A IS FOR ANATOMY

Description:

This event will consist of a written test in which the contestants will view models, slides, and pictures to identify organs from the following human body systems. Both structure and function will be tested in a series of written questions.

1. Skeletal
2. Muscular
3. Digestive
4. Respiratory
5. Circulatory
6. Urinary
7. Nervous
8. Sensory
9. Endocrine

Number of Participants: **2**

Approximate Time: **30 minutes**

The Competition:

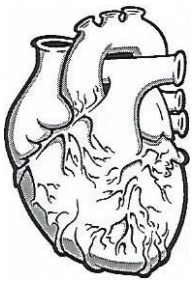
Every team will be given an answer sheet. Team members may consult with each other by writing (no talking). Only one answer for each question will be accepted. Team members will move through 20 stations answering approximately 40 questions. Questions will be at the stations or in a test booklet.

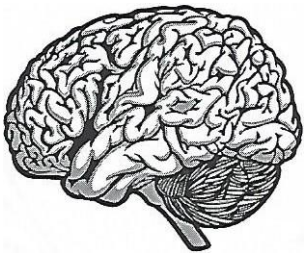
Scoring:

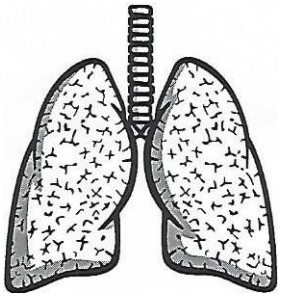
At the end of the testing period, the questions and answer sheet will be collected from those teams who have not turned in their responses. Time is not a factor in scoring. Correct spelling will be used as a tiebreaker.

Resources:

Fourth, Fifth and Sixth Grade Science and Health Books







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:

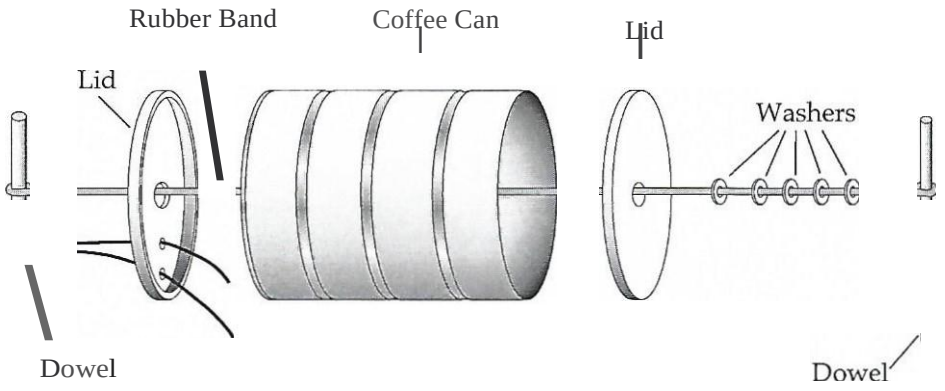
1. Students will make and bring to the contest one can racer for each team of two students.

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

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.

DENSITY

Description:

This event is designed to examine the students' basic understanding of the nature of density using blocks of various materials that are square or rectangular.

Number of Participants: 2

Approximate Time: 30 minutes

The Competition:

This activity will consist of several stations that will be used to determine the competitors understanding of density. Each station will test different aspects of the problem. Students may also be asked to find the mass of an object in grams (g) using an elementary or digital balance. They may also be asked to measure length, width and height in centimeters (cm) and calculate the area in cubic centimeters (cm^3). Students may be asked to calculate density using a simple formula (e.g., if a 20-gram block is 10 cubic centimeters, the density is $2g/cm^3$).

Scoring:

Highest score wins. One point is given for measurements, two points for density questions. Tiebreakers will be previously determined questions.

Sample Stations/Questions:

Station One: Given a set of 3-4 blocks, rank order them from most to least dense.
Station Two: Given two blocks, which would float in water?
Station Three: Given two objects with the same size, ask which is more dense.
Station Four: Given two objects with the same mass, ask which is more dense.

Note: If blocks are used they should be numbered for easier identification.

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

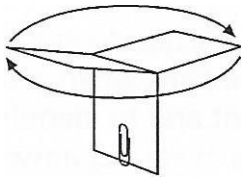
Approximate Time: 45 minutes

Construction:

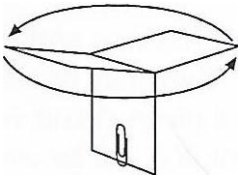
1. Each team will be given one sheet of 8 1/2 x 11 inch 60-90 lb. card stock and 3 standard paper clips to construct 3 choppers that use rotation to slow their descent.

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.

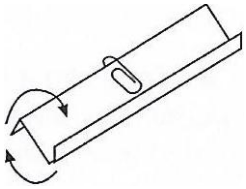
3. Each chopper must rotate in a different direction, as shown below, and they must be labeled with the direction they are intended to rotate. The drawings only illustrate the direction of rotation. The choppers may be any design.



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

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.

LARGE NUMBER ESTIMATION

Description:

Students will be asked to estimate the answers to approximately twenty questions requiring an estimate between ten and one million.

Number of Participants: 2

Approximate Time: 30 minutes

The Competition:

1. The questions will follow the following format:

Question	Estimate (Circle One)
a. How many pennies in the jar?	10, 100, 1,000, 10,000 100,000, 1,000,000
b. How many two centimeter paper-clips could be laid end to end across a standard football playing field?	10, 100, 1,000, 10,000 100,000, 1,000,000

2. *No calculators will be allowed.*

3. When estimating, round off to the nearest power of ten, for example, 50,001 would be closer to 10,000 than 100,000 and 45 would be closer to 10 than to 100.

   EXPLANATION:
   1. round 50,001 to 50,000

100,000	50,000
- 50,000	-10,000
50,000	40,000
50,000 away from 100,000	40,000 away from 10,000

4. Hands-on items may be felt by the students.

Scoring:

1. Points will be awarded on the following scale:
   Right on . . . . . .5 points
   Within one power of 10 . . . . . .3 points
   Within two powers of 10 . . . . . .1 point
2. The team with the most points wins.
3. In case of ties, the greatest number of 5-point estimates will determine the winner.

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:

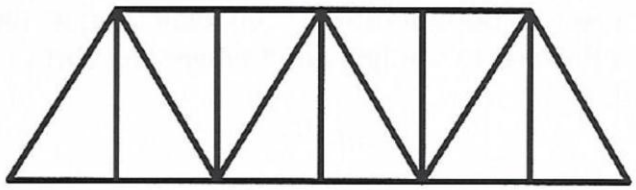
1. Students must build a bridge to span the distance between the two blocks or tables.

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:

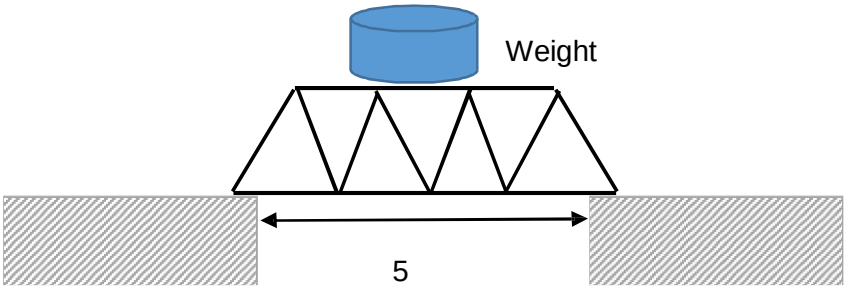
The bridge that holds the greatest number of weights wins!



Please see amended rules

2016 Delaware Elementary Division A Science Olympiad

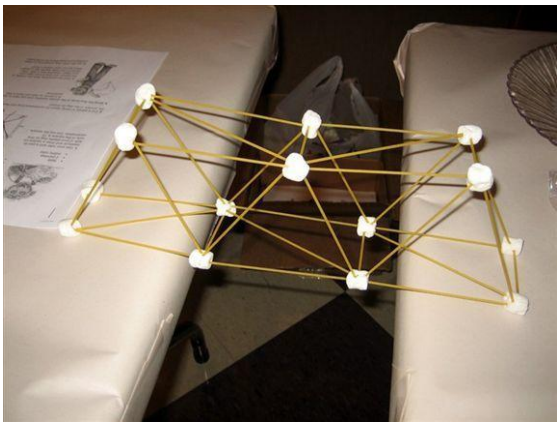
Pasta Bridge AMENDED RULES



The bridge will be constructed with no more than 20 pieces of spaghetti and a maximum of 20 grams of clay. The bridge must span between two blocks that are 5 inches apart. **The bridge is to be a 3 dimensional truss type bridge of at least 1 inch in height and 1 inch in width**. Additionally, there can be no more than 4 pieces of spaghetti that extend between the two supports and touch each support and form the base of the bridge. **The weights in the cup for judging will be applied by the student to the top portion of the bridge structure** in a manner to be determined by the judges. The type (eg. marble, penny, washer) and maximum weight for the event is to be determined.

ADDITIONAL COMPETITION INFORMATION:

Length of event is to be 50 minutes. Students will be allowed 25 minutes to build their bridges. The remainder of the time will be used to test the bridges by adding weights until one of these three things happens: the bridge "sags" enough for any part of the bridge to be touching the table, the cup of weights falls from the bridge to the table, or the weights are dumped from the cup. We are finding that the bridge may not completely break, but we will stop adding weight and take a measurement when any of the above takes place.



SCORING:

a. The best structural efficiency (highest number) wins, determined by the following equation:

Structural Efficiency = Load Supported (grams) ÷ Mass of Bridge (grams)

b. Bridges that hold more than the maximum weight provided will use this as the maximum Load Supported. For example, if the maximum weight for the event is X kg, the maximum Load will be X kg even if actual weight exceeds that.

c. Bridges will be scored in 3 tiers.

Tier 1: Bridges with no violations

Tier 2: Bridges with construction or competition violations

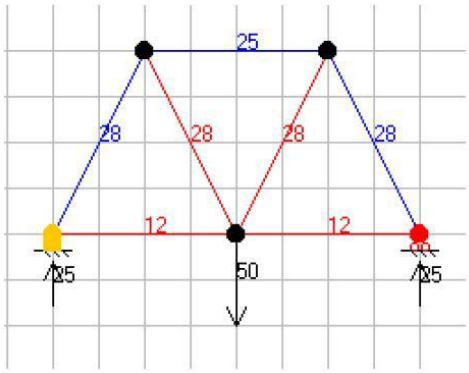
Tier 3: Bridges that cannot be tested for any reason (e.g. cannot accommodate the loading block or team does not have proper eye protection) will be ranked in the 3rd tier by the lightest bridge.

d. Ties will be broken in favor of the team with the lighter bridge.

Tips

1. Use truss designs
2. Test your bridge. Find out the weakest point. Improve it and test again.
3. Draw a full size pattern on paper to lay the members accurately (you can bring the plan to the event).

4. Symmetry is your friend
5. Test your design virtually. Find out the tension and compression members.



http://www.jhu.edu/~virtlab/bridge/bridge.htm John Hopkins Truss Bridge Designer

Please check the Delaware Science Olympiad website for latest information.

Resources http://www.pbs.org/wgbh/buildingbig/lab/shapes.html

https://en.wikipedia.org/wiki/Truss_bridge

https://sites.google.com/a/bcsemail.org/wdstem/bridges

https://sites.google.com/a/bcsemail.org/wdstem/bridges/how-to-build-a-bridge

http://www.pbs.org/wgbh/nova/tech/build-bridge-p1.html

http://engineering.jhu.edu/ei/wp-content/uploads/sites/29/2014/01/Spaghetti-Bridge-Construction-Hints.pdf http://pages.jh.edu/~virtlab/bridge/truss.htm

ROCK HOUND

1. DESCRIPTION: This event will have 20 stations that the teams will rotate through in 2 minute increments, timed by the event supervisor.
Teams may be viewing any combination of:
samples, pictures, or written descriptions of
rocks and minerals on the 2017 Delaware Division A Rocks and Minerals list.
Teams will be asked multiple questions at each station.
The questions will be:
multiple choice, fill in the blank, short answer, etc. about the sample...
or questions about rocks and minerals in general without any sample.

2. TEAM: of up to: 2 **Safety Requirements** - none

3. MAXIMUM TIME: 50 min

4. TEAMS: Must bring writing instruments.
One published field guide that they may tab and write in,
and / or one 3-ring binder (any size) containing information in any form from any source.
The materials must be punched and inserted into the rings sheet protectors are allowed.

5. THE COMPETITION: The Teams will be assessed on their knowledge of:

The proper identification of all rocks and minerals on the 2017 Delaware Division A list

For rocks -
a. The environments of formation of igneous, sedimentary, and metamorphic in general
b. The rock cycle
c. The formation and difference between the coal varieties on the list
d. Grade of metamorphism including parent rocks for the metamorphic rocks on the list
e. The classification of the rocks on the list

For minerals -
f. The methods of formation of minerals in general
g. Moh's hardness scale
h. The habit (botryoidal, hexagonal, prismatic, etc.) of the minerals on the list
i. The economic importance or lack of, for the minerals on the list

6. REPRESENTATIVE STATION ACTIVITIES:
j. Identify each of the minerals and place them in the correct order according to Moh's scale
k. Match each metamorphic rock with the type of rock from which it may have been formed

7. SCORING:
Total highest scores will determine rankings in this event.
Ties will be broken by the accuracy or quality of answers to pre-selected questions.

Recommended Resources: All reference and training resources including the Rock & Mineral Teaching Guide (RMCD), the Bio/Earth CD (BECD) and the National Audubon Society Field Guide to North American Rocks and Minerals are available on the Official Science Olympiad Store or Website at www.soinc.org, and the Rocks and Minerals kits (*excluding only silver, gold, and diamond) may be ordered from Ward's Science Olympiad Kits.

ROCK HOUND

2017 Delaware Division A Rocks and Mineral List

For the State of Delaware, you will need to know about - Sillimanite and " Blue Rock " .

Minerals

Native Elements:
Copper
Graphite

Carbonates:
Aragonite
Azurite
Calcite
Malachite

Oxides:
Hematite
Magnetite

Sulfides:
Chalcopyrite
Galena
Pyrite

Silicates:
Sodalite
Staurolite
Tourmaline group

Garnet group:
Almandine

Quartz varieties:
Amethyst
Milky Quartz
Rose Quartz

Rocks

Igneous:
Basalt
Granite
Obsidian
Pumice
Scoria

Sedimentary:
Breccia
Conglomerate
Sandstone
Shale

Metamorphic:
Gneiss
Phyllite
Schist [Mica]
Slate

Coal varieties:
Anthracite
Bituminous
Lignite

STARRY, STARRY NIGHT

Description:

This event will tests student's knowledge of astronomy in two parts.

Number of Participants: 2

Approximate Time: 30 minutes

The Competition

1. Each team will be given one test booklet and one answer sheet. Team members may consult with each other by writing (no talking). Only one answer for each question will be accepted.
2. At the end of the testing period the test booklet and answer sheets will be collected from those teams who have not turned in their responses.
3. The contestants will be shown star charts, slides, overheads or photographs of star fields and be asked to identify indicated stars and constellations.
4. Contestants should prepare for the test by looking through astronomy periodicals or textbooks for pictures of the moon, planets, star clusters, nebula, or galaxies.

Part I: The contestants will identify the following celestial objects:

1. At least 5 constellations (See attached list of stars and constellations.)
2. At least 5 stars. (See list.)
3. At least 3 planets.
4. The moon and/or any of its phases.
5. The sun.
6. The totally eclipsed sun.
7. A spiral galaxy, a nebula, a star cluster and a comet.

Part II: The contestants will answer a series of written questions about important astronomical facts and concepts:

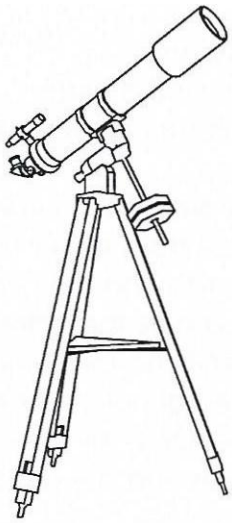
1. Distinguish between the motions of rotation and revolution.
2. State the effects produced by rotation and revolution of the earth.
3. Demonstrate knowledge about units of time (day, month and year) and their astronomical basis.
4. Arrange a group of bodies according to their relative sizes from largest to smallest.
5. Arrange a group of objects according to their distance from either the sun or the earth.
6. Demonstrate knowledge about the seasons on the earth and their causes.
7. Be able to name and identify the phases of the moon and state the factors that produce them.
8. Demonstrate knowledge about the celestial sphere and the following points: zenith, horizon, four directions, celestial meridian, north celestial pole, and ecliptic.
9. Demonstrate knowledge about the members of the solar system.
10. Demonstrate knowledge about solar and lunar eclipses and the conditions that produce them.

CONSTELLATION	STARS or CLUSTERS*
Aquila	Altair
Bootes	Arcturus
Canis Major	Sirius
Canis Minor	Procyon
Cassiopeia	
Cepheus	
Cygnus	Deneb
Draco	
Gemini	Castor
	Pollux
Leo	Regulus
Lyra	Vega
Orion	Betelgeuse
	Rigel
Pegasus	
Scorpio	Antares
Taurus	Aldebaran
	Pleiades (7 sisters)*
	Hyades*
Ursa Major	Merak
	Dubhe
Ursa Minor	Polaris
Virgo	Spica

Scoring:

All questions will be evaluated with equal weight. The contestant attaining the highest score will be declared the winner.

NOTE: Students should bring a red penlight.



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.

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.

WRITE IT/DO IT

Description:

This event tests competitor's ability to clearly communicate in writing and follow written directions.

Number of Participants: 2

Approximate Time: 55 minutes

The Competi

1. One student is shown a contraptio n built from blocks, science equipment, tinker toys, Legos, K'NEX, Construx, Lincoln Logs, or other inexpensive materials. The student has 25 minutes to write a description of the object and how to make it.

2. His/her partner (in another room) takes the description and attempts to recreate (build) the original object in 20 minutes.

3. No diagrams allowed and no verbal or other communication allowed in passing.

Scoring:

The student who builds the object nearest to the original is declared the winner. A point will be given for each piece of material placed in the proper location. No penalty will be assessed for parts that were not assembled. The decision of the judges is final. Time may be used as a tiebreaker.