

A Report on

**The 64<sup>th</sup>**  
**International**  
**Mathematical**  
**Olympiad**  
**July 2<sup>nd</sup> - July 13<sup>th</sup>**



IMO 2023



Chiba, JAPAN **64<sup>th</sup>**



国際数学オリンピック委員会  
International Mathematical Olympiad Board



公益財団法人 数学オリンピック財団  
Mathematical Olympiad Foundation of Japan

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# Preface

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The 64th International Mathematical Olympiad in Japan” was held from July 2 (Sunday) to July 13 (Thursday), 2023, mainly in Makuhari, Chiba City. This was the second time for Japan to host the Games, the first time in 20 years since the 44th Tokyo Games. The total number of participating countries and regions was 112, with 618 athletes (including 67 women) and approximately 1,000 officials and executives from each country, making it the largest event of its kind ever held in Japan. With the worldwide outbreak of coronavirus infection under control, there is a sense that the face-to-face world championships have recovered in earnest, and the number of participating countries and regions is steadily expanding, and it is encouraging to see the interest and challenge in mathematics of the younger generation who will lead the future of society.

Looking back, the Executive Committee was formed in 2017, and in 2018, the general framework was decided upon, with the contest venue to be Makuhari Messe and the main lodging location for competitors and others to be the APA Hotel & Resort. I would like to take this opportunity to thank all those involved both inside and outside the country who have been involved in the implementation of this competition as well as in its preparation over a long period of time, and JST and all sponsoring companies, organizations, and individuals for their financial support.

At the conference, we were honored to receive congratulatory speeches from Keiko Nagaoka, Minister of Education, Culture, Sports, Science and Technology, at the opening ceremony, and from Shunichi Kamiya, Mayor of Chiba City, at the closing ceremony. The opening ceremony featured performances by taiko drummers and Tokyo Brass Style, and the closing ceremony was followed by a welcome party with a band led by Sachiko Nakajima, a former Math Olympian, who added her own special touch to the event. I am sure that both athletes and officials had a lot of fun and that the event was a pleasant memory for all. On the other hand, the management of the tournament was not a simple task. Just prior to the event, there were times when delays in preparations became apparent, and we were very concerned. However, the success of the event was made possible by the cooperation and understanding of the roles of the Executive Committee, management staff, volunteers, and others, who were able to respond flexibly to various situations. In fact, we have received many comments and opinions from the participants from various countries praising the event.

This booklet summarizes the main points of the conference as a record of the conference results that can be used for future reference. The following is a general report on the convention, including organization, participation, program, contest questions, contest results, excursions, and sponsors. In particular, the results of the contests are expected to confirm that the level of the contests has been increasing year by year in proportion to the scale of the contests. We also hope that the number of people in each role and the size of the budget for running the convention will be helpful in preparing for future conventions.

International conventions are often affected by national and global circumstances, and some countries were unable to participate this year. I strongly hope that many countries will be able to participate successfully in the future conventions and that the international conventions will further flourish. I am proud of the role that the Japanese convention played as a guidepost for the development of the international convention, linking the past to the future, but in the end, based on the record of this convention in this booklet and on the IMO website, I await the evaluation of all concerned and society at large. We would appreciate your frank evaluation and opinions.

Lastly, I would like to thank Mr. Yujiro Ito, Chairman of Sumitomo Mitsui Banking Corporation, a classmate of mine from my junior and senior high school days, for his great help in arranging accommodations and other matters. I would like to take this opportunity to thank him.

I would like to thank you all for your continued support and understanding of the Mathematical Olympiad, and in return, I would like to express my gratitude to you all for your support of the Japan Games.

March 2024  
Mathematical Olympiad Foundation  
Takahiko Fujita, President

# I IMO2023 Chiba, JAPAN 組織

## 1 Organizing Committee 組織委員会

名誉会長		
文部科学大臣	永岡	桂子
委員長		
ジブラルタ生命保険株式会社 代表取締役社長	添田	毅司
副委員長		
東京理科大学 栄誉教授	秋山	仁
中央大学 教授（IMO2023 日本大会実行委員会委員長）	藤田	岳彦
富士通株式会社 代表取締役社長	時田	隆仁
日本電信電話株式会社 相談役	篠原	弘道
株式会社公文教育研究会 代表取締役社長	池上	秀徳
株式会社ナガセ 代表取締役社長	永瀬	昭幸
株式会社東京出版 代表取締役社長	黒木憲太郎	
Arithmer 株式会社 代表取締役社長	大田	佳宏
一般社団法人 日本数学会 理事長	清水	扇丈
公益社団法人 日本数学教育学会 会長	清水	美憲
委員		
上野製薬株式会社 代表取締役社長	上野	昌也
公益財団法人 豊田理化学研究所 所長	玉尾	皓平
ヤフー株式会社 代表取締役社長 CEO	小澤	隆生
日本電気株式会社 執行役社長	森田	隆之
明治安田生命保険相互会社 代表執行役社長	永島	英器
株式会社みずほフィナンシャルグループ 代表執行役社長	木原	正裕
日本 IBM 株式会社 代表取締役社長執行役員	山口	明夫
第一生命ホールディングス株式会社 取締役会長	渡邊光一郎	
日本生命保険相互会社 代表取締役社長	清水	博
伊藤忠テクノソリューションズ株式会社 代表取締役社長	柘植	一郎
株式会社三菱 UFJ フィナンシャルグループ 代表執行役社長	亀澤	宏規
株式会社三井住友フィナンシャルグループ 執行役社長	太田	純
ロート製薬株式会社 代表取締役社長	杉本	雅史
公益財団法人 孫正義育英財団 ソフトバンクグループ代表	孫	正義
株式会社日立製作所 代表執行役社長 CEO	小島	啓二
東亜薬品株式会社 代表取締役社長	中井	淳
カラクリ株式会社 代表取締役 CEO	小田	志門
三菱電機株式会社 代表執行役社長	漆間	啓
東京海上日動火災保険株式会社 代表取締役社長	広瀬	伸一
公益社団法人 日本アクチュアリー会 理事長	上田	泰史
河合塾本郷校 K 会 チーフ	石井	潤
公益財団法人 日本数学検定協会 理事長	高田	忍

## 2 Executive Committee 実行委員会

Member	
委員長（数学オリンピック財団理事長）	藤田 岳彦
副委員長	前田 吉昭
委員	秋山 仁 ・ 浅井 康明 ・ 安藤 哲哉 石井志保子 ・ 小島 定吉 ・ 近藤 宏樹 佐古 和恵 ・ 高木 悟 ・ 田崎 慶子 谷 聖一 ・ 谷山 公規 ・ 中島さち子 新國 亮 ・ 福永 薫 ・ 宮下 三奈 森田 康夫 ・ 横田 佳之 ・ 若月 宏
オブザーバー (担当旅行会社：株式会社日本旅行)	藤間 貴子 ・ 江草 春奈 ・ 寺田江梨奈 新井 早紀 ・ 鳥生 慎祐 ・ 保科 均
Finance manager 財務担当	
	浅井 康明 ・ 田崎 慶子 ・ 宮下 三奈
Fund Raising manager 寄付金募集担当	
	前田 吉昭 ・ 浅井 康明
Problem Selection Committee (PSC) manager 問題選択委員会担当	
	安藤 哲哉
Coordination/Coordinator manager コーディネーション/コーディネータ担当	
	安藤 哲哉
Information Technology manager IT 担当	
	谷山 公規 ・ 谷 聖一
Public Relations manager 広報担当	
	石井志保子
Schedule manager 進行計画担当	
	小島 定吉 ・ 前田 吉昭
Opening and Closing Ceremony manager 開会/閉会式担当	
	福永 薫
Contest/Invigilate manager 試験実施/試験監督担当	
	近藤 宏樹 ・ 横田 佳之
Guides/Volunteers manager ガイド/ボランティア担当	
	前田 吉昭 ・ 谷山 公規 ・ 浅井 康明
Medals/Goods manager メダル/グッズ担当	
	佐古 和恵
Event/Excursion manager イベント/エクスカッション担当	
	前田 吉昭 ・ 中島さち子
Transfer manager 送迎担当	
	高木 悟 ・ 新國 亮 ・ 横田 佳之
Advisor and Help manager アドバイザー担当	
	秋山 仁 ・ 若月 宏
International Jury Meeting manager 国際ジュリーミーティング担当	
	藤田 岳彦 ・ 安藤 哲哉

### 3 IMO BOARD (IMOB) IMO 役員

Commissioner (コミッショナー)	
Anastasiya Sudakova	
Advisory Board (アドバイザーボード)	
Gregor Dolinar (President) ・ Géza Kós Dávid Kunszenti-Kovács ・ Ben Kirk 森田 康夫 ・ Joseph Myers	
System Director (システムディレクター)	
Mctjaz Zeljko	

## II Participants 参加者

1 Participants Summary Table 総括表（参加者役割別人数）

	Country	C(F)	L	DL	OA	OB	OC	PSC	Coo	Gst	Vip	Org	Gui	Inv	Prs	Sco	Stf	Vol	Chvol	Com
1	ALB	6(1)	1	1																
2	ALG	6	1	1	2	2														
3	ARG	6	1	1	1															
4	ARM	6	1	1	2															
5	AUS	6(2)	1	1	2	1	1	1												
6	AUT	6	1	1																
7	AZE	6(1)	1	1		1														
8	BEL	6(1)	1	1	1															
9	BFA	6(2)	1	1																
10	BGD	6	1	1			1													
11	BGR	6(1)	1	1	1					1										
12	BIH	6	1	1																
13	BLR	6	1	1																
14	BOL	6(1)	1	1																
15	BRA	6	1	1	3					1										
16	BWA	6(2)	1	1	1															
17	CAN	6	1	1	1					1										
18	CHI	3	1	1																
19	CHN	6	1	1	1	1	1			2	1									
20	CMR	6	1	1																
21	COL	6(1)	1	1																
22	CRI	6	1	1						1										
23	CUB	2(1)		1																
24	CYP	6	1	1																
25	CZE	6(1)	1	1																
26	DEN	6(2)	1	1								1								
27	DOM	6(2)	1	1																
28	ECU	6	1	1																
29	ESP	6	1	1				1												
30	EST	6	1	1																
31	FIN	6(2)	1	1	1															
32	FRA	6	1	1																
33	GEO	6(1)	1	1		1														
34	GER	6	1	1	1					4										
35	GHA	2	1	1		2	1													
36	GTM	2(2)	1																	
37	HEL	6	1	1			1													
38	HKG	6	1	1	1		1													
39	HND	2	1	1																



	Country	C(F)	L	DL	OA	OB	OC	PSC	Coo	Gst	Vip	Org	Gui	Inv	Prs	Sco	Stf	Vol	Chvol	Com
40	HRV	6(2)	1	1																
41	HUN	6(1)	1	1				1												
42	IDN	6(1)	1	1	1	1														
43	IND	6	1	1	1	1														
44	IRL	6(1)	1	1						1										
45	IRN	6	1	1	1	1	2													
46	IRQ	4(1)	1	1																
47	ISL	6	1	1																
48	ISR	6	1	1	1	1														
49	ITA	6	1	1	1															
50	JPN	6	1	1	2			9	65	104		23	117	40	25	6	49	14	47	
51	KAZ	6	1	1	1	1				1										
52	KEN	6	1	1			1													
53	KGZ	6	1	1			2													
54	KOR	6	1	1	2	3	2	1								1				
55	KSV	6	1	1		1	1													
56	LIE	2	1	1																
57	LKA	6	1	1																
58	LTU	6	1	1																
59	LUX	3(3)	1	1																
60	LVA	6(1)	1	1																
61	MAC	6	1	1																
62	MAR	6(1)	1	1	1	1										1				
63	MAS	6(1)	1	1	1															
64	MDA	6	1	1																
65	MEX	6	1	1	1															
66	MKD	6	1	1			2													
67	MMR	6(1)	1	1																
68	MNE	4(1)	1	1																
69	MNG	6	1	1	1	2	4													
70	MRT	6	1	1	1															
71	NIC	3	1																	
72	NLD	6	1	1		1	1													
73	NOR	6(1)	1	1													1			
74	NPL	6(1)	1	1		2	2													
75	NZL	6(1)	1	1		1	1													
76	OMN	6(3)	1	1			1													
77	PAK	6	1	1		1	1													
78	PAN	3	1	1																
79	PAR	4(1)	1	1																
80	PER	6	1							1										
81	PHI	6	1	1		3														
82	POL	6	1	1																
83	POR	6	1	1																
84	PRI	4(2)	1	1																
85	ROU	6	1	1	2															
86	RWA	6(2)	1	1		1														

	Country	C(F)	L	DL	OA	OB	OC	PSC	Coo	Gst	Vip	Org	Gui	Inv	Prs	Sco	Stf	Vol	Chvol	Com
87	SAF	6(1)	1	1		1														
88	SAU	6	1	1	2	3														
89	SGP	6	1	1	1	3				1										
90	SLV	3(1)	1	1																
91	SRB	6	1	1																
92	SUI	6(1)	1	1		1		1												
93	SVK	6(1)	1	1																
94	SVN	6(2)	1	1								1					1			
95	SWE	6(1)	1	1				1												
96	SYR	6	1	1	1															
97	THA	6	1	1	2	2														
98	TJK	6(1)	1	1																
99	TKM	6	1	1																
100	TUN	6	1	1		2														
101	TUR	6(1)	1	1	3															
102	TWN	6	1	1	2	2														
103	TZA	1	1	1																
104	UAE	6(3)	1	1																
105	UGA	6(1)	1	1		1	1													
106	UKR	6(4)	1	1	3	1														
107	UNK	6	1	1	8	1	2	1		2					1					
108	URY	3	1																	
109	USA	6	1	1	1	1				4										
110	UZB	6	1	1		1														1
111	VEN	3(2)	1	1			2													
112	VNM	6	1	1			9													

計 618(67) 111 108 60 48 40 16 65 124 1 25 117 40 26 8 51 14 47 1  
 総計 902

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C(F)=contestant(Female), L=Leader, DL=Deputy Leader

OA=Observer A, OB=Observer B, OC=Observer C, PSC=Problem Selection Committee

Coo=Coordinator, Gst=Guest, Vip=Very important person, Org=Executive organization,

Gui=Guide, Inv=Invigilator, Prs=Press, Sco=Senior Coordinator, Stf=Staff, Vol=Volunteer

Cvol=Chiba Convention Bureau volunteer, Com=Commissioner

## 2 Participating Countries 参加国リスト

	Country	Leader	Deputy Leader	ObserverA	ObserverB	ObserverC
1	ALB	Adrian Naço	Enkel Hysnelaj			
2	ALG	Abdallah Rahmani	Hacene Belbachir	Abdeldjalil Hezouat	Maya Chouikrat	
				Younes El Maamoun Benyahia	Abdelhamid Benmezai	
3	ARG	Patricia Fauring	Martin Mereb	Daniel Perrucci		
4	ARM	Smbat Gogyan	Gurgen Asatryan	Tigran Margaryan		
				Bojan Bašić		
5	AUS	Angelo Di Pasquale	Hadyn Tang	Adrian Agisilaou	Michelle Chen	Louise Bilston
				Ben Kirk		
6	AUT	Robert Geretschläger	Veronika Schreitter			
7	AZE	Mammadov Abbas	Hasan Hasanzade		Guliyev Vugar	
8	BEL	Bart Windels	Philippe Niederkorn	Ria Van Huffel		
9	BFA	Innocent Bayala	Cye Antonio Angelberg Kambire			
10	BGD	Mahbubul Alam Majumdar	Nur Muhammad Shafiullah			Md. Baizid Bhuiyan
11	BGR	Stanislav Harizanov	Stoyan Boev	Stefan Gerdjikov		
12	BIH	Adisa Bolić	Goran Janković			
13	BLR	David Zmiaikou	Dzmitry Bazyleu			
14	BOL	Cordero Cárdenas Sonia Ximena Nivia	Pozo Vargas Joel Ruben			
15	BRA	Edmilson Motta	Samuel Barbosa Feitosa	Davi Lopes Alves de Medeiros		
				Fabio Dias Moreira		
				Regis Prado Barbosa		
16	BWA	Mmoloki Lekhutlile	Mathews Masole	Tapologo Mabotho		
17	CAN	Antonio Molina Lovett	Caleb Ji	Howard Halim		
18	CHI	Anibal Velozo	Anibal Velozo			
19	CHN	Liang Xiao	Zhenhua Qu	Yunhao Fu	Bin Wang	Kewen Li
20	CMR	Joseph Marie Domguia	Adrien Herve Benyomo Etoga			
21	COL	Maria E Losada	Santiago Rodríguez			
22	CRI	Daniel Campos Salas	Oscar Zamora Luna			
23	CUB		Evidio Quintana Fernández			
24	CYP	Demetres Christofides	Stelios Kouzaris			
25	CZE	Tomáš Bárta	Pavel Calábek			
26	DEN	Malthe David Søholm Mejlsted	Marius Christian Fischer			
27	DOM	Cesar Santil	Susanna Belussi			
28	ECU	Jorge Chamaidan	Jhosue Infante			
29	ESP	Adel Darwish	Zyad Hassan			
30	EST	Oleg Košik	Hendrik Vija			
31	FIN	Ville Uotila	Daniel Arone	Heikki Pokela		
32	FRA	Vincent Jugé	Théo Lenoir			
33	GEO	George Chelidze	Givi Nadibaidze		Giorgi Svanadze	
34	GER	Uwe Leck	Eric Müller	Jens Reinhold		
35	GHA	Yuka Machino	Joel Dogoe		Jeannette Lacoss	Emmanuel Barima Manu
					Chris Peterson	
36	GTM	José Carlos Bonilla Aldana				
37	HEL	Anargyros Fellouris	Silouanos Brazitikos			Theodora Tsiachta
38	HKG	Tak Wing Ching	Long Tin Chan	Ka Ho Law		Ka Lok Chan
39	HND	Devis Moisés Alvarado Zavala	Luis Armando Ramos Palacios			
40	HRV	Borna Vukorepa	Vlatko Crnković			
41	HUN	Viktor Harangi	Sándor Dobos			
42	IDN	Aleams Barra	Nanang Susyanto	Fajar Yuliawan	Farras Mohammad Hibban Faddila	
43	IND	Prithwijit De	Sahil Mhaskar	Anant Mudgal	Pranjal Srivastava	
44	IRL	Mark Flanagan	Luke Gardiner			
45	IRN	Seyed Hessam Firouzi	Amin Behjati	Navid Safaei	Ali Partofard	Matin Yadollahi
						Roohollah Oraki Kohshoor
46	IRQ	Abdullah Muqdad Mawlood Alani	Ekram Rahim Ghaffar Ghaffar			
47	ISL	Marteinn Hardarson	Sigurður Jens Albertsson			

	Country	Leader	Deputy Leader	ObserverA	ObserverB	ObserverC
48	ISR	Dan Carmon	Ilya Gringlaz	Omri Zemer	Alon Heller	
49	ITA	Massimo Gobbino	Samuele Mongodi	Alessandra Caraceni		
50	JPN	Sogo Murakami	Keiko Tasaki	Atsuya Ishida		
				Naoki Watanabe		
51	KAZ	Assylbek Issakhov	Kanat Satylkhanov	Arailym Suleimenova	Nurbek Kungozhin	
52	KEN	Elijah Matoke Charles	James Kiwanuka Katende			Carey Odhiambo Odoyo
53	KGZ	Bekzhan Dzhumabaev	Makhamadkhan Ishmatov			Mirdin Eshenaliev
						Nazgul Kuzekeeva
54	KOR	Suyoung Choi	Hwajong Yoo	Yongjin Song	Gyeonghui Park	Chaerin Lee
				Ringi Kim	Hongnyung Kim	Hyun Hui Lee
					Kyeongsik Nam	
55	KSV	Armend Shabani	Valmir Krasniqi		Lirie Aliu	Miradije Berisha
56	LIE	Valentin Imbach	Johann Williams			
57	LKA	Dayal Dharmasena	Chethana Chathuprabha Belpa Godage			
58	LTU	Artūras Dubickas	Zina Šiaulienė			
59	LUX	Zeihen Pascal André Jules	Dostert Mike			
60	LVA	Kims Georgs Pavlovs	Filips Jelisejevs			
61	MAC	Ieng Tak Leong	Sio Meng Lao			
62	MAR	Hassan Asensouyis	Mohamed El Ibbouui	Mahmoud Essamet	Mohammed Dahmouni	
63	MAS	Syamil Bin Ahmad Shakir	Nor Ainun Binti Mat	Muhammad Zafree Bin Zaharidan		
64	MDA	Valeriu Guțu	Valeriu Baltag			
65	MEX	Kevin William Beuchot Castellanos	José Ignacio Barradas Bribiesca	Adán Medrano Martín del Campo		
66	MKD	Ilija Jovceski	Mirko Petrushevski			Nikica Davkova
						Teodora Boshkova
67	MMR	Saw Win Maung	Htin Aung			
68	MNE	Nikola Konatar	Gojko Jelovac			
69	MNG	Otgonbayar Uuye	Batbayasgalan Balkhuu	Bayarmagnai Gombodorj	Batzorig Undrakh	Bazar Tumurkhan
					Khulan Tumenbayar	Dayantsolmon Dagva
						Davaasuren Davaadorj
						Baigali Jigjid
70	MRT	Mahfoudh Mohamed Ammou Ahmed	Mohamed Yahya Mohamed Abdellahi Deyah	Isselmou Lebatt Farajou		
71	NIC	Oscar Danilo Quintanilla Luna				
72	NLD	Quintijn Puite	Johan Konter		Nils Van de Berg	Allie Zong
73	NOR	Dávid Kunszenti-Kovács	Andreas Alberg			
74	NPL	Sanat Kumar Acharya	Chhabi Dhungana		Bhadra Man Tuladhar	Hari Prapanna Kandel
					Nirula Tamrakar	Narayan Paudel
75	NZL	Ross Atkins	Josie Smith		Kevin Shen	Jamie Craik
76	OMN	Mian Mohammed Salim Al Hinai	Amal Nasser Said Al Muqarshi			Ali Nasser Hamdoon Nasser Al Rashdi
77	PAK	Sarfraz Ahmad	Hani Shaker		Jamal Nasir	Muhammad Ali
78	PAN	Luis Gabriel Peña García	Luis Alberto Modes Castillo			
79	PAR	Nair Isabel Aguilera Martínez	Dario de Jesus Torres Herebia			
80	PER	Jonathan Farfan				
81	PHI	Hazel Joy Shi	Kerish Villegas		Russelle Guadalupe	
					Josette Biyo	
					Randolf Sasota	
82	POL	Tomasz Cieśla	Łukasz Bożyk			
83	POR	Joana Teles	Nuno Miguel Arala Santos			
84	PRI	Luis Caceres	Omar Colon			
85	ROU	Cătălin Gherghe	Mihai Chis	Lucian Turea		
				Erzsebet Anna (Elisabeta Ana) Nagy (Naghi)		
86	RWA	Jean Nepo Munezero	Honorine Munezero		Marthe Uwiringiyimana	
87	SAF	Liam Baker	Malwande Nqobani Nkonyane		Kerry Jean Porcill	

	Country	Leader	Deputy Leader	ObserverA	ObserverB	ObserverC
88	SAU	Sultan Albarakati	ALzubair Habibullah	Safwat Abdelsalam	Faisal ALquayti	
				Tarek Shehata	Majed ALharbi	
					Shaden ALshammari	
89	SGP	Yong Sheng Soh	Lixing Zong	Tiong Seng Tay	Wee Kean Tan	
					Xu Chen Tan	
					Yangyi, Aloysius Ng	
90	SLV	Christopher Edgardo Padilla Sandoval	Fernando Daniel Domínguez Castaneda			
91	SRB	Miljan Knežević	Teodor von Burg			
92	SUI	David Rusch	Tanish Patil		Annalena Hofer	
93	SVK	Stanislav Krajčí	Martin Vodička			
94	SVN	Gregor Dolinar	Luka Horjak			
95	SWE	Victor Ufnarovski	David Wörn			
96	SYR	Omran Kouba	Leen Qasem	Ahmad Alkhamis		
97	THA	Nithi Rungtanapirom	Teeradej Kittipassorn	Sarita Bunsupha	Supanat Kamtue	
				Penying Rochanakul	Jaray Panmuang	
98	TJK	Pirahmad Olimjoni	Akmaljon Kholiqov			
99	TKM	Arslan Hojiyev	Palvan Agamyradov			
100	TUN	Taoufik Charrada	Raouf Thabet		Alaeddine Sabbagh	
					Monia Daghmouri Bouzouita	
101	TUR	Azer Kerimov	Selim Bahadır	Hatice Dağlıoğlu		
				Mahmut Kamil Koçin		
				Ahmet İleri		
102	TWN	Yen-chi Roger Lin	Chu-Lan Kao	Ming Hsiao	Wan-Chi Lin	
				Chun-Chen Yeh	Chiun-Chang Lee	
103	TZA	Bussury Abdulrahman Omary	Mwinyisheke Muhamadi Kibinda			
104	UAE	Josef Tkadlec	Fatma Mahmood Yousuf Ali Aljanahi			
105	UGA	Joseph Ssebuliba	Medi Ssesanga		Karen Kebirungi	Aiden David Rujumba
106	UKR	Bogdan Rublov	Zarina Kodyrova	Oleksandr Dashkov	Svitlana Mystiuk	
				Ihor Pylaiev		
				Andrii Anikushyn		
107	UNK	Dominic Yeo	Freddie Illingworth	Rebecca Elcome	James Tennet	Emily Chow
				John Collins		Ava Yeo
				Patrick Gaule		
				Omar El Housni		
				Charles Leytem		
				Joseph Myers		
				Ander Lamaison		
				Geoff Smith		
108	URY	Hernán Puschiasis				
109	USA	Po-Shen Loh	Carl Schildkraut	Luke Robitaille	Oleksandr Rudenko	
110	UZB	Utkir Boltaev	Umid Rakhmonov		Khakimboy Egamberganov	
111	VEN	Rafael Sánchez	Francisco Javier Molina Tirado			Marissa Carolina Cordido Martínez
						Simón Andrés Puyosa García
112	VNM	Anh Vinh Le	Ba Khanh Trinh Le			Duy Kha Nguyen
						Cong Hong Sai
						Trong Khanh Truong
						Ngoc Diep Tran
						Viet Anh Trinh
						Tang Vu Nguyen
						Ngoc Minh Hoang
						Duc Thinh Le
						Thanh Do Nguyen

### 3 Coordinators コーディネーター

Ákos	Záhorský	Tímea	Csahók
Ildar	Maratovich Gaisin	Yuji	Odaka
Horace Claudio	Chaix	Michael	Ren
Jeck	Lim	Larry	Lau
Donghyun	Kim	Dylan Shan Hong	Toh
Shanta Singh	Laishram	Rikimaru	Kurata
Satoshi	Hayakawa	Mihir	Singhal
Zhao Yu	Ma	Zack	Chroman
Lovro	Drofenik	Ryotaro	Kosuge
Jaka	Vrhovnik	James	Lin
Yusuke	Nakamura	Ryosuke	Odoi
Yuki	Yoshida	Minkyu	Choi
Fuma	Hirayama	Milan	Haiman
Yuka	Watabe	Takuya	Inoue
Hiromasa	Kondo	Shuho	Kanda
Naoki	Kimura	Soji	Kubota
Taiyo	Kodama	Yuwan	Seo
Kensuke	Yoshida	Kei	Irie
Taisuke	Hoshino	Junghun	Ju
Youngjun	Cho	Seongbin	Jeon
Yoshiki	Oshima	Dain	Kim
Yui	Hosaka	Koichiro	Kobayashi
Soh	Kumabe	Naoki	Kuroda
Stephan	Wagner	Vesna	Kadelburg
Stijn	Cambie	Yuhi	Kamio
Yuan	Yao	Yuliya	Kryvitskaya
Jeonghyun	Ahn	Anna	Luchnikov
Jimin	Kim	Heizo	Sakamoto
Daejun	Lee	Kota	Tokoro
Shogo	Murai	Tomoki	Yoshida
Masaki	Nishimoto		
Elena-Madalina	Persu		
Ayato	Shukuta		
Alec	Sun		
Ahmed Ittihad	Hasib		

### 4 Senior Coordinators シニアコーディネーター

Shingo	Saito	Ander	Lemaison
Omar	El Housni	Geoff	Smith
Joseph	Myers	Sung Jin	Park
Charles	Leytem	Nouzha	El Yacoubi

### Ⅲ Programme 大会プログラム

#### 1 Leader・Obsever A・IMO Board 団長・オブザーバー A・IMO 役員

Date	Time Table	Remarks
July 2 Sunday	18:00 – 20:00 Dinner	Early Arrival
July 3 Monday	9:00 – 18:00 Arrival at Narita or Haneda airport	成田空港/羽田空港
	9:00 – 12:00 IMOB Meeting	ホテル日航成田
	12:00 – 14:00 Lunch	
	14:00 – 18:00 IMOB Meeting	
	18:00 – 20:00 Dinner	
	20:00 – 22:00 Jury Meeting	
July 4 Tuesday	7:00 – 9:00 Breakfast	ホテル日航成田
	9:00 – 11:30 Jury Meeting or Work on Short List	
	11:30 – 13:30 Lunch	
	13:30 – 18:00 Jury Meeting or Work on Short List	
	18:00 – 20:00 Dinner	
	20:00 – 22:00 Jury Meeting	
July 5 Wednesday	7:00 – 9:00 Breakfast	ホテル日航成田
	9:00 – 11:30 Jury Meeting	
	11:30 – 13:30 Lunch	
	13:30 – 18:00 Jury Meeting	
	18:00 – 20:00 Dinner	
	20:00 – 22:00 Jury Meeting	
July 6 Thursday	7:00 – 9:00 Breakfast	ホテル日航成田
	9:00 – 11:30 Jury Meeting	
	11:30 – 13:30 Lunch	
	13:30 – 18:00 Translation	
	18:00 – 20:00 Dinner	
	20:00 – 22:00 Jury Meeting	
July 7 Friday	7:00 – 9:00 Breakfast	ホテル日航成田
	9:00 – 11:30 Jury Meeting	
	11:30 – 13:30 Lunch	
	13:30 Buses depart to Makuhari Messe	
	14:00 – 14:30 Enter in Ceremony Hall	
	15:00 – 16:40 Opening Ceremony	幕張メッセ国際会議場
	17:00 Buses depart to Hotel Nikko Narita	コンベンションホール AB
	18:00 – 21:00 Party	ホテル日航成田
	21:00 – 22:00 Jury Meeting	
July 8 Saturday	7:00 – 9:00 Breakfast	ホテル日航成田
	9:00 – 10:00 Q&A	
	10:00 – 11:00 Jury Meeting	
	11:00 – 13:00 Lunch	
	13:00 – 18:00 Excursion	成田コース/佐原コース
	18:00 – 20:00 Dinner	ホテル日航成田

Date	Time Table		Remarks
July 9 Sunday	7:00 – 9:00	Breakfast	ホテル日航成田
	9:00	Check out Hotel Nikko Narita	
	9:00 – 10:00	Q&A	
	10:00 – 11:30	Jury Meeting	
	11:30 – 13:30	Lunch	
	13:30	Buses depart to Makuhari APA hotel	
	15:00	Check in Makuhari APA hotel	アパホテル&リゾート
	15:00 – 18:30	Free time	
	18:30 – 20:30	Dinner	東京ベイ幕張ホール
July 10 Monday	7:00 – 9:00	Breakfast	東京ベイ幕張ホール
	9:00 – 12:00	Coordination	幕張メッセ Event Hall
	12:00 – 14:00	Lunch	東京ベイ幕張ホール
	14:00 – 18:00	Coordination	幕張メッセ Event Hall
	18:00 – 20:00	Dinner	東京ベイ幕張ホール
July 11 Tuesday	7:00 – 9:00	Breakfast	東京ベイ幕張ホール
	9:00 – 12:00	Coordination	幕張メッセ Event Hall
	12:00 – 14:00	Lunch	東京ベイ幕張ホール
	14:00 – 18:00	Coordination	幕張メッセ Event Hall
	18:00 – 20:00	Dinner	東京ベイ幕張ホール
	20:00 – 20:30	Move to Hotel Springs	
	20:30 – 22:00	Final Jury Meeting	Hotel Springs
July 12 Wednesday	7:00 – 9:00	Breakfast	東京ベイ幕張ホール
	9:00 – 10:30	Final Jury Meeting	Hotel Springs
	12:00 – 14:00	Lunch	東京ベイ幕張ホール
	14:00 – 14:30	Move to Makuhari Messe	
	15:00 – 17:30	Closing Ceremony	幕張メッセ国際会議場 コンベンションホール AB
	18:00 – 20:00	Farewell Party	東京ベイ幕張ホール
July 13 Thursday	7:00 – 9:00	Breakfast	東京ベイ幕張ホール
	10:00	Check out Makuhari APA hotel	アパホテル&リゾート
	10:00～	Departure	成田空港 / 羽田空港



## 2 Deputy Leader・Obsever B 副団長・オブサーバー B

Date	Time Table		Remarks
July 6 Thursday	15:00	Check in Makuhari APA hotel	アパホテル&リゾート
	15:00 - 18:00	Free time	
	18:00 - 20:00	Dinner	東京ベイ幕張ホール
Jury 7 Friday	7:00 - 9:00	Breakfast	東京ベイ幕張ホール
	9:00 - 11:00	Free time	
	11:00 - 13:00	Lunch	
	13:00 - 14:00	Move to Makuhari Messe	
	15:00 - 17:00	Opening Ceremony	幕張メッセ国際会議場 コンベンションホール AB
	17:00 - 18:00	Free time	
	18:00 - 20:00	Dinner	東京ベイ幕張ホール
July 8 Saturday	7:00 - 9:00	Breakfast	東京ベイ幕張ホール
	9:00 - 13:00	Free time	
	13:00 - 14:00	Lunch	
	14:00 - 18:30	Free time	
	18:30 - 20:30	Dinner	
July 9 Sunday	7:00 - 9:00	Breakfast	東京ベイ幕張ホール
	9:00 - 13:00	Free time	
	13:00 - 14:00	Lunch	
	14:00 - 18:30	Free time	
	18:30 - 20:30	Dinner	
Jury 10 Monday	7:00 - 9:00	Breakfast	東京ベイ幕張ホール
	9:00 - 12:00	Coordination	幕張メッセ Event Hall
	12:00 - 14:00	Lunch	東京ベイ幕張ホール
	14:00 - 18:00	Coordination	幕張メッセ Event Hall
	18:00 - 20:00	Dinner	東京ベイ幕張ホール
Jury 11 Tuesday	7:00 - 9:00	Breakfast	東京ベイ幕張ホール
	9:00 - 12:00	Coordination	幕張メッセ Event Hall
	12:00 - 14:00	Lunch	東京ベイ幕張ホール
	14:00 - 18:00	Coordination	幕張メッセ Event Hall
	18:00 - 20:30	Dinner	東京ベイ幕張ホール
	20:30 - 22:00	Final Jury Meeting	Hotel Springs
July 12 Wednesday	7:00 - 9:00	Breakfast	東京ベイ幕張ホール
	9:00 - 10:30	Final Jury Meeting	Hotel Springs
	12:00 - 14:00	Lunch	東京ベイ幕張ホール
	14:00 - 14:30	Move to Makuhari Messe	
	15:00 - 17:30	Closing Ceremony	幕張メッセ国際会議場 コンベンションホール AB
	18:00 - 20:00	Farewell Party	東京ベイ幕張ホール
Jury 13 Thursday	7:00 - 9:00	Breakfast	東京ベイ幕張ホール
	10:00	Check out Makuhari APA hotel	アパホテル&リゾート
	10:00~	Departure	成田空港/羽田空港

### 3 Contestant・Obsever C 選手・オブサーバーC

Date	Time Table		Remarks
July 6 Thursday	15:00	Check in Makuhari APA hotel	アパホテル&リゾート
	15:00 - 18:00	Free time	
	18:00 - 20:00	Dinner	東京ベイ幕張ホール
Jury 7 Friday	7:00 - 9:00	Breakfast	東京ベイ幕張ホール
	9:00 - 11:00	Free time	
	11:00 - 13:00	Lunch	東京ベイ幕張ホール
	13:00 - 14:00	Move to Makuhari Messe	
	15:00 - 17:00	Opening Ceremony	幕張メッセ国際会議場 コンベンションホール AB
	17:00 - 18:00	Free time	
	18:00 - 20:00	Dinner	東京ベイ幕張ホール
July 8 Saturday	6:00 - 8:00	Breakfast	東京ベイ幕張ホール
	8:00 - 8:30	Move to Makuhari Messe	
	9:00 - 13:30	Exam 1	幕張メッセ国際会議場 コンベンションホール AB
	13:30 - 16:00	Lunch	東京ベイ幕張ホール
	16:00 - 18:00	Free time	
	18:00 - 20:00	Dinner	東京ベイ幕張ホール
July 9 Sunday	7:00 - 9:00	Breakfast	東京ベイ幕張ホール
	8:00 - 8:30	Move to Makuhari Messe	
	9:00 - 13:30	Exam 2	幕張メッセ国際会議場 コンベンションホール AB
	13:30 - 16:00	Lunch	東京ベイ幕張ホール
	16:00 - 18:00	Free time	Optional tour
	18:00 - 20:00	Dinner	東京ベイ幕張ホール
	19:00 - 20:30	Culture Festival free activity	
Jury 10 Monday	7:00 - 8:30	Breakfast	東京ベイ幕張ホール
	8:00 - 9:30	Departure for Tokyo Disneyland	
	9:00 - 18:00	Excursion TDL	東京ディズニーランド
	18:00 - 20:00	Dinner	東京ベイ幕張ホール
	19:00 - 21:30	Culture Festival free activity	
Jury 11 Tuesday	7:00 - 9:00	Breakfast	東京ベイ幕張ホール
	9:30 - 17:00	Excursion	Optional tour
	18:00 - 20:30	Dinner	東京ベイ幕張ホール
	19:00 - 21:30	Culture Festival free activity	
July 12 Wednesday	7:00 - 9:00	Breakfast	東京ベイ幕張ホール
	9:00 - 11:30	Free time	
	11:30 - 14:00	Lunch	東京ベイ幕張ホール
	14:00 - 14:30	Move to Makuhari Messe	
	15:00 - 17:00	Closing Ceremony	幕張メッセ国際会議場 コンベンションホール AB
	18:00 - 20:00	Farewell Party	東京ベイ幕張ホール
Jury 13 Thursday	7:00 - 9:00	Breakfast	東京ベイ幕張ホール
	10:00	Check out Makuhari APA hotel	アパホテル&リゾート
	10:00~	Departure	成田空港/羽田空港

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## IV Ceremonies and Events

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### 1 Opening Ceremony

○Date and Time : Friday, July 7, 2023

○Place : Makuhari Messe International Exhibition Hall Convention Hall AB

○Program

- Contestants & Leaders Admission/seating
- Opening Wadaiko (荒川社中)
- Opening Remarks
  - Minister of Education, Culture, Sports, Science and Technology  
Keiko Nagaoka (永岡桂子)
  - IMO Board President Gregor Dolinar
  - Contestants representative osth Japanese national team Contestant  
Keisuke Koide (小出慶介)
  - IMO2023 Organizing Committee Chairman  
The Gibraltar Life Insurance Co., Ltd. CEO Tsuyoshi Soeda (添田毅司)
- Attraction Music performance Tokyo Brass Style (東京ブラスタイル)
- Participating Countries & Contestants Introduction
- Closing Remarks
  - IMO2023 Japan Executive Committee Chairman  
The Mathematical Olympiad Foundation of Japan Chairman  
Takahiko Fujita (藤田岳彦)
- Closing Leaders & Contestants Exit

■Minister of Education, Culture, Sports, Science and Technology Keiko Nagaoka
-------------------------------------------------------------------------------

Good afternoon, everyone!

I am Nagaoka Keiko. Minister of Education, Culture, Sports, Science and Technology of Japan. I am very happy to be saying a few words at this opening ceremony for the 64<sup>th</sup> International Mathematical Olympiad. First, let me warmly welcome all of you who have come from countries and regions around the world to Japan.

The International Mathematical Olympiad provides an opportunity for motivated and talented students to compete against their peers, and thus greatly and contributes to their growth.

Japan has long been supporting this competition, and it is a great pleasure for Japan to be able to historic International Mathematical Olympiad. Mathematics can be said to be the common language for various sciences. It is an invaluable academic field that elucidates the fundamental principles of all phenomena prevalent in industry, the environment, and life itself, and predicts the signs of changes.

Moreover, mathematics is tied to solving the many social problems we are facing, such as using data science to make more accurate weather forecasts.

I believe that the society you will live in from now will hold great possibilities while

presenting various challenges. Within that context, in order to open up these new possibilities and solve problems, it will be essential to have young people who have a flexible mindset, think for themselves, and have the motivation and capability to take on these difficult problems while also cooperating with others.

All of you have the potential to take advantage of the experience you gain here at this Olympiad to further develop science and technology and create new technologies.

I hope that you will use your gifts to help lead the world and create a better society in the future. At this Olympiad, I expect that you will all fully demonstrate your abilities and the fruits of your efforts up to now and tackle the problems given with your all-out efforts so you leave here with no regrets. I also hope you to take on these difficult problems while also cooperating with others.

Finally, I want to express my highest regards to all those who have made such efforts for the holding of this Olympiad and my sincere wish that this wonderful competition will continue to develop in the future. And last but not least, I sincerely hope that all of you young people aspiring to study mathematics will make even greater strides forward.

Thank you very much.

■ Welcome Message from

IMO Board President Prof. Gregor Dolinar, Ph.D

Distinguished guests, honorable Ministry of Education leaders, deputy leaders and the most important, dear contestants, I'm honored to say a few words at the opening ceremony of the 64<sup>th</sup> International Mathematical Olympiad. IMO is by far the largest Science Olympiad, with more than one hundred countries participating.

It has the longest tradition among all Olympiads, and it is the most prestigious. So first of all, I would like to thank the organizers for hosting this important international event here in Japan: "Arigato gozaimasu" (ありがとう). The contestants, let me emphasize the following: Mathematics, as one of the most fundamental and abstract fields of science, is also considered as one of the most difficult subjects in schools and in science. So, each of you is one of the best young minds in your entire generation from your entire country. You know very well it's not easy to qualify for the IMO team. Some of you may have been in the seventh place in the previous years, but this year you're here-and that in itself is a great achievement and deserves all respect and admiration. And I can tell you for sure that you will get the respect and attention you deserve very soon from the best universities in your country and in the world. And later I hope from employers with vision and ambition.

My colleague, when competing in mountain running marathons, likes to say that when we gather at such demanding events, friendship is very important. But, we are there to compete, and I think that is the rules of IMO. So, be friends first, but we are all here because we love to compete. So, in the following two days, I wish you all the best. For less than half of you, there are medals waiting for you, and in addition to that some honorable mentions. Go and get them, but you should do so in an honorable way. So here, I would like to invite one of the Japanese contestants to say an oath, the IMO oath, in the name of all contestants please.

All students, please stand up.

In the name of all the participants, I promise that as we take part in this International Mathematical Olympiad, we will respect and abide by the rules which govern it. We commit ourselves to earnest conduct in the true spirit of fair play for the glory of mathematics and the honor of our teams.

■The Gibraltar Life Insurance Co.,Ltd. CEO Takeshi Soeda

I am pleased to welcome all the contestants and participants from around the world to the 64<sup>th</sup> International Mathematical Olympiad in Japan. I am Soeda Takeshi from Gibraltar Life Insurance and Chairman of IMO2023.

I am thrilled to hold the IMO in Japan again for the first time in 20 years since the last IMO was held in Japan in 2003. From bottom of my heart, welcome to Japan. While most of Covid19-related travel restrictions have now been lifted here in Japan, you must have overcome many challenges to participate in this event.

I am proud that all the contestants who have single-heartedly challenged the possibilities of mathematics amidst such difficulties are now able to demonstrate their abilities to the fullest in Japan and deepen exchanges with other contestants from around the world. We, at the IMO Committee, will provide all necessary support to help contestants to participate in the competition in a perfect condition, so we hope that everyone gives their best. I also hope that you enjoy Japanese culture during your stay and go back to your country with full of fun memories.

Finally, I would like to express my sincere gratitude to the Executive Committee and everyone who has rendered support to the hosting of IMO2023 in Japan. Let me conclude my speech with best wishes for success in the competition and further development of the International Mathematical Olympiad.

■開会式閉会の言葉

IMO2023 日本大会実行委員会委員長 数学オリンピック財団理事長 藤田 岳彦

Hello, everyone. I'm Takahiko Fujita, in charge of this Japan IMO. I'm glad to see you guys, enjoying this opening ceremony. Japanese drums, many interesting speeches, the girls punk band "Tokyo Brass Style", especially your standing ovation to Tokyo Brass Style, very much impressed me. Your parade, sometimes or many times funny, very much pleased us. From now on, you have to enjoy two things or three things. One is of course mathematics, tomorrow and the day after tomorrow. One is of course Japan itself. And another one is communicating with each other all over the world.

That's my closing speech of the Opening Ceremony. Thank you very much.



## 2 International Cultural Exchange

<Excursion>

### The Tour for Leaders

Date and Time : Saturday, July 8, 2023, 13:00-16:00

Two options (Course A and Course B) are selected according to the leader's preference.

(1) Course A "Naritasan Shinshoji Temple Tour

- Departure from hotel (Hotel Nikko Narita)
- Arrive at Naritasan Shinshoji Temple
- Visit Shinsho-ji Temple (guided by a volunteer guide in the temple precincts)
- Free time (stroll through the streets full of Edo atmosphere)
- Departure from Shinsho-ji Temple
- Arrive at hotel



Naritasan Shinshoji Temple

(2) Course B "Sawara Townscape Tour

- Depart from hotel (Hotel Nikko Narita)
- Arrival at Sawara Machinami
- Free time (walk along the historical townscape)
- Ino Tadataka Memorial Museum
- Sawara Mitsubishi Museum
- Nakamura Shop (Japanese goods)
- Boat tour
- Old houses
- Hibashi Bridge
- etc.
- Sase Plant
- Arrival at hotel



Ino Tadataka Memorial Museum

### The Tour for contestants Tokyo Disneyland

Date & Time: July 10, 2023 (Monday) 9:00-18:00

To: From the hotel (Makuhari APA Hotel) by private bus

Return: Each country (team) will return to their lodgings

Free time for each country (team) in TDL (accompanied by team guide)



Tokyo Disneyland

## Team Tour

Date and time: July 11, 2023 (Tuesday) 9:00-18:00

The tour will be divided into the following 10 courses, depending on the wishes of the participants.



University of Tokyo's Kashiwa Campus

(1) Tour of the University of Tokyo's Kashiwa Campus + Akihabara/Kappabashi walk

(2) Visit Meiji Yasuda Life Insurance Company + stroll through Asakusa and Sky Tree

(3) Visit to the Japan Agency for Marine-Earth Science and Technology (JAMSTEC) Yokohama Institute for Marine-Earth Science and Technology

(3) Visit to JAMSTEC (Japan Agency for Marine-Earth Science and Technology) + Walking tour of Minato Mirai and Red Brick Warehouse

Visit to METoA Ginza (Mitsubishi Electric Event Square, Ginza)

(4) Tour of METoA Ginza (Mitsubishi Electric Event Square, Ginza) + Stroll around Zojoji Temple, Shiba Park, and Tokyo Tower

(5) Visit to NTT Musashino R&D Center

(6) Visit Karakuri Corporation (Tsukiji) Experience Hall

(7) Visit to the Tokyo University of Science Math Experience Center (MUSE) + Walking tour of Asakusa, Kappabashi, and Tokyo Sky Tree

(8) Visit Meiji Jingu Shrine, Harajuku, and Shibuya

(9) Walking tour of Ueno Park and Akihabara

(10) Play sports (tennis, soccer) at Kanda University of International Studies

(\*) For (1) to (4) and (6) and (7), outbound: by private bus, return: by own transportation.

(5) is round trip by private bus. (8) to (10): round trip by bus, return by own transport

## <Culture Festival>

From July 9 (Sun.) to July 11 (Tue.), 2023, from 18:00 to 21:00, a Japanese cultural experience exchange (workshop) was held with the following menu. The venue was Tokyo Bay Makuhari Hall (1st floor), and participants were free to attend.

Urasenke Tea Ceremony (July 9)

Furoshiki (wrapping and knotting)" (July 10 & 11)

Mosaic Puzzle Art - Math x Art Works" (July 9 & 11)

Origami - Math x Origami" (July 9-11)

Math and Music" (July 9-11: Introduction of music goods & July 12: Farewell Party)

## <Jane Street Hub>

The following menu was offered as part of the Jane Street Hub activities during the Makuhari dates of July 6-11, 2023, from 9:00 to 21:30.

### Alumni/Contestants'Meeting space

A free space was set up on the first floor of Tokyo Bay Makuhari Hall where IMO competition alumni and competitors could freely mingle. Mathematical discussions, sharing of experience, exchanges through mathematical games (Othello, chess, card games, smartphone games, etc.), and renewal of old friendships were actively conducted during the period.

### <Sponsors Booth>

On Sunday, July 9 from 15:00 to 21:00 and Monday, July 10 to Tuesday, July, 11 from 9:00 to 12:00, sponsors set up booths on the 46th floor of APA Hotel & Resort Tokyo Bay Sky Banquet and the 1st floor of Tokyo Bay Makuhari Hall to introduce their companies, and players had the opportunity to hear from company representatives freely. The booths were set up by IMOF sponsors.

The booths were set up by IMOF sponsors HUAWEI and QuantCo (APA Hotel & Resort 46th floor), IMO2023 sponsors Gibraltar Life Insurance, FUJITSU, Arithmer, and IBM (APA Hotel & Resort 46th floor), KARAKURI, YAHOO! JAPAN” and ‘Jane Street Hub’ (1st floor of Tokyo Bay Makuhari Hall).

### <Farewell Party>

On Wednesday, July 12, 2023 from 18:00 to 20:00, a “Farewell Party” was held on the 2nd floor of Tokyo Bay Makuhari Hall after the closing ceremony. A standing buffet party with live background music, a live band performance, and the Bon Odori dance “Prime Number Dance” as an attraction brought the venue together and provided a grand finale.

## 3 Closing Ceremony

○Date and Time : Wednesday, July 12, 2023 15:00~17:40

○Place : Makuhari Messe International Exhibition Hall Convention Hall AB

○Program

- Contestants & Leaders admission/seating
- Opening Digest VTR Screening
- Opening Remarks
  - Mayor of Chiba City Shunichi Kamiya (神谷俊一)
  - IMO2023 Japan Executive Committee Chairman  
The Mathematical Olympiad Foundation of Japan Chairman  
Takahiko Fujita (藤田岳彦)
- Award
  - Honorable Mention 192 people
  - Bronze 170 people
  - Silver 90 people
  - Gold 54 people
  - Mirzakhani Awards 5 people
  - Perfect Score 5 people
- General review IMO Board President Gregor Dolinar
- IMO flag Inheritance Ceremony
- Next host country Introduction VTR
- Closing Remarks
  - IMO2023 Japan Executive Committee Chairman  
The Mathematical Olympiad Foundation of Japan Chairman  
Takahiko Fujita (藤田岳彦)
- Closing Leaders & Contestants Exit



## ■ Mayor of Chiba Kamiya Shunichi

My name is Kamiya Shunichi and I am the Mayor of Chiba City. On the behalf of the 980,000 citizens of Chiba City, I am delighted to be able to welcome all of the participants here today, who have made the long journey from all over the world. It is a huge honour for Chiba City to host this year's International Mathematical Olympiad.

Chiba City is known for its historical Kasori Shell Mounds and the Chiba Clan, as well as nature, such as greenery, the coastline and the bay area. The city is also characterized by its urban facilities, where people are able to enjoy the convenience and ease of being able to work close to their homes.

Many people come to Chiba City from Tokyo and abroad to work, study and shop, as Chiba City is quite accessible due to its excellent transport network.

Furthermore, Chiba City has a long-running connection with science and technology, as the founding father of rocket research in Japan, Dr.Hideo Itokawa, first began his space research here in Chiba City. Presently, the knowledge of advanced science and technology held by university research institutions and other companies is being passed onto further generations through the implementation of the "Future Science Development Programme" through which junior and high schools in Chiba City are giving students the opportunity to experience drone and robotic technology. Maths has played an essential role in technological advancement since the beginning of time. Chiba City recognizes the important of implementing a mathematical way of thinking and using technology in society to solve social issues. Chiba City avails of AI technology to maintain roads in the city through the automatic detection of road damage, in order to improve services for citizens. To improve the prospects of possible future scientists who could play a role internationally, Chiba Municipal Chiba High School is a state designated "Super Science High School". Through collaborative courses with universities and research institution, and team teaching by teachers in every subject, students at the school are working on applied science and maths, pushing beyond the usual borders of these subjects by studying team in combination with other subjects.

On a side note, the kanji for Chiba City is written using the characters "thousand" and "leaves". The kanji for Chiba was first published 1200 years ago during the late Nara period in the "Mannyoshu", also known as the "Collection of ten Thousand Leaves", which is Japan's oldest poetry collection. There are various theories as to the selection of the name "a thousand leaves", but one of the theories is that is it a description of lush flora. I feel deeply moved by the connection between the name "Chiba", which means "thousand leaves", and mathematics, a language which can describe all things in the universe. To all the participants, you have all worked extremely hard over the past two days. I have no doubt that you all put in a great deal of preparation for this event in order to withstand intense pressure during the competition and represent your country at the highest level.

I hope that you will all cherish the intercultural bonds that you have formed as a result of participating in this competition. In conclusion, I would like to express my gratitude to all those who were involved in organizing the International Mathematical Olympiad and I hope that the actions of the participants will lead to the further progression of maths and in turn, society.

Thank you very much.

■ Farewell Message from

IMO2023 日本大会実行委員会委員長 数学オリンピック財団理事長 藤田 岳彦

Hello, everyone. I'm Takahiko Fujita, in charge of this Japan IMO. I declare the commencement of the closing ceremony. As I stated before during the Opening Ceremony, I'm confident that you enjoyed mathematics, Japan, and international exchange. From now, the major role during the Closing Ceremony is the medal presentation. It is a great moment where the outstanding achievements and efforts of contestants are recognized and celebrated. Thank you.

■ General review from (IMO2023 Closing ceremony 総評)

IMO Board President Prof. Gregor Dolinar, Ph.D.

Distinguished guests, honorable Mayor of Chiba, leaders, deputy leaders and the contestants. The square edition of IMO is coming to an end, and at this point I would like to sincerely thank the organizers who put a lot of effort and resources into making for the 64th IMO as perfect as possible. The organizers have done a great job and on behalf of the IMO Board, and the entire IMO community, I would like to say thank you very much. "Domo arigato gozaimasu" (どうもありがとうございます).

A few words to the contestants: First of all, congratulations to all the prize winners. You have done an excellent job and you will receive the prizes and all the glory you have worked so hard for. Enjoy the glory! Contestants, I am very well aware that some of you may be a little disappointed. That is completely understandable - you are here because you love to compete, and it is not great to miss an honorable mention because of a stupid mistake, to miss a medal of bronze, silver or gold for just one point, or maybe to even have 41 points out of 42, but you should not be too disappointed. As I said at the opening ceremony, you are the best young people in your generation in your country - so you are almost all the time the best in your schools, in your regions, and in your counties. So, you are used to being on the top all the time. But you know, if you are always the best, then you are in the wrong room. You have to find a room that will challenge you and allow you to improve and grow. And I hope, I truly hope, that we can all agree that at this very moment you are all in the right room. And for being here in this room, at IMO2023, I congratulate you from the bottom of my heart. Bravo!

■ IMO2023 Closing remarks (閉会の挨拶)

IMO2023 日本大会実行委員会委員長 数学オリンピック財団理事長 藤田 岳彦

While not all contestants may have been able to win medals, I won't forget you. Their presence and participation in the IMO is already a remarkable achievement itself. So for all of you, it takes great direction, skill, and hard work to reach the level competing on such a stage. So, all the experience gained from this Japan IMO are sure to be invaluable for the future lives of all contestants. So please, enjoy the farewell party. Thank you.



IMO 2023



Chiba, JAPAN 64th

English (eng), day 1

*Saturday, 8. July 2023*

**Problem 1.** Determine all composite integers  $n > 1$  that satisfy the following property: if  $d_1, d_2, \dots, d_k$  are all the positive divisors of  $n$  with  $1 = d_1 < d_2 < \dots < d_k = n$ , then  $d_i$  divides  $d_{i+1} + d_{i+2}$  for every  $1 \leq i \leq k - 2$ .

**Problem 2.** Let  $ABC$  be an acute-angled triangle with  $AB < AC$ . Let  $\Omega$  be the circumcircle of  $ABC$ . Let  $S$  be the midpoint of the arc  $CB$  of  $\Omega$  containing  $A$ . The perpendicular from  $A$  to  $BC$  meets  $BS$  at  $D$  and meets  $\Omega$  again at  $E \neq A$ . The line through  $D$  parallel to  $BC$  meets line  $BE$  at  $L$ . Denote the circumcircle of triangle  $BDL$  by  $\omega$ . Let  $\omega$  meet  $\Omega$  again at  $P \neq B$ . Prove that the line tangent to  $\omega$  at  $P$  meets line  $BS$  on the internal angle bisector of  $\angle BAC$ .

**Problem 3.** For each integer  $k \geq 2$ , determine all infinite sequences of positive integers  $a_1, a_2, \dots$  for which there exists a polynomial  $P$  of the form  $P(x) = x^k + c_{k-1}x^{k-1} + \dots + c_1x + c_0$ , where  $c_0, c_1, \dots, c_{k-1}$  are non-negative integers, such that

$$P(a_n) = a_{n+1}a_{n+2} \cdots a_{n+k}$$

for every integer  $n \geq 1$ .



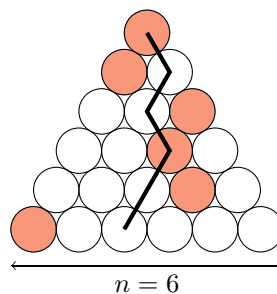
Sunday, 9. July 2023

**Problem 4.** Let  $x_1, x_2, \dots, x_{2023}$  be pairwise different positive real numbers such that

$$a_n = \sqrt{(x_1 + x_2 + \dots + x_n) \left( \frac{1}{x_1} + \frac{1}{x_2} + \dots + \frac{1}{x_n} \right)}$$

is an integer for every  $n = 1, 2, \dots, 2023$ . Prove that  $a_{2023} \geq 3034$ .

**Problem 5.** Let  $n$  be a positive integer. A *Japanese triangle* consists of  $1 + 2 + \dots + n$  circles arranged in an equilateral triangular shape such that for each  $i = 1, 2, \dots, n$ , the  $i^{\text{th}}$  row contains exactly  $i$  circles, exactly one of which is coloured red. A *ninja path* in a Japanese triangle is a sequence of  $n$  circles obtained by starting in the top row, then repeatedly going from a circle to one of the two circles immediately below it and finishing in the bottom row. Here is an example of a Japanese triangle with  $n = 6$ , along with a ninja path in that triangle containing two red circles.



In terms of  $n$ , find the greatest  $k$  such that in each Japanese triangle there is a ninja path containing at least  $k$  red circles.

**Problem 6.** Let  $ABC$  be an equilateral triangle. Let  $A_1, B_1, C_1$  be interior points of  $ABC$  such that  $BA_1 = A_1C$ ,  $CB_1 = B_1A$ ,  $AC_1 = C_1B$ , and

$$\angle BA_1C + \angle CB_1A + \angle AC_1B = 480^\circ.$$

Let  $BC_1$  and  $CB_1$  meet at  $A_2$ , let  $CA_1$  and  $AC_1$  meet at  $B_2$ , and let  $AB_1$  and  $BA_1$  meet at  $C_2$ . Prove that if triangle  $A_1B_1C_1$  is scalene, then the three circumcircles of triangles  $AA_1A_2$ ,  $BB_1B_2$  and  $CC_1C_2$  all pass through two common points.

(Note: a scalene triangle is one where no two sides have equal length.)

## VI Results and Awards 結果

### 1 Summary まとめ

#### GENERAL INFORMATION

Chiba, Japan IMO 2023, 2. 7. – 13. 7. 2023

Number of participating countries: 112

Number of contestants: 618; 67 ♀

#### AWARDS

Maximum possible points per contestant:  $7 + 7 + 7 + 7 + 7 + 7 = 42$

Gold medals: 54 (score  $\geq 32$  points) Perfect score: 5 (score = 42 points)

Silver medals: 90 (score  $\geq 25$  points)

Bronze medals: 170 (score  $\geq 18$  points)

Honourable mentions: 192

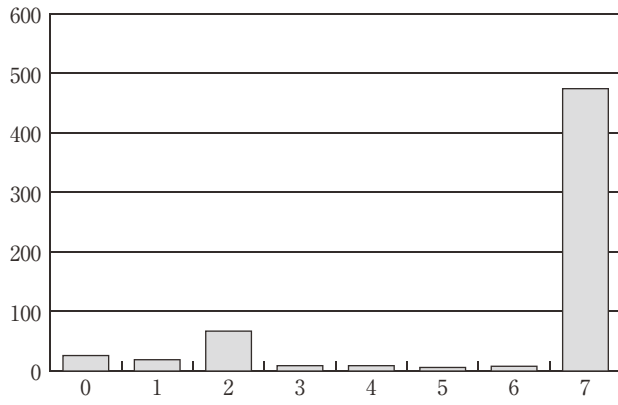
Mirzakhani Awards: 5

※ 2023 日本大会及び歴代大会個人成績は「IMO ホームページ」に常時掲載

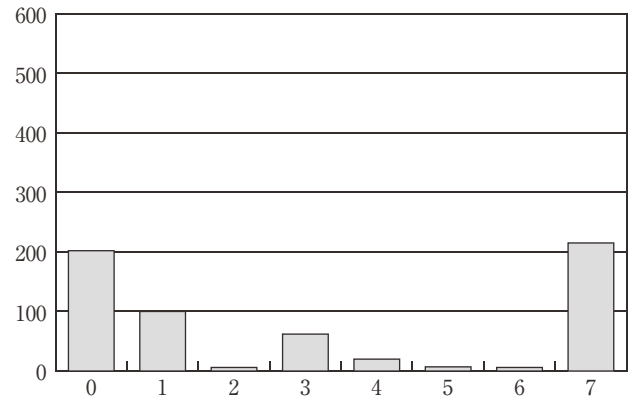
### 2 Statistics 統計

	P1	P2	P3	P4	P5	P6
Num (P# = 0)	26	202	396	86	219	555
Num (P# = 1)	19	100	102	100	29	11
Num (P# = 2)	67	6	7	32	174	36
Num (P# = 3)	9	62	23	8	52	4
Num (P# = 4)	9	20	8	4	4	1
Num (P# = 5)	6	7	6	1	13	1
Num (P# = 6)	8	6	3	3	9	4
Num (P# = 7)	474	215	73	384	118	6
Mean (P#)	5.845	3.162	1.256	4.717	2.417	0.275
Max (P#)	7	7	7	7	7	7
$\sigma$ (P#)	2.227	3.050	2.320	3.000	2.568	1.004
Corr (P#, Sum)	0.677	0.780	0.708	0.801	0.746	0.457
Corr (P#, P1)		0.422	0.271	0.576	0.383	0.125
Corr (P#, P2)	0.422		0.482	0.520	0.412	0.311
Corr (P#, P3)	0.271	0.482		0.377	0.502	0.480
Corr (P#, P4)	0.576	0.502	0.377		0.512	0.193
Corr (P#, P5)	0.383	0.412	0.502	0.512		0.306
Corr (P#, P6)	0.125	0.311	0.480	0.193	0.306	

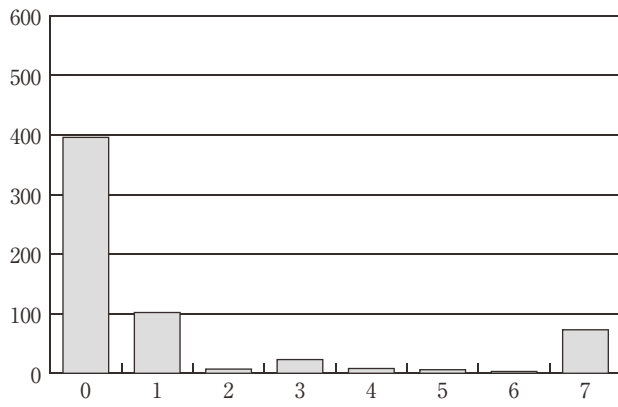
Problem 1



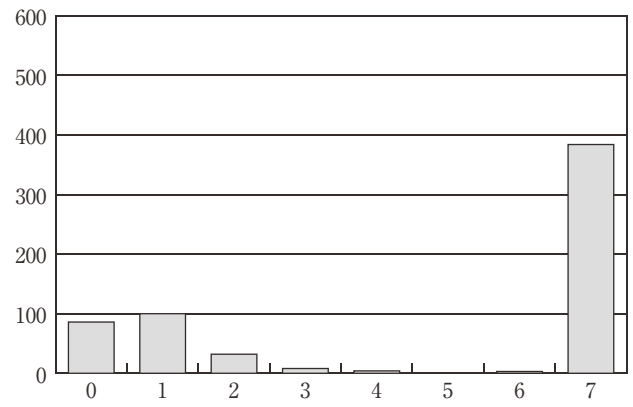
Problem 2



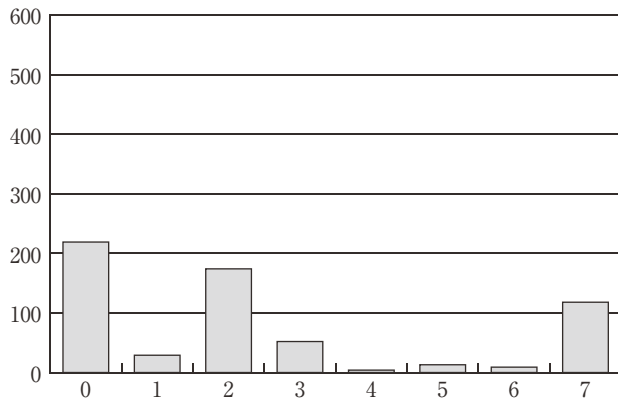
Problem 3



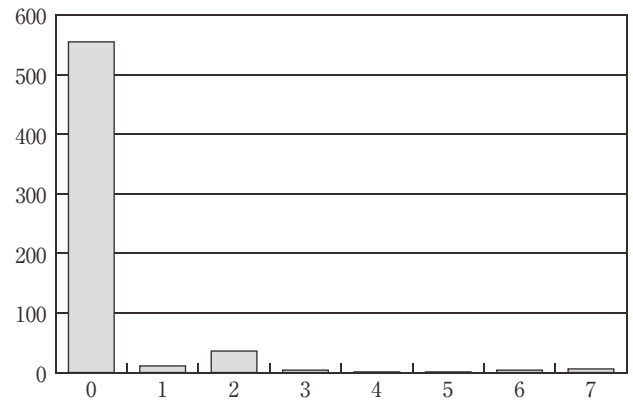
Problem 4



Problem 5



Problem 6



### 3 Awarded Contestants 表彰選手

[Gold]			
Chunji Wang	CHN	Davit Kldiashvili	GEO
Haojia Shi	CHN	Robert Dragomirescu	ROU
Junhwi Bae	KOR	Andrei-Giovani Chiriă	ROU
David-Andrei Anghel	ROU	László Bence Simon	HUN
Derek Liu	USA	Damjan Davkov	MKD
Xingjian Liang	CHN	Keyn-Hantz Edden Chew	SGP
Xinliang Zhang	CHN	Mehmet Can Bařtemir	TUR
Warren Bei	CAN	Isaac King	UNK
Alexander Wang	USA		
Woojin Choi	KOR	[Perfect]	
Qiao Sun	CHN	Chunji Wang	CHN
Arjun Gupta	IND	Haojia Shi	CHN
Atul Shataavart Nadig	IND	Junhwi Bae	KOR
Ryunosuke Kitamura	JPN	David-Andrei Anghel	ROU
Gyudong Lee	KOR	Derek Liu	USA
Rogelio Guerrero Reyes	MEX		
Hao Xiang Gabriel Goh	SGP	[Silver]	
Jeff Lin	USA	Martin Bierbaumer	AUT
Eric Shen	USA	Ruben Mason Carpenter	ESP
VietHung Pham	VNM	Juri Kaganskiy	GER
Marin Hristov	BGR	Panagiotis Liampas	HEL
Andrei Moldovan	ROU	Satoshi Kano	JPN
Zian Shang	AUS	Jihoo Lee	KOR
Zhicheng Jiang	CHN	Omar Farid Astudillo Marbán	MEX
Georgios Tzachristas	HEL	Juan Mathius Tasayco	PER
Cheuk Hei Chu	HKG	Wenhao Cheng	SGP
Ehsan Heidari	IRN	Worrawat Rungaramsin	THA
Itamar Nir	ISR	Chi-An Chang	TWN
Tanoshi Furuya	JPN	Polina Henyk	UKR
Youngbeom Jin	KOR	Tuan Dung Hoang	VNM
JerRen Wong	MAS	William Cheah	AUS
Enerelt Delgerdalai	MNG	Anatole Bouton	FRA
Mathys Douma	SUI	Sobhan Aram	IRN
Tayakorn Suwanich	THA	Mohammadermia Ghaseri	IRN
En-Hua Chiang	TWN	Yuchan Jung	KOR
Alex Chui	UNK	Angelo Farfan	PER
Alex Zhao	USA	Radu-Andrei Lecoïu	ROU
An Thinh Nguyen	VNM	Barış Koyuncu	TUR
Luca Sartori	ITA	Şevket Onur Yılmaz	TUR
Pavel Ciurea	ROU	Chi-En Chung	TWN
Matheus Alencar de Moraes	BRA	Maximus Lu	USA
		Matsvei Zorka	BLR





Enrico Zonta	ITA	Matija Skrt	SVN
Keisuke Koide	JPN	Mouhammad Ali Hourieh	SYR
Daande Groot	NLD	Adem Bizid	TUN
Mads Kok	NLD	Po-Shen Chang	TWN
Al Waqas Mahmood Mohammed Al Khadhuri	OMN	Sida Li	UNK
Konstanty Smolira	POL	Ozodbek Akhtamov	UZB
Ali Alramadan	SAU	Bozhidar Dimitrov	BGR
Mahdi Albaik	SAU	Erik Ježek	CZE
Muath Alqahtani	SAU	Štěpán Mikéska	CZE
Aleksandar Višnjić	SRB	Aino Aulanko	FIN
Yevheniia Frankevych	UKR	Emanuel Tukač	HRV
Nguyen Thanh Danh Tran	VNM	Evelyn Lianto	IDN
Dinh Toan Khuc	VNM	Adhitya Mangudy Venkata Ganesh	IND
Vahan Baghdasaryan	ARM	Yotam Amir	ISR
Sizhe Pan	AUS	Carlo Baronio	ITA
Pierre Akin Dürrüoglu	BEL	Margus Smotrovs	LVA
Vuk Janković	BIH	Ansis Gustavs Andersons	LVA
Ervin Macić	BIH	Hylke Hoogeveen	NLD
Pavel Tsitou	BLR	Ahmed Raza	PAK
Felipe Makoto Shimamura Silva	BRA	Jose Rojas	PER
Samuel Rosiar	CZE	Rickson Caleb Tan	PHI
Daniel Pham Nguyen	DEN	Stefan Šebez	SRB
Luna Skjernaa Mygind	DEN	Alisa Potomkina	UKR
Darío Martínez Ramírez	ESP	Zhan Dautov	KAZ
Charles Dai	FRA	Batyrkhan Sakenov	KAZ
Gaëtan Dautzenberg	FRA	Vesselin Markovich	BGR
Florian Elbrandt	GER	Mirnes Fehrić	BIH
Leonard Kottisch	GER	Filippos Athos Chatzichristofi	CYP
Yung Ho Kwan	HKG	Michal Janík	CZE
Chong Ho Hsieh	HKG	Roger Lidón Ardanuy	ESP
Csilla Fülöp	HUN	Jordi Ferré García	ESP
Denis Tusca	ITA	Kristjan-Erik Kahu	EST
MargulanSharel	KAZ	Philipp Siegert	GER
Luis Eduardo Martínez Aguirre	MEX	Dionysios Petrakis	HEL
Nikola Cvetanoski	MKD	Fionn Kimber O'Shea	IRL
Iveel Arvis	MNG	Benedikt Vilji Magnússon	ISL
Saikhanbileg Tsogtgerel	MNG	Ori Frankel	ISR
Yanniek Nitescu	NLD	WangIok Lin	MAC
Bufan Zhao	NZL	Kuok WaiU	MAC
Sebastian Lozada	PER	Min Heng Tan	MAS
Michał Piotr Lipiec	POL	Mateo Iván Latapí Acosta	MEX
Rafael Martim Tavares Inácio	POR	Nursoltan Khavalbolot	MNG
Bora Olmez	SUI	Lance Bakker	NLD
Eliška Macáková	SVK	David Strømme Eikeland	NOR

Krzysztof Salata	POL	Jalil Huseynov	AZE
Martin Kopčány	SVK	Guillem Beltran Cerezucla	ESP
Selim Halykov	TKM	Auguste Ramondou	FRA
Vladimir Rogovskiy	KAZ	Guram Matcharashvili	GEO
Youcef Kenane	ALG	Tamar Peikrishvili	GEO
Hamlet Petrosyan	ARM	Sebastian Chase	HKG
Md Shahriar Hossain	BGD	Janko Bušelić	HRV
Iliyas Noman	BGR	Ayman RiadSolh	MAR
Lorenzo Sarria	COL	Wei Jie Goh	MAS
Benedek Nádor	HUN	Alin Popescu	MDA
Archit Manas	IND	Jordan Juarez	PER
Hitihami Mudiyanseage Mihiru Anushka Bandara	LKA	Alvann Walter Paredes Dy	PHI
Alfrēds Saročinskis	LVA	Felix Xu	SUI
Kwong WengLoh	MAS	Olimdzhon Tukhtarov	TJK
Drago · Port	MDA	Kseniia Drozdova	UKR
Piotr Maksymilian Miernik	POL	Anvarbek Sadulloev	UZB
Minkyum Kim	SAF		
Andrija Živadinović	SRB	<b>[Honorable Mention]</b>	
Jonah Osterwalder	SUI	Mohamed Wacyl Meddour	ALG
Erik Hedin	SWE	Martín Lupin	ARG
Thammarak Korsakulthum	THA	Ignacio Naguil	ARG
Sidharth Puthiyedathu Suresh	UAE	David Buchmaier Bofill	AUT
Volodymyr Chub	UKR	Anar Mehdiyev	AZE
Hanks Chong	UNK	Mirhabib Asgarov	AZE
Robin Antoine	BEL	Luka Sebbag	BEL
Benjamin Mujkić	BIH	Debapriya Saha Roy	BGD
Mateo Lizcano	COL	Axel Dobloug	CYP
Gabriel NajmiasLang	CRI	Tereza Černá	CZE
Aleksandre Korkotashvili	GEO	Xavier Díaz Austrich	ESP
Lara Semeš	HRV	Ervin Ivanov	EST
Evan Nathanael	IDN	Ivane Kuljanishvili	GEO
Tomas Babelis	LTU	Axel Giovanni Hartanto	IDN
Dan Cernatinschi	MDA	Joshua Marvel Solomon	IDN
Nikola Spirovski	MKD	Fedor Korniiash	KGZ
Tenuunsaikhan Batlkhagva	MNG	Pijus Šapnagis	LTU
Edvard Walde Heimdal	NOR	Chong Un Un	MAC
Mohammad Nur Casib	PHI	Zakariyae Derro	MAR
Adam Džavoronok	SVK	Jan Stojanovski	MKD
Viktor Imrišek	SVK	Erkhesbold Ochirkhuu	MNG
Saria Ramadan	SYR	Kevin Francisco Aquino Díaz	PAR
Ivan Bortnovskiy	UKR	Robert Soboński	POL
Anvarbek Rakhmatov	UZB	Jared Slater	SAF
Federico Crovara	ARG	Abdulrahman Nassief	SAU
Georg Weisbier	AUT	Qinxi Yu	SGP

Matej Bachniček	SVK	Tsovak Yegoryan	ARM
Katarina Grilj	SVN	Dominik Pultar	AUT
Muhammad Alhomsy	SYR	Panagiotis Chatzikostas	CYP
Mashrafdzhon Inomov	TJK	Aleksander Karpov	EST
Hamza Allaberdiyev	TKM	Derek Samir Funez Estrada	HND
Omar Cherif	TUN	Batugahage Don Lasitha Vishwajith Jayasinghe	LKA
Behzod Maksudov	UZB	Ramona Poreitere	LVA
Jan Strehn	AUT	Adrians Piliksers	LVA
Jitendra Barua	BGD	Marius Cerlat	MDA
Harun Alibegović	BIH	Robert Barbu · a	MDA
Carlos Andres Pozo Vargas	BOL	Egor Georgievskii	MNE
Theodor Boaz Pedersen	DEN	Ivar Lee Fevang	NOR
Thirukkumaran Theiventhiran	LKA	Swikriti Acharya	NPL
Constantin Babuc	MDA	Eidrian Lian Perez Gonzalez	PAN
Mohamed Mohamed Lemine Taleb	MRT	Salvi Mucyo	RWA
Jun Yang (Michael) Ma	NZL	Vukašin Pantelić	SRB
Tomás Faria	POR	AmirSoussi	TUN
Hugo Bruwer	SAF	Rasulbek Gafforov	UZB
Ivan Pouly	SUI	Dawn Chen	NZL
Erik Červek Roškarič	SVN	Uriel Digestani	ARG
Ivar Ängquist	SWE	Iris Xu	AUS
Sirawit Pipittanaban	THA	Maia Reffs Vistisen	DEN
Rahym Agamyradov	TKM	Seán Hallissey	IRL
Davut Muhammetgurbanov	TKM	Nurtilek Duishobaev	KGZ
Eric Liang	NZL	HibaEl Farchioui	MAR
Abdennacir Boufedjighen	ALG	Soe Thway Ko	MMR
Farrukh Asadov	AZE	Gvozden Lapčević	SRB
Luis André Villan Gabriel	BOL	Aadi Sinha	UAE
Alejandro Campos Rojas	CRI	Erik Kërçiku	ALB
Carlos Shum Apuy	CRI	Andreas Arnfred Nielsen	DEN
Kyriakos Tsiannis	CYP	Ian Bobrus	KGZ
Aidin Asankadyrov	KGZ	Yassir Sbai	MAR
Ngou Hin Cheang	MAC	Eyad Alqatari	SAU
Yasser Abouseir	MAR	Lenart Dolinar	SVN
Vebjørn Holm-Gjerde	NOR	Mehrubon Sitamov	TJK
James Jia	NOR	Facundo Méndez	URY
Moied Baleg	SAF	Sirio Dafa	ALB
Enrique Adonay Hernández Rafaelano	SLV	Roberto Adum	ECU
Hugo Trebše	SVN	Jussi Marttinen	FIN
Allayth Shahet	SYR	Kristian Latvanen	FIN
Eraj Sabirov	TJK	Siiri Roschier	FIN
Mauro Akerman	URY	Stella Čolo	HRV
Sukhrob Khalelov	UZB	Emily Wolfe	IRL
Ahmed Adnane Meddah	ALG	Tilek Askerbekov	KGZ

Eldar Iskanderov	KGZ	Boning Dai	NZL
Chandhopama Thidas Bandara Wanasinghe	LKA	Adrian David Frauca Arenas	PAN
JiaHerng Chuah	MAS	Nirvana Rosabella Marrero Tiodang	PRI
Branko Jangelovski	MKD	Samuella Kwizera	RWA
Haotian Wang	NZL	Yian Xu	SAF
Maryorie Damaris Cabrera Silvas	SLV	Fernando Andree González Meléndez	SLV
Jiachen Mi	SWE	Batyr Ovezmyradov	TKM
Olle Rehnquist	SWE	Oussema Soussi	TUN
Abdulwahab Ozoun	SYR	Siyuan Lu	CHI
Yacine Dallil	ALG	Toomas Herodes	EST
Paul Hametner	AUT	Daniel Slivinskiy	FIN
Zhiyi Luo	BEL	Ísak Norðfjörð	ISL
David Sompero Mendoza	BOL	Leonhard Hasler	LIE
Matias Nova	CHI	Michèle Voncken	LUX
Alberto Lobo-Guerrero	COL	Song Pok Hong	MAC
Theofanis Orfanou	CYP	Aymen Hajifi	MAR
Konstantinos Konstantinidis	HEL	Muhammad Daniyal	PAK
Sithija Abhishek Kotuwewatta	LKA	Jorge Liu Luo	PAN
Jurgis Kemeklis	LTU	María José Ortiz Benítez	PAR
Benas Raišutis	LTU	Ariel Alejandro Insaurrealde Aldana	PAR
Isaac Dahir Rodríguez Gutiérrez	NIC	Tobías Santiago Valdez Caballero	PAR
Mina Johanne Heier	NOR	Edmond Iradukunda	RWA
Tiago Miguel Gomesde Sousa	POR	Kaja Rajter	SVN
Xingyu Zhu	POR	Anisa Burieva	TJK
Haydar Qassem	SYR	Aweb Othmen	TUN
Tobías Rodríguez	URY	Juan José Martínez Barreto	VEN
Ibrahim Karimli	AZE	Ted Qamo	ALB
Akram Zakine	BEL	Nea Metohu	ALB
Marvin Mario Martinez Nuñez	BOL	Donato Ofi Moakofhi	BWA
Juanita Giraldo	COL	Matthías Andri Hrafnkelsson	ISL
Sergio Manuel Baldares Arce	CRI	Jokūbas Jasiūnas	LTU
Carlos Manuel Navarro Mora	CRI	André Filipe Dourado Pinheiro	POR
Karla Yisel Ramírez Garcell	CUB		
Lovre Pazinović	HRV	<b>[Mirzakhani Awards]</b>	
Kirill Zolotuskiy	ISL	Asia	Fidan Garayeva
Hrafnkell Hvanndal Halldórsson	ISL	Australasia	Nujhat Ahmed Disha
Edi Berisha	KSV	Africa	Hiba El Farchioui
Orges Ajvazi	KSV	Europe	Alisa Volkova
Tobias Marxer	LIE	America	Maryorie Damaris Cabrera Silvas
Shithila Vibheetha Mahabaduge	LKA		
Petr Gabuniia	LVA		
Leia Mayssa Masyerin	MAS		
Hsu Wutt Yee Lin	MMR		
José GabrielRivas Rivera	NIC		

## VII Information & Annual Regulations 通知と規則

### 1 Information for Contestants 選手への通知

#### Information for Contestants

##### The timings

The IMO 2023 contest will be held in Chiba, Japan. The contest takes place on Saturday 8. and Sunday 9. July 2023.

The contest is scheduled to start at 9:00 am and lasts 4 hours 30 minutes. Each day, contestants are given three problems in up to three languages of their choice. At least one of these languages must be one of the official IMO languages (English, French, German, Russian and Spanish).

##### What you may bring

Contestants must bring their IMO badge with their name and photograph on.

Contestants should bring their personal writing and drawing instruments such as pens, pencils, erasers, pencil sharpeners, rulers and compasses into the examination room.

The following is **not** permitted:

Calculators, mobile phones, **watches (any kind)**, electronic devices, **protractors of any kind including set squares with protractor markings**, briefcases, backpacks, toys, books, notes, tables, papers or any other written material.

You may also bring your personal food or drinks (provided they do not make noise when consumed) and, if desired, a small talisman (small enough so as to fit into one hand). Any personal utensils that you wish to bring into the contest room should be inside the transparent plastic bag that is given to you on arrival in Chiba.

##### The workplaces

The exams take place in Makuhari Messe. You will be guided by the invigilators to your labelled desk according to a seating plan. **You will not be allowed to enter without your name badge.** Please check that your desk and the folder on your desk are indeed marked with your name and your contestant code. Once seated, remain seated quietly during the



# IMO 2023



Chiba, JAPAN **64th**

entire exam. If you want to leave your desk because you need to go to the toilet, or because you want to finish the contest early, you must first consult the invigilators (use the green or red cards as described below).

##### On your workplace

Do not open the Day Folder or envelope before you are instructed to do so.

On your workplace, you will find:

- In a closed envelope: the contest problems in up to three languages as previously requested
- An instruction sheet
- Three Question and Answer forms for submitting a question to the Jury
- Five colored cards:
  - Grey: to request more paper
  - Orange: to submit a question to the Jury (during the first 30 minutes only)
  - Blue: to request water
  - Green: if you need to go to the toilet (not during the first or last 30 minutes)
  - Red: if you need help or want to stop working early (not during the last 30 minutes)
- The Day Folder which contain the following materials:
  - 15-20 sheets of paper (Solution form) to do your rough and final work
  - Three Problem Folders with a specific problem number printed on: Problem 1, 2 and 3 for Day 1, and 4, 5 and 6 for Day 2. Each folder is to collect solution sheets for its specific problem

## **Announcements**

During the contest the elapsed time will be visible throughout the contest hall.

The following main announcements and communications will be made during the contest:

Before the contest: “Remain seated quietly and do not open the Day Folder or envelope before you are told to do so.”

At the beginning of the working time: “You may now open the Day Folder and envelope and start to work. You have the opportunity to ask questions to the Jury in the first 30 minutes.”

After 25 minutes: “You have 5 minutes left to ask questions to the Jury.”

After 30 minutes: “The time to ask questions to the Jury is over.”

After 3 hours 45 minutes: “You have 45 minutes left to work, but only 15 minutes to use the toilets. You may not leave the room in the last 30 minutes.”

After 4 hours: “You have 30 minutes left to work. You may no longer leave the room.”

After 4 hours 25 minutes: “You have 5 minutes left to work on the problems.”

After 4 hours 30 minutes: “Please stop working immediately. Put your solution sheets into the Problem Folders. Then put all three Problem Folders into the Day Folder. Please stay seated in silence.”

Once all the scripts are collected: “Please stay seated until an invigilator tells you to leave the room. Leave in silence by the door you came in. Please take all your belongings with you.”

## **Writing your solutions**

Write your solutions and rough work on the answer forms. If you need more paper, please show your grey card. An invigilator will give you five more sheets of paper.

Do not write on the back of the paper.

Fill in your name, contestant code, problem number (so only one problem on a sheet of paper) and page number on each answer form as you use it.

You must work on your own and submit your solutions in your own language.

Your work will be scanned and copied in black and white, so please use black ink or a very dark black pencil.

## **Questions to the Jury**

During the first 30 minutes of the contest, you may submit written questions to the Jury.

These should be written in your own language on the question form provided. Once your question is ready, raise your orange card and an invigilator will collect the Question and Answer form and send it to the Jury. The Jury will decide whether the question will be answered, and if so, how; afterwards the answer will be communicated back to you. Depending on the number of questions, this may take some time.

## **Other needs or requests**

If you need more water, raise your blue card.

If you have to go to the toilet, show your green card (not during the first or the last 30 minutes of the contest). You will be shown which set of toilets to use.

In case of emergency or illness raise your red card to receive help.

## **At the end of the exam**

Once the end of the examination is announced, stop writing immediately. Sort your work by problem number and put the solutions for each problem into the appropriate problem folder. Put the three Problem Folders, and only those, inside the Day Folder. Leave the Day Folder closed on your table and remain silent and seated until the invigilators have collected all the folders.

Do not put any blank sheets inside the Problem Folders. Unused blank sheets should be left on the table. Used paper that you do not want to submit should also be left on the table and will be discarded. For more information on what to do at the end of your exam, check the rules on how to submit your work.

### **Early termination of the contest**

In case you finish your work during the first four hours (before the last 30 minutes are announced) you may show your red card to tell the invigilators that you have finished and you want to leave the room. **After leaving the examination room you will not be allowed to return to it.**

During the last 30 minutes you cannot leave the exam hall before the regular work period is over; if you finish during this period, wait quietly in your place until the end. Also, you will not be allowed to leave the room during the first 30 minutes.

### **What to take out of the room**

You are allowed to take the contest problems with you (**unless you leave early**). Apart from this, you are allowed to take out of the room only the materials that you brought in your plastic bag. Do not take with you any blank or written answer sheet, Question & Answer form or colored card.

### **Improper behavior**

In the interest of a successful IMO 2023, contestants are expected to work quietly without disturbing others, and of course respect the obligation to work on their own. They need to follow these instructions and rules. In case of violations, the Chief Invigilator may issue a warning, report incidents to the Jury for further action, or take other suitable action to maintain the integrity of the competition.

### **Fire alarms**

In the unlikely event of a fire alarm going off in the building, please sit in silence and wait for the invigilators to tell you what to do.

### **Earthquake**

Earthquakes often occur in Japan. Buildings are designed to withstand large earthquakes.

Jumping out of a building in a hurry is very dangerous. Please stay there.

In the case of a small earthquake, the examination continues as is.

In the case of a large earthquake, chief invigilator will tell you to suspend the examination and hide under your desk.

The organizers of the IMO 2023 wish you good luck!

Hiroki Kondo  
Chief Invigilator



January 2023

All deadlines (times and dates) are at 22:59 UTC (Japan is in UTC + 9 all year). All sums of money mentioned are denominated in Yen.

See also general regulations, <https://www.imo-official.org/documents/RegulationsIMO.pdf>

1. The Host City for the 64<sup>rd</sup> International Mathematical Olympiad (IMO 2023) is Chiba, Japan. The main site is Makuhari messe and APA Hotels&Resort Tokyo Bay Makuhari. The leaders' site (until Sunday July 9<sup>th</sup> 2023) will be Hotel Nikko Narita. From Monday July 10<sup>th</sup> onwards, the whole IMO will be based at the main site.
2. The Host Organization for IMO 2023 is The Mathematical Olympiad Foundation of Japan.
3. The official programme for Leaders and Observers A begins on (arrival day) Monday July 3<sup>rd</sup> 2023 and ends on (departure day) Thursday July 13<sup>th</sup> 2023. The shortlisted problems will not be released before Monday July 3<sup>rd</sup> 2023.
4. The official arrival day for members of the IMOB is Sunday July 2<sup>nd</sup> 2023. Leaders and Observers A may arrive on Sunday July 2<sup>nd</sup> 2023 on payment for the extra day of JPY 30,000 for a single room for each person, and JPY 20,000 for shared accommodation.
5. The Official Programme for Deputy Leaders, Contestants and Observers B and C begins on (arrival day) Thursday July 6<sup>th</sup> 2023 and ends on (departure day) Thursday July 13<sup>th</sup> 2023.
6. The Contest days for IMO 2023 will be Saturday July 8<sup>th</sup> and Sunday July 9<sup>th</sup>. All Contestants must have been born on or after July 2<sup>nd</sup> 2003.
7. Participation of countries and territories must be confirmed online no later than Wednesday February 15<sup>th</sup> 2023.
8. Registration of Leaders, Deputy Leaders, Observers and the number of Contestants must be completed online no later than Friday April 21<sup>st</sup> 2023.
9. Registration of Contestants must be completed online no later than Wednesday May 31<sup>st</sup> 2023.
10. Registration of travel details of Participants and Observers must be completed online no later than Thursday June 15<sup>th</sup> 2023.
11. The official arrival and departure sites for IMO 2023 are the following preferred locations: Narita Airport and Haneda Airport.
12. Accommodation at both sites is normally in shared rooms. Leaders will move to the main site on Sunday July 9<sup>th</sup> 2023. Leaders may apply for a single room upgrade at both sites (for a fee). The deadline for receipt of such an application is Friday April 21<sup>st</sup> 2023. Since extra accommodation is limited, full payment in cleared funds of the following charge must be



made by Friday May 19th 2023. be made by Friday May 19<sup>th</sup> 2023.

- Single room upgrade for a Leader: JPY 100,000.

Applications received without the full payment of the charges will be rejected. No refunds will be given.

13. Applications for Observers to accompany the participants must be made by Friday April 21<sup>st</sup> 2023. Observers A may apply for a single room upgrade at both sites (for a fee). The deadline for receipt of such an application is Friday April 21<sup>st</sup> 2023. Observers B and C may also apply for upgrades to single rooms at the main site (for a fee). Since extra accommodation is limited, full payment of the following charges must be made in cleared funds by Friday May 19<sup>th</sup> 2023:

- Deputy Leader: Single room upgrade : JPY 70,000.
- Observer A (accompanying the Leader): JPY 300,000 (shared accommodation).
- Observer A: JPY 100,000 for an upgrade to single room.
- Observers B and C: JPY 200,000 (shared accommodation).
- Observers B and C: JPY 70,000 for an upgrade to single room.

Applications received without full payment of the charges will be rejected. No refunds will be given.

14. Proposals for problems must be received by Sunday April 2<sup>nd</sup> 2023. Proposals must be submitted via the portal at the IMO official website.
15. Countries that need an official invitation in paper form via (old style) mail, should inform \_info@imojp.org before Saturday April 1<sup>st</sup> 2023.
16. Each Leader must ensure that every participant from their country has appropriate travel and health insurance, including Covid related costs, for the relevant period around IMO 2023. Expenses for any quarantine hotel on arrival must be paid by each individual participating country. It is recommended to purchase flexible tickets so that flights may be changed for any reason (including Covid).
17. Health policy—. During the IMO, all participants must adhere to the organizer's Covid protocol, including testing for Covid. The current Covid policy in Japan is URL LINK.

17 : 森田、小島・前田、各先生共同担当

18. Leaders must ensure that all child protection measures which are legally enforced in their country of origin are correctly observed.
19. For each student less than 18 years old, Deputy Leaders must bring legally notarized letters, signed by the parents (or legal guardians), which state that, in case of medical emergency, the Leader, Deputy Leader or Observer should have the right to approve any necessary medical procedure at the IMO. This letter (in English) should state which of the Leader, Deputy and any Observers is (or are) in loco parentis (i.e. they have the legal role of parents of the children aged under 18 in their team during IMO 2023).

20. IMO General Regulation 1.10 concerns bullying, discrimination and harassment. This regulation is in addition to the laws of Japan. The laws of Japan take precedence over General Regulation 1.10, and allegations of serious misconduct will be reported to the police.
21. Team members of Country X should normally be citizens of Country X, but genuine long term foreign residents who are not citizens (and who are being educated in Country X) are permitted to be in the IMO team of Country X provided that the student will spend at least three full academic years being educated in Country X. Such a foreign education must be for a bona fide reason (e.g. family location). Note that IMO tourism is not permitted: a student may not attempt the final selection examinations of more than one country in a given IMO year. A student who changes their country of residence artificially in order to attempt to qualify for the new country's IMO team, is in fact not allowed to represent. Members of a delegation of any country who conspire to subvert (or attempt to subvert) IMO selection regulations risk suspension from IMO participation. Such a suspension will be reported to the Ministry of Education of the country concerned. (Move 21 to General Regulation at the Joint Meeting in Chiba)
22. The host country can invite 6 students from suspended countries to compete remotely as private individuals (not as a team). The exact protocol for their participation (translations, exam, marking etc.) will be provided in due time.
23. Remote sitting may be permitted but only when Force Majeure makes it impossible to travel to Japan (e.g. full Covid lockdown, armed conflict...). Note that financial reasons are not enough. Countries who wish to apply for permission to sit remotely should send evidence as to why they cannot travel to Japan. A joint IMOB-Japanese Committee will review the evidence and in well founded cases may allow remote sitting. Note that decisions will not be made before the deadline for submitting contestant names (i.e., May 31<sup>st</sup>).
24. Countries which and people who have been given explicit permission by the Japanese organizers and the IMO Board may sit IMO2023 in their own countries or territories. Such exams must take place in an Exam Centre under the supervision of an independent IMO Commissioner approved by the IMOB. The Exam Centre must be continuously monitored both by the IMO Commissioner and by recording cameras. The recordings must be kept safe until the Ethics Committee approves their destruction. The IMOB and Ethics Committee reserve the right to view these recordings.

The Exam Centre should mimic the conditions of a normal IMO Exam hall. If social distancing is necessary, then the conditions in the Exam room must comply with local regulations and guidelines.

Unless there is a special arrangement, the remote exams must take place at exactly the same time as at IMO2023 in Japan. Appropriate language versions of IMO2023 exam papers will be provided to the IMO Commissioner as PDFs before the start of each exam.

First half-hour Questions of clarification can be answered without reference to Japan with the help of guidelines which will be supplied. Photos or scans of all the written questions and the corresponding written answers must be sent to the Ethics Committee by email at the time the answer is given. The Ethics Committee may deduct marks from students if they judge that unfair assistance has been given. Answers should be given according to the guidelines where possible. In addition to the questions in local languages, translations of question and answers into an official IMO language should be supplied.

After each Examination, scans of all work should be uploaded for coordination which will be conducted remotely from Japan by the IMO2023 coordinators.

Note that, in accordance with General Regulation 6.5, participating countries which send delegations to attend IMO2023 in person will have privileged access to the IMO2023 shortlist before IMO2024. Remote attendance is not sufficient.

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## VIII Goods

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- T-shirt



- Cap



- Backpack with handle



- Folding umbrella



- Ballpoint pen and Report paper



- Report paper (front)



- Key ring (panda)



- Mug



- Water bottle



- Medal

Gold

Silver

Bronze



葛飾北斎 富嶽三十六景「神奈川冲浪裏」からデザイン

- Supplementary prize (crystal glass)



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## IX Summary of Operations

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### 1 Operation and Management

#### **IMO2023 Executive Committee**

Led by Dr. Takahiko Fujita, Executive Committee Chair (JMO President), Dr. Yoshiaki Maeda, Deputy Executive Committee Chair, Mr. Yasuharu Asai, JMOB Secretary General, and Dr. Yasuo Morita, former JMO President (IMOB member), the Executive Committee began full-scale preparations in September 2018, about five years ago, and held 33 Executive Committee meetings before the IMO2023. During this period, we met with the Corona virus disaster and major changes in the world situation. It was difficult to foresee the future, but we received subsidies from the government (JST) and support from sponsor companies and individuals in Japan and abroad. The committee would like to express our gratitude to all those involved for making the conference a success.

#### **Short-listed Problems and Solutions**

The Problem Selection Committee consisted of 14 up-and-coming researchers, seven from Japan and seven from overseas, led by the chief, Dr. Tetsuya Ando. All of the committee members were familiar with the activities of IMO (domestic members are also in JMO) and had a keen eye for problem selection. Their work, backed by their expertise, was the first step toward the success of the IMO 2023, given the tight schedule of the IMO 2023.

#### **Coordination**

A total of 65 IMO/OB/OGs, 31 from Japan and 34 from overseas, served as coordinators for IMO2023. All of them were up-and-coming young researchers, graduate students, and undergraduates, and were the most experienced group closest in age to the contingent. It was also very encouraging to have eight senior coordinators, one from Japan and seven from overseas, who assisted in the fair and smooth progress of the program as coordinating supervisors.

Their sense of duty as coordinators, whose role in scoring and adjusting the scores would determine the outcome of the contest, kept the coordination meetings full of heated but professional discussions.

#### **Information Technology**

The System Committee began its preparations around August 2022, about a year before the competition. At the end of 2022, the committee opened the IMO Japan website to publicize the event and contribute to raising public interest. The core system for the operation of the



competition, such as the identification of participant information, the contest progression, and information processing, was fully entrusted to Dr. Matjaz Zeljko's team, which was commissioned by the IMO. Under the supervision of Executive Committee member, Dr. Kouki Taniyama and his team, this systematic program was the driving force behind the competition operations. In addition, at the Narita and Makuhari venues, the day's schedule and communications were displayed on large screens (located at the reception desks and other locations). This was very effective in improving the efficiency of information sharing, as many delegation leaders, officials, and contestants were able to see the information as they passed by.

## **Jury Meeting**

The Jury Committee, consisting of leaders of the delegations and the observers from each country, began selecting contest questions from the Short-listed Problems for the first half of the competition. The task of selecting six good questions from the Short-listed Problems and translating them into their native languages in a short period of time was always a difficult one, but the experienced members of the team accomplished the task. In addition, the medalists were decided accurately and smoothly at the Final Jury Meeting just before the awards ceremony. These tasks were the result of international cooperation by a strong group of experts.

## **Examinations**

The total number of contestants was 618 from 112 countries/regions, the largest number ever. The preparation and administration of the examination was led by Dr. Hiroki Kondo of the IMO 2023 Executive Committee. The examination was supervised by Dr. Tetsuya Ando of Chiba University, who contributed to the extremely smooth preparation and execution of the examination by 39 undergraduate and graduate students of Chiba University. In addition, this year's competition was the first in Japan to adopt a method of reading in PC data from a scanner instead of photocopying, thanks to a system improvement by Dr. Matjaz Zeljko, in preparation for the post-examination marking. The students who supervised the examinations also played an active role in this work, learning the process in a short time and making sure that the first attempt went smoothly. It should be noted that the two Japanese coordinators, who are IMO alumni, were able to successfully complete this large-scale test because of their leadership and supervision of the test administrators from the preparation on the day before the test to the end of the test. In addition, six Russians participated online in their individual capacity.

## **Volunteers**

Forty-seven volunteers from the Chiba Convention Bureau participated in this year's convention through the Chiba International Center, the host of the convention. In addition, 14 people from universities and other organizations also volunteered to support the convention. The volunteers welcomed the participants at the airport, registered them at the hotel reception desk, and provided information at the various venues. The committee would like to express my sincere gratitude to all of them.

## **Guides**

During the period of the Olympiad, 119 members of universities and graduate schools in Japan served as guides for the 112-country delegation, working closely with the contestants in their respective countries from arrival, registration, opening ceremony, contests, TDL, excursions, closing ceremony, farewell party, to departure. They worked together and guided us with dedication. All the guides demonstrated their language skills and hospitality, and some of them commented that the week went by quickly and was a very fulfilling experience.

## **Staff**

A total of 100 staff members worked at the convention office, travel agencies, and other organizations. The environment was different from that of the previous convention in Japan (July 2003), which was held 20 years ago, and almost no one had direct experience of the IMO. Many participants, especially those from overseas, commented that it was a “good convention.”

# **2 Ceremony**

## **Opening Ceremony**

The opening ceremony was held at 13:30 on Friday, July 7 at the International Conference Hall of Makuhari Messe. The program proceeded as follows: Entrance of athletes → Opening ceremony → Opening remarks → Attractions → Introduction of participating countries → Closing remarks → Exit.

The opening address was delivered by Ms. Keiko Nagaoka, Minister of Education, Culture, Sports, Science and Technology, Dr. Gregor Dolinar, IMOB President, and Mr. Takeshi Soeda, President of Gibraltar, Organizing Committee Chairman. Also in attendance were representatives from 2 foreign embassies, 27 people from 15 organizations and companies, 5 people from JST, and 11 parents of the Japanese contestants. The opening ceremony featured taiko drumming, and the attraction was a musical performance. The taiko drumming and



music were performed live, and were very effective in enhancing the atmosphere of the opening ceremony.

### **Closing Ceremony**

The Closing Ceremony was held on Wednesday, July 12 at 14:00 at the International Conference Hall of Makuhari Messe.

The program proceeded as follows: Entrance → Opening (Digest of the Convention VTR) → Opening Remarks → Awards Ceremony → IMO Flag Conferral Ceremony → VTR to introduce the next host country → Closing Remarks → Exit.

Opening remarks were made by Mr. Shunichi Kamiya, Mayor of Chiba City, and Mr. Takahiko Fujita, President of the Mathematical Olympiad Foundation. Other participants included 2 from the Ministry of Education, Culture, Sports, Science and Technology, 2 from Chiba City, 6 from foreign embassies, 32 from 19 organizations and companies, 4 from JST, 10 parents of Japanese athletes, and 27 parents of athletes representing foreign countries.

The medal presentation ceremony was a great honor for the athletes, with the cooperation of many people, including representatives of sponsor companies, foreign embassy staff, guests, and executive committee members, who served as award presenters.

## **3 Contest**

The contest was held at Makuhari Messe Exhibition Hall for two days on Saturday, July 8 and Sunday, July 9 (Sun.). Preparations for the event began in the afternoon of Friday, July 7, the day before the contest, and were carried out in parallel with the opening ceremony at the International Exhibition Hall. The simultaneous preparation was very tight in terms of staffing, but with the help of tutors who had experience as athletes, we were able to proceed without delay. Due to the time differences between participating countries, a few of the contestants felt ill for a while during the contest, but the illnesses were mild, and they were able to continue with the contest. Despite the extremely hot weather, the air conditioning in the venue was appropriately adjusted, and the contest was able to proceed extremely smoothly overall. This year's contest marked the first time in Japan that the conventional method of copying and grading answers was adopted, using a scanner to read the answers into a PC. This reading process was carried out after the answer sheets were collected on both the first and second days. Although this was a first attempt, it went smoothly, thanks to prior discussions among the parties involved.

## 4 Events

### **Tour of the leaders**

On Saturday, July 8, the first day of the contest, the tour was divided into two choices: “Narita-Sanshinshoji Temple” and “Sawara City (Tadataka Ino Memorial Museum, Mitsubishi Museum, boat tours, etc.),” both of which relate to Chiba Prefecture, the host of the contest. The tour offered visitors a taste of Japan's rural tourist destinations with an atmosphere not found in urban areas.

### **Jane Street Hub**

A community area was set up on the first floor of Makuhari Hall from Thursday, July 6 to Tuesday, July 11 during the convention as a place for contestants to interact with each other. The community service provided a relaxing space where mathematical discussions could be exchanged and games could be played, which was different from the tense atmosphere of the competition.

### **Sponsors Booths**

From Thursday 6th July to Wednesday 12th July, sponsors' booths were set up at the Sky Banquet on the 46th floor of the Makuhari APA Hotel and on the first floor of the Tokyo Bay Makuhari Hall. Exhibiting companies included FUJITSU, Gibraltar, Arithmer, Huawei, Quantco, IBM, Karakuri and Yahoo. Many players showed great interest in the booths of these world-class companies and spent a lot of time there between contestants.

### **Sports Event**

On Sunday 9th July from 3pm to 6pm, Tuesday 11th July from 9am to 5pm and Wednesday 12th July from 9am to 12pm, the grounds and tennis courts of Kanda University of International Studies in Makuhari were available for participants to enjoy football and tennis. Due to the extremely hot weather, staff and guides were on hand to help with rest and hydration, and a nurse was also on standby.

### **steAm Culture Festival**

steAm Ltd, of which Executive Committee member Nakajima is CEO, held workshops at Makuhari Hall from 9 to 11 July under the theme "Japanese Culture x Mathematics" with the aim of introducing Japanese culture. The programme included "Tea Ceremony - Urasenke", "Furoshiki", "Mosaic Puzzle", "Origami" and "Mathematics and Music". Visitors were able to experience the spirit of Japan and showed interest in the unexpected connection with a mathematical viewpoint through origami (paper folding), furoshiki (patterns and wrapping)

and puzzles (patterns of combination). The music department helped to unify the venue with musical performances and Bon Odori dancing at the farewell party.

### **Jane Street Hub - Alumni/Contestant's Meeting Space**

The Executive Committee set up a space on the first floor of Tokyo Bay Makuhari Hall from July 6 to July 11, from 9:00 to 21:30, for IMO alumni and contestants to meet and interact. It was a valuable opportunity for graduates to meet each other and renew old friendships after a long absence.

### **The Group Tour for Teams**

The tour was divided into two days, with a visit to Tokyo Disneyland (TDL) on Monday, July 10, and a separate tour on Tuesday, July 11. While the TDL tour was great fun for all the players, it was also a day to experience the time difference, exam fatigue, and humidity of the Japanese summer, as the area around Tokyo began to record extremely hot days (with high temperatures of 35° C or higher) on that day, July 10. Visits to the Kashiwa Campus of the University of Tokyo, Meiji Yasuda Life Insurance Company, JAMSTEC Yokohama Research Laboratory, Mitsubishi Electric Event Square (METoA Ginza), NTT Musashino Research and Development Organization, Karakuri Corporation, Tokyo University of Science Math Experience Hall, Meiji Jingu Shrine, Harajuku, Ueno Park, and the Tokyo Metropolitan Museum of Modern Art. Harajuku, Ueno Park/Akihabara, and Kanda University of Foreign Studies Sports were also arranged. Each participant applied for the tour by smartphone at the registration desk. The tour of Japan's leading research institutes and companies must have stimulated the intellectual curiosity of the athletes from each country. We would like to express our sincere gratitude to all those who cooperated in this endeavor.

### **Farewell Party**

The Farewell Party was held on July 12 (Wed.) at Tokyo Bay Makuhari Hall after the closing ceremony (18:00 - 20:00). The party was a standing buffet style party where the athletes from each country interacted with each other, and the venue was filled with young energy and united by the live background music by KUREAGE, a five-sense concerto, and the Bon dance "Sosu Odori (prime number dance)" performed in collaboration with Nora Bon Odori no Kai as an attraction. For the athletes, it was a memorable moment to decorate their last evening in Japan.

## 5 Comments (After the IMO2023 Chiba, JAPAN)

After the conference, the heads of delegations and executives of each country sent numerous thank-you notes and positive, constructive comments and opinions about the conference to the Executive Committee. Some of them are listed below.

The hotel (scenery) and food were excellent.

The hotel (view) and food were excellent.

I was looking forward to visiting Japan.

I enjoyed the excursion and the choice of courses.

I would have liked to have eaten more Japanese food.

The hotel rooms were small but clean.

I would have liked to explore the city a little more.

The players only walked around the area around their lodgings (hotel) except during the excursion, and some said they would have liked to walk around the local town a little more. However, they rated the view of Chiba from the hotel as “excellent.

## 6 Balance Sheet

### Income

Item	Amount (円)	Abstract
current year donation	45,430,040	
past year donation	105,381,000	Foundation deposit
JST support	179,546,760	
entry fee	40,038,272	
Foundation contribution	12,225,176	
<b>Total income</b>	<b>382,621,248</b>	

### Spending

Item	Amount (円)	Abstract
consumables	2,374,805	T-shirt, Medal and so on
personnel costs	18,870,793	secretariat stuff salary
honorarium	16,991,498	volunteers, officials honorarium
travel expenses	93,288,584	hotel fee(日航成田・APA)
outsourcing cost	114,292,770	secretariat, ceremony, excursion
printing cost	3,363,898	
venue rental fee	33,076,819	幕張Messe、幕張hole、TKP hole
conference fee	67,395,105	Hotel日航成田、APA hotel
communication expenses	515,333	
insurance fee	157,132	
miscellaneous expensses	106,692	
transfer fee	343,738	
past year spending	31,844,081	
<b>Total expenditure</b>	<b>382,621,248</b>	

## X Photo Gallery

【Haneda Airport Arrival】



【Signboard】



【Bus transfer】



【Opening ceremony venue】





【Jury Meeting】



【Keiko Nagaoka Minister of Education】



【Tsuyoshi Soeda Chairman of Organizing Commissioner】



【Keisuke Koide Contestant oath】



【IMO Board Prof. Gregor Dolinar】



【Opening ceremony Japan team】



【Contest hall】



【Ganbaruzo～ Japan team】



【After Contest】



【Team meeting after contest】



【Chakai】



【Jane Street Hub】



【Furoshiki workshop】



【HUAWEI Booth】



【Japanese company Booth】





【Corporate hub】



【Compatible with Japanese company】



【Discussion after the contest】



【Tokyo Disneyland】





【Lecture of Prof. Akiyama】



【Tokyo University of Science  
The Mathematical  
Experience hall】



【Japan Agency for Marine-Earth Science and Technology】



【Koukyo (Imperial Palace)】



【Kavli Institute for the Physics and Mathematics of the Universe】



【Sports Event】





【Before Closing ceremony】



【Shyunichi Kamiya mayor of Chiba City】



【IMO Board Prof. Gregor Dolinar】



【Medal Award】



【Mirzakhani Awards】





【The Mathematical Olympiad Flag from Japan to the United Kingdom】



【Takahiko Fujita Exective Committee Chairman】



【Farewell party】



【Japanese team after the closing ceremony】



【Ministry of Education Courtesy Call】



## XI Sponsors スポンサー



# 国際数学オリンピック日本大会 IMO2023 スポンサー

以下は、公益財団法人数学オリンピック財団を通じてご支援をいただいたスポンサーとパートナーです。

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ジブラルタ生命保険株式会社



### プラチナパートナー

Arithmer 株式会社



### ゴールドパートナー

株式会社公文教育研究会



株式会社ナガセ



株式会社東京出版



### シルバーパートナー

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第一生命ホールディングス株式会社

日本生命保険相互会社

株式会社三菱 UFJ フィナンシャル・グループ

トヨタ自動車株式会社

日鉄ソリューションズ株式会社

学校法人 駿河台学園

一般社団法人 東京倶楽部

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HUAWEI



Jane Street



QuantCo



愛尖子



## 共 催

国立研究開発法人 科学技術振興機構 (JST)

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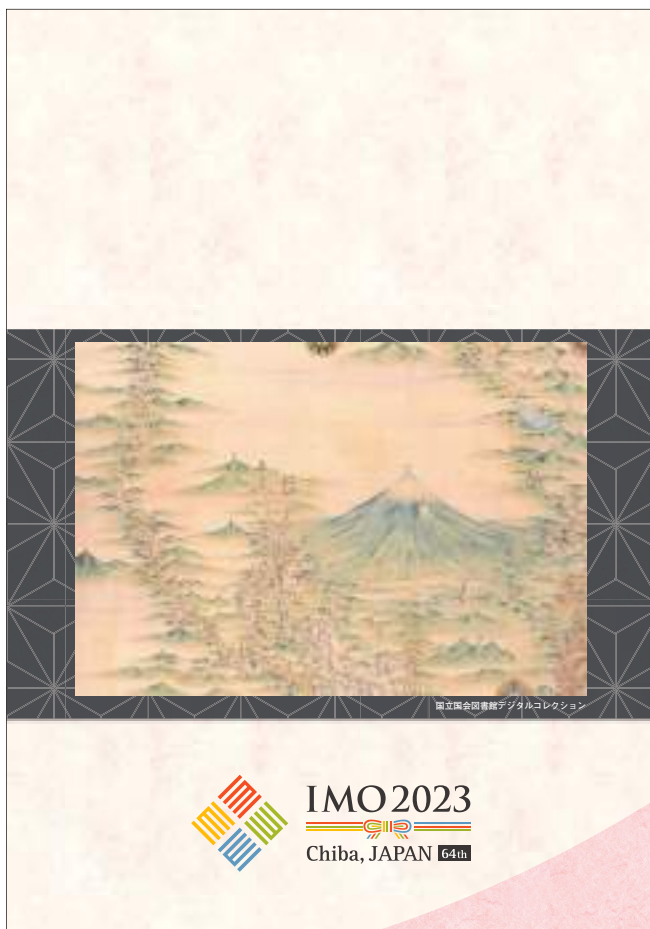
東京理科大学

株式会社 steAm

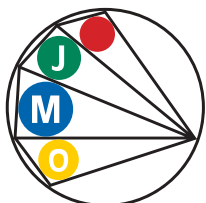
ポケトーク株式会社



1 day Answer Sheets folder (front)



1 day Answer Sheets folder (back)



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