IGMO 2020 Statistics

This is the official document displaying all the important statistics from the results of the Instagram Mathematical Olympiad (IGMO) 2020. The document contains statistics regarding both the 1st round (which was held on 18th December 2020) and the 2nd round (which was held on 15-16th February 2021). This document is divided into 3 sections : **General Statistics**, **Round 1 Statistics** and **Round 2 Statistics**. For the sake of privacy, names were only included after permission to include them was obtained from the participants themselves. All the figures will be rounded to 2 dp.

General Statistics :

Over 2500 people registered for Round 1 and candidates from over 80 countries were recorded. Out of everyone registered, 1069 participants opened the paper on the day of the contest. Out of these 1069, only 101 were qualified for Round 2. This meant only the top ≈ ***9.45%*** of candidates could qualify for Round 2. The criteria to qualify for Round 2 for this year was to achieve a score of 10 or above in Round 1. In Round 1, the median score for **all** questions was **0**/7. Median scores like these are common in contests that are open for anyone to participate in (such as the Putnam).

Round 1 Statistics :

As a lot of people didn't attempt a lot of problems, their default score for the problem was set to 0. This is why we will consider 2 tables to get meaningful statistics : **Table of people who attempted** problems and **Table of people who qualified for Round 2**

Only 1 participant, Luis Modes, obtained a perfect score (42/42) and 3 participants obtained special solution prizes. All 4 special certificates were sent to the achievers(including the one for a perfect score).

Table of People who attempted :

Question	P1	P2	P3	P4	P5	P6
Mean (μ)	3.54	1.11	1.31	3.14	2.07	1.65
SD (σ)	2.85	1.98	2.67	3.19	3.07	2.69

Table of People who qualified for Round 2 :

Question	P1	P2	P3	P4	P5	P6
Mean (μ)	5.42	1.86	2.56	5.78	4.01	3.28
SD (σ)	2.20	2.45	3.32	2.45	3.36	3.12

Conclusions:

The data across the 2 tables is mostly consistent on the indication of the difficulty of each of the problems. Red is for the first table and Blue is for the 2nd. From the data in the 2 tables, we can conclude that the difficulty was (ordered from hardest to easiest)

1. **P2 P2**
2. **P3 P3**
3. **P6 P6**
4. **P5 P5**
5. **P4 P1**
6. **P1 P4**

P2 turned out to be the unexpected hardest problem due to the confusing wording. The team has taken this into consideration and guarantees that the problems for the next sitting will be much simpler to understand. P3 and P6 being at the top together was expected as these were the intended hardest problems (and at approximately similar difficulty). The intended difficulty for the rest of the questions is satisfactory. According to the format of the contest, the intended difficulty is :

1. **P3/6**
2. **P3/6**
3. **P2/5**
4. **P2/5**
5. **P4/1**
6. **P4/1**

The standard deviation for each question was approximately between 2 and 3. The standard deviation was lower in the 1st table than in the 2nd, as in the 1st table there are a lot more “0s” whereas the 2nd table has a lot more 1-7s (this makes sense, the people who qualified for Round 2 would have lesser 0s) and hence there was lesser variation, other than in questions with a much higher mean for the 2nd table (P1 and P4), as those questions had most scores between 4-7 due to them being easier which means the scores were more “around” 4-7 and hence there was lesser variance.

Round 2 Statistics :

Table of Round 2 Submissions:

Question	P1	P2	P3	P4	P5	P6
Mean (μ)	2.14	2.39	1.40	1.38	1.03	0.91
SD (σ)	3.11	2.80	2.39	2.41	2.17	1.80

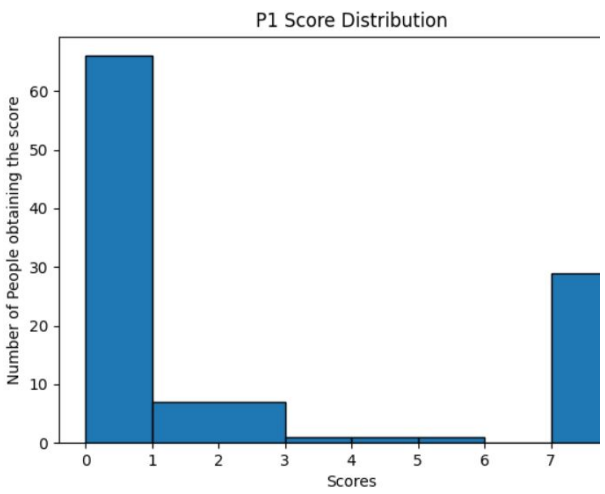
Judging based on the mean, the difficulty of the questions was (from hardest to easiest)

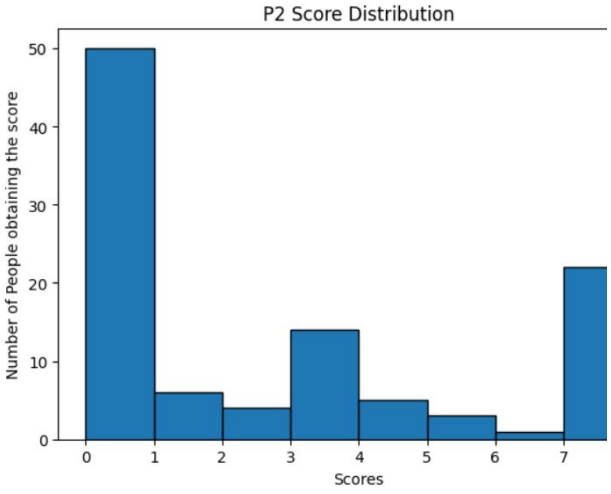
1. **P6**
2. **P5**
3. **P4**
4. **P3**
5. **P1**
6. **P2**

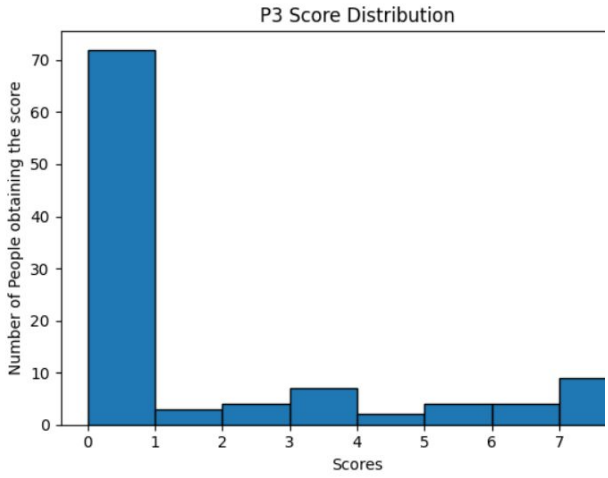
From this there's a few things we'd learned. Mainly that P3 wasn't as hard as it should've been and that P4 was perhaps a little bit harder than what was intended. We're happy with how P1, P2, P5 and P6 turned out in terms of difficulty. To make IGMO somewhat different from a typical contest, we tried including unconventional problems. These were problems P2 and P5. One thing to note is : the standard deviation of P1 is the highest as most people either attempt and make progress in geometry and score high or simply can't make any meaningful progress and score low.

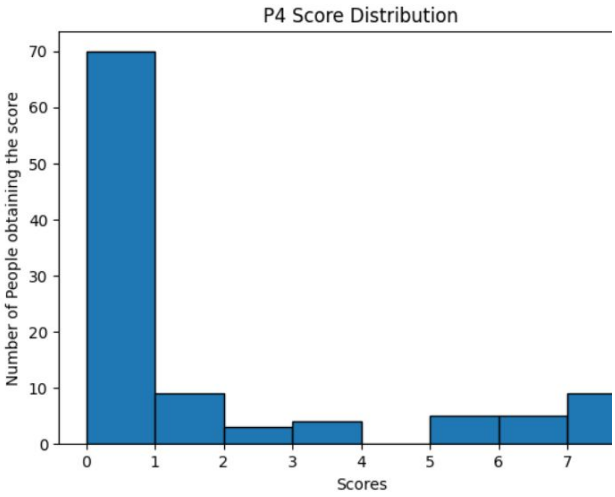
The average score for Day1 was **6.17 / 21** whereas the average score for Day2 was **3.46 / 21**, indicating that Day2 was significantly harder than Day1.

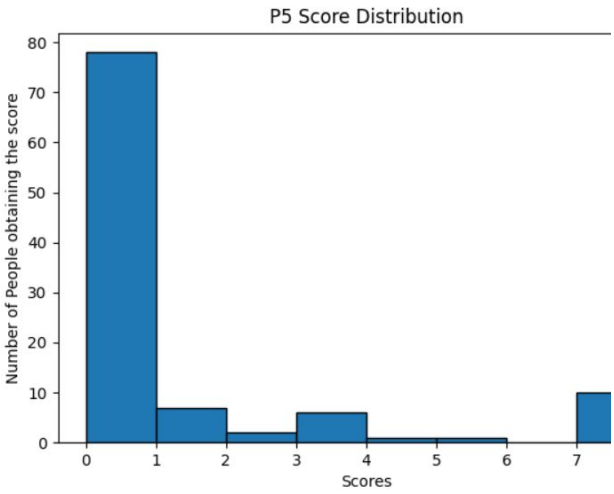
Plotted on the next page is a histogram of all the scores in Round 2. Note that marks are given on a discrete basis and your score for each question is an integer between 0 and 7 inclusive. Hence all the area in "between" two numbers refers to the number of people who achieved the first score. Eg : the height of the bar between 2 and 3 represents how many people scored 2 in the question and in general, the height of the bar chart between n and n+1 is the number of people who scored n. The last bar represents the number of people who scored 7.

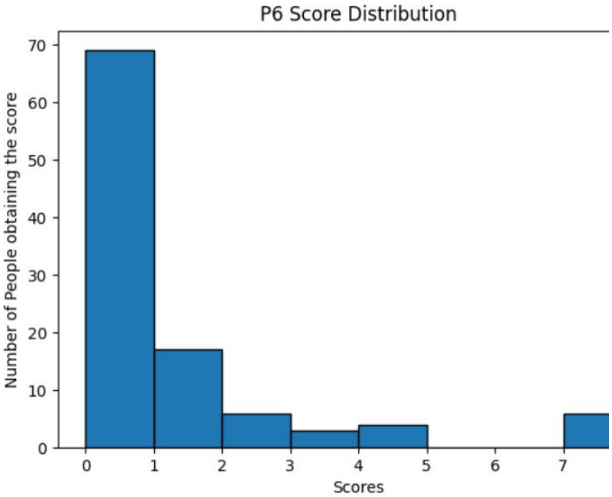




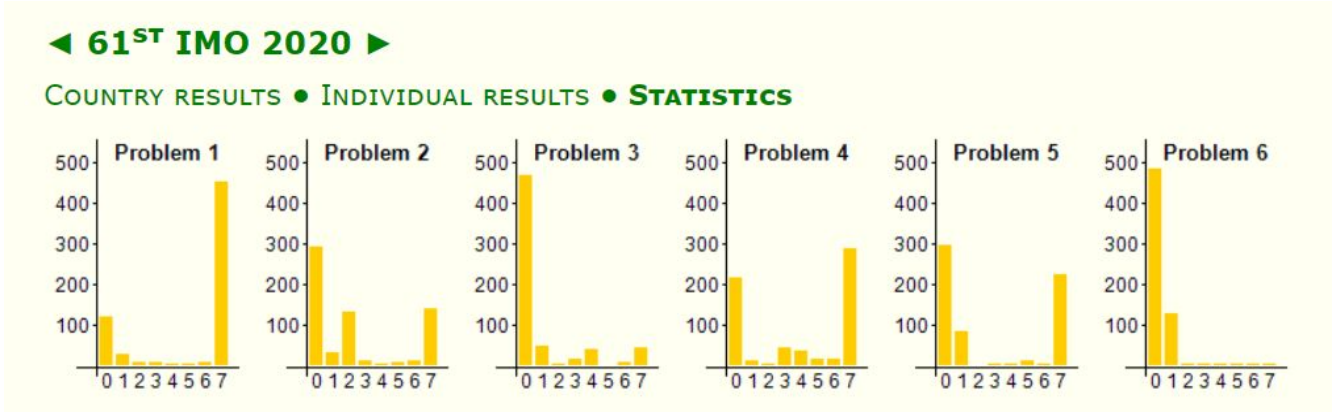








The median score for each problem was once again 0. For comparison, on the next page is the bar chart for IMO 2020.



No one achieved a perfect score. The top 5 scorers (recipients of the $40 giftcard by @daily_math_) are given below :

1. Luis Modes (41/42)
2. Leonid Doroshko (37/42) & Bernat Pages (37/42)
3. Maxim Pushkar (36/42) & Isaac Triality (36/42)

4 of the participants were from Europe, and the odd one out, who was also first place, was from South America. Hence, for this year, we have

Winning Region : **Europe**

No one qualified for the “top female scorer” certificate as all the females who had attempted Round 2 scored 0. 2 participants were given special solution certificates for a solution of theirs to Round 2. They received these through Email.

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