



pen Tournament

Score Data and Item Difficulty (Invitational)

Saturday, April 2, 2022

Final winners!

Middle school

| Rank | Student |
|------|--|
| 1 | Feodor Yevtushenko |
| 2 | Rohan Garg |
| 3 | Andrew Kalashnikov |
| 4 | Aryan Raj |
| 5 | William Liu |
| 6 | Ryan Shin |
| 7 | Kenneth Sun |
| 8 | Pranav Mallina |
| 9 | Caden Lewis-Shickman, Shaheem Samsudeen, Kevin Sun (tie) |

High school

| Rank | Student |
|------|---|
| 1 | Samuel Choi |
| 2 | Adithya Kishor |
| 3 | Gil Yarsky |
| 4 | Robert Dragomirescu |
| 5 | Niyathi Kukkapalli |
| 6 | Sargam Mondal |
| 7 | Arya Sharma |
| 8 | Yifan Chan, Huy Truong (tie) |
| 10 | Aakash Guntumadugu, Anil Sarvabatla (tie) |

Congratulations to all!

Overall statistics

| Division | Mean | Median | Mode | Min | Max | 25%ile | 75%ile | Standard deviation |
|---------------------|-------|--------|------|-----|-----|--------|--------|--------------------|
| Middle School Qual. | 4.36 | 5 | 2, 6 | 2 | 7 | 2 | 6 | 1.86 |
| Middle School Live | 16.83 | 16.5 | – | 7 | 27 | 8 | 26 | 9.45 |
| High School Qual. | 4.60 | 4 | 4 | 4 | 6 | 4 | 5 | 0.84 |
| High School Live | 10.80 | 12 | 12 | 3 | 14 | 12 | 13 | 4.44 |

Middle School statistics

Item difficulty (Qual.)

| Problem | Correct % | Incorrect % | Blank % |
|---------|-----------|-------------|---------|
| 1 | 54.55 | 45.45 | 0.00 |
| 2 | 54.55 | 45.45 | 0.00 |
| 3 | 81.82 | 18.18 | 0.00 |
| 4 | 36.36 | 54.55 | 9.09 |
| 5 | 54.55 | 45.45 | 0.00 |
| 6 | 81.82 | 18.18 | 0.00 |
| 7 | 9.09 | 63.64 | 27.27 |
| 8 | 9.09 | 72.73 | 18.18 |
| 9 | 36.36 | 36.36 | 27.27 |
| 10 | 18.18 | 54.55 | 27.27 |

Score-rank correspondence (Qual.)

| Score | Rank | Percentile |
|-------|------|------------|
| 7 | 1 | 100 |
| 6 | 2 | 91 |
| 5 | 5 | 64 |
| 4 | 7 | 45 |
| 3 | 8 | 36 |
| 2 | 9 | 27 |

Note: the *rank* of a score is defined as 1 plus the number of participants with a *strictly* higher score. For example, if the rank of a score of 5 is 4, exactly 3 participants scored 6 or better.

Item difficulty (Live)

| Problem | Mean (/10) |
|---------|------------|
| 1 | 4.33 |
| 2 | 5.00 |
| 3 | 7.50 |

Score-rank correspondence (Live)

| Score | Rank | Percentile |
|-------|------|------------|
| 27 | 1 | 100 |
| 26 | 2 | 83 |
| 23 | 3 | 67 |
| 10 | 4 | 50 |
| 8 | 5 | 33 |
| 7 | 6 | 17 |

High School statistics

Item difficulty (Qual.)

| Problem | Correct % | Incorrect % | Blank % |
|---------|-----------|-------------|---------|
| 1 | 100.00 | 0.00 | 0.00 |
| 2 | 100.00 | 0.00 | 0.00 |
| 3 | 20.00 | 80.00 | 0.00 |
| 4 | 40.00 | 40.00 | 20.00 |
| 5 | 60.00 | 40.00 | 0.00 |
| 6 | 60.00 | 40.00 | 0.00 |
| 7 | 0.00 | 40.00 | 60.00 |
| 8 | 0.00 | 20.00 | 80.00 |
| 9 | 40.00 | 20.00 | 40.00 |
| 10 | 40.00 | 20.00 | 40.00 |

Score-rank correspondence (Qual.)

| Score | Rank | Percentile |
|-------|------|------------|
| 6 | 1 | 100 |
| 5 | 2 | 80 |
| 4 | 3 | 60 |

Note: the *rank* of a score is defined as 1 plus the number of participants with a *strictly* higher score. For example, if the rank of a score of 5 is 4, exactly 3 participants scored 6 or better.

Item difficulty (Live)

| Problem | Mean (/10) |
|---------|------------|
| 1 | 7.60 |
| 2 | 1.00 |
| 3 | 2.20 |

Score-rank correspondence (Live)

| Score | Rank | Percentile |
|-------|------|------------|
| 14 | 1 | 100 |
| 13 | 2 | 80 |
| 12 | 3 | 60 |
| 3 | 5 | 20 |