

METRIC MASTERY

1. **DESCRIPTION:** Students will estimate and then measure identical objects in metric units. The properties to be measured may include mass, volume, density, area, force, distance, time, and temperature.

A TEAM OF UP TO: 2

APPROXIMATE TIME: 50 Minutes

2. **EVENT PARAMETERS:**

- This event will take place in one room (or two if needed) with between 15-30 stations. Students will rotate through the stations to make their estimations and then, using the same or identical objects, make their measurements. Measuring devices must be kept out of sight during the Estimation Part of the competition.
- Supervisors will furnish pencils and all measuring devices needed for the event.
- Teams **must not** bring watches, writing implements, electronic devices, notes or measuring devices of any kind (e.g., fingers, pieces of paper, pencils, clothing, etc.). **Each student may bring a non-programmable calculator for the Measurement Part only.**

3. **THE COMPETITION:** **Note: The property to be estimated or measured and the units of the response must be identified in the supervisor's directions at each station.**

a. **Estimation Part:**

- Teams will be given a form on which they will record their estimations. This form must be turned in before beginning the Measurement Part of the event or the team will lose the score for this Part.
- Students will rotate through the stations as directed by the supervisor. The recommended time at each estimation station is 30 seconds.
- Students may not touch, feel, or "heft" any of the objects, unless the station directions specifically state the object may be moved or touched.

b. **Measurement Part:** (Note: Prior to the competition supervisors are to determine the acceptable measurement/correct value with the same equipment that is to be used in the event)

- The teams will be given a second form on which they will record their measurements.
- The recommended time at each station for the measurement part is 60 seconds.
- Measurements will be made using the instruments supplied keeping in mind the instrument's resolution (the smallest actual graduation or markings on the instrument plus one estimated digit). An instrument's resolution will refer to the smallest divisions (markings/graduations) on its scale.
- To receive points, measurements must be expressed using the proper resolution and estimated digit appropriate for the instrument(s) provided (e.g., if an answer should be 9.0 cm and the answer given by the team is 9 cm, the answer will be marked wrong).



4. **SCORING:**

- Scores for both parts of the event will be rated according to the accuracy of the estimates or measurements. Rankings will be by highest combined score.
- For the Estimation Part, scores within 5% of the correct value, as determined by the event supervisor, will be awarded 5 points, within 10% will be awarded 3 points and within 20% will be awarded 1 point.
- In the Measurement Part, the correct measurements, as determined by the event supervisor, expressed to the instrument's resolution including one estimated digit will receive 5 points. Values will be considered correct at regional tournaments if the value is within (+/-) 3 of the estimated digit; at state tournaments if the value is within (+/-) 2 of the estimated digit; and for the national tournament if the value is within (+/-) 1 of the estimated digit. Example: If the national supervisor measures the width of a page as 209.1 mm using a ruler whose smallest divisions are 1 mm, then any value from 209.0-209.2 mm would be accepted as a correct answer. All others receive zero points.
- Penalties: A 10 point penalty will be given for each of the following team violations:
 - Does not return measuring devices to their original location.
 - Does not clean up any spills.
 - Alters the equipment (e.g., zeroing a balance or altering other equipment-may also result in DQ).
- Ties will be broken using pre-selected tiebreaker stations.

Recommended Resources: All reference and training resources including the **Problem Solving and Technology CD** are available on the Official Science Olympiad Store or Website at <http://www.soinc.org>