Science Experiment Topic Areas
– Projects are grouped into TWO Divisions -

• Physical Science

Physical science

Area of science which focuses on the study of fundamental behavior of matter, energy, electricity, magnetism, chemistry, light, sound, and other elements related to the physical world. This division includes the geosciences.

Physical science categories:
• Chemistry
• Computer Science
• Earth Sciences
• Energy & Transportation

• Engineering: Electrical & Mechanical
• Engineering: Materials & Bioengineering
• Mathematical Sciences
• Physics & Astronomy
Science Experiment Topic Areas – Projects are grouped into TWO Divisions -

• **Life Science / Health Science**  
  Area of science, which will focus on the phenomenon of life and the preservation of health in all organisms. Emphasis is placed on interactions between plants and animals, function of cells and the genetic mechanism, relationships of the human body systems and the influence of injury, disease, and drugs on these systems.

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**Life/Health Science Categories:**
- Animal Sciences
- Behavioral & Social Science
- Cellular & Molecular Biology
- Medicine & Health
- Plant Sciences
- Biochemistry
- Environmental Management
- Environmental Sciences
- Microbiology
THE SCIENTIFIC METHOD

• **PROBLEM** – The question you are trying to answer. Always state the problem as a question.

• **HYPOTHESIS** – A statement of what is being investigated. The hypothesis is a “best guess” or “educated guess”.
THE SCIENTIFIC METHOD

• MATERIALS – A complete listing of all materials and equipment used to perform the experiment. The exact amount of each material to be used should be listed.

Example: 6 rubber bands (number)
90 ml of water (capacity)
1 kilogram (mass/weight)
1 metric ruler (length)
THE SCIENTIFIC METHOD

• PROCEDURE – List the steps followed during the investigation. List all details used when performing the experiment so that someone else could perform the same experiment and gather the same data. *The experiment should be done using metric measurement.*

The science experiment should be performed at least **three times** and the **three sets of data averaged together**.
THE SCIENTIFIC METHOD

• OBSERVATIONS – Make clear and careful observations. Carefully collect the experimental data. Record the data on charts, tables, and graphs.
THE SCIENTIFIC METHOD

• CONCLUSION – State the outcome of the experiment. If the hypothesis was not supported – then state so – it is okay for the experiment not to support the hypothesis. Include additional information that would explain why the hypothesis was or was not supported.
VARIABLES AND CONTROLS

VARIABLES –

- **Manipulated** – The factor in the experiment that is deliberately changed.
- **Responding** – The factor in the experiment that reacts or is caused to change as a result of the manipulated variable.

CONTROLS – The factors that do not change. An experiment may contain numerous controls.
EXAMPLES OF VARIABLES
Things that can be changed

• Temperature
• Air
• Soil
• Density
• Motion
• Water
• Light
• Weight
• Friction
• Pressure
All Science Fair entries must contain charts, graphs, **AND** tables. (all three required on project)

The charts, graphs, and tables may be computer generated by the student with parental help.

The charts, graphs, and tables may be done independently by the student on graph paper using map pencils or crayons.
CHARTS, GRAPHS, AND TABLES

- Chart
  Provides Information

- Graph
  Bar graph, pie graph, line graph, picture graph

- Table
  (can take information to turn into a graph)
EXPERIMENT
VS. DEMONSTRATION

• EXPERIMENT – compares two or more things. An experiment has manipulated variables and one or more controls.

• DEMONSTRATION – illustrates a known scientific principle. It does not have a manipulated variable. Its purpose is not to compare, but to demonstrate how something works.
Display Experiment

Purpose

Hypothesis

Background / Research

Materials & Procedures

Project Title

DATA

Charts

Photos

Models

Results

Conclusion & discussion

Neatly
Types of Investigations

- Types of Investigations (based on the Science TEKS)

Descriptive investigations involve describing and/or quantifying parts of a natural or man-made system.

Experimental investigations involve designing a fair test in which variables are actively manipulated, controlled, and measured in an effort to gather evidence to support or not support a causal relationship.

Comparative investigations involve collecting data on different organisms, object, or features, or collecting under different conditions (e.g., times of year, temperatures, locations) to make a comparison.

*Texas Education Agency, 2010*
## Types of Investigations

- Types of Investigations (based on the Science TEKS)

<table>
<thead>
<tr>
<th>Grade Level (K-8)</th>
<th>TEKS Introduction statements</th>
<th>TEKS Student expectations</th>
<th>Types of investigations required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kindergarten</td>
<td></td>
<td>(2B),(2E)</td>
<td>simple descriptive investigations</td>
</tr>
<tr>
<td>Grade 1</td>
<td></td>
<td>(2B),(2E)</td>
<td>simple descriptive investigations</td>
</tr>
<tr>
<td>Grade 2</td>
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<td>2(B),(2E)</td>
<td>simple descriptive investigations and descriptive investigations</td>
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<tr>
<td>Grade 3</td>
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<td>(2A)</td>
<td>descriptive investigations</td>
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<td>Grade 4</td>
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<td>(2A)</td>
<td>descriptive investigations</td>
</tr>
<tr>
<td>Grade 5</td>
<td></td>
<td>(2A)</td>
<td>simple experimental investigations</td>
</tr>
<tr>
<td>Grade 6</td>
<td>(4) A(ii)</td>
<td>(2A), (2B)</td>
<td>comparative and descriptive investigations, experimental investigations</td>
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<tr>
<td>Grade 7</td>
<td>(4) A(ii)</td>
<td>(2A), (2B)</td>
<td>comparative and descriptive investigations, experimental investigations</td>
</tr>
<tr>
<td>Grade 8</td>
<td>(4) A(ii)</td>
<td>(2A), (2B)</td>
<td>comparative and descriptive investigations, experimental investigations</td>
</tr>
</tbody>
</table>
A bibliography and acknowledgements are required for Grades 6-8, recommended for grades K-5.
Investigation Journal

• Required for grades 6 – 8

• See http://sciencebuddies.org/science-fair-projects/ for suggested contents and organization

• A good time to introduce the habit of documentation and organization of ideas
IMPORTANT INFORMATION

• No animal projects will be allowed.

• No projects that involve human or animal body fluids are allowed.

• Avoid personal pronouns (I, we, you) when writing information on the display board.

• The Science Fair Entry Form must be turned into your student’s teacher for approval prior to beginning the experiment.
East Elementary

• Grade K - 3
  December 3 – Projects Due

December 6 – Judging

Kim Rodriguez

Wood River Elementary

• Grade K - 3
  December 3 – Projects Due

December 6 – Judging

Brenda Wright

* The top 3 entries from each grade level will proceed ahead to the Coastal Bend Science Fair
MAGEE INTERMEDIATE

• Grade 4 & 5
  December 3 – Projects Due

December 6 – Judging

Pete Van Maren

* The top 6 entries from each grade level will proceed ahead to the Coastal Bend Science Fair
Calallen Middle School

• Grade 6, 7 and 8

December 3 – Projects Due

December 6 – Judging

*Rhonda Wright

* The top 6 entries from each grade level will proceed ahead to the Coastal Bend Science Fair
Required Forms
Required Forms – K - 5

- Grades K-2 required forms
  - Project registration for K-5 (web form)
  - Approval form for K-2 projects (pdf)
  - Code of conduct form for K-12 (pdf)
  - Photo consent form (only required for students who wish to post photos of others on their display boards) (pdf)

- Grade 3-5 required forms
  - Project registration for K-5 (web form)
  - Research form for 3-5 projects (pdf)
  - Code of conduct form for K-12 (pdf)
  - Photo consent form (only required for students who wish to post photos of others on their display boards) (pdf)
Required Forms – 6-12

• **Grades 6-12 required forms**
  - Project registration for 6-12 (web form)
  - Abstract form (pdf)
  - Checklist for adult sponsor/safety assessment (pdf)
  - Student checklist and research plan (pdf)
  - Approval form (pdf)
  - Code of conduct/media release form (pdf)

• **Grades 6-12 additional forms**
  Additional forms for grades 6-12 may be needed depending on the project. Students are encouraged to use the ISEF Rules Wizard to help determine the ISEF forms required based on a series of questions about their proposed project/experiment.

  - Regulated research institutional/industrial setting (pdf)
  - Qualified scientist form (pdf)
  - Risk assessment form (pdf)
  - Human subjects and informed consent form (pdf)
  - Vertebrate animal form (pdf)
  - Potentially hazardous biological agents form (pdf)
  - Human and vertebrate animal tissue form (pdf)
  - Continuation projects form (pdf)
  - Photo consent form (for students who wish to post photos of others on their display boards) (pdf)
COASTAL BEND SCIENCE FAIR

- American Bank Center – Corpus Christi
  February 21 & 22

Winning entries that proceed to the Coastal Bend Science Fair will receive the required information and paperwork from their teachers.

Students who participate in the Coastal Bend Science Fair are expected to be present during the entire time slot for interviews with multiple judges. The interview times will be listed in the paperwork provided by your student’s teacher.
Scoring Rubric – NEW (See description for each category)

2012 K-5 Judging Rubric Score Sheet

<table>
<thead>
<tr>
<th>Evaluation Criteria</th>
<th>Exceeds Expectations</th>
<th>Meets Expectations</th>
<th>Below Expectations</th>
<th>Not Present</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Objectives/ Requirements</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Hypothesis (question) Or Problem Statement (comparative / engineering / design goal)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2. Design &amp; Procedures</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientific method in experimental design &amp; implementation (hypothesis testing) Or Engineering process in design of invention &amp; its implementation (fulfilling requirements)</td>
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<tr>
<td>3. Data / Results</td>
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<td></td>
<td></td>
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<tr>
<td>Experimentation (completeness &amp; documentation) Or Problem Solution (fulfilling requirements)</td>
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<td></td>
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<tr>
<td>4. Discussion / Conclusions</td>
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<tr>
<td>Experimentation (hypothesis supported or not) Or Problem Solution (usage value, potential)</td>
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<td></td>
<td></td>
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<tr>
<td>5A. Interview How precisely are questions answered?</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(A) Student demonstrates understanding of the design and findings</td>
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<tr>
<td>5B. Interview How precisely are questions answered?</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(B) Student can interpret graphs and statistics</td>
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<tr>
<td>5C. Interview How precisely are questions answered?</td>
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<tr>
<td>(C) Student can relate project to background information or prior research</td>
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<tr>
<td>5D. Interview How precisely are questions answered?</td>
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<tr>
<td>(D) Student can discuss implications, further questions, and validity of the results</td>
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<tr>
<td>6A. Display (a) Creativity</td>
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<tr>
<td>6B. Display (B) Logic - sections arranged in a way to enable viewer to follow a step-wise sequence</td>
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<tr>
<td>6C. Display (C) Clarity - Format for exhibit contributed to clarify of understanding of topic</td>
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<tr>
<td>6D. Display (D) Accuracy - grammar, graphics, and interpretability</td>
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</tbody>
</table>

Page 1 Total

Page 2 Total

Page 1 Total

Column Totals

Grand Total
## Middle School Judges Score Sheet

<table>
<thead>
<tr>
<th>ORIGINALITY, SCIENTIFIC THOUGHT, APPROACH, AND THOROUGHNESS</th>
<th>Score</th>
<th>Judge’s Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objectives/Requirements (10)</td>
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<tr>
<td>Title</td>
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<td>Problem</td>
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<tr>
<td>Hypothesis</td>
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<tr>
<td>Materials</td>
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<tr>
<td>Procedure</td>
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<tr>
<td>Observation/Data (5)</td>
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<tr>
<td>Pictures</td>
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<tr>
<td>Table</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Graph</td>
<td>1</td>
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<tr>
<td>Chart</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Conclusion/Inference</td>
<td>1</td>
<td></td>
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<tr>
<td>Design and Procedures (15)</td>
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<tr>
<td>Metric</td>
<td>2</td>
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<tr>
<td>Sample Size (at least 3 times or 50 people)</td>
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</tr>
<tr>
<td>Variables (Controlled/Manipulated)</td>
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<tr>
<td>Steps Make Sense</td>
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<tr>
<td>Data and Results (Complete match of all data) (15)</td>
<td>15</td>
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<tr>
<td>Tables</td>
<td>5</td>
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<tr>
<td>Graph</td>
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</tr>
<tr>
<td>Table or Schedule</td>
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<tr>
<td>Discussion and Conclusions (15)</td>
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<td></td>
</tr>
<tr>
<td>Conclusion - Does it match data? / Does it answer problem?</td>
<td>4</td>
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<tr>
<td>Inference/Real Life Application</td>
<td>3</td>
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<tr>
<td>Written Findings</td>
<td>5</td>
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<tr>
<td>Statement of Acceptance or Rejection of Hypothesis</td>
<td>3</td>
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<tr>
<td>QUALITY OF DISPLAY</td>
<td>18</td>
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<tr>
<td>Creativity</td>
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<tr>
<td>Logic - sections arranged in a way to enable viewer to follow a step-wise sequence</td>
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</tr>
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<tr>
<td>Accuracy - grammar, graphics, and interpretability</td>
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</tr>
<tr>
<td>NOTEBOOK/INVESTIGATION JOURNAL</td>
<td>3</td>
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<tr>
<td>Clearly written, complete with dates and comments</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>USE OF RESOURCES</td>
<td>4</td>
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<tr>
<td>A complete and correctly formatted bibliography is included and acknowledgements are listed</td>
<td>4</td>
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<tr>
<td>ORAL PRESENTATION</td>
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<tr>
<td>Student demonstrates understanding of the design and findings</td>
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<tr>
<td>Student can interpret graphs and statistics</td>
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<tr>
<td>Student can relate project to background information/research</td>
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<tr>
<td>Student can discuss implications, further questions, and validity of the results</td>
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<td>Total</td>
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Dr. Melana Silva
PK-12 Math and Science
Curriculum Specialist
242-7590

CBSF Guidebook

K – 5 Exhibit and Presentation Guidelines

6 – 12 Exhibit and Presentation Guidelines