GITEA

PROBLEM

SOLVING

COOKBOOK

VOLUME 3

Complied by:
The Georgia Industrial
Technology Education Association

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This book of Problem Solving Activities has been compiled by the Georgia Industrial Technology Education Association. Members of our professional organization have contributed ideas and activities that work in their classrooms and laboratories. We hope that these activities will be beneficial to you in your classroom or laboratory situation.

Please feel free to reproduce any portions of this booklet or the entire book to use in your classes or to share with other Technology Education professionals. GITEA is working to improve and enhance Technology Education in Georgia. We appreciate this opportunity to share our ideas with you.

For additional information or if you have ideas and activities that you would like to and are willing to share with us please send to:

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Special Thanks

We would like to thank the members of GITEA who have contributed their knowledge, time and resources to the production of this 3rd edition of the GITEA Problem Solving Cookbook. Without your help and support this endeavor would not be possible. It is our hope that this book will be beneficial to all Technology Educators.

Through your help and support we will continue to be able to produce quality documents that will enhance the efforts of the classroom instructors. Your continued support is greatly appreciated.

The 1996-97 GITEA Executive Committee

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Candle Snuffer

Pam Brown - Central Middle School

OBJECTIVE

Students will design and construct a device that can be triggered to put out a candle.

MATERIALS
(Per Team of 2 or 3)

1. Cardboard
2. Marble
3. Clothes hangers
4. Cardboard tubes
5. 2 Rubber Bands
6. 5 small paper clips
7. Glue or advesive
8. Masking Tape - 8 inches
9. Balloon
10. String (3 feet)
11. Aluminum foil
12. 2 Styrofoam cups
13. 2 clothes pins

TOOLS

1. Scissors
2. Wire Cutters

LIMITATIONS

1. You may use only the materials provided.
2. Device can not be attached to the walls, ceiling, floor, door frames or doors.
3. Device must be able to be set to a ready position before testing and then be triggered for testing.

INSTRUCTIONS

1. Sketch the design/plan for your device.
2. Attain needed materials from your instructor.
3. Construct your device.

TESTING

1. Students should set up their device for testing.
2. Instructor will provide candle for testing.
3. Students should place candle at appropriate place for devise to work.
4. Instructor should light the candle.
5. Student should trigger the candle snuffer.

Note: For Safety you should keep a fire extinguisher ready during testing

Cardboard Tower

Roger Jessup - Buford High School

OBJECTIVE

Students will design and construct a tower to support a much weight as possible.

MATERIALS

(Per Person or Team of 2)
1. 1 - Cardboard soda flat
2. Glue or other adhesive
3. Masking Tape
4. Straight Pins

TOOLS

1. Ruler
2. Scissors
3. Yard Stick (for class use)

LIMITATIONS

1. You may use only the materials listed.
2. You must remove <u>all</u> pins from the tower before testing.
3. Height -   Minimum: 6 inches
                Maximum: 10 inches
4. Base size - Minimum length and width: 3 inches
                Maximum length and width: 8 inches
5. Top Size - Minimum length and width: 2 inches
                Maximum length and width: 5 inches

INSTRUCTIONS

1. Sketch the design/plan for your tower.
2. Build your tower.
3. Tower should be able to support as much weight as possible.

TESTING

1. Instructor will provide weights that can be placed on top of the tower.
2. Instructor should place weights on the tower.

Container to Hold Volume

Roger Ivey - Creekland Middle School
and
John Kirby - Mount Zion High School

OBJECTIVE

Students will design the smallest, re-sealable container to hold 91 beans.

MATERIALS

(Per Person or Team of 2)

1. 1/2 sheet of Poster Board
2. Masking Tape (12 inches)
3. Glue or other adhesive

TOOLS

1. Ruler
2. Scissors
3. Paper cutter (for class use)

LIMITATIONS

1. You may use only a half sheet of poster board.
2. You may only use the tape to hold the container while the glue dries.
3. You must remove <u>all</u> tape from the container before testing.

INSTRUCTIONS

1. Sketch the design/plan for your container.
2. Build your container so that it can be opened and closed.
3. Container should only be large enough to hold 91 beans.
4. Container should hold 91 beans.

TESTING

1. Student will open the container.
2. Instructor will provide 91 beans to poured into the container.
3. Student must close the container. (The container must be able to remain closed.)

Cradle Drop Device

Scott Brown - Carrollton High School

Scenario:

You are working in the marketing division of an electronics company. Your supervisor has just approached you with the task of redesigning the packaging for a supersensitive aquadactor the most fragile component that the company manufactures. You are not only to redesign the structure of the package, but you must also develop new advertisement for the product.

Assignment:

You are to design and construct an enclosed structure that will be dropped a distance of at least eighteen feet (18') onto a concrete surface and survive the impact.

Requirements:

Structure:
- Outside of structure must be made out of recyclable materials.
- No exterior dimension may exceed three inches (3").
- Inside of structure must be made out of biodegradable materials.
- The interior structure should be shaped to hold a raw chicken egg (the chicken egg is the same size and shape as the supersensitive aquadactor).

Advertisement:
- Each side of the exterior of the structure should contain some type of advertisement for the product.
    Advertisement criteria:
    - The advertisements should be reflective of an electronics business.
    - The name and location of the business should be included.
    - The company logo should be included.

Documentation:
- A one page double space typed report detailing how you created this package design. Use the Problem Solving Method as a guide.
- A detailed materials list of all materials used.

Impacts of Technology Presentation

Angela H. Powell - Morrow High School

Scenario:

Usually technology makes our lives simpler, however there are often negative effects of technology on society. For example, automobiles allow us to travel at a must faster pace than the people of 100 years ago, but automobiles have led to traffic jams and pollution. It is important for us to realize some of the problems that technology has created and suggest solutions for these problems.

Assignment:

Using a minimum of two resources, you and your partner will develop a presentation on a topic related to the impacts of technology on society or the environment. Your presentation may be informative or persuasive in nature.

Requirements:

The presentation must:

- Be accompanied by a 1 page typed summary (12 point 1" margins on top, bottom, and sides) as well as a outline and a bibliography
- Be at least four minutes long, but not longer than eight
- Include at least one visual aid. This can be a poster, transparency, or presentation program on the computer. (No more than 1 minute of video can be shown during the presentation).
- Be presented in a professional manner. Keep in mind that you are going to inform or persuade your class, not to entertain. Unless it is appropriate to the topic, you should not laugh during your presentation. You will be spending your valuable time researching and preparing this presentation, so you will want everyone to hear and understand you. Try to refrain from nervous habits that can be very distracting. You are free to use note cards or pages of notes, but they shouldn't interfere with the speech.
- Be a collaborative activity. Both parties should participate in the research, organization, and presentation of the topic.

My Life in the Future

Scott Brown - Carrollton High School

Scenario:

As you approach the end of your senior year of high school, you find yourself looking towards the future. As your history teacher talks about the changes that have occurred throughout history, you begin to fantasize about what the world will be like in 25 years. What type of job you will hold? Where will you live? How you will travel? What will you eat? What type of entertainment will be available to you and your family?

Assignment:

Put yourself into the above scenario. Use your creativity, allow your imagination to run free. Describe "What it will be like to live and work in your future". Tell about some of the adventures you think you encounter. Describe the different technological advancements that you think will be made in such areas as medicine, jobs, communications, machinery, food, entertainment, sports, shopping, travel, transportation, etc... Think about the living conditions that you may encounter and how you will adapt to them.

Requirements:

Paper must include the following items:

- A title page. (Include: Title, Name, Class Period, and Date)
- Five page double space typed report. (Page margins - 1" top, left, right, and bottom)
- One freehand colored drawing of a technological advancement that has changed our world during the past 25 years
- One freehand colored drawing of a technological advancement you predict during the next 10 years.

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PAPER AIRPLANE DESIGN
(Aerobatic Action)

Tony Burton

OBJECTIVE

Students will design and build a paper airplane that will perform the most aerobatic acts.

MATERIALS

(Per Person)

1. 1 - Piece of Graph Paper
2. 1 - Sheet of Paper (8 1/2" x 11")
3. 1 - Paper Clip
4. Scotch Tape (12 inches)
5. Colored Pencils or Markers (optional)

(For Testing)

1. 1 - Launching Device

TOOLS

1. Ruler
2. Scissors
3. Wire Cutters

LIMITATIONS

1. You may use only one sheet of paper for construction of your airplane.
2. You must have a launch hook on your airplane.

INSTRUCTIONS

1. Sketch the design/plan for your airplane on graph paper.
2. Build your airplane and decorate if desired. Remember to attach the launch hook to the airplane as shown in the example below:
3. Test your airplane design.
4. Make modifications to your design.
5. You will be allowed two attempts for your airplane to perform the most acrobatic act. The instructor will test each aircraft. (Note: You may want to choose a group of students to judge the acrobatic acts.)

PAPER AIRPLANE DESIGN
(Flight Time)

Tony Burton

OBJECTIVE

Students will design and build a paper airplane that will have the longest flight time.

MATERIALS

(Per Person)
1. 1 - Piece of Graph Paper
2. 1 - Sheet of Paper (8 1/2" x 11")
3. 1 - Paper Clip
4. Scotch Tape (12 inches)
5. Colored Pencils or Markers (optional)

(For Testing)
1. 1 - Launching Device

TOOLS

1. Ruler
2. Scissors
3. Wire Cutters

LIMITATIONS

1. You may use only one sheet of paper for construction of your airplane.
2. You must have a launch hook on your airplane.

INSTRUCTIONS

1. Sketch the design/plan for your airplane on graph paper.
2. Build your airplane and decorate if desired.
3. Test your airplane design.
4. Make modifications to your design.
5. You will be allowed two attempts for your airplane to attain the greatest flight time. The instructor will test each aircraft. (Note: A stop watch will be needed for accurate time keeping.)

Paper Golf Tee

Roger Jessup - Buford High School

OBJECTIVE

Students will design and construct a paper gold tee that will support a golf ball for 5 seconds.

MATERIALS

(Per Person or Team of 2)
1. 1 - sheet of paper 8 1/2" x 11"
2. Masking Tape - 12 inches

TOOLS

1. Ruler
2. Scissors

LIMITATIONS

1. You may use only the materials provided.

INSTRUCTIONS

1. Sketch the design/plan for your golf tee.
2. Build your golf tee.
3. Golf tee should be able to support a golf ball for 5 seconds.

TESTING

1. Students should set up their gold tee for testing.
2. Instructor will provide and place a golf ball on top of the tower.
3. Instructor should have a stop watch to time the duration.

Science or Technology?

Kim Coffman - Callaway High School

OBJECTIVE

Students will be able to differentiate between science and technology. They will draw or cut out examples of science and technology and create a poster.

MATERIALS

(Per Person)

1. 1 - sheet of paper 8 1/2" x 11"
2. Magazines
3. Glue or adhesive

TOOLS

1. Ruler
2. Scissors
3. Crayons, Markers or colored pencils

PROCEDURES

1. Discuss with students the difference between science and technology. (Science is everything made be mother nature. Technology is everything man made to solve a problem using resources from science.)
2. After the students have a good understanding of technology and science have them construct a poster that displays examples of science and technology.
3. Students can draw examples and/or cut out pictures from magazines.

EVALUATION

Check each poster to make sure the students understand the concept of science and technology

Technology Education Promotional Poster

Angela H. Powell - Morrow High School

Scenario:

Technology Education classes are fun and informative, however not everyone in the school knows about these classes. Many students are not aware of what is going on in the technology center. The curiosity of these individuals needs to be raised and they need to be informed of how they can get more information about technology classes.

Assignment:

You are to design a poster which will promote enrollment into the technology classes at the school. The poster should information concerning information about where the prospective students can obtain additional information regarding the Technology Education program (specifically, Introduction to Technology) at the school. If your poster could be hanging in the hallway, so it need to be attention getting and easy to see.

Requirements:

The poster :

- Must be on a sheet of paper that is at least 11 X 14
- Needs to include a "catch phrase" such as "Technology Education will change the world".
- Should include artwork related to the "catch phrase"
- Can have computer generated artwork, however there must be something on the poster that is not computer generated
- Needs to be able to be read from at least 15 feet away

Time Line Assignment

Andy Peryam - Newnan High School

Assignment:

You will select a tool, idea, method, or invention which as a part of technology has had an impact on our lives. It could be that the impact was long ago and is now hard to see the connection. Your job is to research your topic and determine the significance of the tool and present that in your paper. You will also have to create a poster presenting your information.

Requirements:

Topic:

You may choose a topic and have it approved by the instructor. If you want a topic assigned, one will be assigned by the instructor.

Paper:

- The paper must have a cover sheet. In the upper right corner place your name and class period.
- The paper must be 2 pages (double spaced) typed.
- The paper must have at least three references.
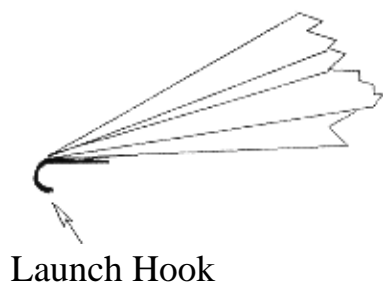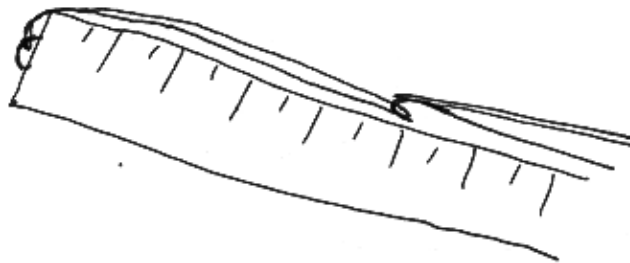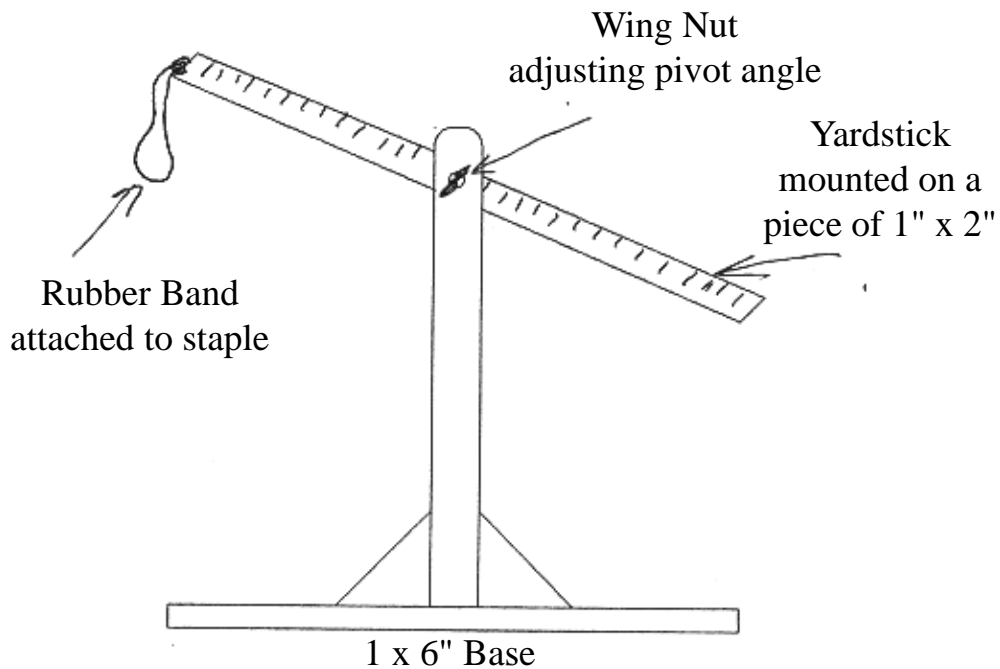- Bibliography must be included at the end of your paper.

Poster:

- Must be on an 11 " X 17" piece of paper. (preferably poster paper)
- The poster must identify your topic in letters large enough to read from a distance of 15 feet.
- You must include at least one colored graphic related to your topic.
- You must have a date identifying the timeline position of your topic.
- Your name and class period must be on the upper right on the back.

Additional Option:

Give an oral presentation of your topic to the class. It must be a five minute presentation.

Airplane Launch Device
Tony Burton

Wing Nut
adjusting pivot angle

Yardstick
mounted on a
piece of 1" x 2"

Rubber Band
attached to staple

1 x 6" Base

Directions

Launch Hook

Hook the launch hook to the rubber band. Pull all aircraft back to the same point on the yardstick. Release airplane. You may allow students to adjust the pivot angle.