SCIENCE CLUB

SRI RAMAKRISHNA INSTITUTE OF TECHNOLOGY

HUB FOR INNOVATION AND ENTREPRENEURSHIP

ASME SETTING THE STANDARD SRIT STUDENT SECTION

ORGANISED BY SCIENCE CLUB, SRIT • TECHNICAL PARTNERS: HIVE & ASME SRIT

STEM FUSION CHALLENGE

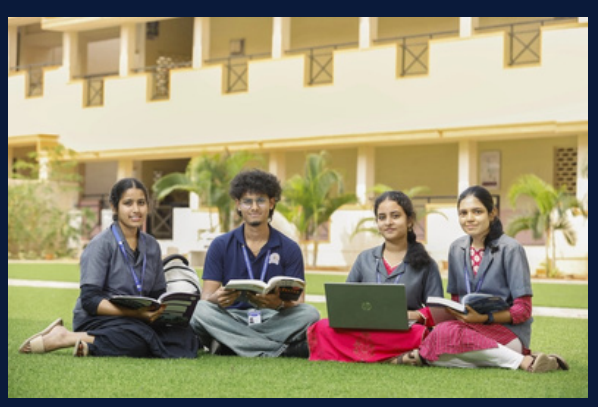
OFFICIAL RULE BOOK

Rules, marking and all 200 problem statements

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stem.asmesrit.com

1. About the Challenge

Teams pick a problem statement, submit one PDF report for each of three phases (Mathematics, Chemistry, Physics), then build and present a working physical model to a jury at the Grand Finale.

Organised by: Science Club, SRIT

Technical Partners: HIVE (Hub for Innovation and Entrepreneurship) and ASME SRIT

Website: stem.asmesrit.com

Log in with: your Register Number and Date of Birth, then verify your email with a one-time code

2. Eligibility and Teams

1. Every first-year student on the college roster can take part.

2. A team has 1 to 4 members. Working alone is allowed.

3. One student creates the team and becomes the team leader. Only the leader can add or remove members, choose the topic, upload files and request a re-evaluation.

4. Team members must be on the student list, and each student can be in only one team.

5. Team names are 3 to 40 characters (letters, numbers, spaces and - _ . & ' only).

6. Every member must be able to explain their own part of the work at the Grand Finale.

3. Timeline

Phases open and close automatically. The system rejects any upload outside the window, so submit well before the deadline.

Phase 1 · Mathematics
Opens 17 Nov 2026 | Closes 20 Nov 2026, 09:00

Phase 2 · Chemistry
Opens 20 Nov 2026, 09:00 | Closes 23 Nov 2026, 09:00

Phase 3 · Physics
Opens 23 Nov 2026, 09:00 | Closes 25 Nov 2026, 09:00

Grand Finale · Physical model
Date to be announced. Bring your model to college.

4. Choosing a Problem Statement

Claim one of the 200 listed problem statements (Section 9) or propose your own custom topic.

1. First come, first served. Each listed topic can be held by only one team.
2. Only the team leader chooses the topic, on the Topics page of the website.
3. You can switch to another free topic while selection is open. Selection locks after Phase 1.

Custom Topics and Submissions

Custom topic: 4 checks, all must pass

The leader submits a title, a description and short notes on the Maths, Physics and Chemistry used, the materials, what will be measured, and safety. Organisers approve it only if it passes all four checks:

Three-subject link: Uses a specific concept from each of Maths, Physics and Chemistry.

Buildable: A physical model can be made with low-cost materials within the timeline.

Measurable: At least one quantity can be measured and compared.

Safe and original: No hazardous chemicals, open flame or high voltage, and not a copy of a listed topic.

A custom title that matches a listed topic, or one already proposed by another team, is rejected.

5. Submission Rules

In each phase the team leader uploads one PDF report and a photo of the team's prototype on the Dashboard page.

1. **Report:** a PDF file, at most 4 MB.
2. **Prototype photo:** a JPG or PNG, at most 4 MB, showing your own prototype as it stands in that phase.
3. **Real photos only:** you must confirm the photo is real and not AI-generated.
4. **Deadlines are firm:** uploads are accepted only while the phase is open. You can replace your files within that window, up to 12 uploads per phase each day. The latest upload is evaluated.
5. **Your own work:** reports must be written by your team in its own words, with sources and data credited.

6. Evaluation and Marking

Each online phase is scored out of 20 and the Grand Finale jury out of 40, for a maximum of 100 marks. Every score comes with a written reason, shown on your team dashboard.

Phase 1: Mathematics (20 marks)

Mathematical modelling (5): Clear equations or relations describing the model, with variables defined.

Calculations and accuracy (5): Correct working shown step by step, with units.

Data, graphs and analysis (4): Labelled tables and graphs, trends interpreted, errors or uncertainty noted.

Optimization or logical reasoning (4): Options compared and the best choice justified with maths.

Clarity and presentation (2): Logical structure, readable PDF, correct notation.

Phase 2: Chemistry (20 marks)

Chemical concepts identified (5): Correct principle (reaction type, rate, pH, redox, material properties) named and explained.

Equations and stoichiometry (4): Balanced equations; quantities and concentrations calculated correctly.

Experimental method and data (4): Procedure, controlled variables, observations or measurements recorded.

Analysis and justification (4): Results explained using chemistry; sources of error and improvements discussed.

Safety and environment (3): Hazards identified, safe handling and disposal, eco-friendly choices.

Evaluation, continued

Phase 3: Physics (20 marks)

Physical principles applied (5): Correct laws (forces, energy, heat, fluids, electricity, optics) linked to how the model works.

Calculations and units (5): Correct formulas, substitution, final answers with units.

Design and engineering reasoning (4): Design choices justified; alternatives considered and trade-offs explained.

Measurement and validation (4): Predicted values compared with measured values, with percentage error.

Clarity and diagrams (2): Labelled diagrams and a clear explanation of how it works.

Results, re-evaluation and ties

1. Phase reports are evaluated with AI assistance and reviewed by the organisers, who can override any score.
2. The team leader can request one re-evaluation per phase after the result is published, giving a reason of at least 10 characters.
3. Ties are broken by jury marks, then Physics, then Chemistry, then Maths.
4. Final ranking = three phase scores (60 marks) + jury score (40 marks).

7. Grand Finale

Every team brings its physical model to college, demonstrates it and answers the jury's questions. The date will be announced on the website. The jury scores out of 40.

Working prototype (10): It does what the report says.

Integration of Maths, Physics and Chemistry (8): All three subjects are genuinely used.

Innovation and creativity (6): Original ideas and approach.

Build quality and use of materials (6): Good craftsmanship and sensible materials.

Oral explanation and answering questions (6): Clear explanation and confident answers.

Teamwork and individual contribution (4): Every member can explain their part.

8. Safety, Originality and Conduct

1. **Stay safe:** no hazardous chemicals, open flame or high voltage. Use household or low-cost materials and dispose of chemicals responsibly.
2. **Original work:** your model, data, calculations and report must be your team's own. Copying, AI-generated photos or fabricated data can lead to marks being withheld or disqualification.
3. **One team, one project:** a team works on one topic only, and no two teams may hold the same listed topic.
4. **Fair use of the website:** log in only with your own Register Number and Date of Birth; do not share your login or one-time codes.
5. **Decisions:** the organisers' decision on scores, topic approvals and disqualification is final.

9. The 200 Problem Statements (1/5)

Heat and Energy

1. Best Insulated Cup Challenge
2. Solar Oven from a Pizza Box
3. Cooling Without Electricity (Clay Pot Cooler)
4. Self-Heating Can Model
5. Hand Warmer Reaction Design
6. Thermal Insulation of a Model House
7. Heat-Proof Ice Storage Box
8. Solar Water Heater Model
9. Heat Retention: Metals vs Plastics
10. Evaporative Cooler Design
11. Insulated Lunch Box for 6-Hour Warmth
12. Solar Still for Drinking Water
13. Thermal Conductivity Ranking Rig
14. Cold Pack from Endothermic Reaction
15. Heat Loss Calculator Model Wall
16. Candle-Powered Spinner
17. Sand Battery Heat Storage Model
18. Thermos Flask from Waste Materials
19. Greenhouse Effect Jar Model
20. Cooling Rate Graph Challenge

Electricity and Chemistry

21. Lemon Battery Power Bank
22. Potato Battery Clock
23. Saltwater Battery
24. Coin-and-Vinegar Cell Stack
25. Electroplating a Copper Coin
26. Electrolysis of Water Setup
27. Simple Circuit Alarm System
28. Hand-Crank Generator
29. Electromagnet Strength Challenge
30. Night Lamp with Light Sensor Circuit
31. Graphite Pencil Resistor Study
32. Conductivity Tester for Solutions
33. Fruit Cell Voltage Comparison
34. Rust Prevention Using Electrical Protection
35. Homemade Capacitor Charge Test
36. Series vs Parallel Bulb Brightness Model
37. Fuse Wire Design
38. Aluminium-Air Cell Demo
39. Static Electricity Sorting Machine
40. Water Purity Meter Using Conductivity

9. The 200 Problem Statements (2/5)

Motion and Forces

41. Balloon-Powered Car
42. Egg-Safe Drop Capsule
43. Paper Parachute Slowest Fall
44. Rubber-Band Catapult Accuracy
45. Straw Rocket Distance Challenge
46. Marble Roller Coaster
47. Ramp Distance Optimization
48. Friction Challenge: Best Brake Material
49. Pendulum Timing Device
50. Domino Chain Reaction Machine
51. Newton's Cradle Energy Study
52. Longest-Flying Paper Plane
53. Wind-Powered Cart
54. Slowest Rolling Object Down a Ramp
55. Spinning Top Longest Spin
56. Projectile Target Challenge
57. CO2-Powered Car
58. Gravity-Powered Delivery System
59. Stopping Distance Model
60. Tug-of-War Friction Rope Study

Fluids, Density and Buoyancy

61. Aluminium Foil Boat Cargo Challenge
62. Density Tower and Mystery Liquid Identifier
63. Cartesian Diver Design
64. Hydraulic Lift with Syringes
65. Siphon Water Transfer System
66. Water Rocket Design
67. Smallest Boat, Largest Load
68. Oil Spill Cleanup Challenge
69. Fastest Water Drain Design
70. Surface Tension Paper Clip Float
71. Salt Water Buoyancy Study
72. Plimsoll Line Boat Model
73. Raft That Holds the Most Pennies
74. Water Pressure vs Depth Rig
75. Viscosity Comparison of Liquids
76. Fountain Using Pressure
77. Lava Lamp Density Model
78. Homemade Hydrometer
79. Water Clock (Clepsydra)
80. Measure Density of an Irregular Object

9. The 200 Problem Statements (3/5)

Water, Environment and Purification

81. Homemade Water Filter and Purity Test
82. Activated Charcoal Filter Efficiency
83. Rainwater Harvesting Model
84. Desalination Using Solar Still
85. Hard Water Softening Test
86. Natural Coagulant for Muddy Water
87. Sand-Gravel-Charcoal Filter Optimization
88. Plastic Waste to Paving Block Model
89. Oil-Water Separator Design
90. Acid Rain Effect on Marble
91. Air Pollution Particle Collector
92. Compost Heat Generation Study
93. Biogas Digester Model
94. Plant Water Absorption and Gypsum Study
95. Drip Irrigation Flow Design
96. Soil pH and Plant Growth Model
97. Water Hardness vs Soap Lather
98. Algae Bloom and Nutrient Model
99. Eco-Friendly Cleaner Formulation
100. Wastewater Colour Removal Study

Reaction Rates and Gases

101. Rate-of-Reaction Controller (Fizz Timer)
102. Balloon Gas Volume Measurement
103. CO2 Fire Extinguisher Model
104. Coke-and-Mentos Optimization
105. Antacid Effectiveness Comparison
106. Catalyst Effect on Hydrogen Peroxide Decomposition
107. Elephant Toothpaste Foam Height Study
108. Gas Law Syringe Experiment
109. Temperature vs Dissolving Rate
110. Surface Area vs Reaction Speed
111. Effervescent Tablet Optimization
112. Self-Inflating Bag Design
113. Gas Collection Over Water Apparatus
114. Shelf-Life of Fizz Tablets
115. Yeast Fermentation Gas Rate
116. Slow-Release Reaction Capsule
117. Clock Reaction Colour Timer
118. Reaction Rocket Using Film Canister
119. Vinegar and Baking Soda Energy Study
120. Concentration vs Reaction Rate Graph

9. The 200 Problem Statements (4/5)

Acids, Bases and Indicators

121. Natural pH Indicator Chart (Red Cabbage)
122. Turmeric Indicator Test Strips
123. Titration Using Household Chemicals
124. Buffer Action Model
125. Antacid Neutralization Capacity
126. Soil Acidity Test Kit
127. Beetroot Indicator Colour Study
128. Acid Strength vs Conductivity
129. Detecting Vitamin C in Juices
130. pH of Common Beverages Dashboard
131. Neutralization Heat Measurement
132. Indicator from Hibiscus Flowers
133. Toothpaste vs Acid Erosion Test
134. Invisible Ink Message Design
135. Acid Rain Simulation Chamber
136. Lemon Juice Rust Remover Study
137. Antacid Dosage Mathematical Model
138. Colour-Change Smart Label
139. Milk Spoilage pH Tracker
140. Cleaning Power of Weak Acids

Materials, Structures and Polymers

141. Paper Bridge Load Challenge
142. Straw Skyscraper Stability
143. Earthquake-Proof Building (Shake Table)
144. Bioplastic from Starch
145. Strongest Paper Tube Design
146. Slime with Target Stretch and Viscosity
147. Concrete Mix Strength Test
148. Triangle vs Square Truss Strength
149. Natural Fibre Composite Strength
150. Biodegradable Packaging Comparison
151. Papercrete Brick Test
152. Rust Prevention Coating Comparison
153. Crystal Growing Optimization
154. Egg Shell Strength vs Shape
155. Spaghetti Tower Load Study
156. Cantilever Beam Overhang Challenge
157. Foldable Bridge Design
158. Waterproofing a Fabric Using Wax
159. Edible Straw Strength Study
160. Insulating Foam from Waste Material

9. The 200 Problem Statements (5/5)

Light, Sound and Optics

161. Periscope Design
162. Pinhole Camera Image Quality
163. Water Drop Magnifying Lens
164. Rainbow Maker with Water and Prism
165. Sundial Time-Telling Design
166. Spectroscope from a CD
167. Fiber-Optic Light Pipe with Water Stream
168. Sound Insulation Box
169. String Telephone Distance Study
170. Speed of Sound from Echo
171. Resonance in Glass Bottles
172. Solar Cell Efficiency vs Angle
173. Colour Absorption and Heat Study
174. Light Intensity vs Distance Law
175. Kaleidoscope Geometry Design
176. Fluorescence Detector with UV Light
177. Mirror Reflection Maze
178. Light Reflection and Ice Melting Study
179. Total Internal Reflection Demo Tank
180. Sound Absorbing Wall Panels Comparison

Measurement, Optimization and Applied Maths

181. Largest Volume Box from One Sheet
182. Estimate Tree Height with Shadows
183. Build a Working Clinometer
184. Speed of a Rolling Ball Measurement Rig
185. Fair Balance Scale from Everyday Objects
186. Scale Model with Accurate Proportions
187. Probability Game Board Design
188. Tessellation Tile Design
189. Minimum Material, Maximum Load Optimization
190. Golden Ratio in Structures Study
191. Pyramid vs Cube Heat Retention
192. Fibonacci Spiral Solar Reflector
193. Parabolic Reflector Heat Concentrator
194. Optimal Angle for Solar Panels
195. Cylinder vs Cuboid Container Efficiency
196. Mathematical Model of Cooling (Newton's Law)
197. Statistical Study of Reaction Times
198. Graph-Based Lab: Lemon Battery Data
199. Optimal Slope of a Water Channel
200. Packing Efficiency of Spheres Model