

# 1991-92 PROFILE

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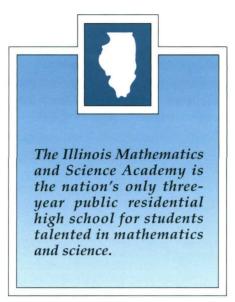
he need to understand how the universe works is fundamental to human nature. It is also essential for safely managing the human future; but foolishly, we have designed a society based on science and technology in which hardly anyone understands science and technology. This is a clear prescription for disaster.

Our future depends on producing and encouraging highly competent, ethically responsible young scientists, as well as a much greater scientific literacy in the general public.

The Illinois Mathematics and Science Academy in Aurora, Illinois, is dedicated to meeting this challenge...

It is a gift from the people of Illinois to the human future."

Dr. Carl Sagan Laboratory for Planetary Studies Cornell University, Ithaca, New York Member, IMSA National Advisory Board



## Illinois Mathematics and Science Academy

## BELIEF STATEMENTS

#### We believe that

- meaning is discovered, not prescribed.
- all individuals have equal intrinsic worth.
- all people have an innate desire to learn.
- the power of the human mind is the world's greatest resource.
- every individual is capable of both changing and bringing about change.
- trust is essential for any human relationship to prosper.
- the survival of global civilization depends primarily upon the quality of the education provided to all citizens.
- every person is responsible for his/her own choices and actions.
- belonging to a group implies subordination of self-interests to the common good.
- excellence is worth the effort, but not always worth the cost.

- achieving our vision of the future depends upon our willingness to sacrifice in the present.
- aversion to risk-taking stifles innovation and creativity.
- learning is an individual, life-long endeavor.
- valuable learning results from both failure and success.
- all adults share responsibility for the well-being of all children.
- the ability to discern and create connections is the essence of knowing.
- a good life is harmony among the emotions, the body, the intellect and the spirit.
- the process of education is more than merely the accumulation of facts.

## MISSION

The mission of the Illinois Mathematics and Science Academy, a community of scholars dedicated to intellectual exploration, is to develop leaders who know the joy of discovering and forging interconnections among mathematics, science, the arts and the humanities, and who, by example and by instruction, inspire others to live in harmony with themselves, other human beings and the physical world.

#### Student Learner Outcomes

#### **Cognitive Skills Outcomes**

- Formulate questions and seek answers through the observation and interpretation of phenomena
- Solve problems and think critically in all areas of learning by analyzing, evaluating and integrating data
- Judge the value and relevance of information (data) in presenting conclusions
- Demonstrate a core base of knowledge and skills in all areas of learning
- Demonstrate research and investigation skills
- Communicate effectively through the spoken and written word

#### **Creativity Outcomes**

- Think creatively and innovatively
- Demonstrate the use of intuition and imagination in the generation and solution of problems

#### **Personal Outcomes**

- Demonstrate a healthy and positive self-concept
- Demonstrate the joy and excitement of life-long learning
- Demonstrate an appreciation of aesthetics, based upon observation and perceptions

#### **Social Outcomes**

 Demonstrate a sense of social awareness and responsibility

"Graduates of the Illinois Mathematics and Science Academy will be among the leaders of tomorrow in science, mathematics, art and humanities. They will be a diverse group – representing both genders and a variety of racial, ethnic, geographic and socioeconomic backgrounds. As leaders in our state, nation and world, they will have in common a lifelong yearning to learn, a sense of excitement about discovery, skills of analysis and synthesis, values of honesty and integrity, and a sense and appreciation of the wonder of it all."

Dr. Walter Massey, Director, National Science Foundation

- Make decisions within a moral and ethical context
- Demonstrate the academic and technical knowledge needed to fulfill civic responsibility, improve the student's own health and life, and cope with an increasingly technologically complex world

## Curriculum

Advanced level courses are taught in all of the academic disciplines with strong emphasis in mathematics and science. An equally rigorous humanities program places a heavy emphasis on inquiry and analysis of social issues. In the foreign language curriculum students experience immersion in target languages and their respective cultures. Faculty members design course content and work with students in exploring ideas and connecting concepts within and across the disciplines.

IMSA courses bring students face-toface with essential concepts rather than text-based content—the focus being the quality of understanding rather than the quantity of information. This represents a critical step in the Academy's work to develop "decidedly different learners"—learners who can conduct research, analyze and interpret data, think critically and creatively, and find and solve problems.

As apprentice investigators, students engage in individual and group research in all areas. The academic schedule features Exploration Days (every sixth school day) when instead of attending regular classes, students participate in independent and group research, special seminars and symposia, academic field trips and mentorship.

#### Mentorship

Students participating in mentorship research work one-on-one with scientists, engineers and researchers along the Illinois Research and Development Corridor. Some of the areas of investigation have included superconductivity, computer graphics, paleontology, particle physics, plant genetics, synthetic inorganic chemistry, cultural anthropology, molecular genetics, fluid dynamics and physiology.

## ACADEMIC

## PROGRAM

Mentorship sites have included Argonne National Laboratory, AT&T Bell Laboratories, Cargill Hybrid Seeds, Federal Reserve Bank (Chicago), Fermi National Accelerator Laboratory, Field Museum, Illinois Institute of Technology, IMSA, Loyola University Medical Center, Loyola University of Chicago, Northern Illinois University, Northwestern University, and Willowbrook Wildlife Haven.

#### Information and Communication Systems

To support its innovative curriculum, IMSA combines the resources traditionally found in academic libraries, computer centers and audio/visual services into a single integrated information and communication system. Resources include more than 600 micro-computers as well as access to local and wide-area computer networks, on-line and CD-ROM data bases along with automated retrieval systems, 27,000 monograph volumes and 150 periodicals, a video production laboratory, a 750-volume curriculum-based video collection, satellite-based video communications, and a Telecommunications Instructional Consortium classroom.

As a result of IMSA joining NSFNET, students now enjoy instantaneous access to worldwide data bases, library card catalogs, and scientists and researchers. Through computer networking, IMSA's young scholars can consult with mentors at Argonne National Laboratory, Fermi National Accelerator Laboratory and other scientific and research organizations. Students also have access to supercomputers at the Cornell National Supercomputing Facility and the National Center for Supercomputing Applications at the University of Illinois in Urbana.

#### Assessment

IMSA's Student Learner Outcomes require a qualitatively different kind of assessment. IMSA is moving away from standardized tests and pencil-andpaper multiple choice tests as primary modes of student evaluation. Instead, teachers are developing assessments which require students to use information in contexts similar to those they will encounter as professionals. Other modes of assessment, including thinking logs, learning journals, lab practicals, portfolios and quick response questions help teachers "see" what students are thinking as they progress through the curriculum.

"IMSA stands as an example that excellence truly is possible. The combination of outstanding students, innovative curriculum and dedicated faculty ensures that many IMSA graduates will become leaders not only in science and technology but also in other fields. That is important because we need people in all walks of life who are comfortable with science – people who can evaluate evidence and make sensible judgments whether in a laboratory or elsewhere."

Dr. Frank Press, President, National Academy of Sciences

In light of IMSA's selective admission process and in order to promote collaborative exploration and discovery, the Academy does not calculate grade point averages nor class rankings.

## Faculty

IMSA conducts a national search for exemplary faculty who can implement authentic learner assessments, facilitate discovery learning and support and nurture holistic student development.

The average teaching experience is approximately 12 years and nearly 25% hold PhDs. The faculty include several Presidential Award winners, noted authors, fellowship recipients and a full-time resident scientist. The resident scientist engages students in high level research beyond opportunities provided by the curriculum. One outcome of this interaction is the publication of student works.

Many faculty provide leadership in professional organizations and serve as resources for the greater educational community of Illinois and the nation.

### Mathematics

Advanced Calculus Advanced Geometry Analysis I, II, III, IV AP Calculus I, II, III **AP** Computer Science **Computer Seminar** Data Analysis **Differential Equations Discrete Mathematics** Geometry I, II Independent Study Introduction to Pascal Mathematical Investigations I Multi-Variable Calculus Number Theory **Problem Solving** Senior Research Project

#### Science\*

Biology Cell Biology Ecology General Microbiology Genetics Human Anatomy and Physiology Pathogenic Microbiology Patterns of Biological Diversity II Plants and People University Biology Chemistry Advanced Chemistry Biochemistry Facets of Thermodynamics Methods in Chemical Research Organic Chemistry I, II Sophomore Chemistry Survey of Organic Chemistry Physics Advanced Physics Astrophysics Calculus-based Physics/Mechanics Calculus-based Physics/Electricity & Magnetism Electronics Observational Astronomy Sophomore Physics Topics in Modern Physics Other Courses Independent Study Science, Society and the Future (0.5 credit in Science, 0.5 credit in Social Science) Junior Project in Science Senior Research Project

### Social Science

American Studies World Studies Senior Social Science Electives: Independent Study International Relations Macroeconomics Microeconomics Political Science Psychology Science, Society and the Future (0.5 credit in Science, 0.5 credit in Social Science) Topics in Psychology Senior Research Project Utopia/Anti-Utopia (0.5 credit in Social Science, 0.5 credit in English)

#### English

Sophomore English Junior English Senior English Electives: American Voice in Prose Dramatic Literature Idea of the Individual Images of Horror Independent Study Modern American Poetry Modern Literature Portraits of Creativity Russian Consciousness in Literature Short Story Senior Research Project Utopia/Anti-Utopia (0.5 credit in English, 0.5 credit in Social Science)

#### Foreign Language

French I, II, III, IV German I, II, III, IV Japanese I, II, III Latin I, II, III, IV Russian I, II, III Spanish I, II, III, IV Independent Study Senior Research Project

#### Fine Arts

Art Design Ceramics Concert Band Chamber Choir Concert Choir Concert Orchestra Independent Study: Art Independent Study: Music Jewelry Making and Metals Photography Senior Research Project Symphonic Wind Ensemble

### **Physical Education**

Driver Education (Classroom portion only) Health Physical Education Senior Research Project

\*All Science courses except Calculus-based Physics, Pathogenic Microbiology and Science, Society and the Future are laboratory-based.

## IMSA

## COURSE

## OFFERINGS

## Mathematics/Science

8.0 credits in Mathematics and Science which must include:

- a) minimum 4.0 credits in science including at least 1.0 credit above the introductory required courses in Chemistry, Physics and Biology.
- b) at least 3.0 credits in mathematics which include core courses that move toward completion of BC Calculus. Students are to be enrolled in a mathematics course each semester.

### Social Science 2.5 credits

English 3.0 credits

#### Foreign Language

2.0 credits taken during two out of the three years at the Academy, including completion of an Academy Level II course.

Fine Arts 0.5 credit

#### **Physical Education**

Fulfilled by completing two semesters of physical education. Students enrolled in Health Education at IMSA are required to take only one semester of physical education.

#### Health Education

Required unless taken during the ninth grade at home school.

#### **Consumer** Education

Fulfilled by passing competency exam or the completion of a designated course.

#### **Driver** Education

Fulfilled by completing 30 hours of classroom instruction.

#### **Courseload Requirements**

Students must enroll in a minimum of 5 academic courses each semester. Students taking a 6th course may take it for a grade or pass/fail. Students taking a 7th course must take it pass/fail. If a Fine Arts course is taken as an 8th course, it must be taken pass/fail. However, all courses that serve to fulfill graduation requirements must be taken for a grade.

## Senior Research/Independent Study Project

An optional research project or independent study is available on a privileged basis for 0.25-2.0 credits. This fulfills elective credit and may be used to meet course requirements for each semester.

## Community Service and Campus Work Service

Each student must satisfactorily complete 80 hours of community service and 300 hours of campus work service.

## Total graduation requirements equal 16.0 units for grades 10-12 at the Academy

This allows for flexibility in student choices during the senior year, including time for in-depth study in particular courses and topics of interest.

## GRADUATION

### REQUIREMENTS

## CLASS OF 1992

## Fall Semester 1989

		Α	В	C	D	Р	F
MATHEMATICS							
Analysis II, III, IV; AP Calculus I, II, III;							
Geometry I	(N=180)	29.44%	40.00%	28.34%	2.22%	NA*	NA*
Advanced Geometry, Computer Seminar,	1					1	
Differential Equations, Intro to Pascal,							
Mathematica™, Multi-Variable Calculus,	(N=24)	62.50%	12.50%	0%	4.17%	16.66%	4.17%
Problem Solving							
SCIENCE							
Biology: University Biology	(N=175)	25.14%	62.29%	12.00%	.57%	NA*	NA*
Chemistry: Advanced Chemistry, Organic							
Chemistry I	(N=39)	41.02%	53.85%	5.13%	0%	0%	0%
Physics: Advanced Physics, Astrophysics,							
Calculus-based Physics/Mechanics,							
Observational Astronomy, Topics in	(N=75)	33.33%	52.00%	9.33%	0%	5.34%	0%
Modern Physics							
SOCIAL SCIENCE World Studies	(N=169)	56.80%	38.46%	4.14%	.60%	NA*	NA*
ENGLISH Junior English	(N=170)	53.04%	37.81%	7.22%	1.93%	NA*	NA*
FOREIGN LANGUAGE							
French, German, Japanese, Latin, Russian,							
Spanish	(N=176)	39.77%	38.07%	18.75%	1.14%	1.70%	.57%
FINE ARTS							
Art Design I, Ceramics, Concert Band,							
Concert Choir, Concert Orchestra	(N=88)	56.80%	15.90%	5.70%	0%	21.60%	0%

## Spring Semester 1990

		Α	В	C	D	Р	F
MATHEMATICS							
Analysis II, III, IV; AP Calculus I, II, III	(N=174)	29.89%	39.08%	25.29%	5.74%	NA*	NA*
AP Computer Science, Intro to Pascal, <i>Mathematica</i> ™, Multi-Variable Calculus, Number Theory, Problem Solving	(N=38)	50%	21.05%	13.16%	0%	15.79%	0%
SCIENCE							
<b>Biology:</b> General Microbiology, Genetics, University Biology	(N=196)	28.06%	46.94%	21.43%	2.55%	1.02%	0%
<b>Chemistry:</b> Advanced Chemistry, Organic Chemistry I, II	(N=26)	38.46%	15.38%	11.54%	0%	34.62%	0%
<b>Physics:</b> Advanced Physics, Astrophysics, Calculus-based Physics/Electricity & Magnetism, Electronics, Topics in Modern Physics	(N=67)	52.25%	31.34%	7.46%	0%	8.95%	0%
SOCIAL SCIENCE World Studies	(N=179)	48.60%	37.99%	11.73%	1.68%	NA*	NA*
ENGLISH Junior English	(N=172)	57.56%	35.47%	4.07%	2.90%	NA*	NA*
FOREIGN LANGUAGE French, German, Japanese, Latin, Russian, Spanish	(N=180)	41.67%	37.78%	16.67%	2.77%	1.11%	0%
FINE ARTS Art Design I, Ceramics, Concert Band,							
Concert Choir, Concert Orchestra, Photography	(N=80)	47.50%	21.25%	1.25%	0%	28.75%	1.25%

\*This information is not applicable because required courses cannot be taken pass/fail.

## GRADE

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## DISTRIBUTIONS

## CLASS OF 1992

## TESTING HIGHLIGHTS

- Mean SAT composite score for IMSA seniors was 453 points above the national average for college-bound seniors.
- Mean ACT composite score for IMSA seniors was 10.8 points above the national average for college-bound seniors.
- Of IMSA juniors and seniors taking the Advanced Placement Examinations, 92.34% scored "3" or better and 67.34% scored "4" or better.
- Mean Achievement Test score for IMSA seniors in Mathematics-Level II was 744, 78 points higher than the national average for college-bound seniors. Mean Achievement Test score for IMSA seniors in English Composition was 629.42, 110.42 points higher than the national average for college-bound seniors.
- A total of 62 members of the IMSA Class of 1992 (35.84%) were named semifinalists in the 1992 National Merit Competition. Another 67 (38.73%) were named commended students.

#### Preliminary Scholastic Aptitude Test (PSAT) Scores Class of 1992 — Middle 50% Range and Mean

	VERE Mid 50%	BAL	MA Mid 50%	ТН	SELECTION INDE Mid 50%			
	Range	Mean	Range	Mean	Range	Mean		
Female (N=69)	51-68	59.5	64-70	66.0	166-206	185.00		
<b>Male</b> (N=108)	56-67	61.0	60-74	69.6	172-200	191.60		
IMSA Mean (N=177)	55-66	60.4	64-72	68.2	174-204	189.00		
Illinois Mean		40.3		45.0		125.60		
Nat'l Mean		40.4		45.0		125.40		

#### Achievement Test Scores for the Class of 1991 Middle 50% Range and Mean

TEST	TOTAL IMSA SCORES REPORTED	MIDDLE 50% RANGE	IMSA MEAN	ILLINOIS MEAN	NATIONAL MEAN
ENGLISH Composition Comp w/ Essay Literature	76 29 4	580-690 570-670 NA*	629.42 621.38 697.50	569 NA** 571	519 NA** 529
MATHEMATICS Level I Level II	2 104	NA* 710-790	670 744	585 706	549 666
SCIENCES Biology Chemistry Physics	50 30 35	610-700 640-760 680-760	662 697.33 689.71	598 617 633	561 575 601
HISTORY American European	7 1	NA* NA*	597.14 750	590 582	537 541
<b>LANGUAGES</b> French Spanish German	8 3 2	NA* NA* NA*	613.75 500 530	560 567 NA**	548 556 NA**

## American College Testing (ACT) Scores

Class of 1991 — Middle 50% Range and Mean

SUBSCORE	FEMALE N=44	MALE N=58	IMSA MEAN	ILLINOIS MEAN	NATIONAL MEAN
ENGLISH (1-36) Mean	31.0	29.8	30.3	20.5	20.3
MATHEMATICS (1-36) Mean	31.2	32.5	32.0	20.4	20.0
<b>READING</b> (1-36) Mean	32.8	31.9	32.3	21.3	21.2
SCIENCE REASONING (1-36) Mean	30.2	30.7	30.5	20.7	20.7
COMPOSITE (1-36) Mean	31.5	31.3	31.4	20.8	20.6
Percentages of IMSA	Students in 1	Test Score Int	tervals		

SCORE INTERVALS	ENGLISH M F	MATHEMATICS M F	READING M F	SCIENCE REASONING M F	COMPOSITE M F
27-36	84 95	98 98	93 98	86 91	97 100
22-26	16 5	2 0	7 2	12 7	3 0
19-21	0 0	0 2	0 0	2 2	0 0
1-18	0 0	0 0	0 0	0 0	0 0

#### Scholastic Aptitude Test (SAT) Scores for the Class of 1991 Middle 50% Range and Mean

	FEMAL	E (N=53)	MALE (	N=70)	TOTAL (N=123)			
CLASS OF 1991	VERBAL	MATH	VERBAL	MATH	VERBAL	MATH		
IMSA Mid 50% Range IMSA Mean	620-670 643	650-730 693	570-680 628	690-780 730				
IL Col Bound Sr. Mean All Col Bound Sr. Mean	465 477 418 453		512 426	560 497	471 422	535 474		
TSWE-IMSA Mean TSWE-IL Mean TSWE-Natl Mean	4	7.6 7.6 2.8	4	7.2 6.5 1.4	57.4 (appro 47 42	.1		

#### Advanced Placement (AP) Examination Scores for IMSA Students: 1991

	AP GRADE	Biology	Chemistry	Computer Science A	Computer Science AB	Economics Macro	Economics Micro	English Lang. & Composition	English Lit. & Composition	French Language	German Language	Math Calculus AB	Math Calculus BC	Music Theory	Physics B	Physics C Electr. & Magn.	Physics C Mechanical	Spanish	U.S. History	TOTAL GRADES REPORTED	PERCENTAGE OF TOTAL
	5	11	2	9	6	0	1	6	0	1	0	0	18	0	2	5	3	1	0	65	33.16%
	4	11	4	7	1	1	1	3	1	1	3	2	17	1	5	3	6	0	0	67	34.19%
	3	4	7	1	6	0	0	2	4	1	1	3	10	0	3	3	3	1	0	49	25.00%
	2	1	0	0	2	0	0	0	0	0	0	0	2	0	3	2	1	1	2	14	7.14%
	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0.51%
	TOTAL	27	13	17	15	1	2	11	5	3	4	5	48	1	13	13	13	3	2	196	100.00%
	IMSA MEAN	4.19	3.62	4.47	3.73	4.00	4.50	4.36	3.20	4.00	3.75	3.40	4.02	4.00	3.46	3.85	3.85	3.33	2.00	3.92	
e e	NAT'L MEAN	3.07	2.90	2.84	2.63	3.07	2.97	2.93	3.07	2.95	3.30	2.94	3.57	3.09	2.81	3.35	3.35	3.32	3.01	NA**	

NA\* Not Applicable NA\*\* Not Available

## IMSA Acceptances and Matriculations – Class of 1991

College/University	Accepted	Enrolled	College/University	Accepted	Enrolled
Amherst College	1	0	New College of the Univ. of South Florida	1	1
Bard College	1	0	New York University	5	1
Barnard College		1	Northeast Missouri State University	1	0
Bennington College		0	Northern Illinois University	1	0
Blackburn College		0	Northwestern University		10
Boston University		0	Oberlin College		1
Bowdoin College		0	Pennsylvania State University		1
Bradley University		2	Pomona College		1
Brigham Young University		1	Purdue University		0
Brown University		1	Reed College		0
Bryn Mawr College		1	Rensselaer Polytechnic Institute		0
Butler University		0	Rice University		5
California Institute of Technology		4	Rutgers University		1
Carleton College		1	Scripps College		1
Carnegie Mellon University		0	Southern Illinois UnivCarbondale		0
Case Western Reserve University		0	Southern Illinois UnivEdwardsville		1
		0	Southern Methodist University		0
College of St. Cathering		0	Stanford University		1
College of St. Catherine		0	•		0
Columbia College			Stevens Institute of Technology		0
Columbia University		1	Syracuse University		0
Cornell University		1	Texas Christian University		0
Dartmouth College		1	Trinity College		1
Davidson College		1	Trinity University		0
Duke University		0	Tulane University		0
Earlham College		0	U.S. Air Force Academy		1
Embry-Riddle Aeronautical University		0	U.S. Military Academy		1
Emory University		1	U.S. Naval Academy		0
Florida Institute of Technology		0	University of Alabama		0
Georgetown University		1	University of Arizona		0
Greenville College		1	University of California-Berkeley		2
Grinnell College		0	University of Chicago		4
Hampshire College		0	University of Illinois-Urbana		27
Harvard-Radcliffe College		5	University of Iowa		0
Harvey Mudd College	5	1	University of Miami	7	1
Haverford College	1	0	University of Michigan	8	0
Hawaii Loa College	1	0	University of Missouri-Kansas City	1	0
Hope College	2	1	University of Missouri-Rolla	1	0
Howard University	1	1	University of New Orleans	1	1
Illinois Institute of Technology	1	0	Univ. of North Carolina-Chapel Hill	1	1
Illinois State University	5	1	University of Notre Dame	2	1
Illinois Wesleyan University	1	0	University of Pennsylvania	10	4
Indiana University	1	1	University of Rochester	1	0
Johns Hopkins University	6	0	University of Southern California	3	1
Knox College	3	2	University of Tulsa	1	0
Lehigh University		1	University of Virginia	1	0
Loyola University of Chicago		0	University of Washington		0
Macalester College		0	Washington University-St. Louis		4
Massachusetts Institute of Technology		3	Wellesley College		0
Miami University of Ohio		0	Wesleyan University		0
Michigan State University		4	Western Illinois University		0
Michigan Technological University		1	Western Michigan University		0
Mills College		0	Williams College		2
Milwaukee School of Engineering		0	Wittenburg University		0
Mount Holyoke College		1	Yale University		0
Mundelein College of Loyola University		0			0
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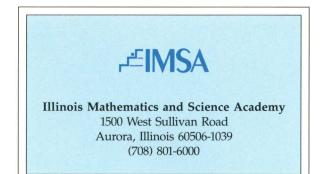
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# **≓IMS**A

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- IMSA adheres to the standards set forth in the *Statement of Principles of Good Practice* of the National Association of College Admission Counselors.
- IMSA is accredited by the North Central Association of Colleges and Schools.
- ACT/CEEB Code Number: 140177



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