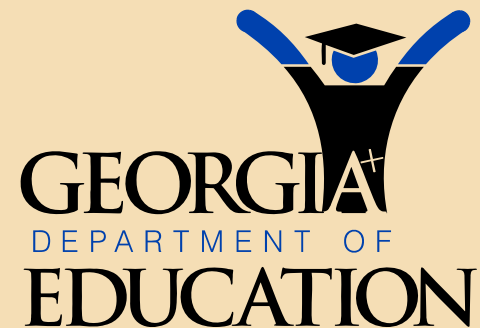




# Math and Science Education

Achievement, Needs, and Solutions



Kathy Cox, State Superintendent of Schools



*We will lead the nation in  
improving student  
achievement!*

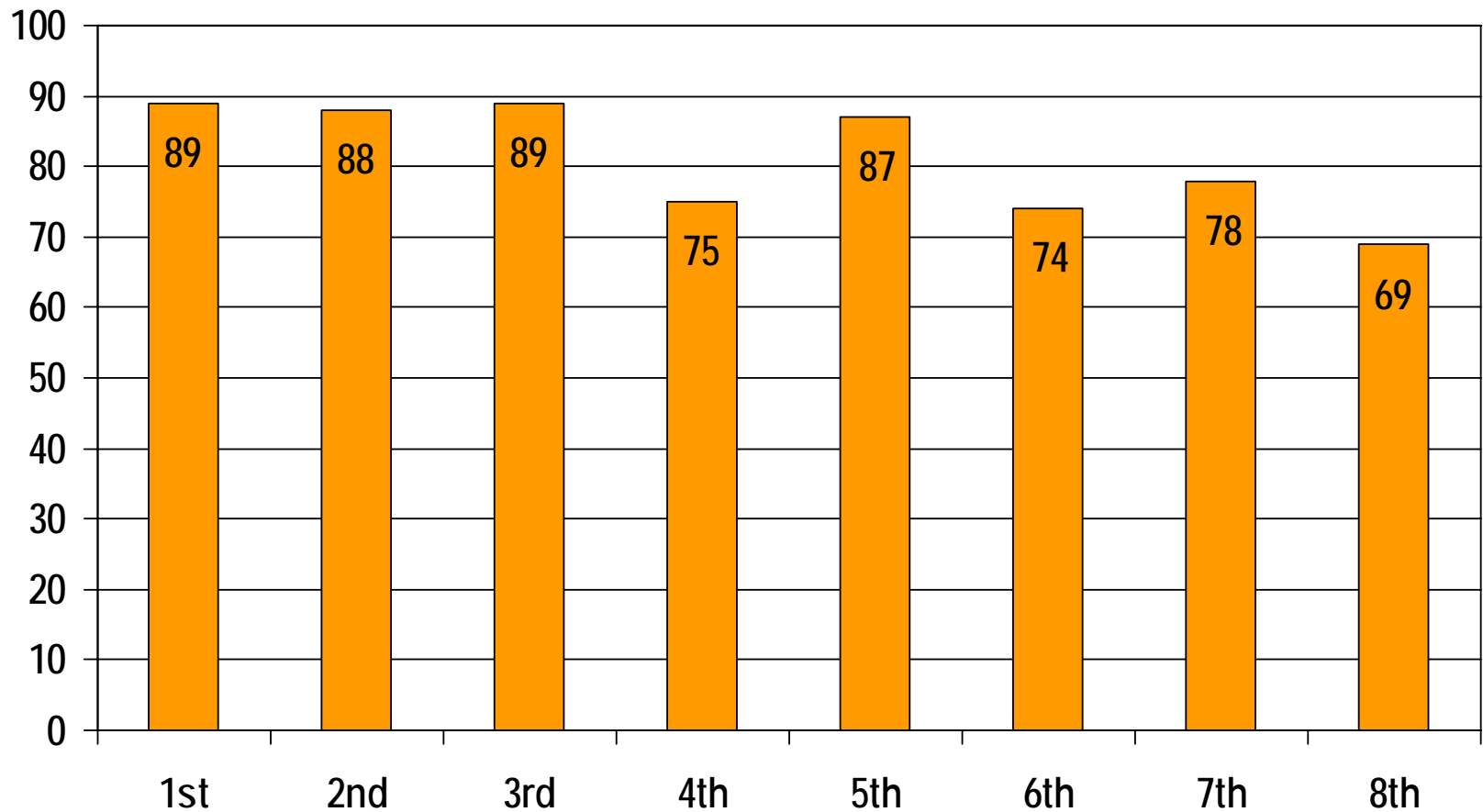


# Student Achievement in Math and Science

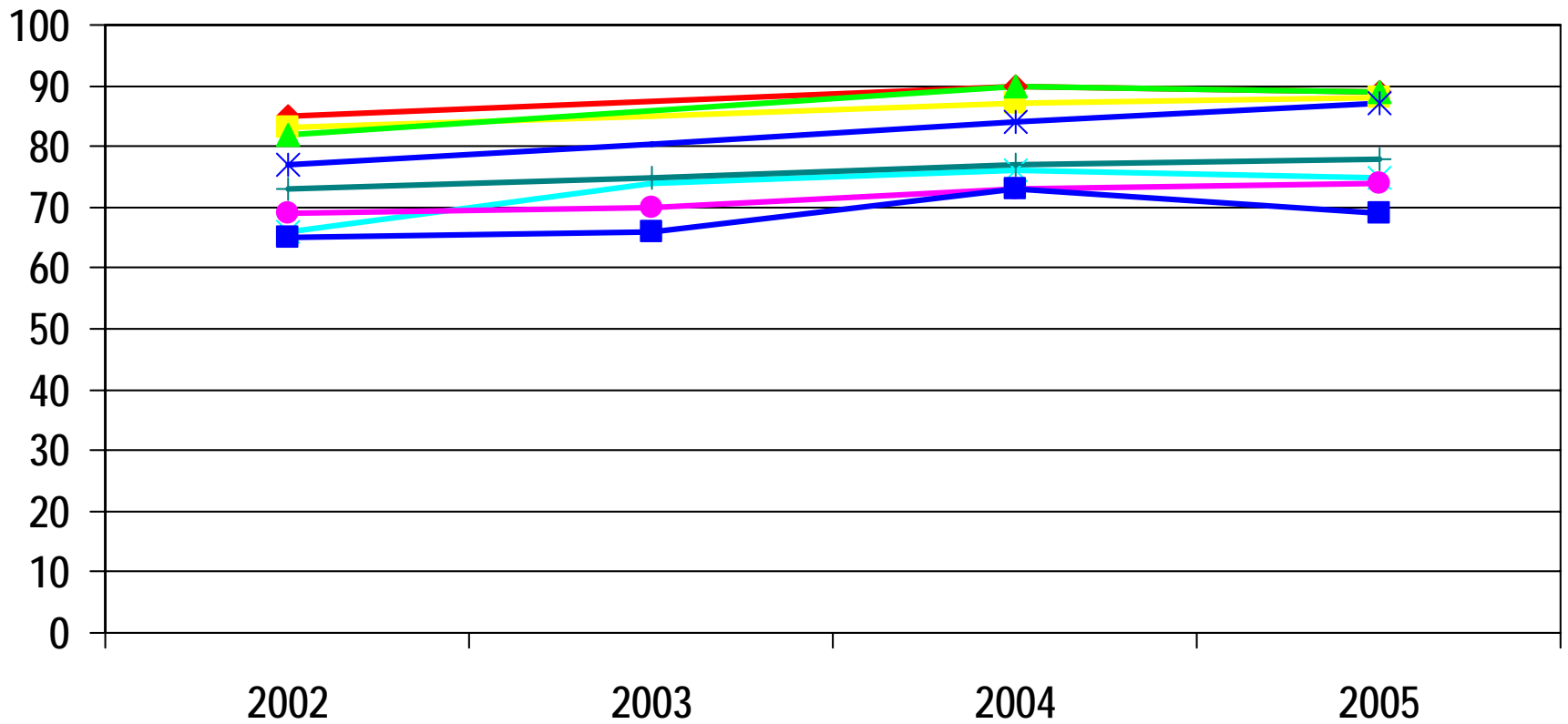
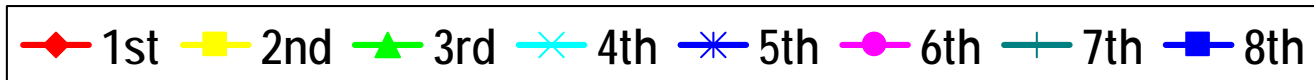


# 2005 CRCT Math Performance

## Percent Meeting or Exceeding Standards

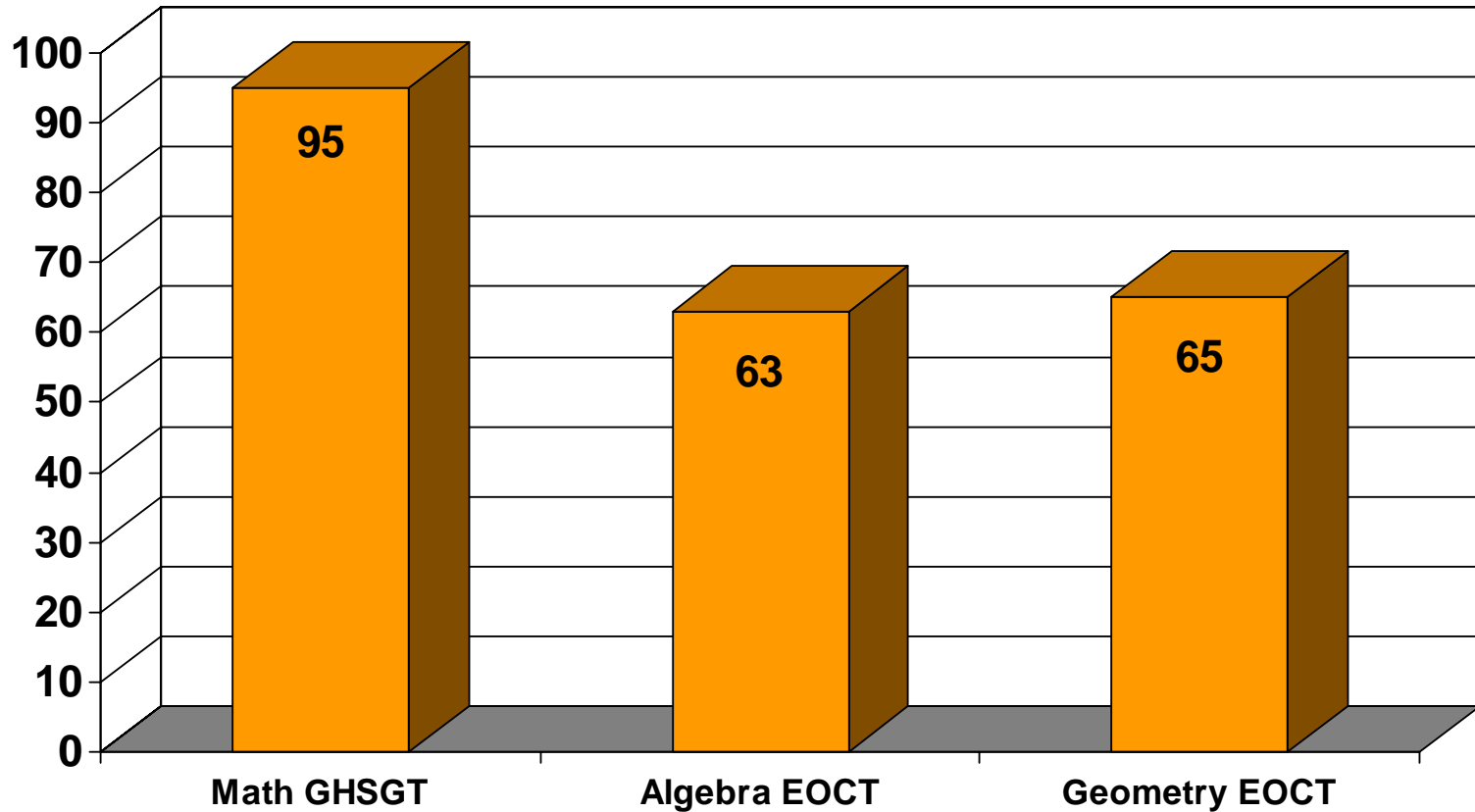


# 2002-2005 CRCT Math Performance: Percent Point Change in Students Meeting or Exceeding Standards



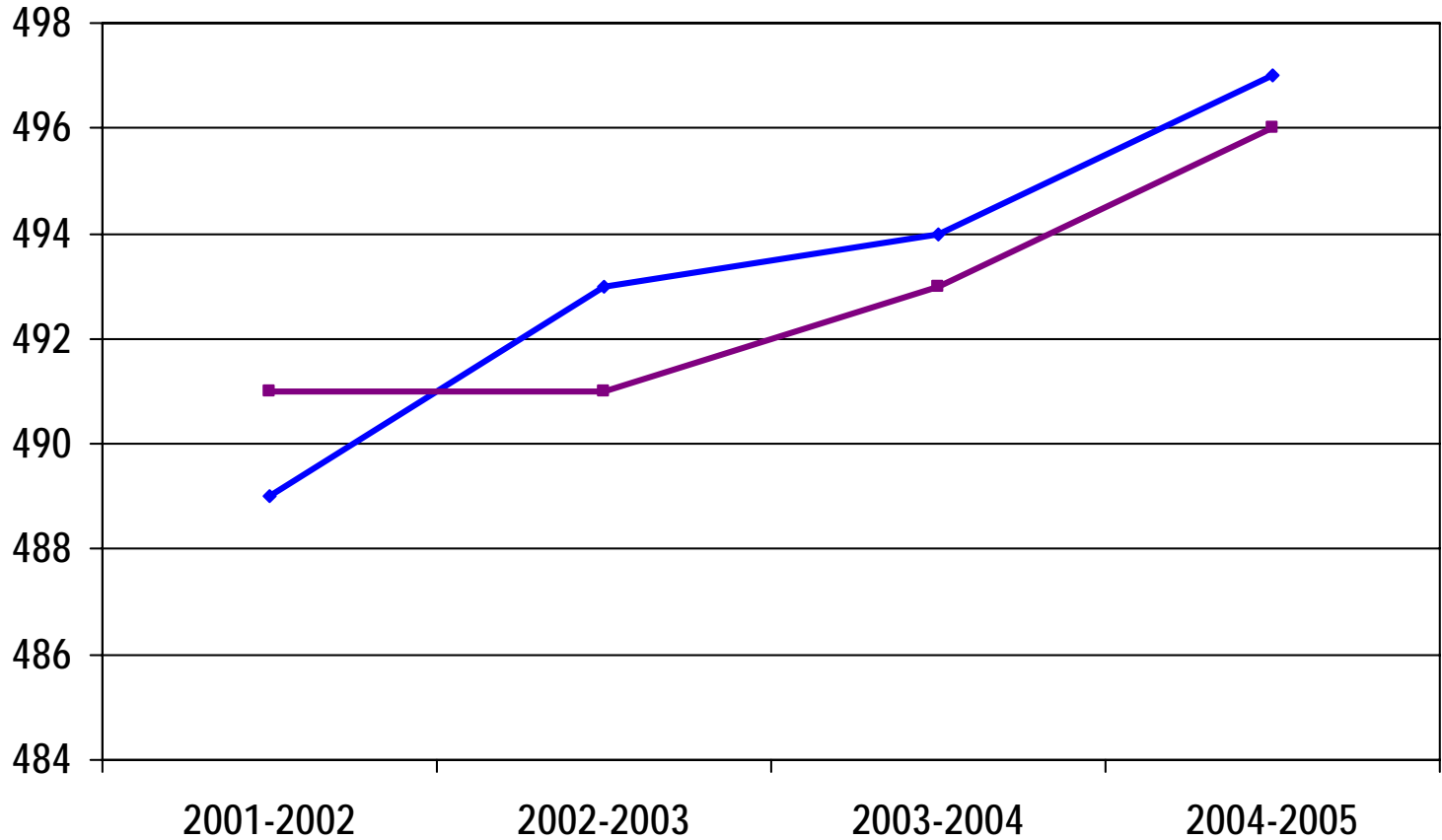
# 2005 Math Achievement of High School Students

## Percent Passing Graduation and End of Course Tests



# 2002-2005 Georgia Average SAT Math Score

Verbal Math



# 2005 SAT Math Performance

(Maximum score = 800)

- Georgia Schools
  - School average Math scores range from 327 to 600
  - 92 of 344 schools had an average math score of 500 or above
  - 107 of 344 schools had an average verbal score of 500 or above
- School Systems
  - System average Math scores range from 270 to 569
  - 33 of 178 systems had an average Math score of 500 or above
  - 42 of 178 systems had an average Verbal score of 500 or above



# SAT Verbal Performance in States with 75 or Higher Percent of Students Participating

State	Participation Rate	Score
New York	92%	497
Connecticut	86%	517
Massachusetts	86%	520
New Jersey	86%	503
New Hampshire	81%	525
District of Columbia	79%	490
Georgia	75%	497
Maine	75%	509
Pennsylvania	75%	501



# SAT Math Performance in States with 75 or Higher Percent of Students Participating

State	Participation Rate	Score
New York	92%	511
Connecticut	86%	517
Massachusetts	86%	527
New Jersey	86%	517
New Hampshire	81%	525
District of Columbia	79%	478
Georgia	75%	496
Maine	75%	505
Pennsylvania	75%	503



# SAT Performance in States with 75 or Higher Percent of Students Participating

State	Participation rate	Verbal	Math
New York	92%	497	511
Connecticut	86%	517	517
Massachusetts	86%	520	527
New Jersey	86%	503	517
New Hampshire	81%	525	525
District of Columbia	79%	490	478
Georgia	75%	497	496
Maine	75%	509	505
Pennsylvania	75%	501	503

\* 24 states test 50% or more of their students. Of those, 14 have higher Math scores than Verbal.



# Math Scores in States with Highest Number of Students Participating

State	No. Tested	Math Score
California	199,747	522
New York	163,452	511
Texas	144,733	502
Pennsylvania	109,497	503
Florida	100,047	498
New Jersey	85,109	517
Georgia	63,057	496
Massachusetts	61,847	527
Virginia	59,202	514
North Carolina	55,713	511



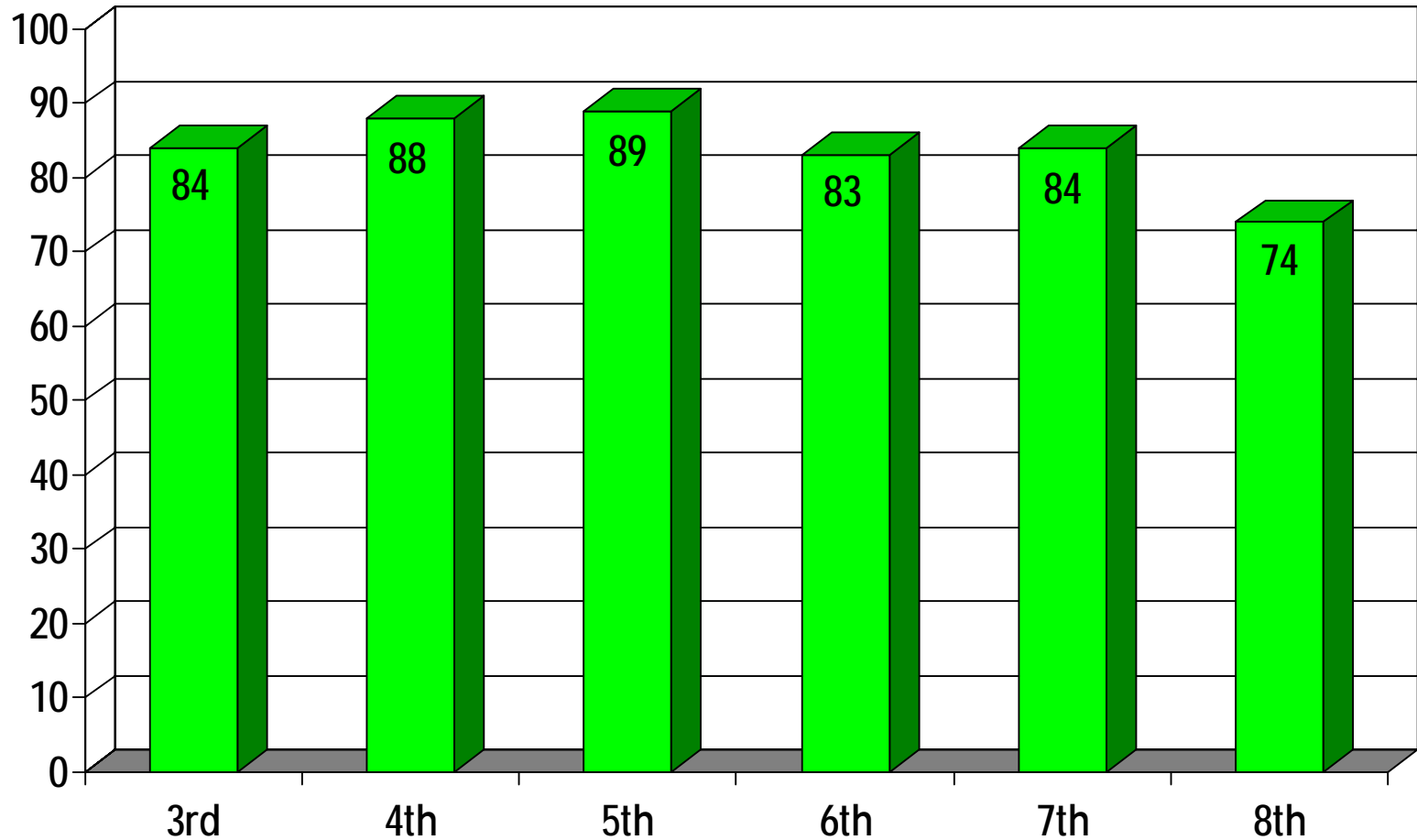
# Top Intended Majors of 2005 SAT Takers

- Health and Applied Sciences (20%)
- Engineering and Engineering Technologies (15%)
- Business and Commerce (13%)
- Social Sciences and History (8%)
- Education (7%)
- Arts: Visual and Performing (7%)
- Biological Sciences (5%)
- Computer and Information Sciences (5%)

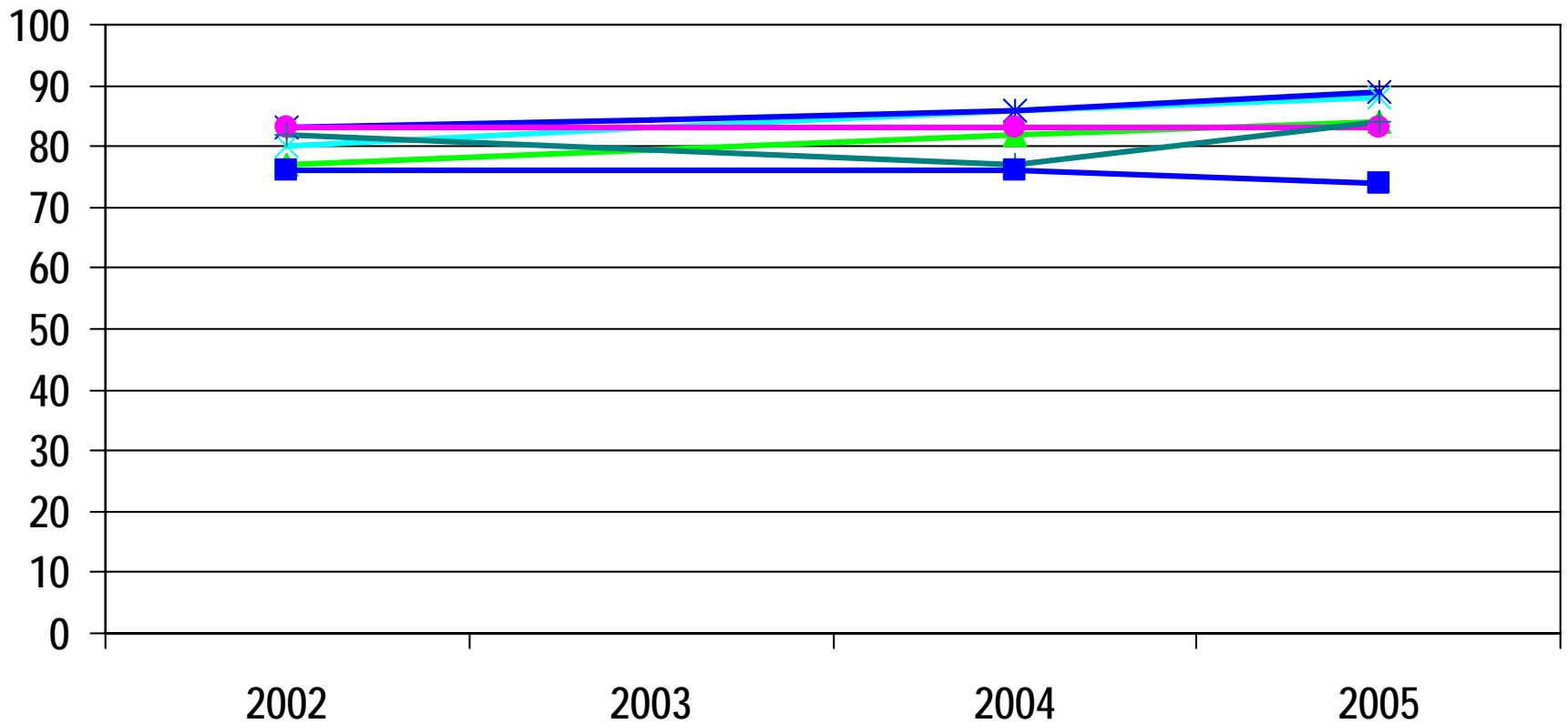
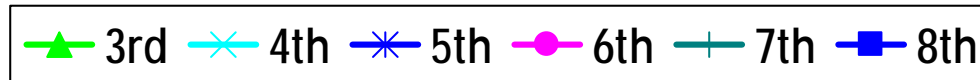


# 2005 CRCT Science Performance

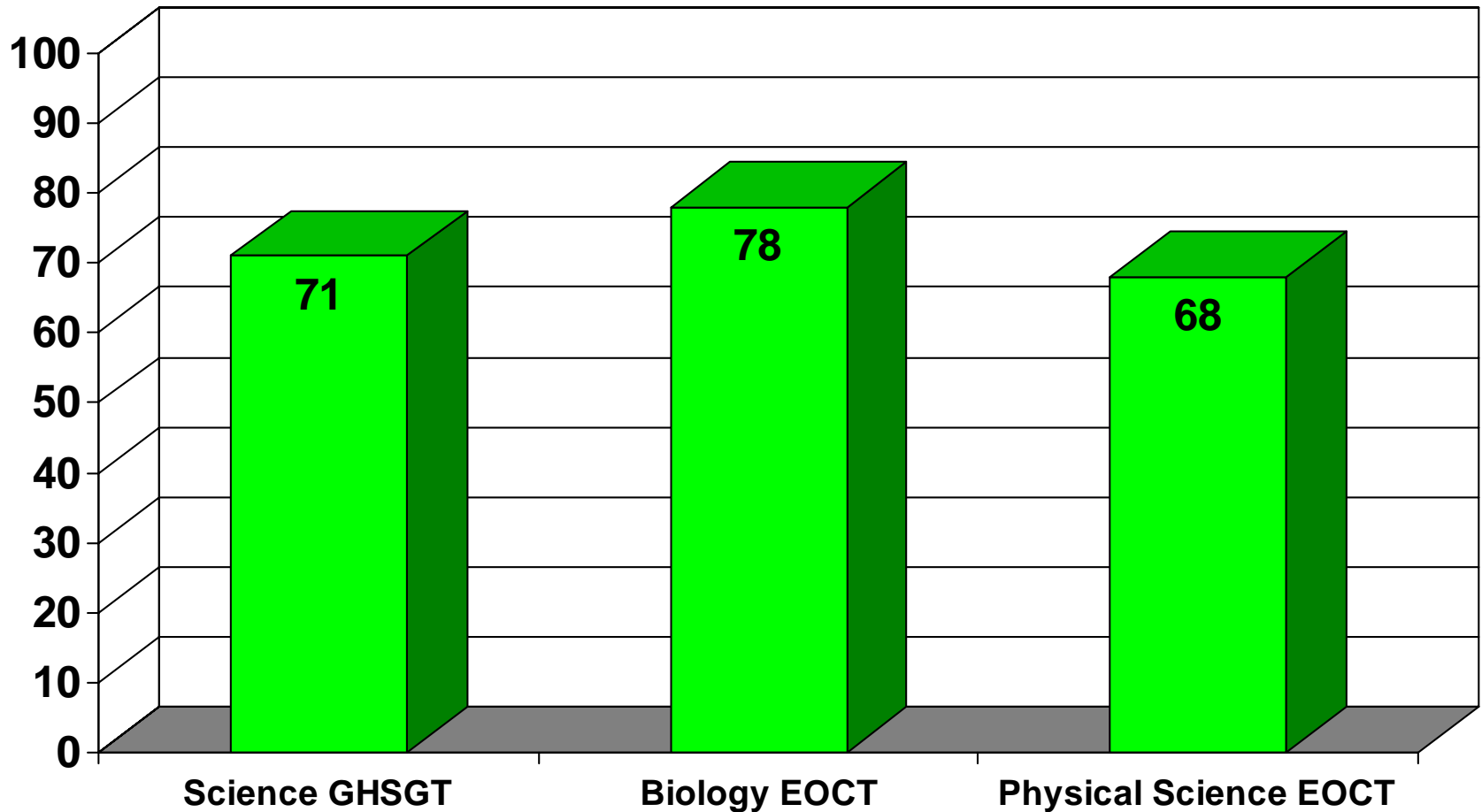
## Percent Meeting or Exceeding Standards

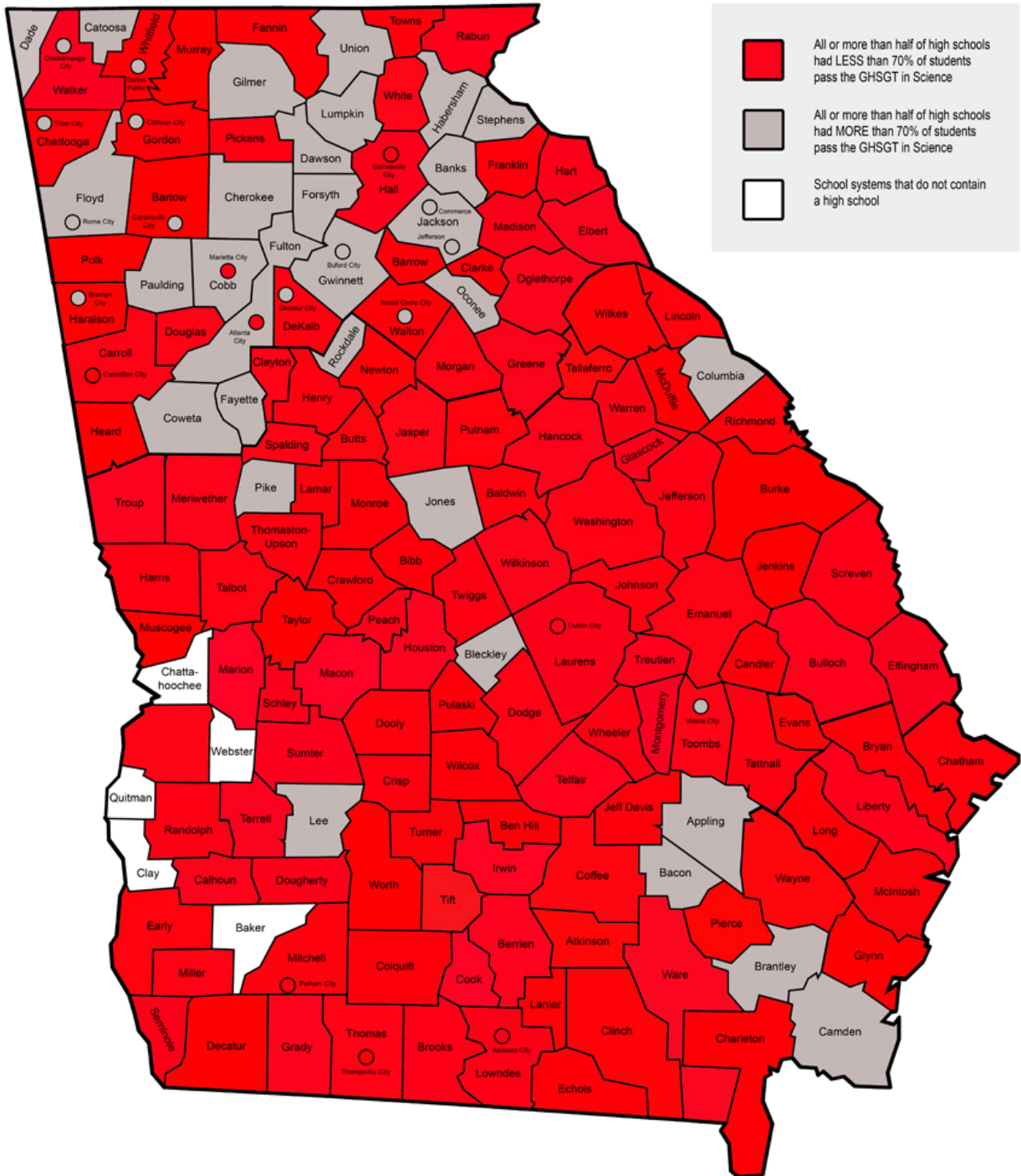


# 2002-2005 CRCT Science Performance: Percent Point Change in Students Meeting or Exceeding Standards



# 2005 Science Achievement of High School Students Graduation and End of Course Tests





*There is a significant, positive relationship (.622) between the pass rate on the science portion of the GHSGT and graduation rate.*

This relationship is stronger than any of the other three subject areas.



In the Spring of 2005, of all 11<sup>th</sup> grade first time takers of the Georgia High School Graduation Test who failed only one subject . . .

- 94 failed Language Arts
- 194 failed Math
- 966 failed Social Studies
- 13,284 failed Science

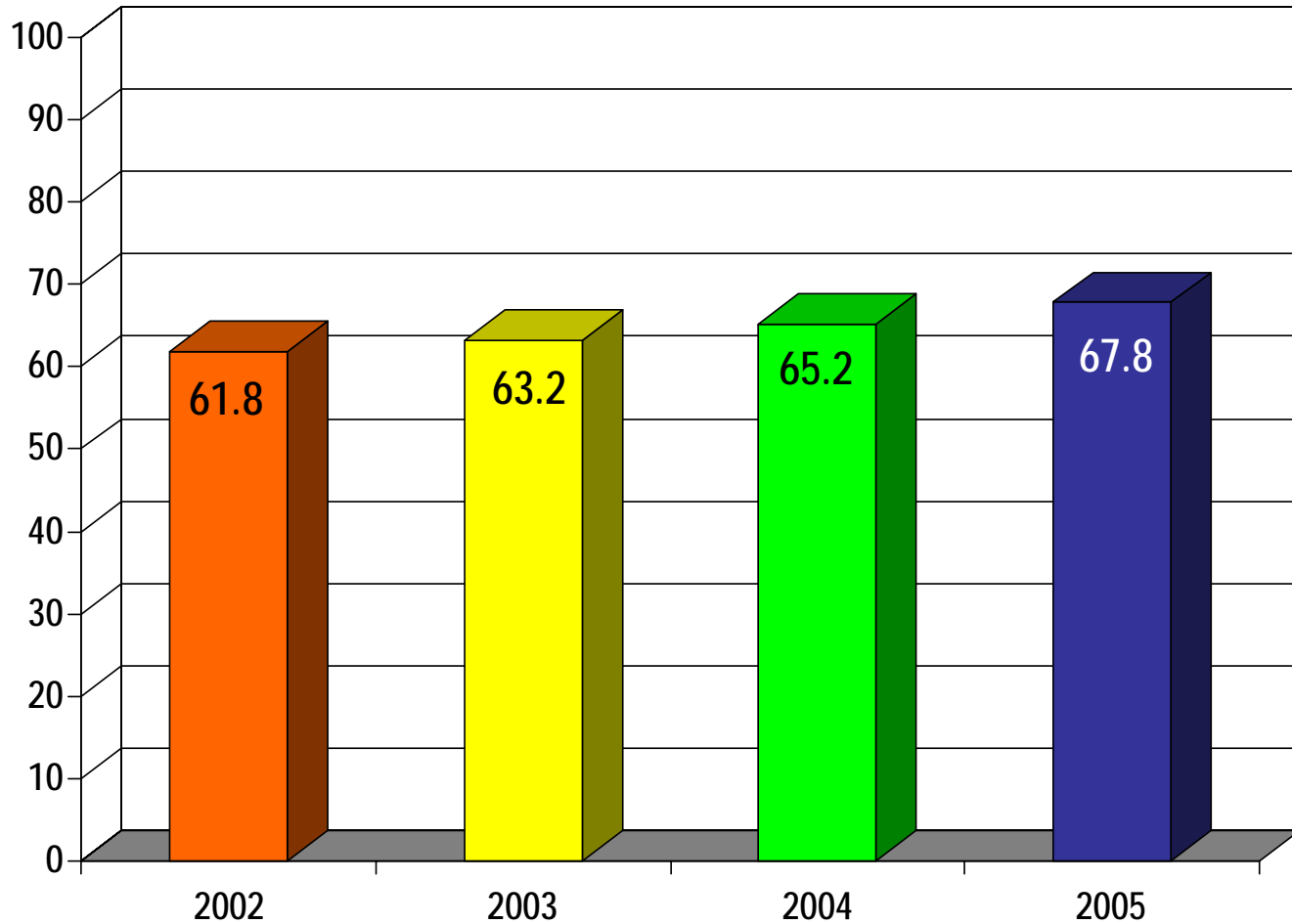


50% of students who failed the science portion of the high school graduation test in 2004 did not graduate with a regular diploma in Spring 2005

*28,146 students failed this year*



# High School Graduation Rate: Percent Graduating with a Regular Diploma in Four Years



# Companies in Top 100 by Market Cap

	<u>1925</u>
Railroads	23
Metals	4
Autos & Parts	10
Technology	0
Financial Services	0
Healthcare/Pharma	0



# Companies in Top 100 by Market Cap

	<u>1925</u>	<u>2005</u>
Railroads	23	0
Metals	4	1
Autos & Parts	10	1
Technology	0	24
Financial Services	0	22
Healthcare/Pharma	0	13



In 1995, 10,000 students in China received undergraduate engineering degrees. How many students will earn such degrees in China this year?

1. 10,000
2. 50,000
3. 100,000
4. 200,000
5. 300,000



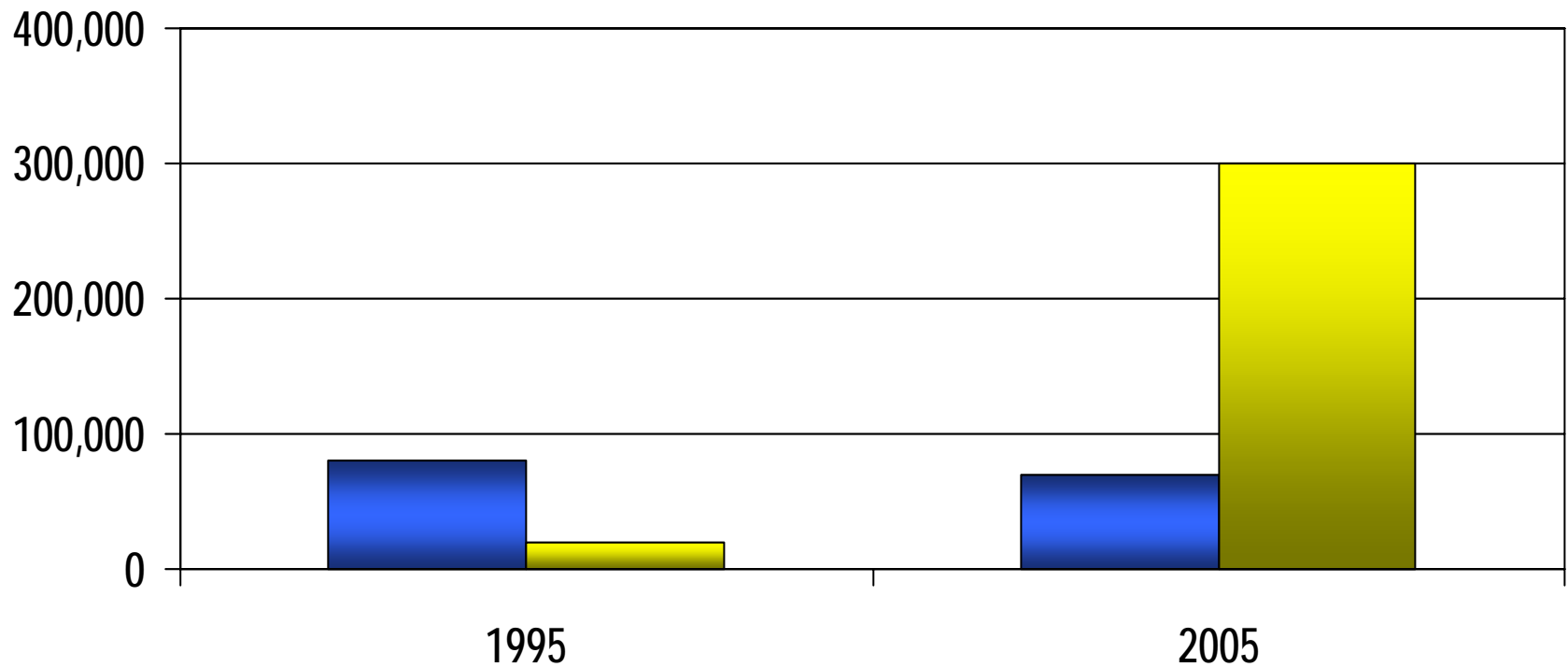
In 1995, 10,000 students in China received undergraduate engineering degrees. How many students will earn such degrees in China this year?

1. 10,000
2. 50,000
3. 100,000
4. 200,000
5. 300,000



# Number of Engineering Graduates United States & China

■ U.S. ■ China



In 2000, China exported 6 million pairs of socks to the U.S. How many pairs did it export here in 2004?

1. 23 million
2. 67 million
3. 139 million
4. 286 million
5. 670 million



In 2000, China exported 6 million pairs of socks to the U.S. How many pairs did it export here in 2004?

1. 23 million
2. 67 million
3. 139 million
4. 286 million
5. 670 million



We must graduate more students who  
are ready for college, work, and  
citizenship.



- Today, roughly 60 percent of jobs require some postsecondary education; experts say this percentage will increase in the coming years. The jobs requiring the most education are the fastest growing.

College Ready = Work Ready



# Expectations are the same for both college & “good jobs”

- The knowledge & skills that high school graduates will need in order to be successful in college are the same as those they will need in order to be successful in a job that
  - pays enough to support a family well above the poverty level,
  - provides benefits, &
  - offers clear pathways for career advancement through further education & training.

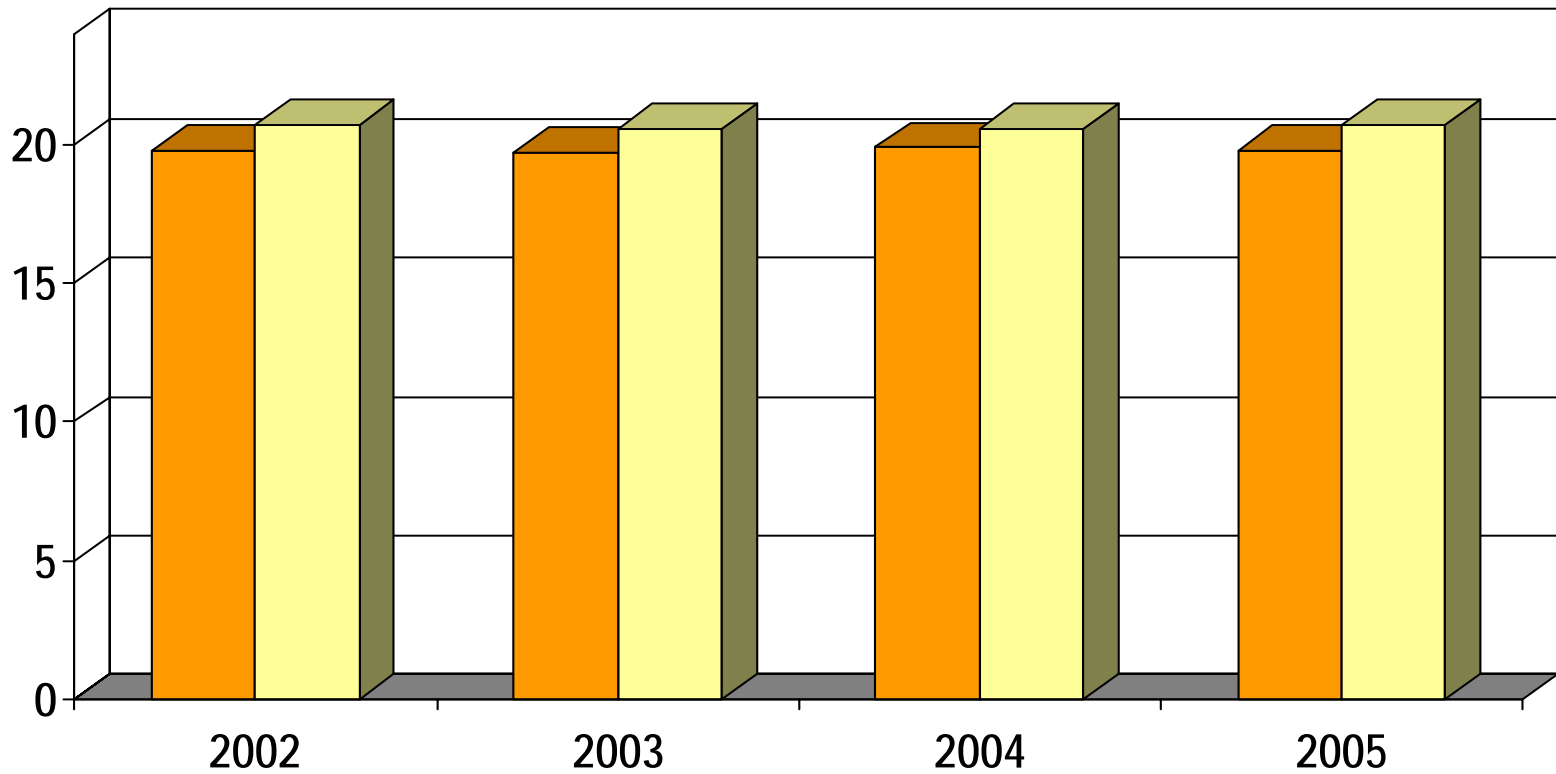


*But, college bound does not  
necessarily mean college ready*



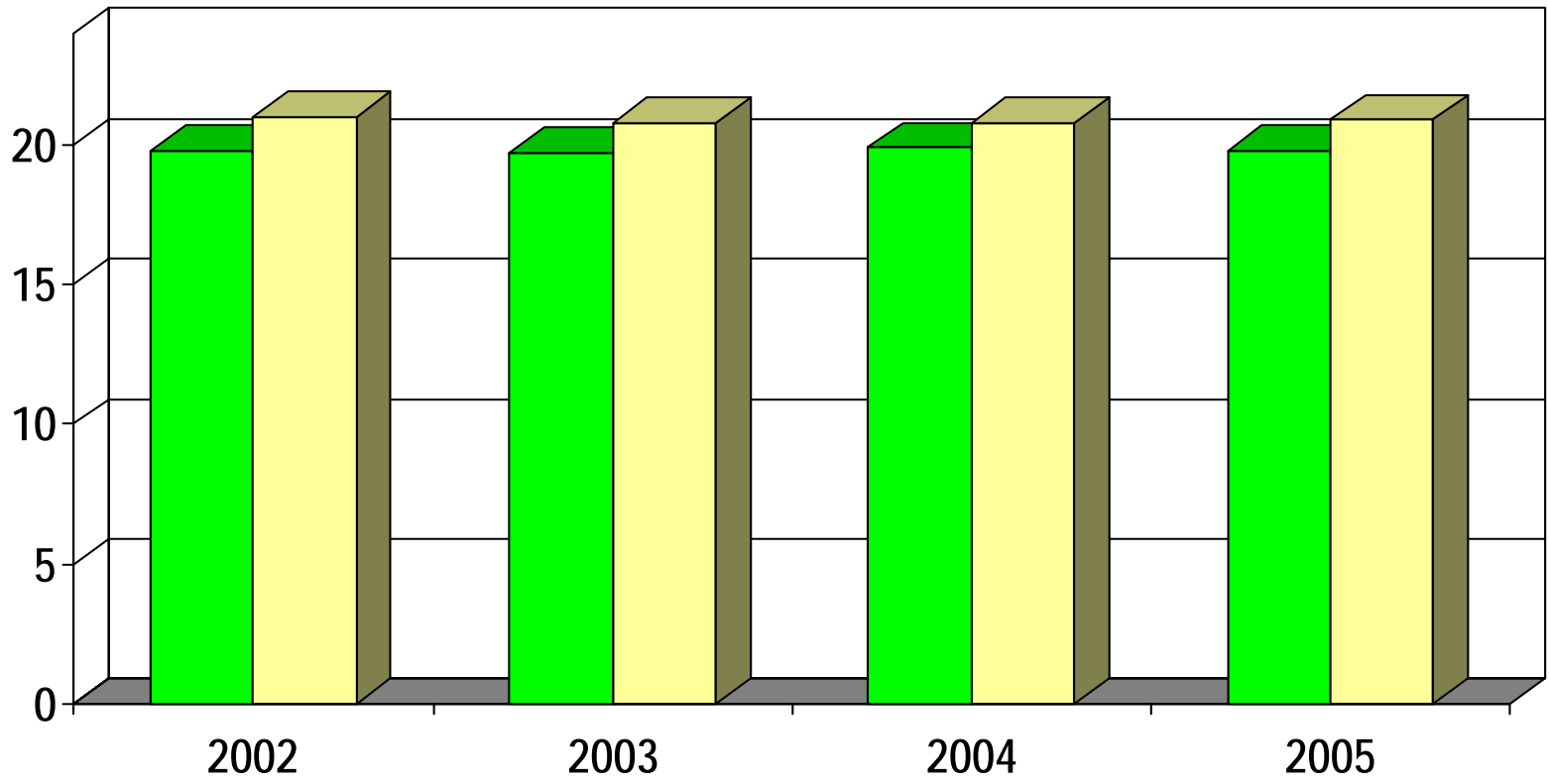
# 2005 ACT Results: Academic Achievement in Math

Math National Average



# 2005 ACT Results: Academic Achievement in Science

■ Science ■ National Average



# 2005 ACT Results: Academic Achievement

- **Minimum College Preparatory Curriculum**
  - English: 4 years
  - Math: At least 3 years
  - Social Studies: At least 3 years
  - Natural Sciences: At least 3 years



# 2005 Average Composite Scores by College Preparatory Curriculum and Race/Ethnicity

	Number Tested	Percent taking Core or More	Average ACT Composite Score	
			Minimum Core	Non-Core
All Students	23,324	60	20.6	18.4
African American/Black	7,561	61	17.7	16.0
Am. Indian	48	58	20.7	19.3
Caucasian Am./White	12,257	61	22.3	20.2
Hispanic	611	57	19.7	17.5
Asian Am./Pacific Islander	710	66	22.5	20.6

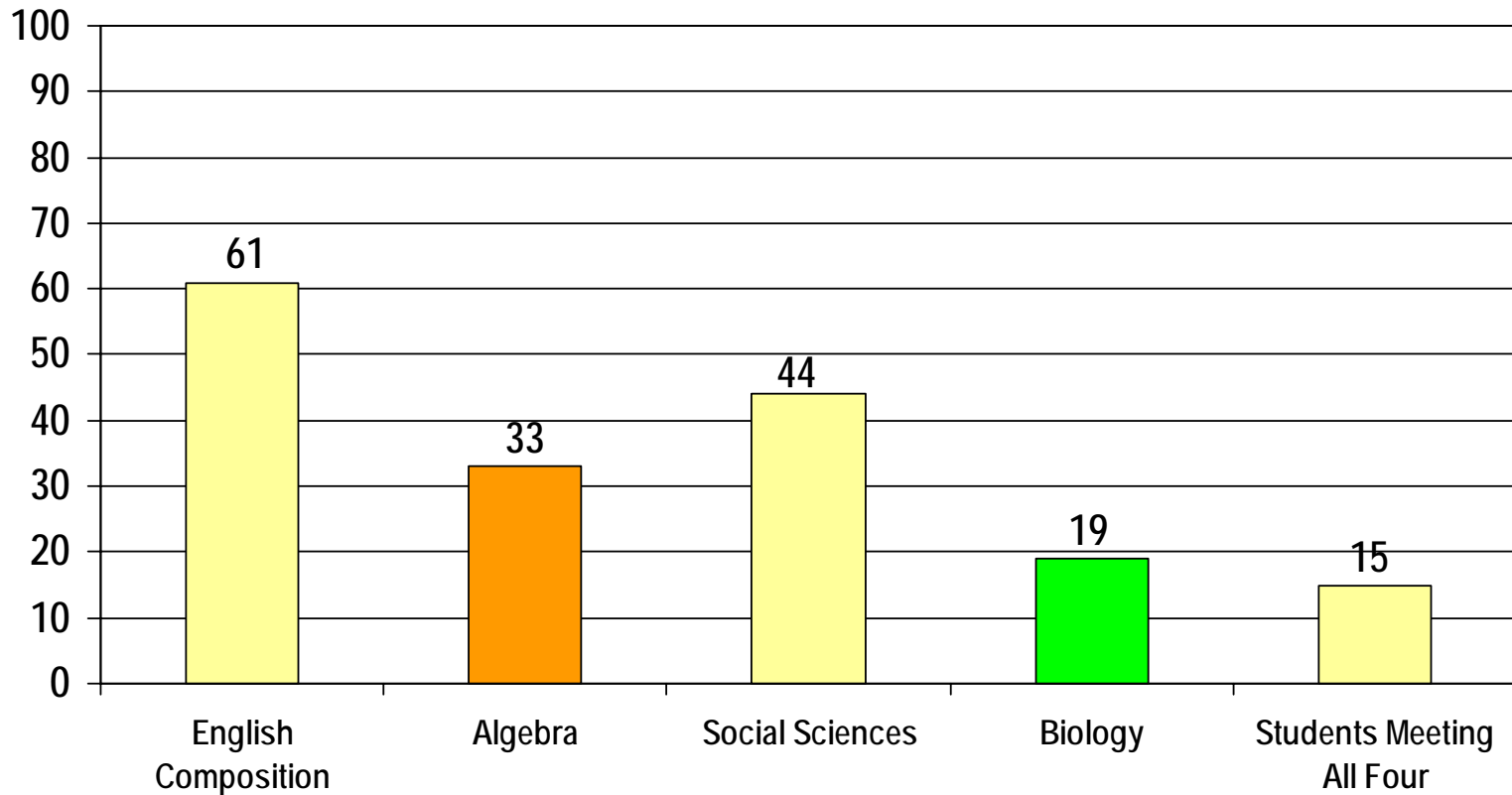


# 2005 ACT Results: Measuring College Readiness

- Benchmark scores indicate the probability that a student will do well in a college level course in the subject area
  - Math 22
  - Science 24



# 2005 Georgia ACT-Tested Graduates likely to be Ready for College Level Work (in percent)



# Top Intended Majors of 2005 ACT Takers

- Health Science & Applied Health (21%)
- Business and Management (10%)
- Social Sciences (8%)
- Visual & Performing Arts (7%)
- Engineering (5%)
- Science: Biological and Physical (5%)



# Math Score Increase by High School Math Course Sequence

Course Sequence	Average ACT Math Score	Average ACT Math Score Increase
Core + Advanced Math, Trig, and Calculus	24.4	+ 7.2
Core + Advanced Math and Trigonometry	20.7	+ 3.5
Core + Advanced Math	18.4	+ 1.2
Algebra I, Algebra II, and Geometry (Min. Core)	16.9	- 0.3
Less than 3 courses (Less than Core)	17.2	



# Science Score Increase by High School Science Course Sequence

Course Sequence	Average ACT Science Score	Average ACT Science Score Increase
Biology, Chemistry, and Physics	22.3	+ 5.0
Biology and Chemistry	19.6	+ 2.3
Biology Only	17.3	



# Steps to Address the Crisis

- Georgia Performance Standards
- Science Implementation Specialists
- Partnership for Reform in Science and Mathematics (PRISM)
- Georgia Virtual School



# Georgia Performance Standards Implementation in the Classroom

	Math	Science
2005-2006	Grade 6	Grades 6, 7, & 9-12
2006-2007	Grades K-2, 7	Grades 3-5
2007-2008	Grades 3-5, 8	Grades K-2, 8
2008-2009	Grades 9-12	

Note: The training of teachers occurs one year prior to classroom implementation.



- **Georgia Performance Standards**
  - Sets clear expectations for what a student should understand and be able to apply upon the completion of a lesson
  
- **Science Implementation Specialists**
  - A statewide support system for teachers
  - It is critical that teachers have broader and deeper content knowledge

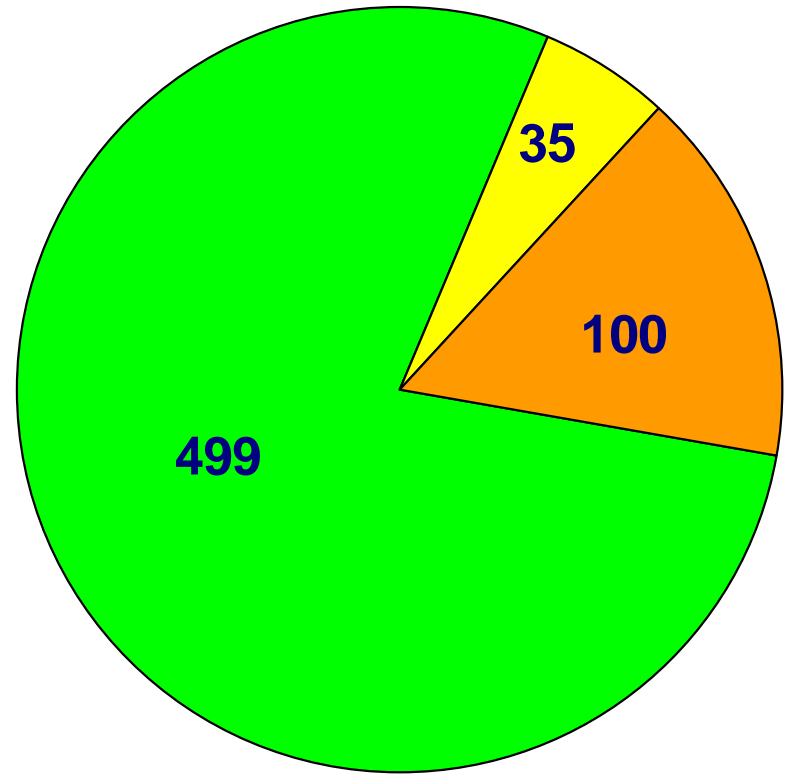


- **PRISM**
  - Unprecedented collaborative effort between K12 and higher education to increase science and mathematics achievement for all P-12 students in order to improve their readiness for post-secondary education and careers
  
- **Georgia Virtual School**
  - Expanding opportunities for more rigorous coursework



# Georgia Virtual School

- 634 students enrolled, with hundreds more requests for information
- 146 students enrolled in AP courses, an increase of 456% over Spring 2004 in online AP participation



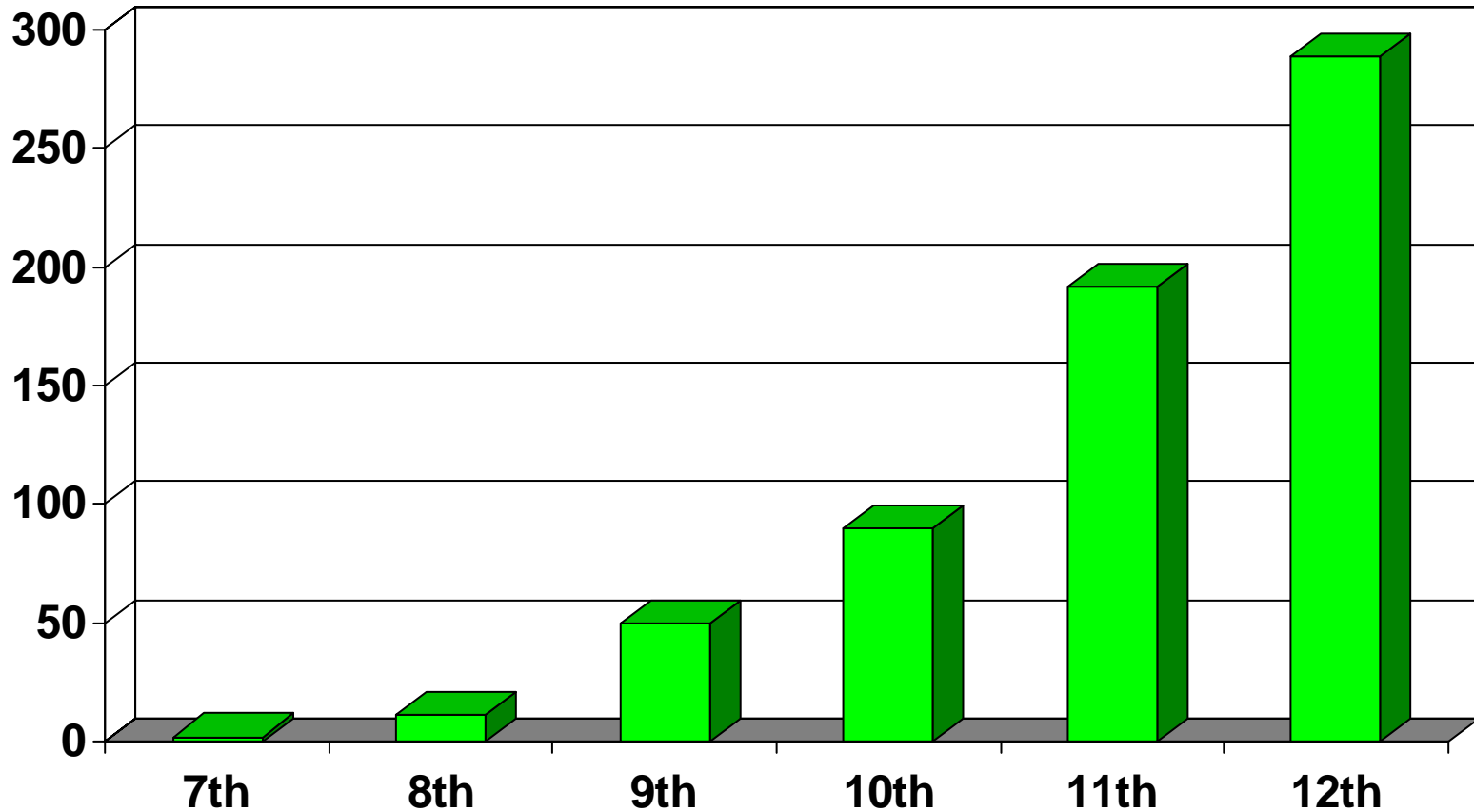
■ Public ■ Private ■ Home School



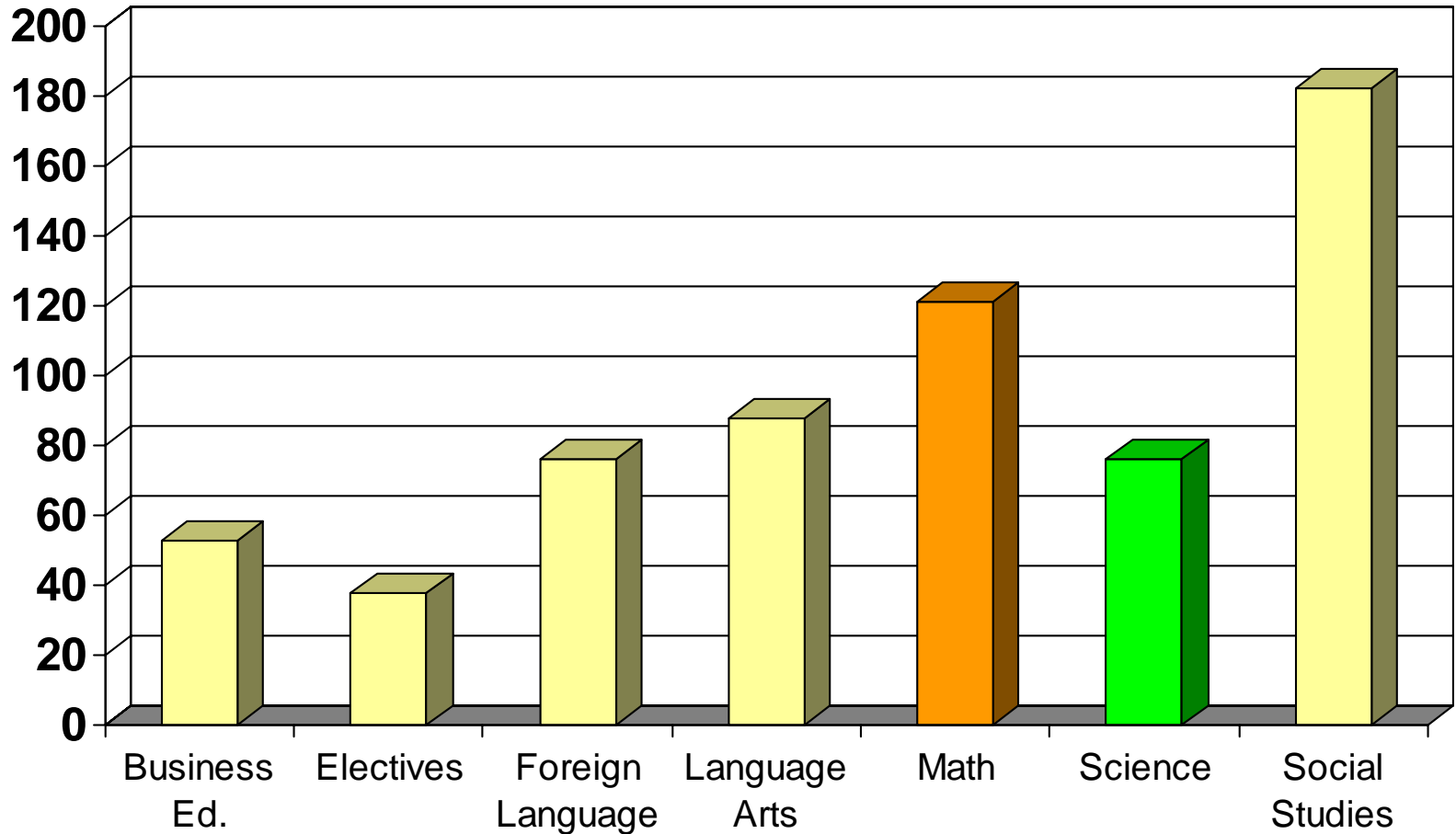
# Enrollment by Grade Level

## Georgia Virtual School

### Fall 2005



# Enrollment by Subject Georgia Virtual School Fall 2005



*Have a Great Year!*



*Kathy Cox, State Superintendent of Schools*

