



Exploring the World of Science

2012
STANISLAUS COUNTY
ELEMENTARY
COACHES MANUAL
AND
RULES

Revised by Leslie Brennecke and Bret Berghold



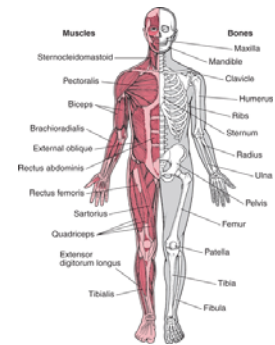
2012 Elementary Science Olympiad

Table of Contents

A is for Anatomy: Skeletal.....	1
Barge Building	2
Bridge Building	3
Can Race.....	4-5
Catapult – Rubber Band.....	6
Circuit Wizardry.....	7
Crime Busters.....	8
Don't Bug Me.....	9
Food Web – Owl Pellets.....	10
Metric Estimania.....	11-12
Mystery Architecture.....	13
Orienteering.....	14
Rock Hound.....	15
Starry, Starry Night.....	16
Straw Egg Drop.....	17
Water Rockets.....	18-19
Write It, Do It.....	20



Competition Day Note: In the spirit of the competition, no assistance will be allowed within (or in the immediate vicinity of) an event venue during last-minute preparation, nor during an event.



A is for Anatomy: Skeletal

Description:

This event will test student understanding of both the human **Skeletal** systems. Both structure and function of the systems will be tested in a series of written questions with multiple choice answers.

Number of Participants: 1-2 Approximate Time: 50 minutes

The Competition:

- 1. Teams may bring in one handwritten charts/notes to the competition limited to one 8 1/2 x 11 inch sheet of paper. Both sides of the paper may be utilized.**
2. Every team will be given answer sheets on which they will record their answers.
3. Students will move through a series of stations (the number of which will be determined by the event supervisor), at which they will view models, slides and/or pictures of respective system organs.
4. Questions and multiple choice answers (the number of which will be determined by the event supervisor) will appear at the stations and/or in the test booklet.
5. As soon as teams have completed the stations, they are to hand their completed answer sheets in to the event supervisor.
6. Questions, diagrams will be from the 4th, 5th, and 6th grade California standards-based texts **and other basic anatomy resources.**

Scoring:

At the end of the testing period, the answer sheets will be collected from those teams that have not yet turned in their responses. Time is not a factor in scoring. The tiebreaker will be an essay question where correct spelling will be considered.

Resources:

Fourth, Fifth and Sixth Grade California standards-based science textbooks **and other basic anatomy resources.**



Competition Day Note: In the spirit of the competition, no assistance will be allowed within (or in the immediate vicinity of) an event venue during last-minute preparation, nor during an event.



Barge Building

Description:

The goal of this event is for the foil barge to hold the largest amount of cargo before sinking. Students will construct a foil barge from a single sheet of aluminum foil. The foil weight to be determined by the event supervisors on the day of the competition. Students will then float their barge in a tub of water. The type of cargo will be determined by the event supervisor and will not be announced until during the competition.

Number of Participants: 1-2 Construction Time: 5 minutes
Approximate Test Time (all teams): 45 minutes

The Competition:

1. Barge must be built on site with the aluminum provided by the Science Olympiad officials. Each team will be given the same amount of foil.
2. Before they begin their construction, the event supervisor will reveal the type of cargo to be loaded, informing each team of the average mass (in grams, not ounces) of each cargo piece. The cargo may be centimeter cubes, pennies, washers, paper clips, marbles or other similar objects.
3. Each team will then be given five minutes to construct their boats and then turn them into the supervisor. No other materials may be used in building the boat.
4. The students will then predict the number of pieces of cargo that the boat will hold.
5. The event supervisor will provide the students with the cargo to be loaded.
6. The barge must then be loaded, one piece at a time, within five minutes until it sinks. Each piece must be loaded while the boat is floating in a tub of water. If, at any time, the barge shows signs of sinking, no pieces will be added without supervisor permission. The piece that caused the barge to sink will not count in the total cargo. Sinking occurs when the barge is under water.

Scoring:

1. Scores will be determined by the following formula:
(Amount of cargo held x 10) – (the difference between the predicted amount and the actual amount).

For example, if the team predicts their barge will hold 70 pieces and it sinks at 57, their score would be:

$$\begin{array}{r} (57 \times 10) - (70 - 57) \\ 570 - 13 \\ 557 \end{array}$$

2. Ties will be broken by accuracy of the prediction.
3. If the judges determine that a team intentionally sinks its boat at or near the predicted number, that team will be disqualified and receive participation points only.



Competition Day Note: In the spirit of the competition, no assistance will be allowed within (or in the immediate vicinity of) an event venue during last-minute preparation, nor during an event.



Bridge Building

Description:

In this event, students will build a long, strong, stable and reproducible bridge from plastic straws and one meter of masking tape capable of supporting the weight of an object, not to exceed 10 x 10 x 10 cm with a mass of between 30 and 100 grams, for 10 seconds.

Number of Participants: 1-2 Construction Time: 20 minutes

The Competition:

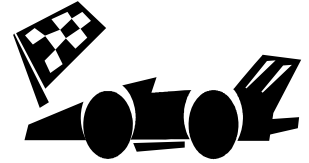
1. The event supervisor will announce the mass and show the object to be used. Object mass will be between thirty and one hundred grams.
2. Students will be given fifty plastic straws and 1 meter of masking tape. They are to construct a bridge that spans the greatest possible distance and be able to support the object when placed by the judge in the center of, and at a right angle to, the length of the bridge.
3. The bridge must support the block for ten seconds.
4. No building materials, save the fifty straws and tape, will be allowed in the construction of the bridge.
5. **Scissors will not be provided, but will be allowed. Each team will responsible for bringing their own scissors. Only one pair is allowed.**
6. The bridge will be suspended between two similar supporting structures, such as two tables.
7. Straws may be crimped and slipped together.
8. No tape may be used for sticking the bridge to the supporting structures. No sticky part of the tape may touch the top or sides of the supporting structure.
9. All parts of the bridge must sit *above* the supporting structure *before* testing (note: the sinking of the bridge, *below* the supporting structure, *is* allowed during testing due to the weight being added).
10. Any team which uses any tools or materials other than straws, scissors, and tape at the competition site will be disqualified.

Scoring:

1. Each team's bridge will be tested beginning with a span of fifty centimeters, followed by increments chosen by the event supervisor, until the bridge is unable to hold the block for ten seconds. The greatest distance spanned before succumbing to the weight of the object will be recorded as a team's final score.
2. Bridges will be ranked based on their final score (the longer the final span, the higher the rank).
3. If a tiebreaker is required, more weight will be added incrementally until the last bridge is still standing.
4. If all bridges fail during the *incremental weight* tiebreaker round, the one that held the weight for the longest will be declared the winner.



Competition Day Note: In the spirit of the competition, no assistance will be allowed within (or in the immediate vicinity of) an event venue during last-minute preparation, nor during an event.



Can Race

Description:

In this event, teams will construct a vehicle made from a can which will travel as close to 300 cm as possible in the shortest amount of time and in the straightest possible path.

Number of Participants: 1-2 Test Time (per team): 5 minutes

Impound: Yes – during designated impound time (and with a “data chart” if the team made one)

The Competition:

1. Each team will make and bring to the competition one can racer to test.
2. Any type of can may be used (irrespective of size or material).
3. Racer surfaces may not be modified by the addition of any substance (e.g. rubber bands at the can edges).
4. The racers will be impounded as students sign up for their race time. They will remain in the impound area until the assigned race time.
5. The racers will be run on a course approximately three meters long and one meter wide. The sides of the track will be wooden barriers (such as 2 x 4's).
6. Teams will be given two runs of the raceway. The better of the two runs will then count as the official time/distance measurement.
7. A maximum of five minutes will be allowed to complete the two runs.
8. Adjustments will be allowed between runs.
9. No parent or coach may intervene during the 5-minute race time.
10. Racers will be released on a center line by contestants without any assisting push, and may not be touched by anyone until they stop rolling.
11. Racers stuck against the lane barriers will have their run length measured at that point.
12. The can will be timed for the entire time it runs; even if it passes the three-meter line.
13. The stopping location will be measured from the center-point of the center-line of the can. (i.e., in essence, the point will be at the top of the can, in the center, where it will cut the cylinder in half.)

Scoring:

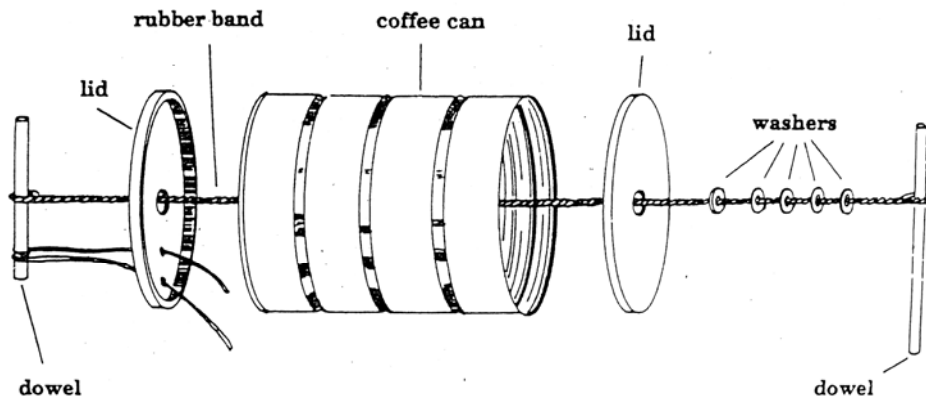
1. Additions:
 - a. One point will be awarded for every centimeter the racer travels up to 300 centimeters.
2. Deductions:
 - a. One point will be deducted for every centimeter the racer travels beyond the 300 centimeter line.
 - b. One point will be deducted for every second the racer travels before it comes to a complete stop.
 - c. One point will be deducted for every centimeter away from the center line the racer is when it comes to a complete stop.

For example, if a can traveled 400 cm. in 15 seconds and strayed from the center line by 10 cm., the score would be 300 (highest allowable distance points) – 100 (centimeters traveled past the 3-meter line) – 15 (seconds traveled) – 10 (centimeters strayed from the center line), for a final score of 175 points.

3. Tie breaker. In the event of a tie, teams that submit any type of “data chart” (compiled from before-event practice runs) will be ranked higher.

To Make a Racer:

1. Drill holes in the precise center of the can bottom and plastic lid(s) - the holes must be large enough so a large rubber band will thread through them easily. Be sure the edge of the hole in the can is smooth so it won't cut the rubber band.
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 a 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.





Catapult - Rubber Band

Description:

Students will design and construct a catapult device to shoot a rubber band at a target that is placed within a given range.

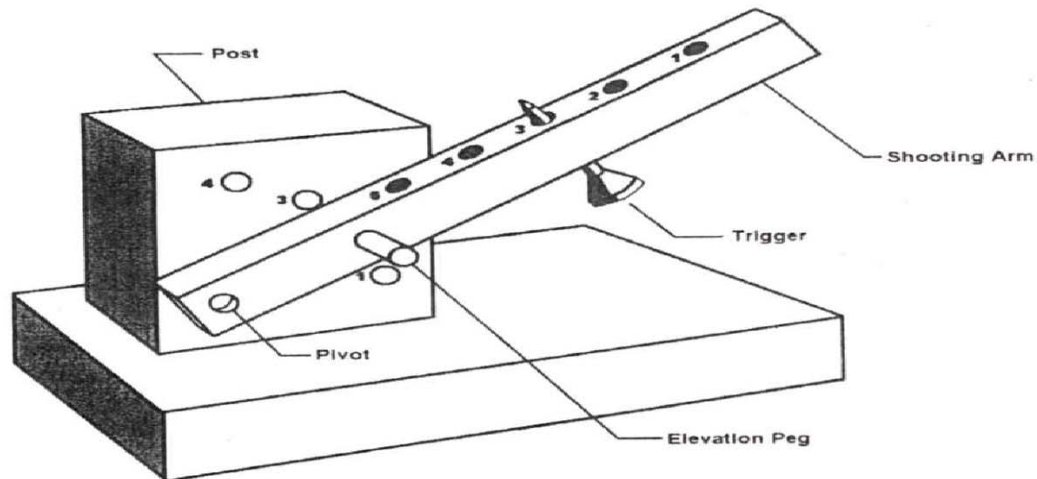
Number of Participants: 1 or 2 Approximate Set Up and Launch Time: 5 minutes

Impound: Yes

Eye Protection Required: Yes, but not required for impound.

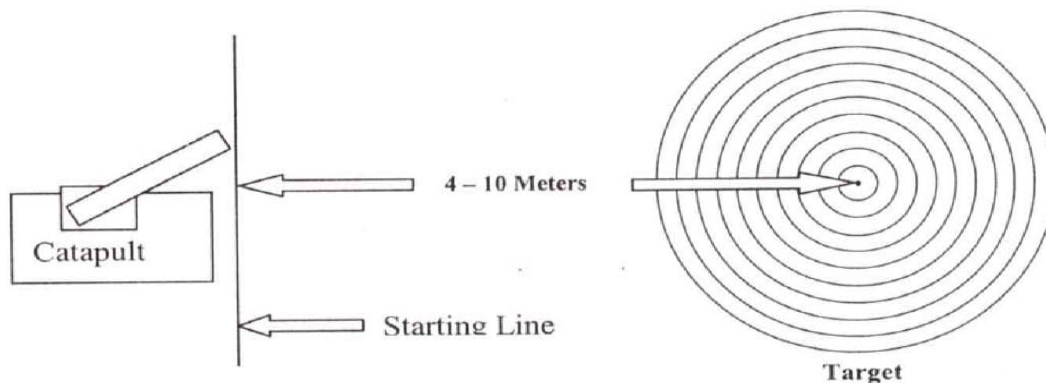
The Competition:

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



2. Catapults may be any size and constructed from any material, with as few or as many shooting positions as needed to hit a target.
3. Data will be collected and presented on a table which includes base position, shooting arm positions, and the distances traveled. Teams without data tables will be ranked below teams presenting a data table.

4. The target will consist of three to twenty concentric rings with a dot at their center. The smallest ring will be approximately 8 cm in diameter with approximately 5 cm between rings. The center dot will be approximately 2 cm in diameter. The center of the target will be located between four and ten meters from the starting line.



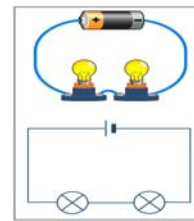
5. No part of the catapult may extend beyond the starting line.
6. Contestants will shoot three different rubber bands.
7. Students are required to bring their own rubber bands (student chooses sizes). Rubber band maximum size limit is 22 cm in length, measured with the rubber band suspended freely from 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 points, with each successively larger ring worth one 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. Teams without data tables will be ranked below teams presenting a data table.
5. Ties will be broken in favor of the team with: first, the most X's; second, the most twenties, continuing with nineteen's though one's. Any remaining ties will be broken in the same manner comparing each shot, 1st through 3rd, in order.
6. If ties still exist, the team with the best-prepared data table will win.



Competition Day Note: In the spirit of the competition, no assistance will be allowed within (or in the immediate vicinity of) an event venue during last-minute preparation, nor during an event.



Circuit Wizardry

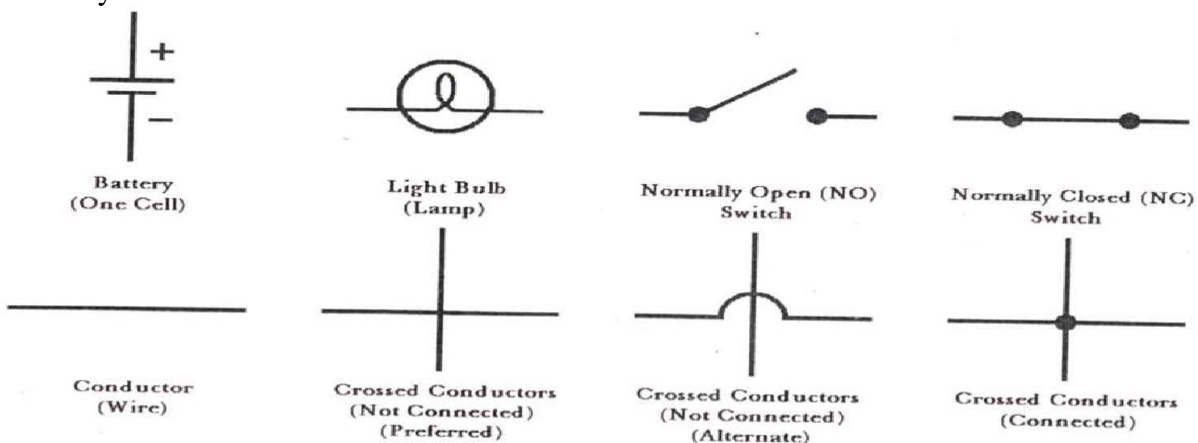
Description:

This event will challenge the student's knowledge of direct current (DC) circuits using low voltage batteries. Wall socket (AC) current will not be used!

Number of Participants: 1-2 Approximate Time: 50 minutes

The Competition:

Participants should be familiar with the terms conductor, insulator, open circuit, short circuit and know the difference between normally open and normally closed switches, series, parallel and series-parallel circuits. They should be able to identify and draw, from written instructions, circuits using the schematic symbols below:



Part One: Students will be given a set of circuit drawings and asked to answer questions (some with multiple parts) regarding the circuits. They may be asked what happens when a switch is closed/open or whether a lamp in a given circuit will light or not and to identify series, parallel, and series-parallel circuits. Points will be awarded for each correct answer.

Part Two: The student(s) will build a continuity tester from the materials provided (battery, lamp and wires), and use it to accomplish the following tasks: Given five different circuit cards or circuit boxes having contact points labeled A., B, C, etc., that are internally connected to form one or more multi-point circuits, determine which combinations or points on each card are connected together; given a tray of common household items, classify them as conductors or insulators. Points will be awarded for correctly identified circuits and conductors/insulators.

Part Three: Students will be given written instructions for three different circuits and asked to:

- A) Neatly draw each circuit using schematic symbols.
- B) Answer questions about the drawn circuits.
- C) Construct one of the three circuits using the materials provided.

Points will be awarded for successfully completing each task.

Scoring: The team with the highest total number of points will be the winner. The shortest amount of time used will break ties.



Competition Day Note: In the spirit of the competition, no assistance will be allowed within (or in the immediate vicinity of) an event venue during last-minute preparation, nor during an event.



Crime Busters

Description:

In this event, participants will use various tests to identify 8 unknown powders. The powders used will come from the following list **and this list only**:

Salt,	Cornstarch
Granulated sugar	Baking soda
Plaster of Paris	Limestone (calcium carbonate)
Flour	Sand

They will also be asked to match fingerprints and use paper chromatography to identify a note found at a crime scene.

Number of Participants: 1-2 Approximate Time: 50 minutes

Eye Protection Required: Yes

The Competition:

1. Students must bring and wear their own chemical splash-proof goggles and a lab apron or coat.
2. Due to safety reasons, touching or tasting of the substances will not be allowed.
3. Each team will be given seven vials, each containing one substance along with two vials containing a mixture of two substances. Students will be supplied with a list of possible powders.
4. Teams will be supplied with the following materials to aid in the identification of the powders: water, 1M hydrochloric acid (or vinegar), iodine solution (KI_3), a magnifying glass and several plastic cups. (These materials will be provided by the event supervisor).
5. Students will be given a set of fingerprints from several suspects. They will be asked to match them to fingerprints found at the scene.
6. Students will be asked to make a chromatogram from a pen and use this to help identify the criminals. Chromatograms will be turned in with the test sheet.
7. After all the evidence is collected, the students will be asked to identify who committed the crime and to explain in writing why they believe this is the criminal, making specific references to the evidence they uncovered during their labs.

Scoring:

1. The score will be based on the following formula:
Identification of the powders = 50%
Chromatography = 15%
Fingerprints = 10%
Identification of the criminal, including written component = 25%
2. Ties will be broken by taking into account the clarity and completeness of the written explanation (see number 7 in the “Competition” section above).



Competition Day Note: In the spirit of the competition, no assistance will be allowed within (or in the immediate vicinity of) an event venue during last-minute preparation, nor during an event.



Don't Bug Me

Description:

The contestants are to distinguish insects from non-insects, identify various body parts, characteristics, habitats, ecological significance, life cycles, and major classes and orders of arthropods.

Number of Participants: 1-2 Approximate Time: 1 hour

The Competition:

1. Participants will be asked two part questions at each of 20-25 stations. Depending upon availability, pictures, preserved or living specimens may be used.
2. Questions will include the major classes of arthropods and orders of insects. Classes: ARACHNICA, CHLOPODA, CRUSTACEA, DIPLODA, INSECTA (HEXAPODA). Orders: Thysanura, Orthoptera, Isoptera, Neuroptera, Ephemrida, Odonata, Mallophaga, Anoplura, Hemiptera, Hornoptera, Dermaptera, Coleoptera, Trichoptera, Lepidoptera, Diptera, Siphonaptera, Hynmenoptera.
3. Participants may develop and bring to the competition a collection of notes, charts, keys to aid them in answering these questions. All the contents of the binder must be student-generated, handwritten notes, that fit into one 2" 3-ring binder.
4. **Any samples, slides, and/or specimens used will be insects native to California.**

Scoring:

One point will be given for each correct answer. Tiebreaker questions will be predetermined through test questions (weighted) by the event supervisor.

SAMPLE QUESTIONS

Grasshopper

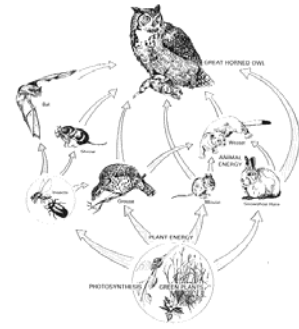
- A. To which order does this insect belong?
1. Diptera 2. Odonata 3. Orthoptera
- B. What is the purpose of the leg on the last thoracic segment?
1. walking 2. food gathering 3. jumping 4. mating

Picture if a feathery antenna of a moth

- A. What class of insects has this kind of antenna?
1. Coleoptera 2. Lepidoptera 3. Diptera
- B. What do we call this type of antenna?
1. laminate 2. club 3. plumes



Competition Day Note: In the spirit of the competition, no assistance will be allowed within (or in the immediate vicinity of) an event venue during last-minute preparation, nor during an event.



Food Web - Food Chains Owl Pellets

Description:

In this event, students will carefully dissect, analyze the contents of an owl pellet, and reconstruct the animal skeletons, as well as to answer questions on the diet of various owls, various food webs and predator-prey relationships.

Number of Participants: 2-3 Approximate Time: 50 minutes

The Competition:

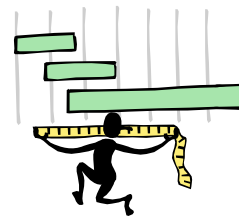
1. Prior to the competition, student teams should use and collect various resources (textbooks, trade books, Internet, guides, etc.) paying particular attention to the diets of various owls, as well as general information on food choices and webs, and predator – prey relationships.
2. Student-generated, handwritten notes, that fit into **one** 2” 3-ring binder.
3. At the competition, teams will be given an owl pellet, along with a toothpick, glue sticks, tweezers, needles, scissors, a magnifier and a cup of water for softening the pellet.
4. They are to observe and examine the external features of the pellet, dissect and attempt to reconstruct the skeletons of the animals devoured by their particular owl.
5. Through the dissection of the owl pellet, students should be able to identify the rodents or birds that are part of the owl’s diet.
6. A written test will be administered on the diet of various owls, food choices and webs, and predator – prey relationships.
7. Throughout the event, students need to work quietly and cooperatively to complete the task in the allotted time.
8. **For incomplete skeletal structures, students will not be penalized, however, they will be required to draw in any missing parts.**
9. **Students will be required to correctly identify and label the type of bones on the reconstructed skeleton.**
10. **Glue will be provided by the Event Supervisor for reconstructing the skeleton.**

Scoring:

1. Up to fifty points will be awarded for the procedures and identification of the diet of the owl, and up to fifty points will be awarded on the written test.
2. Tiebreaker questions will be predetermined through test questions (weighted) by the event supervisor.



Competition Day Note: In the spirit of the competition, no assistance will be allowed within (or in the immediate vicinity of) an event venue during last-minute preparation, nor during an event.



Metric Estimania

Description:

In this competition, the students will have to use their abilities to estimate accurately in the metric system. Students should know how to measure and /or calculate length, width, height, volume (in both cubic centimeters and milliliters), area, mass, circumference, diameter, radius and perimeter.

Number of Participants: 1-2 Approximate Time: 50 minutes

Materials: Students may bring a pen or pencil. No measuring devices allowed.

Competition:

Students will be handed a chart on which they will record their estimates.

Part One:

1. Objects will be placed on tables. **The number of objects used will be based on the number of teams competing; therefore, if there are twenty-five teams in the competition, 25 objects (representing, in essence, 25 stations),** will be placed on the tables. Supervisors should come prepared with extra objects if necessary.
2. Teams will move from object to object (station to station) making their predictions. Each station will specify which measurement they will be asked to predict. They will record their estimates on their provided tables with a pen/pencil.
3. **The Event Supervisor will determine which unit of measurement for the estimation, i.e. meters, centimeters, decimeters, millimeters.** If an answer is expressed using the standard system of measurement (inches, feet, etc.) it will be considered incorrect.
4. No use of hands, pencils or other devices during the estimated section is allowed. Teams that are caught doing this will be disqualified.
5. Teams will be given same amount of time at each station **not to exceed 90 seconds.** A signal will be given and teams will move to the next station.

Scoring:

1. Teams will be scored on the accuracy of their estimations.
2. Estimates will be compared to the actual measurements determined by the event supervisor before the event.
3. **Answers without units will be considered incorrect.**
4. **Supervisor will determine the acceptable range for correct answers for each station.**
5. **The tiebreaker will be overall best estimations for all stations.**



Competition Day Note: In the spirit of the competition, no assistance will be allowed within (or in the immediate vicinity of) an event venue during last-minute preparation, nor during an event.



Mystery Architecture

Description:

In this event, students will use the contents of a bag of materials (of which they had no prior knowledge) to construct a freestanding tower as high as they can, which will support the weight of a **baseball** at the top.

Number of Participants: 1-2 Construction Time: 20 minutes

The Competition:

1. Each team of students will be given a bag of identical building materials. The materials might include straight pins, paper cups, drinking straws, paper clips, tape, string, paper, etc. (This list provides only a sample of possible materials, for it is up to the event supervisor to choose any materials they feel appropriate for the event).
2. Only those materials supplied in the bag, as well as the bag itself, may be used to construct the tower. No other materials or adhesives may be part of the finished tower.
3. Students may bring a pair of scissors, a ruler and a pair of pliers to use as tools while building the tower. Each team may also bring their own **baseball** to use while building their tower; however, all towers will be tested using the same **baseball** (regulation size and weight) provided by the event supervisor.
4. Each team will have a maximum of twenty minutes to construct a tower to support a **baseball** at its highest point. The top of the **baseball** must be higher than any part of the structure.
5. The students are to inform the judges when they finish their tower. They will place the **baseball** provided by the event supervisor on top of their tower. The tower must remain standing for 10 seconds. After the ten seconds, the tower will then be secured so that the *height* can be measured. The *base* of the tower will be measured before testing.
6. The tower must be completely free-standing. It cannot be attached to the tabletop, floor, wall or ceiling.

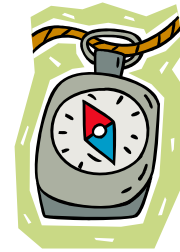
Scoring:

1. The height of the tower and the width of its base will be measured as precisely as possible by the judges. Since no building materials are to extend above it, the top of the **baseball** will be considered the highest point of the tower. The width of the tower will be measured at its base. The largest diameter of the base will be recorded.
2. All towers that support the **baseball** for ten seconds will be ranked. Those that do not will receive one point.
3. The towers in each of these groups will be ranked according to their height – tallest tower first, the shortest tower last.
4. The first tiebreaker will be smallest base measurement, and the second tiebreaker will be shortest construction time.

NOTE: The measurements of a standard **baseball**



Competition Day Note: In the spirit of the competition, no assistance will be allowed within (or in the immediate vicinity of) an event venue during last-minute preparation, nor during an event.



Orienteering

Description:

In this event, teams will follow a series of bearings around an orienteering course as accurately and quickly as possible.

Number of Participants: 1-2 Maximum Course Time: 5 minutes

The Competition:

1. Any type of compass may be used. **No electronic devices allowed.**
2. Each team will receive an instruction card from the event supervisor. No two instruction cards describe the same route.
3. These cards will list a starting position, as well as a series of bearings, which will direct the team from marker to marker around a course. Note: course distances will be the same for all teams.
4. A sample card follows:

#6
C
32 196 290 92 316

- a. #6 is the card number.
- b. The letter “C” refers to the starting position - the flag from which the teams will begin the course.
- c. The numbers below the letter “C” are the various bearings which the teams will follow from flag to flag. For example, at position “C”, teams will dial in the bearing of 32° . This bearing will lead them to their next location, where they will then dial into 196° , and so on.
- d. Each new location (marker, flag) has a letter placed upon it. As they move from marker to marker, teams will record these letters.

Scoring:

1. All teams which finish their courses accurately will be ranked above those who don't.
2. After accuracy level is taken into consideration, shortest time taken to complete the course will determine the final rankings.



Competition Day Note: In the spirit of the competition, no assistance will be allowed within (or in the immediate vicinity of) an event venue during last-minute preparation, nor during an event.



Rock Hound

Description:

In this event, students will prepare charts, identify various rocks and minerals, and describe their characteristics and possible origins.

Number of Participants: 1-2 Approximate Time: 50 minutes

The Competition:

1. Teams will be handed an answer sheet on which they will record their answers.
2. Teams will be allowed 50 minutes to work through a series of timed stations (approx. 2-3 minutes per station) identifying as many rocks and minerals as possible from a selected group. Samples may include such rocks as, but not necessarily limited to, the following:

ROCKS:	basalt	bituminous coal	conglomerate
	gneiss	granite	limestone (fossil)
	marble	obsidian	pumice
	quartzite	sandstone	schist (garnet)
	scoria	shale	slate

MINERALS:	calcite	copper	feldspar (pink)
	fluorite	galena	graphite
	gypsum	halite	hematite
	mica-biotite	pyrite	kaolinite
	quartz (chert)	quartz (crystal)	talc

3. Teams will also be asked questions about the rocks and minerals, such as their color, relative density, relative hardness, reaction to vinegar, shape, texture, etc.
4. Teams may bring in one handwritten charts/notes to the competition limited to one 8 ½ x 11 inch sheet of paper. Both sides of the page may be utilized. These charts may be used in the identification process and to aid in answering any questions.

Scoring:

1. One point will be awarded for each rock or mineral identified and each question answered correctly.
2. Teams will be ranked by total number of points awarded.
3. Tie-breaker questions will be predetermined by the event supervisor.

Suggested Preparation Resources:

- Boxed rock and mineral sets available through Science Olympiad, as well as varied other vendors.
- Rocks and Minerals guides, such as those published by DK.



Competition Day Note: In the spirit of the competition, no assistance will be allowed within (or in the immediate vicinity of) an event venue during last-minute preparation, nor during an event.



Starry, Starry Night

Description: Students will become the school's astronomy experts! They will become familiar with the constellations, planets, the Earth's moon, types of stars, tides and phases of the moon, etc.

Number of Participants: 1-2 Approximate Time: 50 minutes

The Competition:

1. Contestants should prepare for the test by looking through astronomy resources, such as textbooks, and sites on the Internet. They should be looking for pictures of the moon, planets, star clusters, nebula and galaxies.
2. Participants may develop and bring to the competition a collection of notes, charts, keys to aid them in answering these questions. All the contents of the binder must be student-generated, handwritten notes that fit into one 2" 3-ring binder.
3. Each team will be given one test booklet and one answer sheet. Team members may consult with each other by writing, but they may not speak to one another. Only one answer for each question will be accepted.
4. At the end of the testing period the test booklet and answer sheets will be collected from those teams who have not at that point turned in their responses.
5. The contestants will be shown either star charts, overhead slides, or photographs of star fields and be asked to identify indicated stars and constellations.

Scoring:

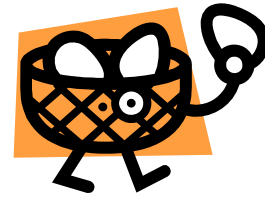
1. Teams will be ranked by total score.
2. Tiebreaker questions will be predetermined by the event supervisor.

Suggested Study Resources:

Fourth, Fifth and Sixth Grade California standards-based science textbook **and basic astronomy resources.**



Competition Day Note: In the spirit of the competition, no assistance will be allowed within (or in the immediate vicinity of) an event venue during last-minute preparation, nor during an event.



Straw Egg Drop

Description:

In this event, teams will construct a device meant to hold and protect a large, raw egg that will be dropped from a fixed height onto a target.

Number of Participants: 1-2 Construction Time: 20 minutes
Drop time: 5 minutes

The Competition:

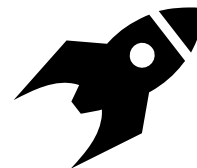
- Each pair of students will be provided with:
 - 20 plastic, flexible and/or non-flexible straws
 - One meter of one-inch masking tape
 - One pair of scissors
 - One large, raw egg
- Students will have twenty minutes to construct a device to cushion the egg and prevent it from cracking or breaking. Note that the egg is considered part of the device.
- The masking tape is intended to help fortify the plastic straw structure. No tape may be attached to the surface of the egg.
- They will have five minutes to drop the device onto a target from a height of 2 – 3 meters
- There will be one drop per team only.
- Plumb lines will not be allowed during the competition.
- Note: during construction time, if an egg is broken, a team will be assessed a distance penalty of 15 centimeters. If broken a second time, another 15 centimeters penalty is added.

Scoring:

- All devices will first be placed into one of three categories:
 - Unbroken – highest rank
 - Cracked but with no liquid escaping (membrane not broken) – middle rank
 - Broken/oozing (all others) – lowest rank
- Within their categories, each device will then be ranked by their nearness to the target (specifically, this is the distance from the center of the target to the farthest edge of the egg, egg part, device, or any part of the device that has broken off.) Eggs with the “broken penalty” will have 15 centimeters added.
- Please note that the event supervisor will have sole determination of the condition of the eggs after being dropped.
- Scoring examples:
 - An unbroken egg landing 24 cm. from the target would be ranked before any cracked or broken egg, no matter their distance from the target.
 - In the event that there are no unbroken or cracked eggs (a case where all eggs are broken and oozing), those landing closer to the target will be ranked higher.
- In the event of a tie, where both the condition of the eggs and their respective distances from the target, are the same, the smallest device, in terms of diameter, will be declared the winner.



Competition Day Note: In the spirit of the competition, no assistance will be allowed within (or in the immediate vicinity of) an event venue during last-minute preparation, nor during an event.



Water Rockets

Description:

Prior to the tournament, teams will use a 2-liter plastic carbonated beverage bottles to build up to two water rockets. The goal of the event is to keep a rocket aloft for the longest period of time.

Number of Participants: 1-3 Approximate Launch Time: 10 minutes

Impound: Yes No adjustments will be allowed between impound time and test time.

Eye Protection Required: Yes

The Construction:

1. The rocket's main vessel must be constructed out of **clear** 2-liter plastic carbonated beverage bottles (**no colored bottles please, they may not fit on the launcher**). **Bottles smaller than 2 liters and non carbonated water bottles can be dangerous.**
2. The main vessel will be used to hold a combination of water and pressurized air, which will propel the rocket when released from the launch pad.
3. For safety reasons, the main vessel must not be altered in any way (i.e. holes, scratches, increasing the volume, restricting the bottle's opening, the use of hot glue on the surface, as well as adhesives such as super glues (cyanoacrylate) that can weaken the bottle.
4. Further restrictions include commercially made rocket components, sharp/pointed objects, and parts made from glass and metal (except for a small snap swivel for attaching parachutes).
5. Hot glue and super glues may be used on parts of the rocket other than the main vessel.
6. Fins, parachutes, and other items may be added to the outside of the bottle to increase time aloft.
7. Rockets(s) must fit on a flat launch pad provided by the event supervisor. Therefore, fins should not extend below the mouth of the bottle.
8. Energy to propel the rocket must come only from the water and air pressure in the bottle. Other sources of potential or kinetic energy are not allowed.
9. Only plain tap water provided by the event supervisor may be used in the rocket. No other material of any type may be put in the bottle or added to the water.
10. A water level line may be marked on the bottle to aid in adding water in the case there is no graduated cylinder available.
11. Parts of the rocket may separate during flight, but they must remain attached together by a string/lanyard.
12. The school name and team number must be clearly marked on all rockets and parachutes.

The Competition:

1. Rockets, along with any repair kit, spare parts and extra parachutes, will be impounded at the posted time. No adjustments will be allowed between impound time and test time.

2. Any parts found to be dangerous (e.g. glass or metal), illegal (e.g. commercially made rocket parts), or which prevent a rocket fitting on the launch pad, must be removed before the rocket can be launched.
3. If it is determined that a rocket does not meet safety and/or construction requirements, a team may make alterations during their 10 minute test time.
4. Those rockets which cannot be made to fit the launcher, or those that, in the judgment of the event supervisor, are unsafe, will not be launched.
5. Team members must wear eye protection for the duration of the launches.
6. Two launches will be allowed. Different rockets may be used for each launch.
7. Teams will add the desired amount of water to the rocket before each flight and may make alterations or repairs between launches (if the same rocket is launched a second time).
8. Event supervisors may assist the teams in setting up their rocket on the launch pad.
9. Other outside assistance/coaching from the sideline is not permitted.
10. The event supervisor will pressurize the rocket to 75 p.s.i. and launch it. (It is recommended that during practice sessions coaches do the pressurizing and that the 75 p.s.i. is not exceeded).
11. Team members may not hold their rocket during pressurization. (It is recommended that rockets are designed to stay as intact as possible due to weather conditions such as a wind).
12. Once a rocket has been pressurized, it must be launched. In case of high winds, the supervisors will launch the rocket as quickly as possible. It will be the supervisor's decision as to whether the flight should be considered unofficial due to weather conditions.
13. In the event a rocket suffers from a weather-related event (i.e. wind blows off nose cone), it will be the event supervisor's decision as to whether or not another launch is allowed.

Scoring:

1. Judges will measure and record the time aloft for each flight. Time starts when the rocket is launched, and stops when any part of the rocket touches the ground or any object in contact with the ground (e.g., tree, building).
2. A team's best flight (that in which the rocket remains aloft for the greatest length of time) will be used as their final score.
3. Rockets will be ranked in the following manner:
 - a. Teams whose rockets meet all of the construction requirements will be ranked in the first tier. These will then be ranked by time aloft. (Rockets that stay attached will be ranked higher than rockets that come apart. See construction rule #11).
 - b. Rockets that do not meet specifications will be ranked lower than those participants that meet specifications.
 - Tier 1- longest flight time and meets specifications
 - Tier 2 - longest flight time yet detachment of part of rocket during the flight
 - Tier 3 - rocket launched but does not meet specifications
 - Tier 4 - rocket unable to be launched (e.g. will not fit on launcher) yet receives 1 point.
4. While longest time aloft is the goal, and will usually determine the winner, the tier placement is vital. For example, a rocket in the second tier could end up with the longest time aloft, but would still be ranked below all rockets in the first tier. Therefore, it is highly recommended to adhere closely to all construction requirements.
5. Ties will be broken using teams' lesser flight times. Teams with two flights, therefore, will have an advantage over those teams with only one flight in a tie situation.



Competition Day Note: In the spirit of the competition, no assistance will be allowed within (or in the immediate vicinity of) an event venue during last-minute preparation, nor during an event.



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 Competition:

1. One student will be shown a contraption built from blocks, science equipment, Tinker Toys, Legos, K'NEX, PVC pipe fittings, Lincoln Logs, **pipe cleaners** or other inexpensive materials. The student will have 25 minutes to write a description of the object and give directions on how to reproduce it.
2. His/her partner (in another room) takes the description and attempts to recreate (build) the original object in twenty minutes.
3. No diagrams will be allowed and no verbal or other form of communication will be allowed in passing.

Scoring:

The team which 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.

