Science Olympiad 2016

It’s About

Time

Division C

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Description

Teams will answer questions related to time and they may construct and bring one non-electrical device to measure time intervals between 10 and 300 seconds.
Description

• Team size: Up to 2
• Eye Protection: none (*)
• Impound: Yes (Only one Device)
• Time: 50 min (time trials ~30 + test ~ 20)
At sign up teams are divided in two groups: even and odd.

(Times according to http://time.gov/HTML5/)

Sign up(20 min): 9:00 to 9:30
   All teams report to Workman 107.
   After sign up, teams proceed to impound.

Impound: 9:00 to 9:45
   Even : room 107;  Odd   : room 115

Time trials (30 min): 10:00 to 10:30
   Even : room 107;  Odd   : room 115

Test (20 min):  10:35 to 10:55
   Even : room 107;  Odd   : room 115
Floor Plan

1.2m

72cm
Impounding Check List

- Only 1 timing device is being impounded (along with supplies, tools, etc).

- Device and components are able to be moved by team members without outside assistance.

- Device and components (except for clean-up supplies, tools, stopwatch) fit into 80cm cube.

- Device and any storage boxes are marked with team name and number.

- Device does not utilize commercial counters, timepieces or parts of either.

- Device does not utilize any electrical components or chemical reactions (*except* for battery operated electronic balance).

- Device is constructed to contain spillage.
Calculators are not allowed during the first part of the competition

Do not bring watches, cell phones or other time-keeping devices into the competition room (except for any impounded stopwatch)

All reference material must be in one 3-ring binder (which does not have to be impounded)
Construction

At impound, the device and components must fit in to an 80cm x 80cm x 80cm …

The device may become larger once setup for part I.

Devices must be constructed to minimize possible impacts on other teams when running (quite as possible, occupies reasonable amount of space when set up, etc.)
Construction

Event supervisors must verify that devices meet event rules. Devices that do not meet event rules must not be impounded unless modified to meet event specifications by the team before the end of the impound period.
The Competition
Part I: Time Trial
Maximum 50 points

<table>
<thead>
<tr>
<th>Trial</th>
<th>Range (s)</th>
<th>Target Time</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10 – 90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>90 – 300</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>10 – 300</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Record times to nearest tenth of a second
Team must be given 5 minutes to setup and calibrate their device. All timing devices used for this calibration must then be impounded with the event supervisor prior to the start of the timing trials.
The Competition
(Part I)

Teams must be allowed to interact with their devices before, during, between, and after the time trials.
## Part I: Scoring

**Maximum 50 points**

<table>
<thead>
<tr>
<th>Trial</th>
<th>Range (s)</th>
<th>Points Deducted per – 0.1 sec error</th>
<th>Points (No less than Zero)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10 – 90</td>
<td>0.3</td>
<td>$15 – 3 \times</td>
</tr>
<tr>
<td>2</td>
<td>90 – 300</td>
<td>0.2</td>
<td>$15 – 2 \times</td>
</tr>
<tr>
<td>3</td>
<td>10 – 300</td>
<td>0.1</td>
<td>$20 – 1 \times</td>
</tr>
</tbody>
</table>
Scoring  
(Part I)

f. If any material or substance splashes, spills or falls on a table or floor, or the team violates any other event rule the team may be assessed a penalty up to 10 points.

[ there is no carry over of penalty points ]
# Potential Penalties

## Up to 50 Points

Penalty due to any material or substance splashes, spills or falls on table or floor. **Up to 10 points.**

<table>
<thead>
<tr>
<th>Team fails to completely clean up after their competition period. <strong>15 Points</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
</tr>
</tbody>
</table>

Device is operated in an unsafe manner or does not comply with the rules. Disqualified (notify the team and their coach as soon as possible) **Zero points for part I**

<table>
<thead>
<tr>
<th>Device is operated in an unsafe manner or does not comply with the rules. Disqualified (notify the team and their coach as soon as possible) <strong>Zero points for part I</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
</tr>
</tbody>
</table>
Part II – the test
Maximum 50 points

Format

• Multiple choice: 25 questions.
• Plus one open question as a tie breaker.
• Two points per question
• 20 minutes
Test Topics

i. Physics of modern timekeeping devices
   (e.g., atomic clocks, quartz clocks, electronic oscillations)

ii. Dynamical systems
    (e.g., motion equations, planetary motion, gravity, relativity, half-life)

iii. Waves and frequencies
    (e.g., electromagnetic waves, frequency analysis, harmonics, normal modes, resonance)

iv. Historical time keeping devices
    (e.g. pendulum clocks, water clocks, sun dials, early clocks and watches, primary mechanisms for keeping time)

v. Time standards
    (e.g., UDT, sidereal time, leap years/seconds, major calendars)

Note: 5 questions per Topic
Final Score

FS = Part 1 + Part 2 - Penalties

where

Part 1 Max 50 points
Part 2 Max 50 points
Penalties: Max 50 points
Online Resources

All reference and training resources including the It’s About Time DVD (TIMD) and the Chem/Phy Sci CD are available on the Official Science Olympiad Store or Website at

http://www.soinc.org

Official Time: http://time.gov/HTML5/

Timer: http://physics.nmt.edu/~clopez/timer_.html
During the year, feel free to contact Andy or Bro. with questions!