

Boomilever 2021
Supplemental Rules for Satellite Meets

1 April 2021

These rules supplement Official Science Olympiad rules for the Boomilever event for both Division B and Division C. The Official Science Olympiad rules can be downloaded for free from [Digital Rules for 2021](https://store.soinc.org/us/page/manuals) (<https://store.soinc.org/us/page/manuals>). These supplemental rules are intended to define expectations for consistency of the Test Apparatus and the testing process.

Definitions:

- **Fixed Camera:** A camera that is in a fixed position that can show the test stand during the testing. This camera will need to be capable of joining a Zoom Meeting or the method prescribed by the meet officials. Often a laptop or cell phone on a tripod is used.
- **Mobile Camera:** A camera that can move around the test site to provide the Event Supervisor views of the Test and Test Apparatus. This camera will need to be capable of joining a Zoom Meeting or the method prescribed by the meet officials. The Event Supervisor will direct the Remote Supervisor on what needs to be shown by the Mobile Camera. Often a cell phone is used.
- **Remote Supervisor:** a person over the age of 18 that can be an impartial party to attend the test, provide onsite supervision, help verify all dimensions and construction requirements, be a safety observer and operate the mobile camera during the test.
- **Scale Resolution:** The resolution of a scale is the smallest increment in applied weight that can be detected and displayed on the scale.

SAFETY: All participants and the Remote Supervisor must keep in mind that this event includes heavy weights, possible flying objects, and dusts. Safety precaution including wearing of class B eye protection is required. Participants must wear flat full coverage shoes and may not compete with bare feet, flip-flops, or open toed shoes. At any time, the event can be stopped by the Remote Supervisor or Event Supervisor for safety concerns such as an poorly secured test stand. The test will end at that point and the Boomilever will be scored.

Paragraph numbers below refer to Official Science Olympiad rules for the Boomilever.

Supplemental Rules

1. Description: Teams will design and build a Boomilever meeting requirements specified in these rules to achieve the highest structural efficiency. In addition, the competing team will provide:
 - all Test Apparatus and scales meeting the requirements of Section 5 of the Official Science Olympiad rules and applicable Supplemental Rules in this document
 - a Remote Supervisor
 - Two (2) video and audio feeds.
 - Eye Protection: Requirements for eye protection shall apply to the team members and the Remote Supervisor.

4. Part I – Each team must provide two (2) live video and audio feeds via Zoom or the method prescribed by the meet officials. One fixed feed and one mobile feed with sound and microphone. The Boomilever will be scored in Tier 3 if no video feeds are provided during the Test Period. If only one camera is provided during all or a portion of the Test Period, then the Boomilever will be scored in Tier 2 as long as necessary information can be obtained by the Event Supervisor.

4. Part I – Prior to 4. Part I. the Event Supervisor will review and qualify the Test Apparatus and weighing scales (steps a – e below). The steps for the Test Period will include steps a – h and must be completed in the time defined by 4. Part II.b in these supplementary rules.
 - a. Welcome and Introduction
 - b. Review and qualification of the Test Wall (5.a and supplementary rules)
 - c. Review and qualification of the Loading Assembly (5.b)
 - d. Review and qualification of the Sand (5.c)
 - e. Review and qualification of the Stabilizing Sticks (5.d and supplementary rules)
 - f. Check-in (4. Part I)

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- g. Testing (4. Part II)
- h. Close out

4.Part I.b – Boomilever scale: The scale resolution should be 0.01 gram with at minimum resolution of 0.1 gram. If the scale resolution is larger than 0.1 gram (for example 0.2 gram or 1.0 gram), the Boomilever will be scored in Tier 2. The scale must read in grams, if the scale reads in any other unit of measure, the Boomilever will be scored in Tier 2. NOTE! Digital scales will be the only acceptable measurement device. If dial scales, manual beam scales, balance scales, spring scales, or similar are used, the Boomilever will be scored in Tier 2.

4.Part I.e – Sand scale and load verification: The scale resolution should be in grams. If scale resolution is greater than 5 grams (for example 6 grams or 10 grams), the Boomilever will be scored in Tier 2. The scale must read in grams or kg (if kg, then it must display 3 digits to the right of the decimal point) If the scale reads any other unit of measure (newtons, pounds, etc.), the Boomilever will be scored in Tier 2. NOTE! Digital scales will be the only acceptable measurement device. If Bathroom scales, dial scales, manual beam scales, balance scales, spring scales, luggage handheld scales or similar are used, the Boomilever will be scored in Tier 2. Before check-in, the Remote Supervisor must demonstrate the combined mass of the Loading Assembly and Sand is between 15,100 and 15,200 grams.

4.Part II.b

- Nine (9) minutes will be allowed for Test Apparatus review and qualification, check-in and close out measurements.
- Six (6) minutes will be allowed for the set-up and testing of the Boomilever to maximum load or failure (4.Part II). If Set-up and Testing takes longer than the allowed 6 minutes, the Boomilever will be scored in Tier 2.
- Fifteen (15) minutes will be allowed in total to complete Section 4 and Test Apparatus review and qualification, review and close-out (Test Period). If a competition entry takes longer than 15 minutes, the Boomilever will be scored in Tier 2.
- A countdown timer that has a resolution in seconds and has an audible alarm must be used. If a timer meeting the requirements is not available, the Boomilever will be scored in Tier 2.

5.a. - Before check-in, the Remote Supervisor must demonstrate the Testing Wall meets the Official Science Olympiad rule requirements including but not limited to:

- 5.a.i. Testing Wall is vertical, solid and rigid. If the Testing Wall does not meet these requirements, the Boomilever will be scored in Tier 2. Should the wall noticeably shift from a vertical position during the test, the test will be stopped and scored at that point, even if the Boomilever has not failed or time has not expired.
- 5.a.ii. and 5.a.iii. Use of an incorrect “J-hook” or incorrect attachment that cannot be corrected in the test period will result in the Boomilever being scored in Tier 2
- 5.a.iv and 5.a.v. The Testing Wall must be properly and clearly marked so the Event supervisor can see the wall marks on the video feed. If the marking cannot be rectified during the test period, the Boomilever will be scored in Tier 2
- All length measurement devices must have a resolution of 1 mm. If the measurement device reads in any other unit of measure, the Boomilever will be scored in Tier 2.

5.b - Before check-in, the Remote Supervisor must demonstrate the Loading Assembly meets all of the requirements. Be ready to demonstrate the combined mass of the Loading Assembly does not exceed 1.5 kg. Failure to meet the Loading Assembly requirements will result in the Boomilever being scored in Tier 2. All length measurement devices must have a resolution of 1 mm. If the measurement device reads any other unit of measure, the Boomilever will be scored in Tier 2.

5.c - Before check-in, the Remote Supervisor must demonstrate the Sand meets all of the requirements. Failure to meet the Sand requirements will result in the Boomilever being scored in Tier 2.

5.d - Before check-in, the Remote Supervisor must demonstrate that the pair of Stabilizing Sticks meets all of the requirements or at minimum, two dowels or sticks approximately 18” long are supplied. Failure to meet the Stabilizing Stick requirements will result in the Boomilever being scored in Tier 2.



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Additional Notes for the Remote Supervisors at Satellite Meets.

- Additional information on the rules can be found at: [NSO Boomilever Page](#) and [WSO Boomilever Guide](#)
- TEST APPARATUS: The Remote Supervisor must provide a test apparatus that meets the requirements of section 5 Test Apparatus and Supplemental Rules for Satellite meets. The Remote Supervisor is to provide the following but not limited to:
 - Testing Wall
 - Loading Block assembly
 - Sand or another clean, dry free-flowing material
 - Two bucket-stabilizing sticks that satisfy the requirements of rule 5.d or at minimum, two dowels/sticks approximately 18" long
 - Boomilever scale
 - Sand scale
 - A countdown timer that has an audible alarm
- Boomilever Scale: If your school cannot provide a scale for the Boomilever measurement, a low-cost scale that meets the minimum requirements for this event is an **ACPro-200** made by American Weigh Scales that sells for about \$20.00 on Amazon. REMEMBER this scale has a 200-gram capacity with a 0.01-gram resolution. if your Boomilever will be heavier than 200 grams, this scale will not work. This is simply an example and is not a recommendation or requirement, any scale meeting the rules and supplemental rules may be used.
- Sand Scale: If your school cannot provide a scale for the sand measurement, a low-cost scale that meets the minimum requirements for this event is a **MyWeigh Ultraship Ultra-35**. It sells for about \$45.00 on Amazon. This scale has a 16 kg capacity, measures in grams with a 5-gram resolution. This is simply an example and is not a recommendation or requirement, any scale meeting the rules and supplemental rules may be used.
- Reminders for Staging and/or general preparedness
 - Pre-measurements of sand
 - Proximity of scales/equipment
 - Script (per your checklist)
 - Proper rulers (easy to see) – may need multiple types of rulers for the types of measurements needed to make (really clunky)
- Video feeds for the event
 - At minimum two video feeds will be supplied during the test: 1) a static view of the test stand and entire Boomilever when mounted on the stand and 2) a handheld device and operator that shall move at the Event Supervisors direction for close up and detailed views of the measurements and observation of the test.
 - Video of measurement devices should be taken perpendicular to the measurement device.
 - The Remote Supervisor is responsible for pointing their cameras so that the Event Supervisor is able to clearly see the measurements taken (scale displays with units, length measurement scales, the Boomilever) during the entire test period.

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- Test Time: The time you sign up for is your call -in time. Call in with both Cameras. We will check that you have proper video feed and sound. You will then be placed in a break-out room until an Event supervisor is available, normally within $\frac{1}{2}$ of your call-in time. You should plan 45 minutes to 1 hour for the entire cuing and test.

Thanks for your support of Science Olympiad!!