Odyssey of the Mind

. . . a creative approach to education.

NATIONAL SCIENCE & TECHNOLOGY WEEK

Sooner than we think, we'll be counting on the students sitting in our nation's classrooms to be the discoverers, inventors, healers, investors and policy-makers of tomorrow. Will they be ready for tomorrow's world?

They can be if they are provided a rich environment, both in and outside of school. Planting the seeds of curiosity and exploration in the minds of students is the goal of National Science & Technology Week '90 (April 22-28), coordinated by the National Science Foundation. The Odyssey of the Mind Program captures this spirit by supplying fascinating, hands-on activities adaptable for students in kindergarten through college. These activities are also appropriate for use in the classroom, at home or in extracurricular settings.

So whether you're a teacher, a parent or an interested member of the community, we urge you to celebrate NSTW by using these activities yourself or by promoting their use wherever possible. Help us nurture the young minds that will be so necessary to guide tomorrow's world. For more information on NSTW, write the National Science Foundation, Washington, D.C. 20550.

APRIL 22-28
1990

The Odyssey of the Mind Program

The Odyssey of the Mind Program promotes divergent thinking in students from kindergarten through college. It offers students a unique opportunity to participate in challenging and motivating activities both inside and outside their regular classroom curriculum. Students learn to work with others as a team developing self-confidence by creating solutions, evaluating their ideas and making final decisions. They develop their creative skills through problem solving and independent thinking. Hence, the Odyssey of the Mind Program makes learning fun.

To participate in the Odyssey of the Mind Program, the school must be a member of OM Association. Members come from throughout the United States, Canada, China, Japan, Mexico, Poland, the Soviet Union, and U.S. Department of Defense Schools located in several different countries.

In addition to the problems and rules for competition, OM members receive curriculum materials containing creative problem-solving activities at the elementary and secondary levels for science, mathematics, technology education, social studies and language arts. These materials are made possible by IBM, the sole corporate sponsor of OM and its student competitions.

Odyssey of the Mind teams consist of five to seven members. An OM Association member may have several teams in the same problem and run intramural competition to determine the best team to enter in sanctioned competition. Each team entering sanctioned competition must have a teacher, parent or other adult designated as its coach.

Competition is by division. The divisions are as follows:

- Division I, kindergarten through fifth grade;
- Division II, grades six through eight;
- Division III, grades nine through twelve;
- Division IV, college and university students.

Competing teams are judged in three areas: **the long-term problem** where teams prepare solutions and bring them to competition; **style** or the enhancement of the long-term solution; and the **spontaneous problem** given to the team on the day of competition. The long-term solution is worth a maximum of 200 points, style is worth a maximum of 50 points and spontaneous is worth a maximum of 100 points. The total of these three scores determines a team's rank in competition.

Teams in most locations compete on a regional and/or state level. Teams advancing from competition become eligible to attend the annual World Finals.

For more information, write OM Association, Inc., P.O. Box 27, Glassboro, NJ 08028.

Corporate Sponsor IBM

A Message to the Teacher,

One of education's most important goals should be to teach people to think. This can be accomplished in any subject area. Creative problem solving is one method that can help to enhance an individual's critical thinking skills. It can be an exciting way to teach and, judging from the high motivation of hundreds of thousands of students, an exciting way to learn.

Creative problem solving is a method of teaching easily adapted to science and technology. Science is not a body of knowledge to be memorized - it is the process of asking questions and finding answers using all of the information and resources available. In broad terms, science is systematized knowledge derived from observation, study and experimentation performed in order to determine the nature or principles of what is being studied. Science searches for systematized knowledge of nature and the physical world. This knowledge invariably stimulates new questions that require solutions as well as challenges to existing theories. Science is a perpetual process of discovery. It is a fundamental quest for answers which in turn creates new questions. It is an endless process of problem creation and problem solving. The joy of science derives from the notion that there are no boundaries to the questions asked - the only limitations are those of human curiosity, imagination and energy. Students normally possess these attributes in enormous quantity. They need only to be encouraged to try, and to understand that science is a process of trial and error. There is discovery in the process regardless of the outcome.

Technology may be described as applied science. Simply stated, technology is developing ways to do things easier or accomplish tasks that we can't do naturally. Primitive examples such as the spear and the plow (which changed man from a food gatherer to a food producer), to modern wonders such as computers, telecommunications and nuclear energy, all fall under the umbrella of technology.

Creative problem solving may very well become an important method of teaching in the future. This brochure offers several problems of varying degree of difficulty. These may be done individually or by teams for friendly competition. They may also be used in science fairs or activities during National Science and Technology Week. Some teaching techniques used in creative problem solving are somewhat different from those used in a more traditional classroom. A few teaching strategies are as follows:

1. **Emphasize Divergent Problems**

   Many students, especially those with high creative potential, enjoy divergent problems more than the convergent type. Convergent problems, or those with one correct answer, are the type on which our educational system is largely based. For example, rote memorization or reading something and searching for the correct answer to a specific question usually doesn't require in-depth thought processes. Convergent problems are certainly easier to use, but quite often are not as interesting. Divergent problems are "open ended," that is, they have numerous acceptable solutions. Problems appeal to the child in all of us. How do you respond to a question that begins, "What if . . . ?" Immediately you know your imagination, not just your memory, is going to be involved. Students have greater opportunity to think critically, analyze a problem, formulate alternatives to it, then synthesize a solution that they feel is the best approach to solve the problem. Decision making becomes a continuous process.

2. **Keep an Open Mind**

   Teachers who try to place an emphasis on developing creative skills in students quickly learn to expect the unexpected. At first, this may make some teachers uncomfortable since convergent problems are generally used in our educational system. Most teachers tend to feel more secure when they know exactly what the outcome to a problem is supposed to be; however, not knowing all possibilities is part of the creative development process. Creative problem solving is quite motivating for students, and their enthusiasm makes teaching exciting. Teachers should provide a climate for developing creativity by caring, encouraging decision making and rewarding students often for divergent thinking.

3. Make the Students Do the Work

The teacher's role should be that of a facilitator. Subject content makes more sense to students when it is tied to real life experiences and personal understanding. The effective teacher asks provocative questions and poses interesting problems. He or she is then available to direct students toward appropriate resources and give the intellectual "nudges" necessary for thinking and learning to continue. When students need to know something, they learn how to find it. Teachers will find that they have a new status—that of a resource person.

4. How to State a Problem

Teachers should avoid stating a problem that suggests a stereotypic answer. For example, if you ask someone to make an envelope, we have a preconceived concept of what an envelope is and how it is made. If we ask students to name different ways that we could carry a letter, we may be surprised at their responses. Asking for different ideas to get rid of flies is a much better problem statement than asking someone to design a fly swatter. Another helpful way to stimulate ideas is to pose certain limitations to a problem. For example, if you ask someone to invent something, he or she may be bewildered. This is too broad a statement. On the other hand, you cannot ask to design a red, ride-on toy fire truck. This is too constrictive. You may take a middle ground and ask to design a toy, or a pull-toy. This still leaves a great deal of latitude for creative thinking. You should include those limitations that have practical considerations, such as types of materials to be used, costs, size, safety, solutions in good taste, etc.

5. Try to Keep the Ideas Flowing

After the problem has been stated, the next step is to try to come up with as many ideas as possible. Brainstorm sessions and group discussions are good ways to begin to generate ideas. Teachers should make students aware of the fact that better ideas usually come later in the thought process. Most people have a tendency to evaluate or judge ideas too soon. When a student has an idea that can solve a given problem, encourage the student to remember or record that idea, but have the student try to come up with alternative solutions. If we have a large number of ideas from which to choose, our chances of success are increased. The old saying, "Let me sleep on it," is very appropriate. After putting a problem aside for awhile, we may return to see obvious flaws, better ways to do it, or perhaps combine several ideas into one.

6. Strive to Make Students Love to Learn

Make learning fun! Humor is generally very important to creative people. OM attempts to inject humor into problem solving whenever possible. Being curious and having fun is natural for young people. If we combine learning with curiosity and fun, it may prove to be one of the best ways to motivate children. Creative problem-solving activities should be followed by good, open-ended teacher questioning and class discussion. This will maintain enthusiasm and interest in the subject and cultivate a growing understanding of that discipline's concepts.

7. Encourage Students to Extend Themselves

Creative problem solving can be used in either competitive or non-competitive situations. Teachers may want to try both methods or, better yet, let the students decide. Remember that the students do all the work. They create the ideas, make their own decisions and carry out the solutions. The competition factor makes them try harder, do more than what is required and give attention to details. This extra effort helps them to develop lifelong skills: they put pride in their work and go beyond what is asked of them. In team competition, learning to work with other people is also a very important social skill. This is greatly enhanced when people interact with others and develop strong friendships.

ROUND TRIP (for Middle and Secondary School Students)

A. The Problem

Your problem is to design, build or adapt a vehicle that will travel forward to reach a qualifying line and then return as close as possible to its original position. The vehicle must break the imaginary plane of a qualifying (Q) line (see Figure A). The qualifying vehicle with the shortest distance to any part of its own start mark will advance in the competition. Also, any vehicle crossing the Q line that returns to its starting area and breaks the balloon in that area will automatically advance to the second round.

Thus, the **SPIRIT OF THE PROBLEM** is to have your vehicle go forward, cross the qualifying line and return, resting closer to its start mark than anyone else's vehicle does.

B. Limitations

1. The vehicle may not be guided by remote control.
2. The vehicle must be self-propelled. You may not assist it **except** in preparation (e.g., you may wind rubber bands, turn switches, etc.).
3. The vehicle must be self-contained. It may not drop off parts, etc.
4. The vehicle, including pins, etc., may not exceed 10″ in width, 24″ in length.
5. You may use up to 4 straight pins on your vehicle to break your balloon.
6. The vehicle must touch the balloon to break it. It may not shoot darts, pins, etc.
7. The vehicle must break the plane of the qualifying line prior to breaking its balloon to count.
8. Vehicles may turn around, go in reverse, or in any other manner return to the start mark.
9. You may not touch the vehicle after it has been released.
10. You may not alter the competition site, e.g., lay tracks, guide wires, etc.
11. There are no cost limitations.
12. The judge will give the signal to begin. When the last vehicle stops, that round of competition will end.
13. If something is not prevented in the limitations, it is allowed.

C. The Competition

1. Participants will compete in two (or three) rounds. In each qualifying round (Round I and possibly Round II) up to three competitors will be selected to advance. Rounds II or III will be the finals where the winners will be determined.
2. The competition site should be set up as in Figure A.

Round I (Possibly Round II):

1. Contestants and their vehicles must be entirely behind the start line and in their starting area when the competition begins.
2. Any vehicle not crossing the plane of the qualifying line will be eliminated. However, it will not be removed from the site until the last vehicle has come to rest.
3. If two or more vehicles tie when reaching their start marks, the first vehicle to break its balloon wins. In the event of a tie, where no vehicles break their balloons, the vehicles that tie will compete until one wins.

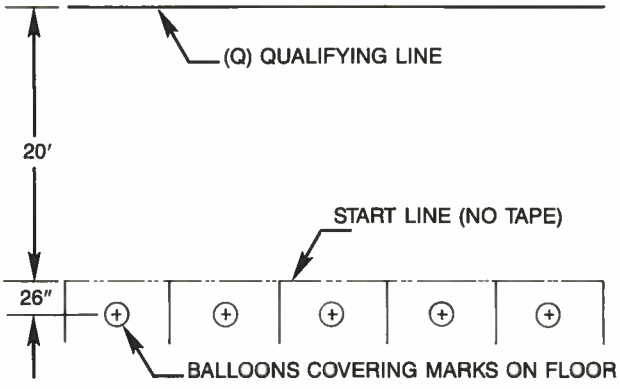
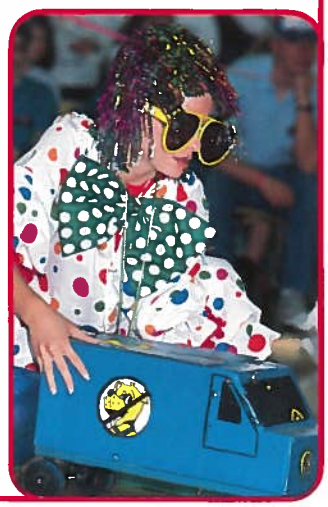


Figure A



CLEAN UP YOUR ACT (for Elementary, Middle and Secondary School Students)

A. The Problem *(suggested for teams of three to five people):*

Your team's problem is to create and present a performance about pollution and an attempt to reduce it. You can decide the type of pollution for your theme, such as the pollution of fresh water, salt water, air, the ozone layer, environmental aesthetics, etc. The team must include the following in its performance:

1. The cause of the pollution.
2. A representation of the pollution. This may be pictures, drawings, models, people in costume, etc.
3. The actual or potential effect of the pollution on our environment.
4. A suggestion to reduce the pollution.
5. Something made from trash, e.g., putting old products to new uses, make a new product from trash, a work or art, an animal made out of trash that can be helped by reducing pollution, etc.
6. Involving the audience in some way.

B. Limitation

1. Everything must be made from trash or used items. However, teams may purchase glue, staples, tape and other simple fasteners.
2. Performance time: 8 minutes.
3. School furnishings may be used. This includes musical instruments, video players, projectors, musical recordings, art supplies, etc.

C. Scoring *(if the problem is used in a competition):*

1. Quality of the presentation . . . . . 1 to 15 points
2. Creativity of the presentation . . . . . 1 to 30 points
3. Team's method of showing how the pollution occurred . . . . . 1 to 20 points
   a. Making a simple statement about the pollution . . . . . 1 to 5 points
   b. A more elaborate way of presenting how it occurred . . . 1 to 20 points
4. The representation of pollution . . . . . 1 to 30 points
5. Effect(s) on the environment . . . . . 1 to 15 points
   a. Making a simple statement about the effect . . . . . 1 to 5 points
   b. A more elaborate way of presenting the effect . . . . . 1 to 15 points
6. The solution to reduce pollution . . . . . 1 to 50 points
   a. Making a simple statement about reducing it . . . . . 1 to 25 points
   b. A more elaborate way of presenting the solution . . . . . 1 to 50 points
7. Make something using trash . . . . . 1 to 25 points
   a. Elementary level: make an animal that can be helped by reducing pollution or replicate something that is being done.
   b. Middle school/secondary levels: putting old products to new uses, making new products from old ones, etc.
8. Involving the audience . . . . . 1 to 15 points

D. Suggestions for the Teacher:

1. You may suggest a theme such as good (clean-up) vs. evil (pollution); a documentary; save a particular species of animal; optimum use of a resource, etc.
2. For older students, you may choose any one of the themes mentioned and add others, e.g., convincing someone who is doubtful, making a trash band (musical instruments out of trash), etc.
3. Use your own discretion to change the problem for your class. You may add further limitations, eliminate some, change the scoring, etc.
4. Have students present their solutions to each other. Judges may be chosen or have each student vote for the best presentations. Then have the better teams make presentations to parent groups, assemblies, Board of Education meetings, etc.

Problems by C. Samuel Micklus, Ed.D., Founder, Odyssey of the Mind, Professor of Technology, Glassboro State College, NJ, and Samuel W. Micklus

SKYSCRAPER (for Elementary, Middle and Secondary School Students)

A. The Problem

Your problem is to design and build a structure made of toothpicks, straws and clay. Your structure will support a container on its top that will be able to hold weight. You will be scored on your structure's height as well as the amount of weight that it holds.

B. Limitations

1. You will be given an envelope containing 50 toothpicks, 4 plastic straws and 1 piece of clay. You will also be given scissors to use. The scissors and envelope may not be a part of your structure.
2. After your structure is finished, it will be measured. For each 3″ height increment your structure reaches, your score will be increased. After it has been measured, you will then place the container on the top.
3. Nails will be used as weights. You must place the nails into the plastic container one at a time without removing them. Nails must be supported for 3 seconds to count for score.
4. Once the first nail has been put into the container, the structure may not be touched. You will continue to place nails into the container until the structure breaks.

C. Scoring

1. If your structure stands at least 3″ high and successfully supports the container, you will receive 10 points.
2. Each nail supported will receive 1 point. The total number of nails held will be multiplied by the total number of 3″ height increments.

   For Example: If your structure is 3″ tall and holds 10 nails, then 3″ equals 1 increment and 10 nails x 1 increment equals 10 points.

   Another Example: If your structure is 6″ tall and holds 10 nails, then 6″ equals 2 increments and 10 nails x 2 increments equals 20 points.

D. Suggestions for the Teacher

1. You may set a time limit for the problem. For example, if you allow 15 minutes to work on the problem, start and stop each team at the same time. Then move the container and nails in turn to each solution for testing.
2. Give each team an envelope containing 50 toothpicks, 4 straws and 1 piece of clay (3/4″ x 3/4″ x 1″) such as Plasticine, Plast-I-Clay, or equivalent safe, soft clay.
3. Height is to be measured from the surface on which the structure is placed to the top of the structure. **Do not** include the height of the container.
4. The container should be a pint-size plastic food container.
5. Standard 20-penny nails are recommended. The same size nails must be used for each team.
6. Increments must be a full 3″. The structure must reach or exceed the full 6″, 9″ or 12″ measurement to receive additional score.
7. Give each team a ruler, yardstick or tape measure to determine the height of its structure while it is working.
8. As an extension to this problem, you may invite an architect or structural engineer to visit your class to discuss structural design in your community.

E. For Elementary School Teachers

If you feel that the problem is too complicated for young children you may consider eliminating the height increments. Have the students make a structure a minimum of 6″ high. You may also substitute paper clips or pennies for nails. For example, if the structure is a minimum of 6″ high, award 10 points; if the structure supports the container award 10 points; and for each nail, paper clip or penny held, score 1 point.