

AERODYNAMICS

Description:

Each two-member team will build one paper airplane to be flown a distance of at least five meters, landing on a predetermined target. Airplanes must be of a folded aerodynamic design. Crumpled wads of paper do not qualify.

Number of Participants: 2

Approximate Time: 30 minutes

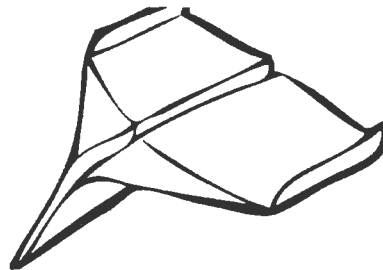
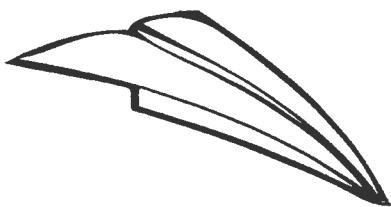
The Competition:

1. Two sheets of plain white paper will be supplied for each team along with approximately five centimeters of masking tape and a pair of scissors. Two planes will be constructed.
2. Planes flown in competition must be made on site, during the allotted time, using only the materials provided.
3. Planes will be hand launched from behind a line on the floor at a specified target, on the floor, more than five but less than 12 meters distant.

Scoring:

1. After the flight, the distance will be measured from the center of the target to the nose of the airplane where it first landed. The distance from the target will become the team's score.
2. Each team member will fly one of the two planes once. Team score will be determined by adding the two scores.
3. The lowest score, signifying the closest to the target, will be the winner. In case of a tie, the best single flight will break the tie.

Regular Copy paper will be used. Only one trial shot per participant – whose score Will Not count.



BARGE BUILDING

Description:

The purpose of this event is to construct a barge using aluminum foil that can support a cargo of the largest number of objects without getting them wet.

Number of Participants: 2

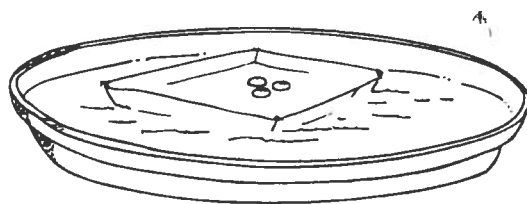
Approximate Time: 20 minutes

The Competition:

1. Each team of two persons will be given a 15 x 15 cm piece of aluminum foil by the event supervisor. Each team will then be given 10 minutes to construct their barges and turn them into the supervisor. No other materials may be used in building the barge.
2. Each team will then be given 5 minutes to load their barges.
3. The event supervisor will inform each team of the average mass of each cargo piece before they begin their construction. The cargo may be pennies, washers, paper clips, marbles, or other similar objects. The cargo will not be known until the time of competition.
4. The student barge captain and his partner must predict the number of pieces of cargo that the barge will hold. The barge must then be loaded until it sinks. The piece that caused the barge to sink will not count in the total cargo. Sinking occurs when water enters the barge.
5. The event supervisor will provide the barge captain with the cargo to be loaded. Each piece must be loaded one at a time while the barge is floating in a pan of water.

Scoring:

The winner will be the team with the highest score. The score will be determined by the following formula: Amount of cargo held x 10 - the difference between predicted amount and actual amount. For example: if the team predicts their barge will hold 70 pieces and it sinks at 57, their score will be 57×10 minus the difference between 70 & 57 which is $(570 - 13 = 557)$ points. Ties will be broken by accuracy of the prediction. If the judges determine that a contestant intentionally sinks his boat at or near the predicted number, that team will be disqualified and receive participation points only.



Practice with Heavy Duty Aluminum Foil – it will be used in the competition

BOTTLE MUSIC

Description:

A three-person team will tune a set of bottles by filling them to different levels with water and use them to play two different tunes.

Number of Participants: 3

Approximate Time: 20 minutes

The Competition:

1. Each team will tune 11 identical bottles (which they will supply) to a C major scale, ranging from high C to G below middle C. Fifteen (15) minutes will be allowed for this tuning. Tuning must be done by ear. Teams will start with unfilled bottles and add water (provided) to begin tuning.
2. At the end of this time, or earlier if the team announces it is ready, the team will play the scale of all the bottles.
3. After that the team will have five (5) minutes in which to play both the required tune, "America -- My Country Tis of Thee", and another tune of their choice.
4. Sounds must be produced by blowing across the mouth of the bottle. Striking the bottle is not permitted (Bottles are to be even in construction to permit uniform sounding).
5. Bottles may not be marked to make tuning easier.

Scoring:

Teams with the highest scores will be declared winners. Judges should be musically literate. Judging for each team will be based on the following criteria:

Area	Weight	x Rating	Subtotal
Relative Pitch	4	4 3 2 1 0	_____
Absolute Pitch	4	4 3 2 1 0	_____
Time to Tune	4	4 3 2 1 0	_____
Arrangement and Teamwork-required tune	2	4 3 2 1 0	_____
Arrangement and Teamwork-optional piece	2	4 3 2 1 0	_____

CAN RACE

Description:

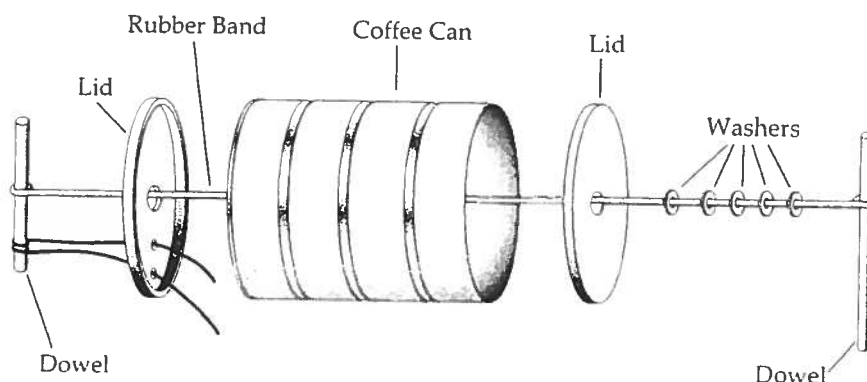
A team of two students will race a can against other teams in a drag race format.

Number of Participants: 2

Approximate Time: 20 minutes

The Competition:

1. Students will make and bring to the contest one can racer for each team of two students.
2. The racers will be run on a course approximately three meters in length and thirty centimeters in width. The racing surface could be a gym floor, hallway, concrete or close nap carpet. Lane control will be provided by boards or other barriers along the outer edges of each lane.
3. Any can (small or large size) may be used. Racer surfaces may not be modified by addition of any substance.
4. Lollipop, Popsicle or other similar sticks may be used as the running arm. Tape and washers may be used.
5. Racers will be released by contestants without any assisting push and must not be touched by anyone until they cross the finish line. Racers stuck against lane barriers will have their "run length" measured at that point. Those jumping off of the course will be ranked after those that stay on the course.



CAN RACE CONTINUED

To Make Racer:

1. Drill holes in the precise center of the can bottom and plastic lid(s). The holes must be large enough so the rubber band will thread through them easily, and be sure the edge of the hole in the can lid is smooth so it won't cut the rubber.
2. Put the lid(s) on the can and thread the large rubber band through the hole so that the loops protrude from both ends of the can.
3. Push the shorter wooden dowel or stick through the loop of rubber band protruding from the can bottom.
4. Punch two small holes in the can bottom on either side of the stick, and tie the stick securely to the can bottom with twine, wire, or a twist tie.
5. Thread the other loop of the rubber band through the holes in several washers. (There must be sufficient number of washers to keep the longer stick, which is added in step 6, from rubbing against the edge of the can. Later, if appropriate, you can increase or decrease the number of washers.)
6. Finally, place the longer wooden dowel or stick through the loop with the washers so that one end sticks out beyond the side of the can.
7. Wind up the rubber band and release the racer.

Scoring:

1. Total distance and elapsed running time of each racer will be recorded.
2. Cans will be ranked by distance. The winner will be chosen on the basis of the greatest distance traveled.
3. In case of a tie, the shortest elapsed time will determine the winner.

It's distance that matters first! One trial run per team before the real deal. Remember to bring extra rubber bands incase of breakage – we don't provide these

CHOPPER CHALLENGE

Description:

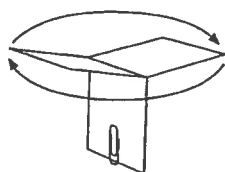
Contestants will build and test 3 choppers (rotary flying devices) using only the materials provided at the competition. They may bring pencils, a ruler/straight edge and scissors. No other equipment/supplies are allowed.

Number of Participants: 2

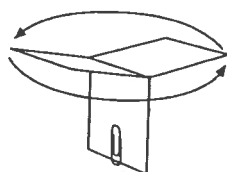
Approximate Time: 45 minutes

Construction:

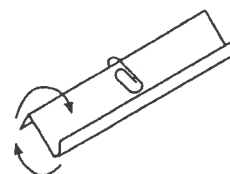
1. Each team will be given one sheet of 8 1/2 x 11 inch 60-90 lb. card stock and 3 standard paper clips to construct 3 choppers that use rotation to slow their descent.
2. Each chopper must be made using a single piece cut from the sheet of cardstock provided and one paper clip. The pieces for the 3 choppers need not be the same size and shape.
3. Each chopper must rotate in a different direction, as shown below, and they must be labeled with the direction they are intended to rotate. The drawings only illustrate the direction of rotation. The choppers may be any design.



Clockwise Rotation



Counter-Clockwise Rotation



Vertical Rotation

4. Contestants may test their devices in the building area but will not be allowed to test them from the official drop location.

The Competition:

1. When it is their turn, contestants will release their choppers, one at a time, from the height specified by the judges. All teams will release their choppers from the same height.
2. The judges will measure and record the time required for each chopper to reach the ground/floor. Time will continue if the chopper bounces off an object, but will stop if the chopper gets stuck and stops.
3. A chopper's flight time will be divided by 2 if it does not rotate in the direction labeled.

Scoring:

The team's score will be the sum of the flight times for all three choppers. Longest total time wins. Ties will be broken by comparing each team's single longest flight times.

COOL IT

Description:

Teams will construct a container (using provided materials) that will prevent an ice cube from melting.

Number of Participants: 2

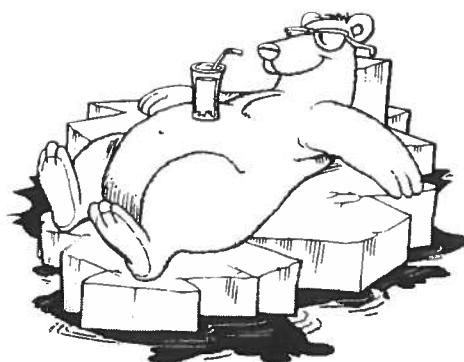
Approximate Time: 45 minutes

The Competition:

1. Each team will be provided a uniformly formed ice cube, a small plastic bag with fastener (sandwich type without the Ziploc top), and assorted materials (e.g., Styrofoam cup, Styrofoam chips, metal cans, plastic cups, foam, newsprint, fabric scraps, various types of insulating materials). CAUTION: Do not use commercial grade fiberglass because of the dangers of inhalation and abrasion to skin and eyes.
2. Each team will build a container from the assortment of materials. Place the ice cube in the plastic bag and tie tightly to prevent the loss of water should the ice cube melt. Place the bag containing the ice cube into the insulated container. After one half hour remove the bag and its contents from the container. Carefully remove the ice cube from the bag and pour the accumulated water into a metric measuring device (e.g., cup, graduated vial or cylinder).

Scoring:

1. The team with the least amount of water from the melted ice cube will be the winner. The judge will do the measuring for each team.
2. As an alternative, the ice cube in the bag may be massed before and after the time limit. Using this system, the resultant water from melting will be poured off before the final massing to determine the cube that lost the smallest mass.



GUNK

Description:

The student will make "gunk" to the characteristics announced at the Science Olympiad.

Number of Participants: 1

Approximate Time: 45 minutes

The Competition:

1. Each participant will be given a measured quantity (50-150 ml) of each of the materials for making gunk (Elmer's glue, liquid starch, non-iodized salt).
2. The student will then assume that he/she has been hired as a chemist or an engineer to make a gunk to certain characteristics. To meet the challenge, he/she should study gunk in a scientific way. The participant should hold two of the ingredients constant and vary the amount of one ingredient at a time.
3. The quantities of each material given at the beginning of the activity is all that the participant will receive, therefore caution should be used in the making of the mixture.
4. The student will be told to make a product with certain characteristics (bounce or elasticity) to be announced at the Science Olympiad.

Scoring:

1. The student who comes closest to making gunk closest to the characteristics - the most bounce or greatest stretchability will be declared the winner.
2. The student must finish in the allotted time.
3. The student will be given a written quiz about his/her gunk. This will be used as a tiebreaker.
4. The judge's decision is final.

Do NOT use Elmer's School Glue – It won't work! Rather practice with Elmer's Glue All – that's what will be used in the competition

MYSTERY POWDERS

Description:

A team of two contestants will be asked to identify a mixture of common white household powders.

Number of Participants: 2

Approximate Time: 20 minutes

We provide the safety glasses and magnifying glasses. Be sure YOU have the Charts Reaction Sheet and give it to the judges – it proves you know what you know and is the decider in case of a tie.

The Competition:

1. Three mixtures containing one to three powders will be placed in vials marked A, B and C. Mixtures could include such powders as: sugar, baking soda, flour, salt, plaster of Paris, corn starch, white sand. Mixtures will ONLY be selected from the items listed.

Mixture A will have two mystery powders; mixtures B and C will contain three mystery powders. For younger students or an introductory tournament, mixture A could have one powder; mixture B - two powders; and mixture C - three powders.

2. Students will be given twenty minutes to correctly identify as many powders as possible.
3. No tasting or touching of powders will be allowed!
4. Teams will be supplied with the following materials to aid in the identification of the powders: vinegar, water, a candle, aluminum foil, a clothespin, iodine solution, magnifying lens, and black paper. Safety precautions must be used. Students must bring and wear their own splash-proof safety goggles. If a candle test is used, an adult must man this station at all times. Students will not be allowed to bring other materials for testing.
5. Participants will be asked to collect evidence and complete a chart describing the powders' reactions to the above materials BEFORE attending the tournament. This chart should be brought to the tournament with the participants. The chart and answer sheet will be collected at the end of the event.

Scoring:

1. The team with the greatest correct number of powders identified in the shortest period will be declared the winner. For example, if several teams identify six powders correctly, the team with the shortest time will be the winner even if another team finishes ten minutes earlier but identifies only five powders correctly.
2. In case of ties, the team with the most complete data table/chart will be declared the winner.



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PASTA BRIDGE

Description:

Using only the materials given, build a bridge to span a specified distance and support a cup (in the middle of the bridge) with as many small weights as possible.

Number of Participants: 2

Approximate Time: 50 minutes

Materials/Team:

Bridge supports (two tables or two 3" pieces of scrap 2" x 4" that are spaced about 4"-5" apart)

Weights (washers, marbles, pennies, anything that you have in large quantities)

Small paper cup to hold weights

Spaghetti

Modeling clay

Other Possible Problems to Solve:

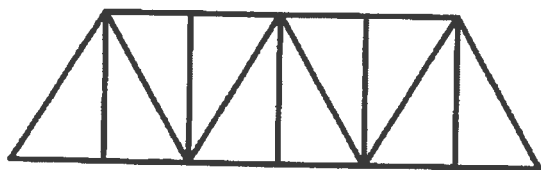
- Design a new bridge to hold even more washers.
- Use less spaghetti.
- Use less clay.
- Try different pastas.
- Move the supports even further apart.

The Competition:

1. Students must build a bridge to span the distance between the two blocks or tables.
2. The clay may be used to stabilize the bridge at the supports, hold the cup in place or to join shorter pieces of pasta.
3. Students place the cup at the center of the span and begin to add weights.

Scoring:

The bridge that holds the greatest number of weights wins!



Please Note the Following Changes/ Additions/ Clarifications

The Size of the Spaghetti will #12 (in other words - NOT thin

Every team will be given a 1 lb box of spaghetti, one 5 ounce container of Play Dough (works far better than modeling clay)

When placed on supports, the bridge will need to span a distance of 4 inches (width) and AT LEAST 8 inches in length.

The winning bridge will be the one that is the LONGEST in length and HOLD THE MOST WEIGHT. The winner will be calculated thus length x 2 + the weight supported (number of washers or coins in cup before it collapsed)

PASTAMOBILE

Description:

To construct a vehicle entirely out of glue and pasta that, when released from the top of a ramp, will travel the greatest distance within a 1.5m wide "lane" before stopping.

Number of Participants: Up to 4

Approximate Time: 60 minutes

Procedure:

1. Any supermarket variety of fresh (soft) or dry pasta uncooked and unaltered. Samples of the pasta used should be brought in the event of a challenge. Any commercially available glue is permissible. Only minimal use of glue is allowed. No "sculpting", joint, or gap filling of the glue will be allowed. The pasta may be shaped by filing, sanding, or other dry machining techniques.
2. The cart must be able to fit into a closed "shoe box" 30cm x 15cm x 10cm. There are no mass restrictions. The device must make and maintain contact with the surface on which it rests on at least three points. (Simple spheres, cylinders, etc. will not do.)

The Competition:

The racers will be placed on the ramp so that the rearmost part of the racer is in contact with a horizontal barrier at the top of the ramp. It is then released by the contestant (no helpful nudges allowed!). The ramp itself is a curved surface that is, at its highest point, 1m high. The entire ramp must fit in a space that is 1m high x 1m long x 0.5m wide.

Scoring:

Scores will be based on:

1. Presentation of a pastamobile that meets the specifications as outlined above.
2. Its ability to complete the run essentially intact.
3. The distance that pastamobile is able to travel within the 1.5m lane out from the ramp. Should the pastamobile lose its structural integrity (fall apart) during its run, the distance factor will be determined by the largest surviving structural component.
4. The highest scores will be awarded to pastamobiles that remain basically intact and travel the greatest distance, followed by those that do not remain intact but do meet all other requirements. If the pastamobile rolls outside of the 1.5m wide lane; its distance will be measured along the edge of the lane to the first point where any part of the pastamobile crossed the boundary line.

Keep to the above measurements for the pastamobile and remember – only MINIMAL amount use of glue! It's NOT a gluemobile. Remember to bring glue gun, glue sticks and pasta in case of emergency repairs. NO TRIAL RUNS!

SCIEN



RUBBER BAND CATAPULT

Description:

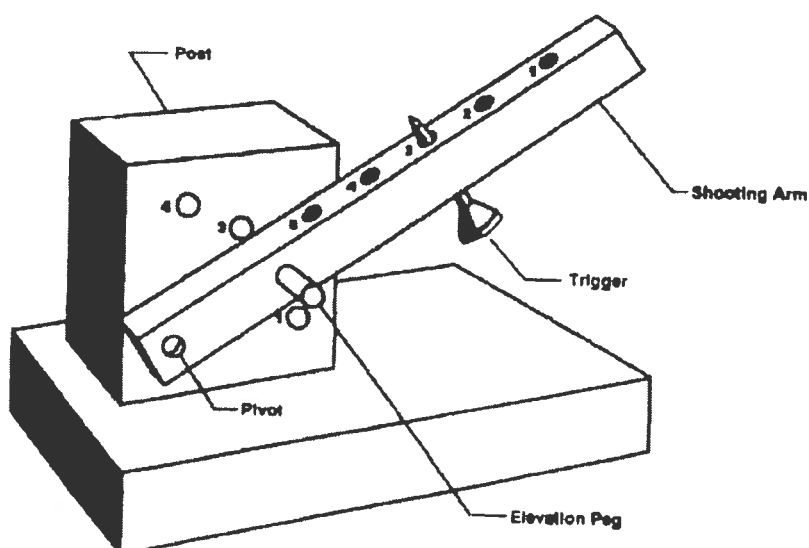
A team of two (2) students will design and construct a catapult device to shoot a rubber band at a target that is placed within a given range.

Number of Participants: 2

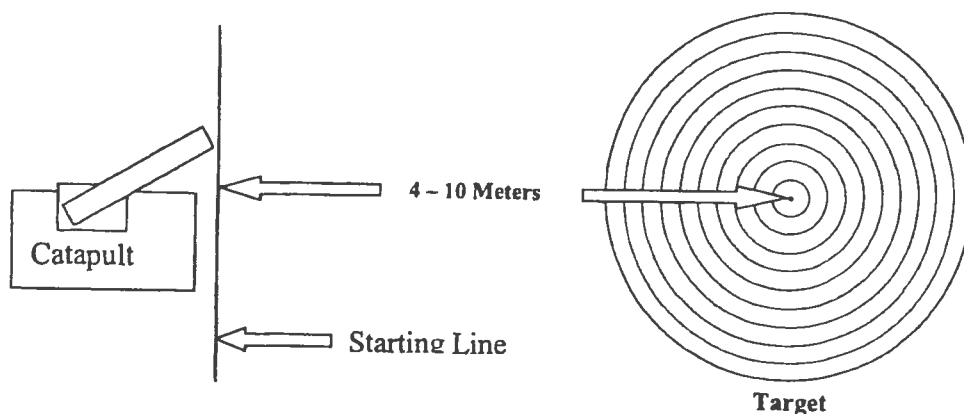
Approximate Time: 20 minutes

The Competition:

1. Students are to design, construct and bring to the tournament a catapult device similar to (but not limited to) the sample below.



2. Catapults are NOT limited to the above design and may be of any size and any material, with as few or as many shooting positions as needed to hit a target.
3. Evidence should be collected and presented on a data table which includes the base positions, shooting arm positions, and the distances traveled
4. The target consists of three to twenty concentric rings with a dot at their center. The smallest ring is approximately 8cm in diameter with approximately 5cm between rings. The center dot is approximately 2cm in diameter. The center of the target will be located between four (4) and (10) meters from the starting line.



5. No part of the catapult may extend beyond the starting line.
6. Contestants will shoot three (3) different rubber bands.
7. Rubber band maximum size limit: 22 cm. (length, not circumference) measured with the rubber band suspended freely, under only its own weight, from a nail or similar object. Rubber bands may not be knotted, linked together or attached to any other material.

Scoring:

1. The score for each shot will be determined by the smallest ring (highest number) any part of a rubber band is touching or inside of when it comes to rest. The smallest ring is worth twenty (20) points, with each successively larger ring worth 1 less point.
2. In addition to the 20 points for the smallest ring, an "X" will be awarded for all shots where any part of the rubber band is touching or within the center dot.
3. The final score will be equal to the sum of the numerical scores for all three shots.
4. The greatest number of points determines the winner.
5. Ties will be broken in favor of the team with: first, the most Xs; second, the most twenties (20), continuing with nineteen's (19) thru ones (1). Any remaining ties will be broken in the same manner comparing each shot, 1st thru 3rd, in order.
6. If ties still exist, the team with the best-prepared data table will win.

Turn in catapult, marked with team name and number, prior to the start of the tournament.
3 rubber bands will be provided for all teams. Each team make make 2 trial shots – these scores will NOT count.

STRAW EGG DROP

Description:

Each pair of students will make a device of straws and masking tape, supplied on-site by the event supervisor, to hold a large, raw egg. The device containing the egg will be dropped from a fixed height to a target.

Number of Participants: 2

Approximate Time: 45 minutes

The Competition:

1. Each pair of students will be provided with:
 - a. 20 plastic non-flexible straws
 - b. one meter of one inch masking tape
 - c. scissors
 - d. one raw egg
2. Students will have 20 minutes to construct a device to cushion the egg and prevent it from cracking or breaking. They will have 10 minutes to drop the device from a height of 2 - 3 meters onto a target. No tape may be attached to the egg.
3. There will be ONE drop per team from the prescribed height.
4. Plumb lines will NOT be allowed during the competition.

The Straws used WILL be FLEXIBLE

Scoring:

1. Teams whose egg is unbroken after the drop will be ranked ahead of all teams whose egg is broken.
2. Teams whose egg is broken during the drop will be ranked after all teams whose egg is unbroken.
3. Teams whose egg is broken before the official drop will drop the empty container and be ranked after all teams whose egg is broken during the drop.
4. Teams in each of the three groups above will be ranked by the distance measured from the center of the bulls-eye to the farthest edge of the container or the farthest edge of any parts thrown from the container (not the egg).
5. The winning team will be the team whose egg does not crack or break AND is the closest to the target. In the event of a tie, construction time for building the containers will be the deciding factor.