SMT 2019 Scoring Guidelines

Individual problems on subject, general, and team tests will have point values adjusted according to the difficulty of the problems. Specifically, let P be a problem on test T. Let there be N people taking test T, and let C of them get P correct. Then, P will be worth

$$1 + 0.5 \ln(N/C)$$

points (the edge case of $C = 0$ is irrelevant). After every problem's point value is determined, scores will be multiplied by a constant factor so that the top scorer in the test receives full marks. We call these the *normalized scores* for subject and team tests.

Full marks on a subject test is 1/16, and full marks on team is 1. Let S be the set of 30th-highest normalized scores in each subject test. Let m be the minimum element of S. Because the general test is significantly easier than subject tests, full marks on the general test is $2m$ (multiplied by 2 because there is only 1 general test but 2 subject tests). This gives the normalized scores for the general test.

Problems on the power round will have predetermined point values that match our grading rubric. The scores will be multiplied by a constant factor (normalized) so that the top scorer receives full marks, which is 1 for the power test. We then apply the square root curve, i.e. if a team scores s after normalization, then their normalized power score is $\sqrt{s}$. For example, the top team always receives a score of 1, and a team that had a normalized score of 0.81 would have a final power score of 0.9.

A teams overall score is 0.25 * (sum of its members normalized scores on subject and general tests) + 0.25 * (normalized team score) + 0.5 * (normalized power score).