

---

# Contents

<b>1</b>	<b>Introduction</b> .....	1
1.1	The International Mathematical Olympiad .....	1
1.2	The IMO Compendium .....	2
<b>2</b>	<b>Basic Concepts and Facts</b> .....	5
2.1	Algebra .....	5
2.1.1	Polynomials .....	5
2.1.2	Recurrence Relations .....	6
2.1.3	Inequalities .....	7
2.1.4	Groups and Fields .....	9
2.2	Analysis .....	10
2.3	Geometry .....	12
2.3.1	Triangle Geometry .....	12
2.3.2	Vectors in Geometry .....	13
2.3.3	Barycenters .....	14
2.3.4	Quadrilaterals .....	14
2.3.5	Circle Geometry .....	15
2.3.6	Inversion .....	16
2.3.7	Geometric Inequalities .....	17
2.3.8	Trigonometry .....	17
2.3.9	Formulas in Geometry .....	18
2.4	Number Theory .....	19
2.4.1	Divisibility and Congruences .....	19
2.4.2	Exponential Congruences .....	20
2.4.3	Quadratic Diophantine Equations .....	21
2.4.4	Farey Sequences .....	22
2.5	Combinatorics .....	22
2.5.1	Counting of Objects .....	22
2.5.2	Graph Theory .....	23

<b>3</b>	<b>Problems</b> .....	27
3.1	IMO 1959 .....	27
	3.1.1 Contest Problems .....	27
3.2	IMO 1960 .....	29
	3.2.1 Contest Problems .....	29
3.3	IMO 1961 .....	30
	3.3.1 Contest Problems .....	30
3.4	IMO 1962 .....	31
	3.4.1 Contest Problems .....	31
3.5	IMO 1963 .....	32
	3.5.1 Contest Problems .....	32
3.6	IMO 1964 .....	33
	3.6.1 Contest Problems .....	33
3.7	IMO 1965 .....	34
	3.7.1 Contest Problems .....	34
3.8	IMO 1966 .....	35
	3.8.1 Contest Problems .....	35
	3.8.2 Some Longlisted Problems 1959–1966 .....	35
3.9	IMO 1967 .....	41
	3.9.1 Contest Problems .....	41
	3.9.2 Longlisted Problems .....	41
3.10	IMO 1968 .....	49
	3.10.1 Contest Problems .....	49
	3.10.2 Shortlisted Problems .....	49
3.11	IMO 1969 .....	53
	3.11.1 Contest Problems .....	53
	3.11.2 Longlisted Problems .....	53
3.12	IMO 1970 .....	61
	3.12.1 Contest Problems .....	61
	3.12.2 Longlisted Problems .....	62
	3.12.3 Shortlisted Problems .....	68
3.13	IMO 1971 .....	70
	3.13.1 Contest Problems .....	70
	3.13.2 Longlisted Problems .....	71
	3.13.3 Shortlisted Problems .....	76
3.14	IMO 1972 .....	79
	3.14.1 Contest Problems .....	79
	3.14.2 Longlisted Problems .....	79
	3.14.3 Shortlisted Problems .....	83
3.15	IMO 1973 .....	86
	3.15.1 Contest Problems .....	86
	3.15.2 Shortlisted Problems .....	87
3.16	IMO 1974 .....	89
	3.16.1 Contest Problems .....	89
	3.16.2 Longlisted Problems .....	90

3.16.3	Shortlisted Problems .....	95
3.17	IMO 1975 .....	97
3.17.1	Contest Problems .....	97
3.17.2	Shortlisted Problems .....	97
3.18	IMO 1976 .....	100
3.18.1	Contest Problems .....	100
3.18.2	Longlisted Problems .....	100
3.18.3	Shortlisted Problems .....	105
3.19	IMO 1977 .....	107
3.19.1	Contest Problems .....	107
3.19.2	Longlisted Problems .....	107
3.19.3	Shortlisted Problems .....	113
3.20	IMO 1978 .....	116
3.20.1	Contest Problems .....	116
3.20.2	Longlisted Problems .....	116
3.20.3	Shortlisted Problems .....	121
3.21	IMO 1979 .....	124
3.21.1	Contest Problems .....	124
3.21.2	Longlisted Problems .....	125
3.21.3	Shortlisted Problems .....	132
3.22	IMO 1981 .....	135
3.22.1	Contest Problems .....	135
3.22.2	Shortlisted Problems .....	135
3.23	IMO 1982 .....	138
3.23.1	Contest Problems .....	138
3.23.2	Longlisted Problems .....	139
3.23.3	Shortlisted Problems .....	144
3.24	IMO 1983 .....	147
3.24.1	Contest Problems .....	147
3.24.2	Longlisted Problems .....	147
3.24.3	Shortlisted Problems .....	154
3.25	IMO 1984 .....	158
3.25.1	Contest Problems .....	158
3.25.2	Longlisted Problems .....	158
3.25.3	Shortlisted Problems .....	165
3.26	IMO 1985 .....	168
3.26.1	Contest Problems .....	168
3.26.2	Longlisted Problems .....	168
3.26.3	Shortlisted Problems .....	177
3.27	IMO 1986 .....	181
3.27.1	Contest Problems .....	181
3.27.2	Longlisted Problems .....	182
3.27.3	Shortlisted Problems .....	188
3.28	IMO 1987 .....	192
3.28.1	Contest Problems .....	192

3.28.2	Longlisted Problems	192
3.28.3	Shortlisted Problems	200
3.29	IMO 1988	203
3.29.1	Contest Problems	203
3.29.2	Longlisted Problems	204
3.29.3	Shortlisted Problems	212
3.30	IMO 1989	217
3.30.1	Contest Problems	217
3.30.2	Longlisted Problems	218
3.30.3	Shortlisted Problems	229
3.31	IMO 1990	234
3.31.1	Contest Problems	234
3.31.2	Longlisted Problems	235
3.31.3	Shortlisted Problems	245
3.32	IMO 1991	249
3.32.1	Contest Problems	249
3.32.2	Shortlisted Problems	249
3.33	IMO 1992	253
3.33.1	Contest Problems	253
3.33.2	Longlisted Problems	253
3.33.3	Shortlisted Problems	262
3.34	IMO 1993	266
3.34.1	Contest Problems	266
3.34.2	Shortlisted Problems	267
3.35	IMO 1994	271
3.35.1	Contest Problems	271
3.35.2	Shortlisted Problems	271
3.36	IMO 1995	275
3.36.1	Contest Problems	275
3.36.2	Shortlisted Problems	275
3.37	IMO 1996	280
3.37.1	Contest Problems	280
3.37.2	Shortlisted Problems	281
3.38	IMO 1997	286
3.38.1	Contest Problems	286
3.38.2	Shortlisted Problems	287
3.39	IMO 1998	291
3.39.1	Contest Problems	291
3.39.2	Shortlisted Problems	291
3.40	IMO 1999	295
3.40.1	Contest Problems	295
3.40.2	Shortlisted Problems	295
3.41	IMO 2000	300
3.41.1	Contest Problems	300
3.41.2	Shortlisted Problems	300

3.42	IMO 2001	304
3.42.1	Contest Problems	304
3.42.2	Shortlisted Problems	304
3.43	IMO 2002	308
3.43.1	Contest Problems	308
3.43.2	Shortlisted Problems	308
3.44	IMO 2003	312
3.44.1	Contest Problems	312
3.44.2	Shortlisted Problems	312
3.45	IMO 2004	317
3.45.1	Contest Problems	317
3.45.2	Shortlisted Problems	318
3.46	IMO 2005	322
3.46.1	Contest Problems	322
3.46.2	Shortlisted Problems	322
3.47	IMO 2006	326
3.47.1	Contest Problems	326
3.47.2	Shortlisted Problems	326
3.48	IMO 2007	331
3.48.1	Contest Problems	331
3.48.2	Shortlisted Problems	332
3.49	IMO 2008	336
3.49.1	Contest Problems	336
3.49.2	Shortlisted Problems	337
3.50	IMO 2009	341
3.50.1	Contest Problems	341
3.50.2	Shortlisted Problems	341
<b>4</b>	<b>Solutions</b>	<b>347</b>
4.1	Contest Problems 1959	347
4.2	Contest Problems 1960	349
4.3	Contest Problems 1961	351
4.4	Contest Problems 1962	353
4.5	Contest Problems 1963	354
4.6	Contest Problems 1964	355
4.7	Contest Problems 1965	357
4.8	Contest Problems 1966	359
4.9	Longlisted Problems 1967	361
4.10	Shortlisted Problems 1968	374
4.11	Contest Problems 1969	380
4.12	Shortlisted Problems 1970	383
4.13	Shortlisted Problems 1971	389
4.14	Shortlisted Problems 1972	396
4.15	Shortlisted Problems 1973	401
4.16	Shortlisted Problems 1974	407

4.17 Shortlisted Problems 1975 .....	413
4.18 Shortlisted Problems 1976 .....	418
4.19 Longlisted Problems 1977 .....	422
4.20 Shortlisted Problems 1978 .....	437
4.21 Shortlisted Problems 1979 .....	445
4.22 Shortlisted Problems 1981 .....	453
4.23 Shortlisted Problems 1982 .....	461
4.24 Shortlisted Problems 1983 .....	467
4.25 Shortlisted Problems 1984 .....	476
4.26 Shortlisted Problems 1985 .....	483
4.27 Shortlisted Problems 1986 .....	491
4.28 Shortlisted Problems 1987 .....	498
4.29 Shortlisted Problems 1988 .....	508
4.30 Shortlisted Problems 1989 .....	523
4.31 Shortlisted Problems 1990 .....	537
4.32 Shortlisted Problems 1991 .....	550
4.33 Shortlisted Problems 1992 .....	563
4.34 Shortlisted Problems 1993 .....	573
4.35 Shortlisted Problems 1994 .....	585
4.36 Shortlisted Problems 1995 .....	593
4.37 Shortlisted Problems 1996 .....	606
4.38 Shortlisted Problems 1997 .....	622
4.39 Shortlisted Problems 1998 .....	636
4.40 Shortlisted Problems 1999 .....	650
4.41 Shortlisted Problems 2000 .....	664
4.42 Shortlisted Problems 2001 .....	677
4.43 Shortlisted Problems 2002 .....	691
4.44 Shortlisted Problems 2003 .....	702
4.45 Shortlisted Problems 2004 .....	715
4.46 Shortlisted Problems 2005 .....	730
4.47 Shortlisted Problems 2006 .....	742
4.48 Shortlisted Problems 2007 .....	754
4.49 Shortlisted Problems 2008 .....	765
4.50 Shortlisted Problems 2009 .....	777
<b>A Notation and Abbreviations .....</b>	<b>791</b>
A.1 Notation .....	791
A.2 Abbreviations .....	792
<b>B Codes of the Countries of Origin .....</b>	<b>795</b>
<b>C Authors of Problems .....</b>	<b>797</b>
<b>References .....</b>	<b>805</b>



<http://www.springer.com/978-1-4419-9853-8>

The IMO Compendium

A Collection of Problems Suggested for The  
International Mathematical Olympiads: 1959-2009

Second Edition

Djukić, D.; Janković, V.; Matić, I.; Petrović, N.

2011, XIV, 809 p., Hardcover

ISBN: 978-1-4419-9853-8