Elementary Science Olympiad



Exploring the World of Science

Elementary Science Olympiad for All

SCIENCE OLYMPIAD ACTIVITY PLANS FOR STUDENTS WITH DISABILITIES







SCIENCE OLYMPIAD WELCOME

Welcome to **Elementary Science Olympiad for All**, a project that provides K-6 students of all ability levels with a dynamic, engaging STEM experience.

Many elementary classrooms and schools today are fully inclusive. With that in mind, we worked with the Double Good Kids Foundation to create Science Olympiad activity plans for students with disabilities that include individualized accommodations tailored to the following needs:

- Academic
- Communication
- Health
- Vision/Hearing
- Motor (Small and Large)
- Functional
- Social/Emotional

The 10 classic Science Olympiad events we used as a base for our plans touch every letter in STEM and complement any school's science curriculum. There's something for everyone! Bugs, rocks, catapults, planes and towers will spark imagination and creativity, providing opportunities for teamwork, collaboration and shared successes. In each **ESO for All** plan, you'll find insightful advice from our disability experts, like outlining shapes on Monster Cards with glue so that students with sight impairment can use their tactile senses – or providing a student with fine motor disability a bulb syringe instead of a pipette so they have more success handling the instrument.

Here's how to use the **ESO for All** plans: first, read the Introduction to Accommodations and Terminology sections. Then, think about in which setting these plans will work best for your school – in class, as a community event, or a mini-tournament? Once you've decided, choose a few activities and work with your special education team to fill out an accommodation worksheet for each student. The enhancements offered will give your staff and assistants the guidance and support they need to run a fantastic event!







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Implement **ESO for All** in:

A Classroom Setting

The **ESO for All** events are perfect as a culminating activity after a unit of instruction or even as an enhancement to your science instruction. Aligned to the Next Generation Science Standards (NGSS), these events complement any curriculum.

A Fun Day or Night

• **Fun Day:** An Elementary Science Olympiad event run by classroom teachers during the school day. Parent helpers can assist! Elementary Science Olympiad Fun Day can take many forms: as small as one teacher organizing a Fun Day for the students in a single class, or as big as a Fun Day for all students, school-wide and planned by the entire staff. It can include a particular grade or all grades, using classrooms, multipurpose rooms, the library, gym or even the outdoors! Students are usually given a partner to work through each event. There are no winners or losers – just hands-on science opportunities.

• **Fun Night:** An after-school K-6 activity run by both teachers and parents, normally in the evening. During a Fun Night, students in teams of three or four are led by a parent volunteer and rotate through a series of three half-hour events designed to meet age-appropriate skills and knowledge bases. While the Fun Night is similar to Fun Day in that each room hosts a different event, Fun Night relies more heavily on parent volunteerism than on staff preparation. This is one way to lessen the load on teachers and staff while still having a very successful, curriculum-driven science event at your school! It's also a rare chance for working parents who cannot normally participate in volunteer activities at school during the day to experience an event with their child.

Expert Help

One of the most exciting factors of Elementary Science Olympiad Fun Night is the addition of real scientists to the mix. When a child learns how to look for scientific clues in a crime scene from a real police officer from the Evidence Unit, it makes a lasting impression. Fun Night gives each child an opportunity to get close and personal with a geologist, a naturalist or an electrical engineer-and in many cases, this will be their first contact with such a professional. For example, for Straw Tower, ask an architect or engineer to assist or get a local pilot to come in and demonstrate the physics of flight for Aerodynamics.







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Teamwork and Preparation

Fun Night gets kids excited about science, and also about teamwork. Each group of three or four students is required to choose a team name and a team color, and then encouraged to dress for the part on the night of the event. It adds an aura of fun and excitement, reinforces the team concept, and gives the kids an opportunity to get together before the event to plan their theme.

Competitive Tournament

This style would most closely model the Science Olympiad of Grades 6-12, where student teams compete to gain points as they participate in a lineup of events. Organizers create a schedule featuring a set number of activities and can even invite other schools! A scoring system tabulates team scores, and winners receive medals and trophies.

For more information on all styles of Elementary Science Olympiad see <u>www.soinc.org</u> #ESOforAll







INTRODUCTION

Accommodations

The following accommodations are designed to be a springboard to a more inclusive experience for all Elementary Science Olympiad participants.

Included is a list of terminology describing a variety of needs along with possible difficulties a participant may exhibit. Needs indicated on the terminology page parallel the accommodations page.

Each participant will receive his or her own accommodations page. A teacher or service provider familiar with the participant's needs should fill out the accommodations page for each participant, and the participant's Individual Education Plan (IEP) should be used to assist in filling out the accommodations page for each Science Olympiad event. Under each area of need are possible accommodations and the accommodations should be marked based on the participant's needs; multiple areas of need may be marked along with multiple accommodations provided.

Accommodations are not limited to the provided list for each event. Please feel free to add accommodations based on participant's needs, as indicated in their IEP, to provide an inclusive and engaging Elementary Science Olympiad experience for all.

Accommodations Terminology:

ATTENTION: involves listening to, watching, or considering something or someone very carefully.

• Difficulties may include the inability to get focused or stay focused which may include impulsivity and high activity.

BASIC READING: involves reading words in isolation and in passages fluently.

• Difficulties may include frequent mistakes when reading aloud, along with repetition of words and numerous pauses.

COMMUNICATION: involves understanding and conveying information effectively and efficiently. A communication disorder may include stuttering, impaired articulation, a language impairment, or a voice impairment.

• Difficulties may occur with the accurate production of speech sounds, flow of speech, voice quality, understanding what others are saying and/or expressing thoughts and ideas.







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FINE (SMALL) MOTOR: involves the ability to use small muscles, specifically in the hands and fingers.

• Difficulties may occur when trying to pick up small objects, hold a spoon, turn pages in a book, or use a crayon or pencil.

FUNCTIONAL SKILLS: involves managing one's environment for everyday living skills.

• Difficulties adversely impact ability to complete self-help, recreation, health, and functional academic skills independently.

GROSS (LARGE) MOTOR: involves the ability to use large muscles for body movements which may include core stabilization.

• Difficulties may occur in everyday functions such as standing, walking, running, sitting upright along with eye-hand coordination skills such as kicking, throwing and catching.

HEALTH: involves strength, vitality, and alertness.

• Health issues may include having limited strength, vitality, or alertness due to chronic or acute health problems that adversely affect the child's educational performance.

HEARING: involves the process, function, or power of perceiving sound.

• A hearing impairment is a loss in hearing, whether permanent or fluctuating, with or without amplification, that adversely affects a child's educational performance

MATH COMPUTATION AND REASONING: computation involves finding an answer to a problem using addition, subtraction, multiplication, division or logic. Math reasoning involves critical thinking to make use of all other mathematical skills.

• Difficulty occurs in the area of mathematics calculation (arithmetic) and/or mathematics problem solving. A student may also confuse mathematical symbols and misread numbers.

ORGANIZATION: involves planning, arranging, coordinating, structuring, and managing.

• Difficulty with organization involves knowing where to begin a task or proceed with the steps in the task. Difficulty may also occur following directions to complete a task.

READING COMPREHENSION: involves the understanding of words read in isolation and in passages.

• Difficulties in comprehension impact the understanding of directions, the overall message, and the vocabulary in and out of context when reading words, sentences, and passages.







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SENSORY PROCESSING: involves trouble receiving and responding to information through the senses.

 Difficulties may include misinterpretation of everyday sensory information, such as sound, touch and/or movement. It may affect one sense or multiple senses. There may be an over sensitivity to stimuli in the environment.

SOCIAL/EMOTIONAL INTERACTION: involves building and maintaining interpersonal relationships.

- Difficulties may involve an inability to build or maintain satisfactory interpersonal relationships with peers or teachers, may include inappropriate types of behavior or feelings under normal circumstances, a general pervasive mood of unhappiness or depression, and/or a tendency to develop physical symptoms or fears associated with personal or school problems.
 - **PRETALK:** involves introducing any new social situations to a student, through talking, pictures or photos or relating the situation to something the student already knows, in order for them to feel comfortable with the situation.

VISUAL: involves the process, function, or power of seeing.

• A vision impairment, even with correction, adversely affects a child's educational performance. This includes both partial sight and blindness.

WRITTEN LANGUAGE: involves formulating thoughts and ideas in written words, sentences, and paragraphs.

• Difficulties may occur when formulating and organizing ideas and using correct grammar and spelling to put ideas in writing.

Although accommodations follow each set of rules, our accommodations list is by no means comprehensive and you will find that often times it needs to include others. We have included lines for you to add any additional accommodations. Additionally, you may want to consider adjusting the amount of time given for any one event, as well as the number of students working on any given event. Though if you do adjust the number of students on an event, we strongly recommend that you never have a student working alone.

Additional information pertaining to areas of special needs can be sourced from these websites:

Illinois State Board of Education (ISBE) <u>https://www.isbe.net</u> Individuals with Disabilities Education Act (IDEA) <u>https://sites.ed.gov/idea</u>







Participant's Name:

Event Description:

Student teams will learn about basic shapes used in the construction of a tower or tall building. They will also learn about what happens when you apply stress, pressure, or a load to a tower. Finally, the teams will practice building the tallest tower possible out of straws and masking tape that will hold a tennis ball at the top for three seconds.

Materials:

- 1. Twenty five drinking straws per team of 2 or 3 students
- 2. Rubber bands to make straw bundles
- 3. One roll of 3⁄4 " masking tape
- 4. A table top or floor space large enough so each team can construct a tower
- 5. One tennis ball per team
- 6. One set of master sheets (attached) per team
- 7. For students: one metric measuring tape (or meter stick) to measure height or tower
- 8. For teachers: one long metric measuring tape to measure heights of towers
- 9. Access to white board/chalkboard with writing materials

Teacher Preparation/Set Up:

- 1. Divide straws into 25-straw bundles for each team
- 2. Cut or tear off 25cm long strips of masking tape, one strip per team
- 3. Using straws, make up a set of simple structures found on the "Simple Structures" page. Follow the directions on this page when you demonstrate the shapes/structures to your students
- 4. Copy these attached sheets:
 - a. Basic Tower Design
 - b. Simple Structures
- 5. You may wish to practice building a tower yourself before this lesson

Procedures:

Part 1: Introduction - Towers (15-20 minutes)

- 1. Say: "Since today's activity is about building towers, let's talk about some examples of towers you have seen." (Write on board as students respond. Examples: cell phone towers, water towers, electrical towers, skyscrapers, famous buildings)
- 2. Search online for videos of famous building to share with students







- 3. Discuss what is the same about the towers (i.e. larger at the bottom and smaller on top, some have legs, columns, and braces).
- 4. Using the Basic Tower Design Sheet, explain the job of each component of the tower. Tell the students that sometimes the supporting structures are hidden inside the building so we don't see them from the outside.
- 5. Direct the students to the "Simple Structures" sheet. Show them the simple structures you made beforehand. Follow the instructions on the sheet and demonstrate the properties of the structures.
- 6. Say: **"When you make your tower, you will be given a bundle of straws and some tape. You will not be given more, so you have to use these items carefully!** You may use the tape to connect the straws, but you may NOT use the tape to attach your tower to any other surface. Can anyone tell me how we can join the straws together besides using tape?" (Accept responses.)
- 7. Ask if the students have any questions and answer them.

Part 2: Making Towers (30 minutes)

- 1. Say: "Now we are ready to build our towers. You will have 30 minutes to build the tallest tower that will hold a tennis ball at the top of the tower. The tennis ball must stay in place for at least 3 seconds."
- 2. Distribute the materials (tape, straw bundles, and tennis balls) to the teams. Start timing.
- 3. As the teams are building their towers, circulate to help the students. A few times during the half hour, remind the students of the time remaining.
- 4. If it looks like the teams need more time, you may extend the time period, as this is not a competition per se. You can start measuring the towers that are ready while the other teams finish their towers.

Part 3: Measuring the Towers (20 minutes)

 Instead of moving towers, students should stay put when they finish. As students finish their towers, have one team member write the students' names on the board. This way, you can walk to the towers and measure them in any order. Have a teacher or a responsible student be the "recorder" and write the towers' heights on the board next to the students' names as heights are determined. The students who are finished and waiting should courteously watch the other teams as they are getting measured. (This is part of the fun!)

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- 2. To measure:
 - a. Measure the height of the tower (without the ball) using a meter stick or tape measure.
 - b. Have one of the students in the team place the tennis ball on the top.
 - c. When the tennis ball is in place, start to time for three seconds. (You can use a clock with a second hand or a stopwatch.)
 - d. Have the recorder write the height of the tower on the board next to the students' names.
 - e. If the tower stood, put a + before the names; if it fell, put a next to their names.
 - f. Continue in this fashion until all the towers are measured.

Part 4: Closure/Wrap-Up/Clean-Up (20 minutes)

- 1. Look at the towers and the data with the students and discuss what made for success and what the flaws were. Talk about shapes, bracing, joints, and attachments. Ask if the placement of the tennis ball made a difference. Were there patterns in the construction of the successful towers?
- 2. For clean-up, students can either take their towers home or disassemble the towers and put them in the trash. (You decide!)

Participant Accommodations: The marked area(s) indicate need(s) along with possible accommodations. There may be more than one or multiple accommodations to choose from in each marked area depending on the level of the participant's need(s).

Academic:

Basic Reading:

- □ Teammate(s) may read information included on Basic Tower Design Sheet and Simple Structure sheet.
- Provide pictures with labels on Basic Tower Design Sheet and Simple Structure sheet for terminology such as legs, columns and braces.
- Provide an electronic version of Basic Tower Design Sheet and Simple Structure sheet. Participant may use text to speech feature found on a laptop or an extension such as Google Read and Write to then listen to the text while viewing the pictures.
- Other accommodation/s:

Reading Comprehension:

Provide clear, simplified language on Basic Tower Design Sheet and Simple Structure sheet along with labeled visuals of the tower designs and simple structures.



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	 Provide an additional reference sheet with definitions and pictures terminology. Provide a guide sheet showing simple structures, squares, triangle cubes, built out of straws. Include clear and concise language guid to build structures. Other accommodation/s:	s of structure es, pyramids and ding participant how system. ed. dditional materials ills for support with
Commun Liste	 unication: ening Comprehension: Clarify any needed vocabulary such as stress, pressure, load, legs, tower and bundle. Vocabulary is not limited to terms in the example Check for understanding by having participant repeat or rephrase Repeat directions as needed. Rephrase directions and information in clear simple language one When introducing towers, provide labeled pictures of the example towers, water towers, electrical towers, skyscrapers, famous build When introducing basic tower design and simple structures, provi for vocabulary such as joints, columns, braces and legs. Other accommodation/s: 	columns, braces, ple. steps as needed. step at a time. es given: cell phone lings de visuals with labels

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		STRAW TOWER
	Oral	Language:
		Allow additional time for participant to stop, think, and share with his/her team.
		Participant may use sign to communicate. Participant may point to pictures or symbols to communicate. For example, participant
		may point to a picture representing structures such as square, triangle, cube or
		pyramid to indicate he/she thinks the team should use a pyramid structure to support
		the base.
		Other accommodation/s:
He	alth:	ntion
	Attel	Prior to the event, determine if working with a partner or in a team of three would
	-	increase participant's focus.
		If participant has a difficult time attending to the task, give one step at a time, and
		check for understanding.
		Provide guestioning while building tower to increase participant's engagement.
		Provide participant with a specific role.
		Determine if working at a table or on the floor would help increase the participant's focus. A defined space, such as working at a table, with the ability to stand or move within the space may increase the participant's focus
		A visual cue, such as an agreed upon hand gesture, may be used to discreetly redirect
	_	the participant to the task.
		A tactile cue, if no tactile sensory needs, may be used, such as a tap on the shoulder
		to discreetly redirect the participant to the task. Allow participant to take a break, such as getting a drink, to refocus
		Allow participant to take a break, such as getting a dink, to refocus. Although additional time may be provided, prompt student every 10 minutes how
		much work time remains to increase participant's focus. Prompts may be every five
	_	minutes if needed.
		vvait to distribute tennis balls to teams if they are a distraction to participant.
	Med	ical Needs:
		Check and verify medical need(s). Participant will often have a specific health plan.
		Participant may be provided with breaks if fatigued due to health needs.
		Other accommodation/s:
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Vision/Hearing:

- Uision:
 - Provide clear and concise verbal directions and instruction.
 - Provide participant with bright solid color straws.
 - Allow participant to handle teacher made simple structures as a tactile reference point prior to building with teammate(s).
 - Participant may work in a team of three if additional support is needed to build structures.
 - Provide hand over hand support for participant to build straw structures.
 - □ Enlarged print with bold lines on Basic Tower Design Sheet and Simple Structure sheet.
 - □ If straw requires cutting, mark the straw with a dark bold line where participant should cut straw or teammate may cut straw.
 - Provide participant's team with a bright and bold color tennis ball.
 - Other accommodation/s: _____
- Hearing:
 - □ Look at participant when providing instruction and directions. Direct participant to look at presenter for instruction and directions.
 - Give visual directions/steps accompanied by verbal directions. Visuals may be written, pictures or both.
 - Participant may use an auditory device to filter sounds and reduce background noise.
 - Provide participant with a reference sheet with definitions and pictures of structural vocabulary and terminology when presenting as a visual reference.
 - □ When introducing towers, provide labeled pictures of the examples given: cell phone towers, water towers, electrical towers, skyscrapers, famous buildings
 - □ Other accommodation/s: _

Motor:

- Sensory:
 - □ If noise is a factor, find an area to build tower with reduced noise.
 - □ If noise is a factor, participant may use ear plugs or sound blocking headset to reduce noise.
 - □ Although additional time may be provided, prompt student when there is five minutes of work time remaining.



	Elementary ScienceOlympiad STRAW TOWER
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Fine Mc Fine Mc Pa mc Pa tea tea tea pa tea tea	Ther accommodation/s:
Gross M Pa M If t or of Tea str Str Ot	Notor: rticipant may work in a team of three if additional time is needed due to gross otor needs. the participant is in a wheelchair, requires specialized seating or needs to be seated uses a walker, ensure participant's teammate(s) are able to work at a table instead on the floor to build the structure. ammate may assist participant with handling materials such as assembling ructures to build tower and placing tennis ball on tower. by de ample workspace at table to build the tower.
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Functional:

Navigation of Environment:

- Participant may work in a team of three to assist with navigating the environment.
- Provide participant with a designated seat at a table or on the floor with teammates so he/she knows where to sit. Location may be marked for participant.
- Have teammate(s) provide verbal prompts indicating next step.
- Show participant location he/she will work at prior to the event along with at the start of the event.
- Other accommodation/s: ______

Social/Emotional:

Social Interactions

- Provide participant with positive peer teammate(s).
- Prior to the event, determine if participant may interact more successfully with a partner or in a team of three.

Provide participant with a predetermined, adequate and defined work space if he/she requires space when working with team members. The location(s) may be discretely marked with a small colored sticker.

- Discuss expectations for working with materials as a team or with a partner.
- Provide roles based on participant's strengths. For example, if strength, participant may build cubes and pyramids while partner or teammates attach structural elements with tape.
- Provide participant with positive feedback stating specifically what was done well when appropriate interactions occur with teammate(s).
- □ If taking towers home, discuss with participant and team a fair method to determine who will bring home the tower.
- □ Other accommodation/s: _____

G Social Rules and Expectations:

- Provide clear rules and expectations.
- Pretalk appropriate handling of materials such as straws and tennis ball.
- Provide picture cues with rules and expectations.
- Wait to distribute tennis balls to teams if it will decrease the participant's ability to follow social expectations.









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BASIC TOWER DESIGN



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SIMPLE STRUCTURES

Square



Use 4 drinking straws and tape to form a square. Stand the square on edge and apply a downward force to the top of it. The square deforms easily due to the weakness (in rotation) of the corner joints.

Triangle



Make a triangle in the same manner using 3 straws and tape and test it as you did the square. The triangle won't change shape unless you push hard enough for either a joint or one of the straws to break.



Fortunately a 4-sided figure can be changed into 2 triangles by connecting 2 opposite corners together. Add a rigid cross brace to the square and test it again. Now it is much stronger.



Use squares and triangles as a base to form pyramids and cubes which will be the building blocks of your Straw Tower.

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For a complete listing of events, state websites and tournament information, or to learn more about becoming a registered member team, please visit our website or contact us at: www.soinc.org



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