINING WHO MOVES FORWARD TO THE AUSTIN REGIONAL SCIENCE FESTIVAL

- Campuses send from 12 to 18 projects to the Austin Regional Science Festival, based on school population. This information is on the Austin Energy website at: [http://www.sciencefest.org/pdfs/ElemGuideAndChanges.pdf](http://www.sciencefest.org/pdfs/ElemGuideAndChanges.pdf)
- PDFs of all the pertinent Austin Energy forms, parent letter, intent forms, etc., are located in the Science Fair folder in PISD Public.

- Campuses pay school registration and student project fees
  o Purchase Order process must be completed by registration deadline
  o Send with registration packet to Austin Energy

- Campus Science Fair Coordinator (or Fair Committee) responsibilities:
  o Create a Campus Judging Committee
  o Inform students of all Austin Energy Regional Science Festival schedules and requirements
  o Submit students selected to advance on the Austin Energy Online System
  o Collect and submit all required paperwork and registration fees by due date

Choosing projects to move forward to Austin Energy Regional Science Festival:

- Campus Review Committee
  o Teachers, administrators, counselors, etc.
  o Not directly involved with student candidates [current teacher, parents, babysitters, etc.]

- Criteria:
  o Average 2 judges scores
    ▪ Call for 3rd judge when large score discrepancy
  o Combine comments
  o Note “standout qualities” in concept knowledge and communication/application of learning
  o Break tie on equal rankings: review projects/presentations as needed

- Use Intent Forms to determine interest in advancement and family time commitments
CONTACT INFORMATION

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594-0120, sueann.decuir@pfisd.net

Austin Energy Regional Science Festival
www.sciencefest.org

Resource, project idea, and PISD Science Project / Science Fair informational links can be found by visiting:
APPENDIX

- Elementary Science Project Scoring Categories Range Chart
- Grade Level and Project Expectations Guidelines Chart
- TEKS Investigation Types Used as Fair Projects

**Additional Support Materials:**
located in PISD Public

Pathway: S:\!PISD Public\Curriculum and Instruction\Elementary Science\Elem Science Fair

- **Campus Fair Materials**
  
  - Student Project Packet Template [English and Spanish]
  - Request Judging and AERSF Intent Form [English and Spanish]
  - Campus Science Fair Coordinator Fall Semester Check-list

- **Judging Support Materials**
  
  - Rubrics
    - Collection with Classification Rubric [English and Spanish]
    - Exhibit Rubric [English and Spanish]
    - Experiment / Engineering Project Rubric [English and Spanish]
  
  - Sign-in Template
  - Power Point for Judges Orientation [personalize for each campus]
  - Potential Judge Letter template
  - Secured Judge Letter template
  - Thank you Judge Letter template
  - Sample Judging Questions

- **Austin Energy Regional Science Festival support documents**
  
  - Cover Letter: Students advance to Austin Energy [English template]
  - Cover Letter: Students advance to Austin Energy [Spanish template]
  - AERSF – How to Do a Science Fair Project [English and Spanish]
  - AERSF Final Project List template
  - Request Judging and AERSF Intent Form [English and Spanish] (see above)
  - AERSF Registration Information Summary

- **2015 - 2016 Science Fair Campus Representatives / Event Dates** (on Google Doc)

Campus Science Fair Coordinator Stipend Form will be emailed directly to coordinators.
PfISD Elementary Science Project
Scoring Categories

<table>
<thead>
<tr>
<th>Project Type</th>
<th>Score Range</th>
<th>Award</th>
</tr>
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<tbody>
<tr>
<td><strong>Experiment Rubric</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38 – 47</td>
<td>“Gold” level</td>
<td></td>
</tr>
<tr>
<td>28 – 37</td>
<td>“Silver” level</td>
<td></td>
</tr>
<tr>
<td>18 – 27</td>
<td>“Bronze” level</td>
<td></td>
</tr>
<tr>
<td><strong>Exhibits and Collection with Classification Rubrics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 – 22</td>
<td>“Gold” level</td>
<td></td>
</tr>
<tr>
<td>14 - 17</td>
<td>“Silver” level</td>
<td></td>
</tr>
<tr>
<td>10 - 13</td>
<td>“Bronze” level</td>
<td></td>
</tr>
</tbody>
</table>

- Any project scoring below “bronze” level earns a participation award.

- No points may be deducted if the student is not present during judging; however, the interview process allows student to demonstrate additional knowledge and add details that may affect the score.
## PfISD Grade Level Expectations and Guidelines Chart

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>Instruction required to support mastery of Process Skills TEKS and science fair project work</th>
<th>Judging of Individual, Team*, or Class Projects at the Campus Science Fair</th>
<th>Display of Class Projects and Projects NOT Judged at the Campus Science Fair</th>
<th>Projects may advance to Austin Energy Regional Science Festival</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grade K</strong></td>
<td>Model with classroom projects throughout year</td>
<td>Campus decision</td>
<td>Campus decision</td>
<td>No</td>
</tr>
<tr>
<td><strong>Grade 1</strong></td>
<td>Model with classroom projects throughout year</td>
<td>Campus decision</td>
<td>Campus decision</td>
<td>No</td>
</tr>
<tr>
<td><strong>Grade 2</strong></td>
<td>Model with classroom projects throughout year</td>
<td>Campus decision</td>
<td>Campus decision</td>
<td>No</td>
</tr>
<tr>
<td><strong>Grade 3</strong></td>
<td>Model with classroom projects throughout year</td>
<td>Campus decision</td>
<td>Campus decision</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Grade 4</strong></td>
<td>Model process and planning as students design experiment to test effects of force</td>
<td>Parent/Student decision</td>
<td>Campus decision</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Model investigation process throughout year.</td>
<td>Project boards are required for all projects that will be judged</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Grade 5</strong></td>
<td>Model process and planning as students design experiment to test effects of force</td>
<td>Parent/Student decision</td>
<td>Campus decision</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Model investigation process throughout year.</td>
<td>Project boards are required for all projects that will be judged</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Students receive instruction in science process skills TEKS as part of the Elementary Science curriculum at all grade levels. Skills are modeled during instruction that relate to the components of a science fair project. Students apply that learning as they develop their own independent projects.
TEKS Investigation Types:

**Descriptive investigation:**
- **Collection with Classification:** Describes properties of a set of objects using labeled categories
- **Exhibit:** Models or describes how something works – the parts of that “system”
  - Ask a question about a natural or man-made system
  - Examples: rock formation, animal behavior, cloud, bicycle, electrical circuit, the eye
  - Observe to collect and record qualitative and/or quantitative data:
    - Describe the system
    - Communicate learning (draw conclusions)
  - *No hypothesis* – because no variables are tested or compared

**Comparative investigation:**
- Collect data on different organisms/objects/features/events, or under different conditions (e.g., time of year, air temperature, location) to make a comparison.
- The hypothesis identifies the property or part being compared and the expected result of the comparison.
- Data is gathered and used to support the comparison.

**Experimental investigation:**
- **Experiment:**
  - Ask a question to determine how changing one thing (variable) affects a measured result (measured variable).
  - Design a fair test so that all factors are the same, other than the tested variable.
  - Data is collected that measures the effect of that one variable that is changed.
  - The conclusion states that the data either supports or does not support the causal relationship that students predict or hypothesize.

***

**Engineering Design:**

- **ASK:** What is the problem? How have others approached it? What are your constraints?
- **IMAGINE:** What are some solutions? Brainstorm ideas. Choose the best one. Predict/hypothesize and explain how this choice will work.
- **PLAN:** Draw a diagram. Make lists of materials you will need.
- **CREATE/TEST:** Follow your plan and create something. Test it out!
- **IMPROVE/RETEST:** What works? What doesn’t? What could work better? Modify your designs to make it better. Test it out!
- **CONCLUSION:** Use data from testing to report how the problem was solved or not solved.

*Modified from: [http://www.eie.org/overview/engineering-design-process](http://www.eie.org/overview/engineering-design-process)