Online Science Fair Resources

- Science Buddies
  www.sciencebuddies.org
- Science Fairs and Science Projects
  www.sciencevideos.com
- The Internet Public Library – Math & Science
  http://www.ipl.org/div/projectguide/
- MadSci Net
  www.madsci.org/libs/areas/sci_fair.html
- The Discovery Channel's Science Fair Studio
  http://school.discoveryeducation.com/sciencefaircentral
- NC Sci & Eng Fair www.ncsciencefair.org/

A.B. Combs Leadership Elementary Science & Engineering Fair – 2018

Why a Science & Engineering Fair?

- To inspire young people to develop the important Science, Technology, Engineering, Art and Math (STEAM) skills they need to become the creative innovators and problem solvers of tomorrow

Why a Science & Engineering Fair?

- Our leaders are unanimous in the belief that improving our country's abilities in Science and Math is critical to succeeding in today's global economy

Why a Science & Engineering Fair?

- As parents and educators, our role is to ensure that our children engage in more science and math learning opportunities

A.B. Combs Science & Engineering Fair

- Information Packet and Entry Form are online at:
  - http://combses.wcpss.net
- Everyone is encouraged to enter
  - Entry Forms are due January 12th
- Required for 4th & 5th graders
  - A written report is required for 4th & 5th graders
- The Science Fair is Wednesday, January 24th
  - Makeup day is 1 week later, if needed

- Registration
  - Pre-registration is Tuesday, January 23rd from 6:00 – 7:00 PM
    - All Grades - Lobby outside the Media Center
  - General Registration is the day of the fair from 7:15 – 8:45 AM
    - K – 2nd Cafeteria
    - 3rd – 5th Lobby outside the Media Center

Project Judging

- K - 2 projects are reviewed and feedback provided
- Grades 3 - 5 projects are judged for school winners in each grade and each category with feedback provided
- Students may be considered for Regional and State Science Fairs
  - Judges nominate 15 – 20 projects for interviews
  - Students are interviewed by judges to select 3 “Best of Combs Fair” for Regional Science Fair
  - Will especially consider projects showing clear use of the engineering design process or scientific method
- Judges needed (~ 60 total – Please volunteer!)
- Review NC Science & Engineering Fair Rules

Why do we follow ISEF rules?

1. Student Safety
2. Family Safety
3. Teacher Safety
4. School Liability
5. Comply with state and local safety policies
6. Maintain Affiliation with ISEF so students can compete!

Winners Follow the Rules

- Students cannot go on to compete at the next level if they and their schools have not followed ISEF rules.

All projects need to be reviewed in advance!

- Lots of projects we used to do are no longer considered safe!
- Parents, scientists, and teachers are not always aware of updated safety standards.
- if OSHA wouldn't allow it at your workplace then we can't allow it at school.

What are the Rules?

- No Elementary Projects involving culturing of micro-organisms
- Prior approval required:
  - Human Participants
  - Vertebrate Animals

Studies With Microorganisms

- Only projects with Bakers/brewers yeast or lactobacillus (a probiotic commonly found in yogurt) are allowed.
- No microorganisms can be cultured at the elementary school level.

Prior approval no longer required

Studies With Human Participants

Student researchers' requirements:

- *Complete ALL elements of research plan*
- *Research plan in compliance with all privacy laws (FERPA) & HIPAA*
- *Receive prior approval by Institutional Review Board (IRB)*
  - *Additional approval for changes*

Affiliated fair SRC serves in capacity of approving experiment

Studies With Human Participants

The following forms are required:

- Checklist for Adult Sponsor (1),
- Student Checklist (1A),
- Research Plan,
- Approval Form (1B)
- Human Participants Form (4)
  - with applicable consents and survey(s)
- Qualified Scientist Form (2),
  - when applicable

Prior approval is required; no exceptions.

Studies With Vertebrate Animals

Student researchers' requirements:

- *Complete ALL elements of research plan*
- *Satisfy US federal, state, and local laws*
- *Supervision by qualified scientist or designated supervisor*
- *Have vertebrate animal studies approved before experimentation begins*

Prior approval is required; no exceptions.

Studies With Vertebrate Animals

The following forms are required:

- Checklist for Adult Sponsor (1),
- Student Checklist (1A),
- Research Plan,
- Approval Form (1B)
- Vertebrate Animal Form (5A)
- Qualified Scientist Form (2),
  - when applicable

Prior approval is required; no exceptions.

Additional Precautions REQUIRED

- **Chemicals** – discuss safety and disposal in research plan
- **Explosives** – even potato guns

Displays

- The display is typically pictures of your experiment – do not include the experimental organisms, chemicals, etc.
- No organisms – living or preserved
- No food

Project Categories

- Same (5) categories as previous years
  - Biological Sciences
  - Environmental Sciences / Ecology
  - Physical Sciences
  - Earth Sciences
  - Behavioral / Social / Health Sciences

Biological Sciences

- Biotechnology Techniques
- Genetics & Genomics
- Human Biology & Health
- Mammalian Biology
- Medical Biotechnology
- Microbiology
- Plant Biology
- Zoology

Environmental Sciences / Ecology

- Includes projects that involve the environment and the relationships of living things to each other and to the environment
- Examples include studies of organisms in their habitat, relationships between various organisms, and studies on how people's actions affect the environment

Physical Sciences

- Physical Science
  - Aerodynamics & Hydrodynamics
  - Astronomy
  - Chemistry
  - Cooking & Food Science
  - Music
  - Photography, Digital Photography, & Video
  - Physics
  - Sports Science

Physical Sciences (cont.)

- Engineering
  - Civil Engineering
  - Electricity & Electronics
  - Energy & Power
  - Environmental Engineering
  - Materials Science
  - Mechanical Engineering
- Math & Computer Science
  - Computer Science
  - Pure Mathematics
  - Video & Computer Games

Earth Sciences

- Includes projects involving the earth and physical phenomena
- Examples include weather, astronomy, rocks/minerals, and water projects
- Geology
- Ocean Sciences
- Weather & Atmosphere

Behavioral / Social / Health Sciences

- Includes projects related to health, psychology, or consumer / product testing
- Examples include perception studies, aptitude and attitude surveys, product comparisons, and various exercise studies
- Human Behavior
- Sociology

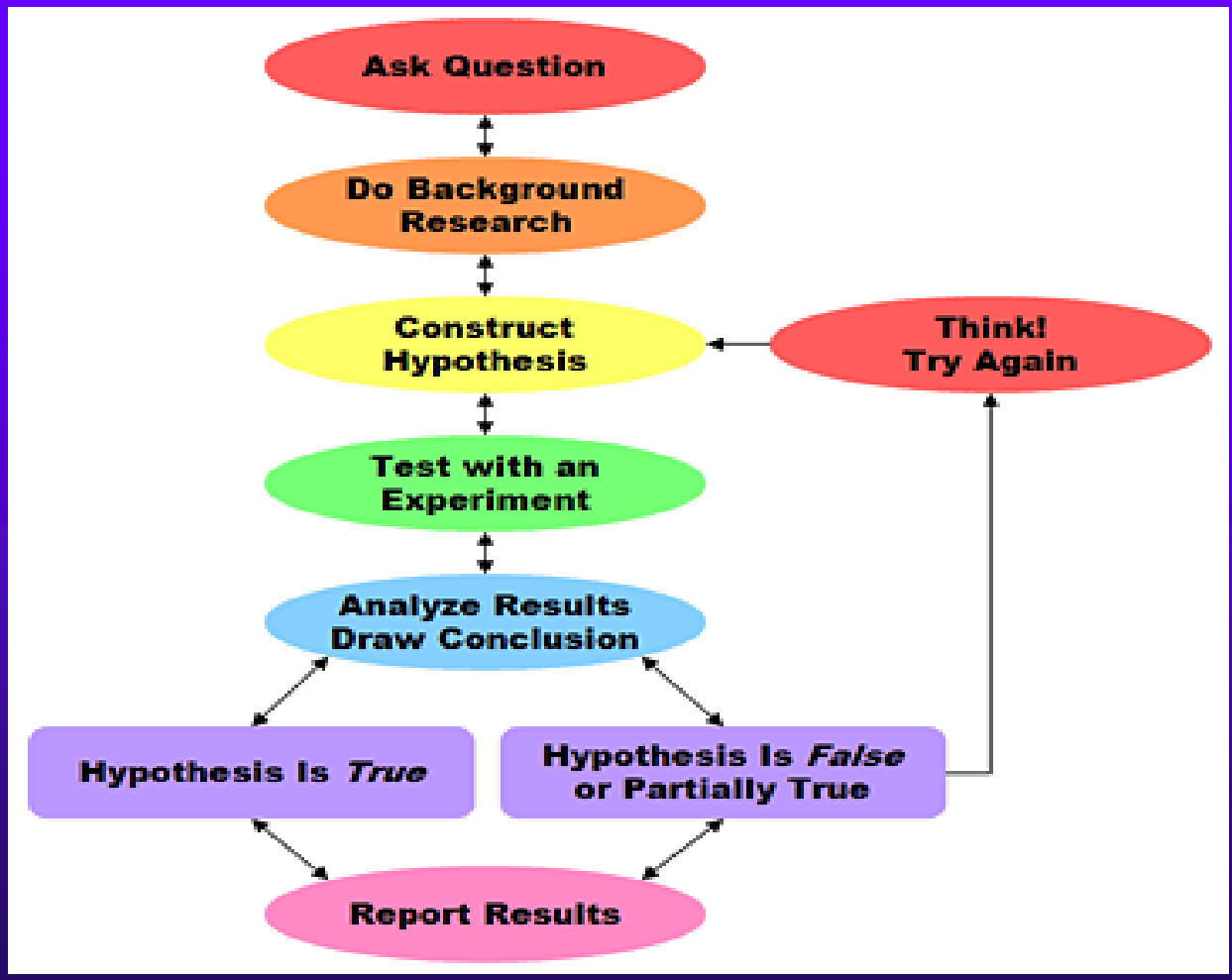
Project Types

- Experiments
  - Conduct an investigation to solve a problem, answer a question, or test a hypothesis
- Observations
  - Report on observations that help explain a scientific process
- Demonstrations / Models
  - Demonstrate a scientific concept with a display or model
- Inventions
  - Invent something new or add an innovative touch to something already existing
- Collections (K – 2 only)
  - Display of shells, rocks, leaves, etc.

The Scientific Method

1. Ask a Question or identify a Problem
2. Observe what is happening and do background Research
3. Construct a Hypothesis that explains what is happening or Predicts a result
4. Test your Hypothesis by doing an Experiment and recording the data
5. Analyze your data and draw a Conclusion
6. Communicate your Results on a project board using descriptions, graphs and tables

The Scientific Method



Scientific Method Example

1. Identify a Question or Problem
   - *What is the best way to grow seeds?*
2. Observe and do Research
   - *What environmental factors affect seed germination?*
3. Form Hypothesis or Prediction
   - *Low temperature slows seed germination.*
4. Test and Record Data
   - *Find 3 or 4 warm and cold spots to place seeds; Measure temperature; Hold other variables constant; Repeat procedure.*
5. Analyze Data and Develop a Conclusion
   - *What is the result? Does your data support your hypothesis?*
6. Communicate Results
   - *Using descriptions, pictures, graphs, explain your conclusion and why your data does or does not match your hypothesis.*

Scientific Method Example

1. Identify a Question or Problem
   - *How do you make thick Christmas cookies?*
2. Observe and do Research
   - *Which ingredients help the cookies rise during baking?*
3. Form Hypothesis or Prediction
   - *More baking powder will make thicker Christmas Cookies*
4. Test and Record Data
   - *Try using 0, 1X and 2X baking powder and measure cookie thickness; Hold other variables constant; Repeat procedure*
5. Analyze Data and Develop a Conclusion
   - *What is the result? Does your data support your hypothesis?*
6. Communicate Results
   - *Using descriptions, pictures, graphs, explain your conclusion and why your data does or does not match your hypothesis.*

Scientific Method Example

1. Identify a Question or Problem
   - *Demonstrate friction.*
2. Observe and do Research
   - *What is friction? Are there different types? How does it work?*
3. Form Hypothesis or Prediction
   - *I can demonstrate friction using a race track and objects that roll or do not roll.*
4. Test and Record Data
   - *Use race track, race car, other rolling objects, other non-rolling objects, tape measure. Roll/Slide objects on race track, measure the distance required for each to stop.*
5. Analyze Data and Develop a Conclusion
   - *What is the result? Does your data support your hypothesis?*
6. Communicate Results
   - *Using descriptions, pictures, graphs, explain your conclusion and why your data does or does not match your hypothesis.*

Scientific Method Example

1. Identify a Question or Problem
   - *Collect several rocks or shells (K-2 only)*
2. Observe and do Research
   - *How are the rocks or shells different?*
3. Form Hypothesis or Prediction
   - *Determine what types of rocks or shells they are*
4. Test and Record Data
   - *What experiment could have been done?*
5. Analyze Data and Develop a Conclusion
   - *What would the experiment show?*
6. Communicate Results
   - *Using descriptions, pictures, graphs, explain your conclusion and why your data does or does not match your hypothesis.*

The Engineering Design Process

Ask: What's the problem? What have others done? What are the constraints?

Imagine: What are some solutions? Brainstorm ideas. Choose the best one.

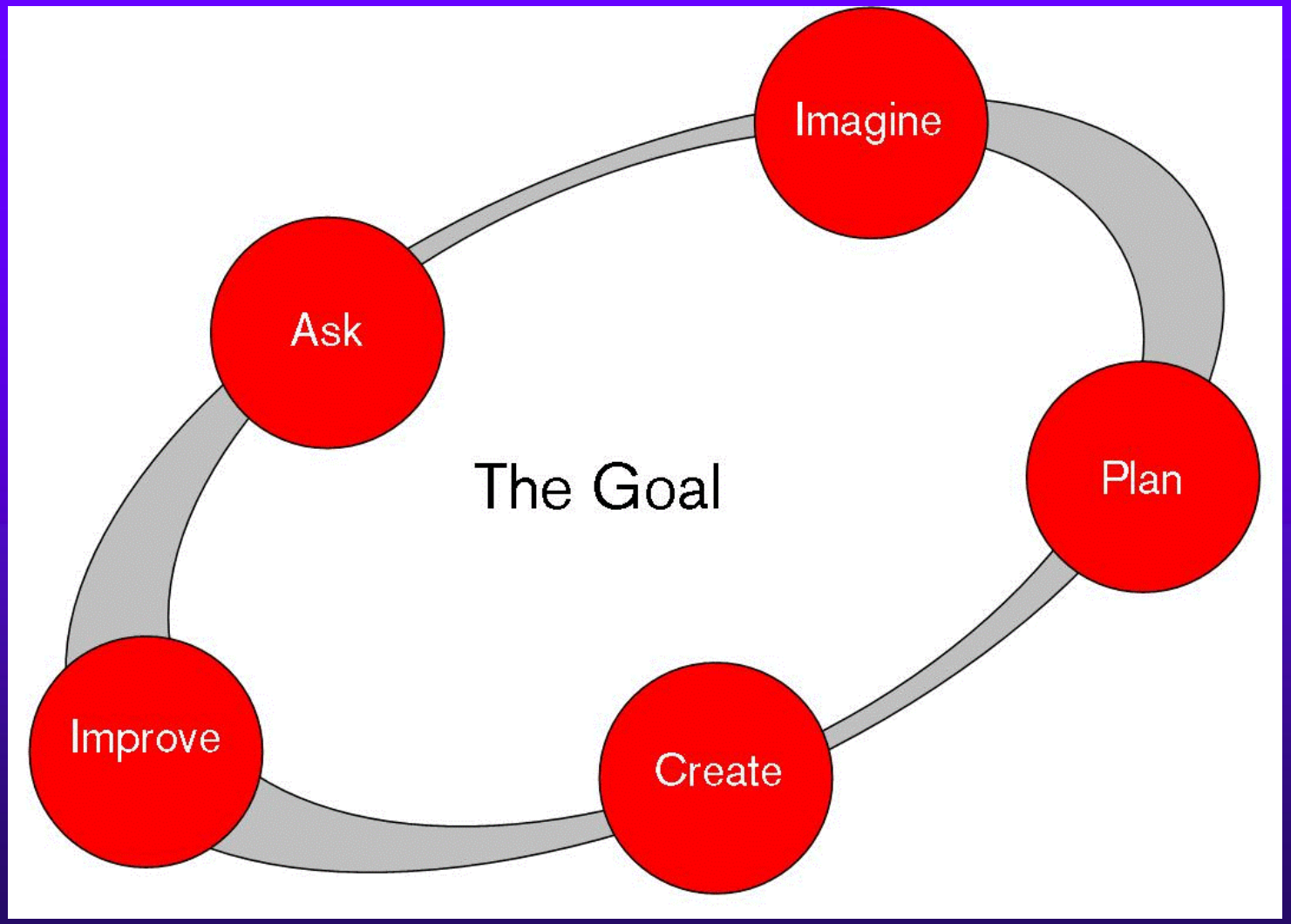
Plan: Draw a diagram. Make a list of materials you'll need.

Create: Follow your plan and create it. Test it out!

Improve: Make your design even better. Test it out!

Designers frequently jump back and forth between the steps – an iterative process

The Engineering Design Process



Engineering Design Process Example

Ask: What's the problem? What have others done?

- *I need a way to check my own ears.*

Imagine: What are some solutions? Brainstorm ideas.

- *Does one exist? How can I make one from household stuff?*

Plan: Draw a diagram. Make a list of materials you'll need.

- *A device containing mirrors placed at specific angles would allow one to check one's own ears.*

Create: Follow your plan and create it. Test it out!

- *Build the design with appropriate materials and test it.*

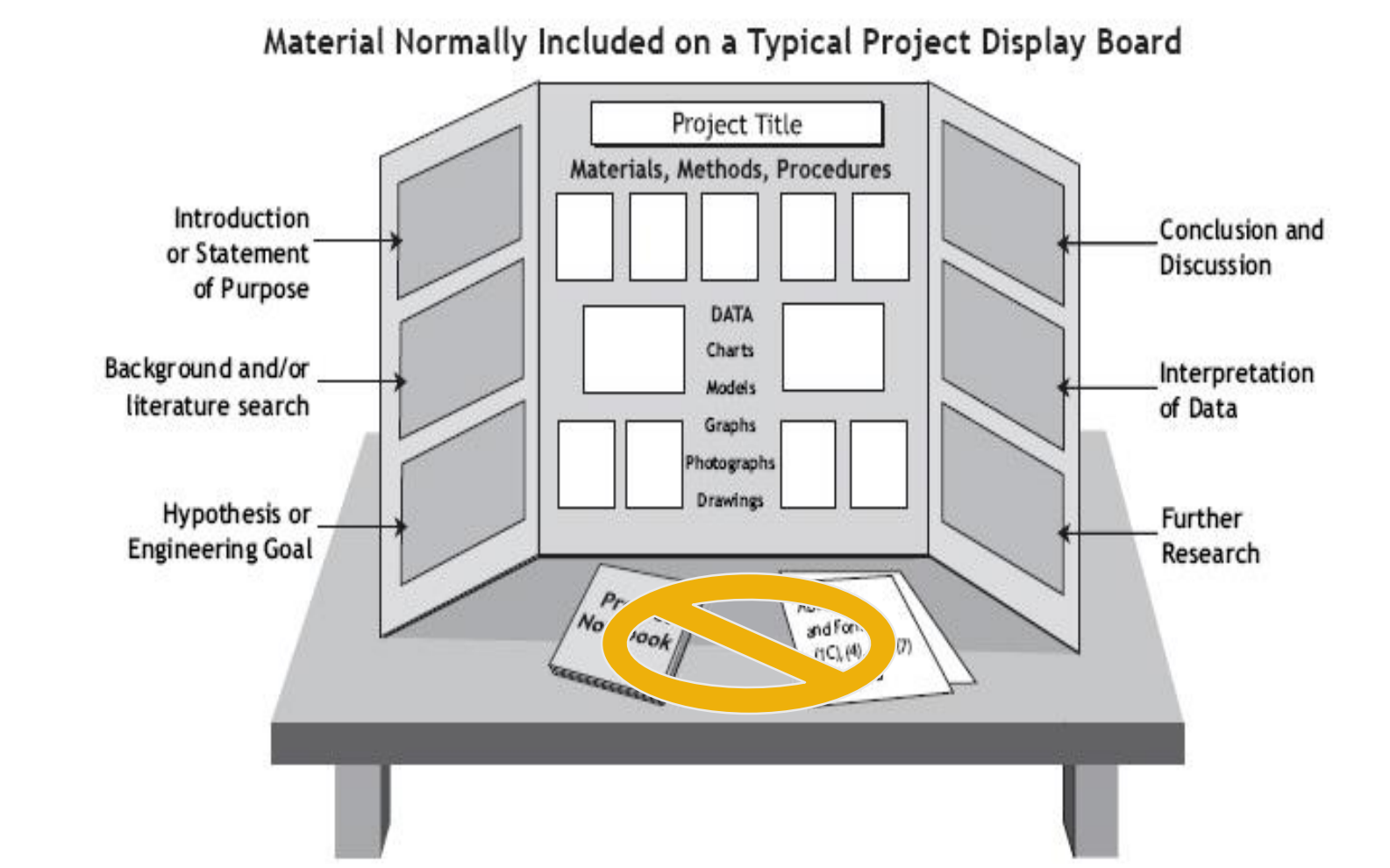
Improve: Make your design even better. Test it out!

- *Does it work or not? If not then try again. Does it work the second time?*

Communicate Results

- *Using descriptions, pictures, etc., explain your design and if it did or did not work and how it can be improved in the future.*

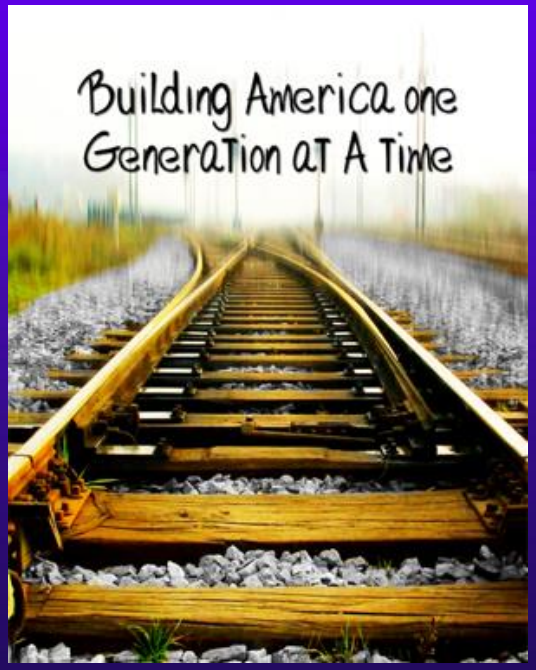
Project Boards



4th & 5th graders should turn their project reports in to their teacher

Selecting a Science Project

- When deciding on a topic, ask these questions:
  - What topic interests me? What is a question for which I would like to seek an answer?
  - Is this question too difficult for me to solve?
  - What materials will be needed?
  - Does this problem require sophisticated or expensive materials?
  - Is the problem a safe one?
  - Is the problem a valid one? Will it be possible to obtain results from this investigation?
  - Is it of significance to today's society?



Project Ideas

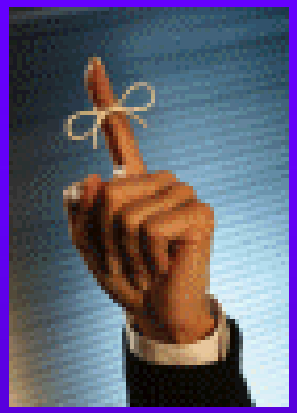
- Which brand of popcorn leaves fewest unpopped kernels?
- What flavor is most attractive to ants?
- Do plants grow taller in water or in soil?
- Does temperature affect the rate of seed sprouting?
- Demonstrate and explain how a lever works
- How does a metal ship float?
- How does the shape and mass of an object affect its buoyancy in water?

Project Ideas

- Which ground cover is most effective at reducing erosion?
- Which soil type is most porous?
- How does a barometer work?
- What affects evaporation most: air temperature, water temperature, or wind speed?
- Which type of bridge is strongest?
- Is our pulse affected by music?

Parent Do's for the Science Fair

- Dates to Remember
  - Entry forms due Friday, January 12th
  - Science Fair: Wednesday, January 24th



- Things you'll need
  - Supplies for project ($20 or less)
  - Display board from Mrs. L'Heureux ($4)
  - Written Report to teachers for 4th and 5th Graders
  - Science Project registered by 8:45AM day of the fair

Parent Do's for the Science Fair

- Do read the Science Fair Packet
- Do encourage your child as they do their project
- Do provide opportunities for your child to do research
- Do suggest that your child start early
- Do remind your 4th and 5th graders to turn in a written report to their teacher
- Do make sure the project is primarily the work of your child
- Do show enthusiasm for your child's project and for the Science Fair

Science Fair "Don'ts"

- Don't bring in any objects with the project
- Don't place the written report with the project (report turned in at check in)
- Don't put student's name on the front of the display board
- Don't include a picture of student's face on the display board
- Don't forget to do a Science Project
- Don't forget to volunteer to help (judges, setup, check-in, refreshments)

Thank you for your time

And

Thank you for your interest.

Questions??

Theo Kingsberry
theo.kingsberry@gmail.com

Jon McDunn
jon.mcdunn@gmail.com

John Rankin
johnrankin@nc.rr.com

Online Science Fair Resources

- Science Buddies
  www.sciencebuddies.org
- Science Fairs and Science Projects
  www.sciencevideos.com
- The Internet Public Library – Math & Science
  http://www.ipl.org/div/projectguide/
- MadSci Net
  www.madsci.org/libs/areas/sci_fair.html
- The Discovery Channel's Science Fair Studio
  http://school.discoveryeducation.com/sciencefaircentral
- NC Sci & Eng Fair www.ncsciencefair.org/