

SCIENCE

Primary Goal - To help students in the elementary and junior high school years to understand the world through the application of the various science disciplines as well as the scientific method, and to enable students at the senior high school level to gain proficiency in specialized science areas.

<u>Staff</u>	<u>Students</u>	<u>Budget</u>	<u>Cost Per Student</u>
43.28	5,659	\$4,322,200	\$764

Level K - 6

While other district initiatives including differentiated instruction, reading, and writing occupy much of the time of our elementary principals, continuous effort has been devoted to providing an effective systemic approach to science instruction. In each of the elementary buildings, multiple resources are available. Continually, teachers are informed of the various resources available in each of the buildings. Included among these are many materials oriented toward providing our students with engaging hands-on science activities. For example, the Star Lab continues to provide a positive experience for students in the astronomy units. The teaching guides for the properties of air and weather continue to be used by 5th grade teachers throughout the district. These activities are valuable and focus our students on higher-level thinking and science-based writing instruction. Many of the schools' science fairs provide students with additional opportunities to present authentic science projects. Furthermore, other activities such as the Lego Club at Boght Hills and Forts Ferry served to provide our students with additional opportunities to do "real science." Finally, Science Enrichment Day at Southgate represents yet another activity where students experience the joy and fun attendant to learning science in an engaging and authentic manner.

The continued emphasis on reading instruction in grades K-2 and the extension of the reading program in grade 3 – 6 have been useful in promoting science instruction as well. Bookrooms are equipped with many reading materials critical to reading in the science content area. Principals continue to be also encouraged to house science materials in one central location so that teachers are knowledgeable of where to find these resources. This year, Candace Lobdell and Kerry Flynn conducted a survey of all elementary teachers. This survey was completed in December of 2005 and sought to identify topics in science needing in-servicing as well support materials. These results have been received and analyzed and will provide both elementary Science Steering Committee co-chairs with the information to determine in-service and resource needs for the 2006-07 school year.

To bring science to life, field trips continue to be a venue that energizes the elementary program. Field trips such as visits to the Herkimer Diamond Mine, the Scotia Glenville Museum, the Five Rivers Environmental Center, the Children's Science Museum in Boston and Schenectady Museum and Planetarium continue to provide wonderful

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opportunities for these experiences. This past March, our elementary teachers joined their district colleagues in making a community connection that they could bring to their classrooms. Many of these experiences involved museums, cultural organizations, and other institutions useful in providing enrichment for science. We anticipate their continued implementation during the 2006-07 school year.

In its third year, the New York State Science Assessment at grade 4 measures both content, skills and applications of science concepts. Performance on this test continues to be strong although we dropped off somewhat this year. In 2004-05, 95% of our students scored at level 3 and 4 compared to 85% 2005-06. These results were reviewed and analyzed by the building principals and areas needing specific improvement will be addressed in the upcoming school year. Particularly crucial is meeting the needs of students with disabilities who are now required by the state to take this test as part of the No Child Left Behind mandates. In addition, it is imperative that we continue to emphasize the content reading and study skills necessary for this test, as application of such skills is essential to students' success. The elementary principals will continue to monitor student performance, and we will also use school time during the school year for staff development to familiarize elementary teachers with it. We also wish to monitor score participation by grade level and desire to expose teachers and other elementary grades to the assessment and scoring process so that their science instruction will continue to be informed by the demands of this test.

District Examinations - Grade 6

Grade 6 Science

Grade	Number of Students/Percentage 2005-06	Number of Students/Percentage 2004-05
A	195/45.9%	177/44.6%
B	124/29.2%	129/32.5%
C	58/13.6%	56/14.1%
D	32/7.5%	16/4%
F	16/3.8%	19/4.8%

On the grade 6 science assessment, our students performed near the level of the 2004-05 examination. There were 75.1% of our students who scored A's and B's compared to 77.1% in 2004-05. The number of students receiving D's and F's was up 11.3 from 8.8% in 2004-05. We will continue to review the program and make changes as needed. Again, overall we continue to be satisfied with the results of our students on this assessment. It represents solid infusion of authentic hands-on science activity with content knowledge and skills. It includes the performance section as well as traditional testing items including multiple-choice questions. Most importantly, it provides us with

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an intermediate check of progress in science between the 4th and 8th grade New York State Assessment.

Level 7 - 8

Emphasis on experimentation and inquiry as well as the use of authentic “real life” examples and how they relate to science instruction continued to be strengths of the program at Shaker Junior High School. High standards and high expectations are characteristics of science instruction at this level. Furthermore, continual reflection and an ongoing desire to reexamine, revise and update programs drives the instructional program for our 7th and 8th graders. Science at the junior high school includes the 7th and 8th grade survey course where the elements of general science are examined. For students with greater skill in science and a deeper interest, the option of taking the high school earth science course in grade 8 offers them additional enrichment as well as a substantial challenge. These students are accelerated by one year and take the New York State Regents as their final assessment. In addition, mathematics instruction is infused into science instruction, thus creating an interdisciplinary element.

At Shaker Junior High School, science is supervised by Mr. Michael Mitchell. Mr. Mitchell provides excellent supervision of the department through department meetings that are held at least once a month. In addition, informal and formal observations are conducted on a regular basis. Mr. Mitchell ensures the continuous flow and progress of instruction through weekly review of teacher lesson plans. Finally, equity and continuity of instruction throughout the halls at the junior high school is ensured through common grade level mid- year and final examinations.

A collegial atmosphere exists in the junior high school science department. Department members engage in conversation about students, student work, curriculum and instruction. These conversations are extremely effective in providing the best for our science students. In addition, Mr. Mitchell and many of the staff at Shaker Junior High School are in frequent conversations with the high school staff and with Mr. Bogert, the high school science supervisor. This ongoing conversation is critical, providing articulation as well as feedback to the junior high school staff. Furthermore, it provides the junior high school faculty with the understanding of the effectiveness of their instruction as students proceed through the high school science curriculum. Thus far, the feedback has been excellent, and the continued success of our students at the high school level is evidence of the excellent preparation offered by the junior high school science program.

Academic intervention services are also provided for students who are performing below grade level. These are students who have received either a 1 or a 2 on the science assessment in grade 4 or who are experiencing poor performance in science in the classroom. AIS services include tutoring with the block support person,

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participation in the Focus Program and after school help with teachers. All these approaches are effective in preparing our science students to meet state requirements for graduation at the high school level.

Regents Earth Science 8X

	2005-06	2004-05	2003-04	2002-03	2001-02
Percent passing	100%	100%	100%	100%	100%
Number enrolled	92	95	91	80	80

As previously stated, the 8X Earth Science program affords our junior high school students the opportunity to pursue high school work one year earlier than scheduled. Our students continue to do well on this test, as 100% pass the examination. Equally impressive is the fact that 92% of our students scored 90% or above, compared to 84% the previous year. This is an outstanding result given the fact that the previous year's results represented an all-time high in achievement in Earth Science at Shaker Junior High School. Congratulations are in order to the Shaker Junior High School Earth Science Department for another set of record results! Again, noteworthy is the fact that 92 students took the test. This represents 20% of the total 8th grade class and is consistent with the 20% enrolled last year. We continue to encourage our young women to participate in rigorous science instruction. In 2004-2005, 60% of the students enrolled in Earth Science instruction were female. This year, 46% of the students were female. Mr. Mitchell and the junior high school staff will continue to encourage female students to participate in Earth Science.

The Earth Science exam continues to have more constructed response items. Teachers continue to be up to date and prepared for the expectations of the Earth Science program. The department continues to revise tests, quizzes and unit exams to include more constructed-response questions.

District Final Examinations

Grade 7 Science

Grade	Number of Students/Percentage 2005-06	Number of Students/Percentage 2004-05
A	64/21%	83/24.3%
B	114/37%	121/35.5%
C	68/22%	79/23.2%
D	36/12%	35/10.3%
F	23/8%	23/6.7%

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Grade 8 Science

Grade	Number of Students/Percentage 2005-06	Number of Students/Percentage 2004-05
A	81/23%	75/19.8%
B	139/39%	139/36.7%
C	79/22%	86/22.7%
D	33/9%	52/13.7%
F	24/7%	26/6.8%

Results on the grade 7 district examination were at or near those from the previous year. The percentage of students receiving A's and B's was 58% compared to 60% the previous year. Twenty percent of our students achieved in the D or F range compared to 17% the previous year. This represents a percentage that is somewhat high, as it is a department goal to not have more than 15% of the students receive scores of D's or F's. The department will focus continued discussions with 7th grade teachers to address this objective. On the grade 8 final exam, 84% of the students received scores of C or above compared to 79% from the previous year. This year, 16% of the students received a grade of D or F on the 8th grade exam, compared to 21% from the previous year. This improvement of results was reflective of the 8th grade teachers' concerted effort to hold more students accountable throughout the year.

NYS Grade 8 Science Assessment

	Number Tested	Number/% Level 4	Number/% Level 3	Number/% Level 2	Number/% Level 1
2005-06	467	296/63.4%	151/32.3%	18/3.8%	2/.4%
2004-05	467	296/63.4	151/32.3	18/3.8	2/.4
2003-04	471	286/60.7	161/34.2	22/4.7	2/.42
2002-03	410	280/68	118/29	12/3	1/.25
2001-02	423	276/65	135/32	12/3	0/0

On the intermediate level science 8 exam, 93% of our grade 8 students achieved at levels 3 and 4. This is compared to 96% the previous year. Only 3 students achieved at level 1, and 28 scored at level 6. Thus, we will have 31 students required to receive some form of AIS services at Shaker High School. These results are slightly lower than previous years. We realize that grades fluctuate, however, and we will continue to focus attention on our science results on the NYS assessment. Furthermore, a new review book was utilized for the 2005-2006 school year. We will continue to examine these results and look for ways to reduce the number of students achieving at level 1 and 2. The hard work of the Shaker Junior High School science teachers and their

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excellent program again deserve recognition. Their continual efforts at aligning our curriculum instruction and assessment with the New York State grade 5-8 core curriculum guide is most commendable.

For the upcoming school year, the department has established some key goals. Included among these will be to continue to review, revise and update the 7E science program and 7E lab program. Also, up for review and revision is the Earth Science lab program in order to bring it in line with the New York State requirements. The science department this year implemented a new Earth Science textbook. This replaces a rather old textbook that had been used by the department for years. Mr. Mitchell and the Earth Science teachers at the junior high school will monitor the use of this new book closely to see if it has a positive impact on instruction. Finally, as previously mentioned, the department will review and monitor the new intermediate level review book to ensure that students are well prepared for the science 8 state assessment.

Level 9 - 12

The 2005-2006 school year was a strong year for the Shaker High School science department. On the New York State Regents exams, our students demonstrated solid performance. Again, our students achieved above a 90% passing rate on all Regents exams offered at Shaker High School. This includes Earth Science, Living Environment, Chemistry and Physics. Noteworthy is the fact that the Living Environment exam was more challenging than those seen in previous years; however, our overall results were outstanding with over 98% of our students passing this exam. The improved results demonstrate the strong commitment to excellence by our life science teachers throughout our Biology, IRP and Science In Our Lives programs. Likewise, our Earth Science results are the best we have seen over the last six years, with 99.7% of our students passing this exam, with only one failure. Our passing rate in Physics was slightly lower than last year (91% versus 93%); however, we continue to be pleased with our results as they reflect very positively among our Suburban Council colleagues. Our Chemistry results were also down slightly (91% versus 93% passing), and the percent of students scoring 85% or better was down as well (23% versus 31%.) The science department reported that the test was fair but challenging. Mr. Bogert plans to work with the Chemistry teachers to see if we can account for any cause for this dip and to facilitate changes and improvements as needed. We are also pleased to report the third year of improvement in Physics enrollment. Because of the unfavorable results statewide in Physics three years ago, enrollments dropped substantially. This year, however, 175 students enrolled in Physics compared to 163 in the previous year. It is evident that the department efforts at recruiting students have produced a positive result.

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For students seeking additional challenges and college credit in the sciences, the Advanced Placement program remains an essential option. At Shaker High School, a wide variety of Advanced Placement courses are offered in Biology, Chemistry, Physics B, Physics C, and Environmental Science. With the exception of Environmental Science, our students showed substantial improvement in the percentage scoring at level 3 or better on the exam. For example, on the AP exam in Biology, 100% of our students scored 3 or better. In Chemistry, 96% of our students achieved at level 3 or better, and on the Physics B exam, 90% scored at level 3, thus earning college credit. This past year, 68% of our students scored 3 or better on the AP exam in Environmental Science. This was down from the previous year's results of 89% achieving at level 3 or better. Mr. Bogert and the department will continue to work on analyzing the results of this exam. Fortunately, we consistently have strong results on the AP exam in Environmental Science with 90% scoring at level 3 or better, and thus, we regard this year as somewhat of an anomaly.

Our students achieved excellent results on the CEEB Achievement Tests. They continue to exceed national norms, and in three out of four of the tests administered, students surpassed last year's results. Most remarkable is the fact that the average student score on the achievement test in Physics was a remarkable 739. In Chemistry, our students' mean score was 675 compared to 654 the previous year, and in Biology M our students again achieved a remarkable performance exceeding last year's mean score 687 to 668. We had a dip in the Biology E achievement results, 638 to 659. It should be noted, however, that oftentimes the numbers of students taking these tests is very low and, as a result, these scores may exhibit some volatile swings from year to year.

Our instructional activities in science are content-based and focused on developing problem-solving, analytical and reasoning skills. These are continually developed as part of our laboratory work. The department also strives to keep its curricula and laboratories updated with relevant science and applicable theory. Over the past few years, many new and young teachers have come into the program. This has enabled the department to inculcate new and fresh ideas into the entire science program. Furthermore, our science courses place great emphasis on the scientific method. Again, our laboratories are the principle venues where this occurs. The department works diligently at developing basic research skills in the scientific setting. Of course, the best example of research in the classroom setting is in the science research course. In this course, students engage in genuine college level research. Their work culminates in a variety of local, regional and eventually, national competitions. Critical to their endeavors, is the work our students do in helping them to build strong scientific foundations. We hope that someday this outstanding work will have an impact on the greater scientific community.

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To address the needs of students struggling to meet state standards in science, the department maintains an AIS lab class throughout the year. Initial placement in the AIS lab is based on the 8th grade assessment and/or high school level assessment, such as the Biology midterm exam and Living Environment Regents exam. The lab is also effective in helping to remediate late transfer students who may need to catch up on their laboratory work to become eligible to take a Regents exam. Also important is the fact that with very challenging students, or in the case of students with schedule conflicts, the science supervisor provides one-on-one AIS support.

The high school science faculty is continuing to monitor the IRP program. At level 4 in technology, there is a new addition to the faculty, which should bring some new and exciting ideas to the table. The IRP program continues to run effectively and it provides our students with another integrated hands-on way of learning science. The science staff expresses some concern about the increase in the number of students per section and Mr. Bogert intends to monitor progress in those sections and provide support as needed.

Last year, Mr. Bogert expressed a concern about modifying the IRP program to meet the New York State Algebra 1 standards. He is pleased to report that this recommendation from last year's annual evaluation was implemented and that the program is now addressing these new standards. Another objective was to prepare for administration of the Part D of the Earth Science performance test. This work has been completed and our staff is ready to administer this new section of the Earth Section Regents. The Physics computer lab has also been replaced and updated with more current computers. In addition, a spectral photometer will be replaced this year and this represents part of Mr. Bogert's overall program to replace outdated equipment as needed. Finally, the department adopted a new Chemistry textbook for this school year. The department will monitor the use of this textbook and they are encouraged by the positive response received from students at this point. Mr. Bogert reports that the Anatomy and Physiology and Forensics courses have not been implemented. These are objectives that are carryovers from past years, however, this year Mr. Bogert intends to write a new program request for the Forensics course so that we can add it to our electives in the 2007-2008 school year. The Anatomy and Physiology course is still a possibility, but Mr. Bogert and the science department faculty believe that the Forensics course will have a stronger attraction to students and thus, it should be implemented first.

Mr. Bogert attributes the strong results of the 2005-2006 school year to the tremendous strengths of the teaching faculty. On a daily basis, they demonstrate tremendous work ethic, dedication and compassion. Furthermore, Mr. Bogert has made a conspicuous effort to follow the model established by Steve Swinton by holding his faculty and staff to high standards and expectations. He uses formal and informal observations to assess teaching throughout the school year. There is a continual emphasis on addressing curriculum issues. If Mr. Bogert and the science department feel that

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program changes are needed, summer workshops are requested. Most important is the daily verbal conversation that occurs with faculty and staff. Monthly, Mr. Bogert collects a monthly report from each teacher that allows them to communicate program needs and curriculum concerns. We continue to be very pleased by the performance of our science students at Shaker High School.

NYS - Regents - Science

Earth Science -SHS- 283 tested (97% of those enrolled) Percent passing = 99.7%
Total including Grade 8 Students Percent passing = 100%
SHS - % of Average Grade Enrollment 65-100 passing = 56%

Biology -SHS- 531 tested -(96% of those enrolled) Percent passing = 95.1%
SHS - % of Average Grade Enrollment 65-100 passing = 101%

Chemistry -SHS - 346 tested (99% of those enrolled) Percent passing = 91%
SHS -% of Average Grade Enrollment 65-100 passing = 63%

Physics -SHS -169 tested (97% of those enrolled) Percent passing = 91%
SHS - % of Average Grade Enrollment 65-100 passing = 31%

Percentage of students scoring 85% or higher on Regents examinations:

Earth Science	71%
Biology	43%
Chemistry	23%
Physics	49%

CEEB Achievement Tests-Performance standards = 668 Biology E; 667 Biology M:
Chemistry 636; Physics 692

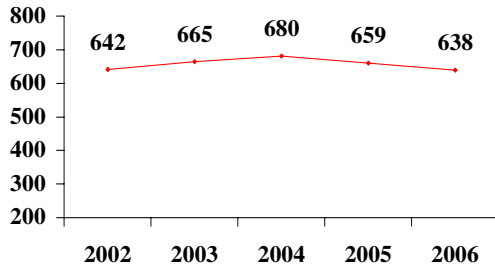
	Biology E	Difference over/under Performance Standard - 668	Biology M	Difference over/under Performance Standard - 667
	638	-30	687	+20
Number Tested	10		28	

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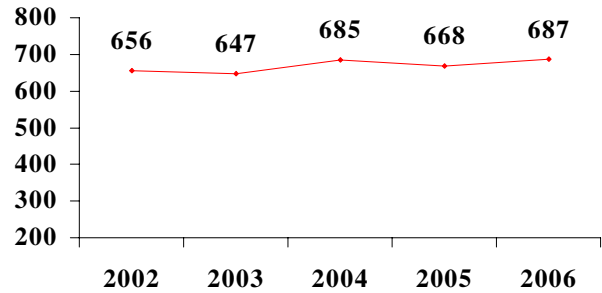
	Chemistry	Difference over/under Performance Standard - 636	Physics	Difference over/under Performance Standard - 692
	675	+39	739	+47
Number Tested	58		13	

(2002-2006 Results - CEEB Science Achievement Tests)

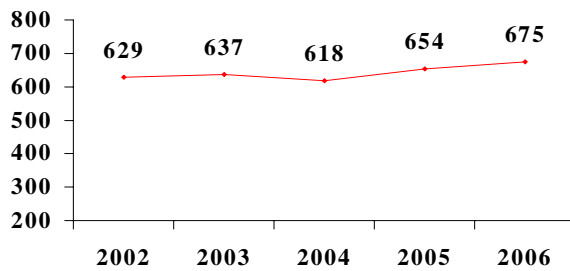
Biology E



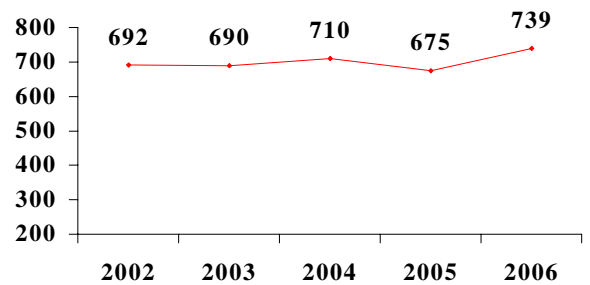
Biology M



Chemistry



Physics



CEEBA Advanced Placement - Performance standard = 90% score "3" or higher

	Biology	Difference over 90%
SHS Percent scoring "3" or Higher	100%	+10
Number tested	13	
NYS Percent scoring "3" or higher	67*	
US Percent scoring "3" or higher	61*	

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	Chemistry	Difference over 90%
SHS Percent scoring "3" or Higher	96%	+6
Number tested	27	
NYS Percent scoring "3" or higher	65*	
US Percent scoring "3" or higher	56*	

	Physics B	Difference over 90%
SHS Percent scoring "3" or Higher	90%	0
Number tested	29	
NYS Percent scoring "3" or higher	65*	
US Percent scoring "3" or higher	59*	

	Physics C, Mechanics	Difference over 90%
SHS Percent scoring "3" or Higher	100%	+10
Number tested	13	
NYS Percent scoring "3" or higher	73*	
US Percent scoring "3" or higher	68*	

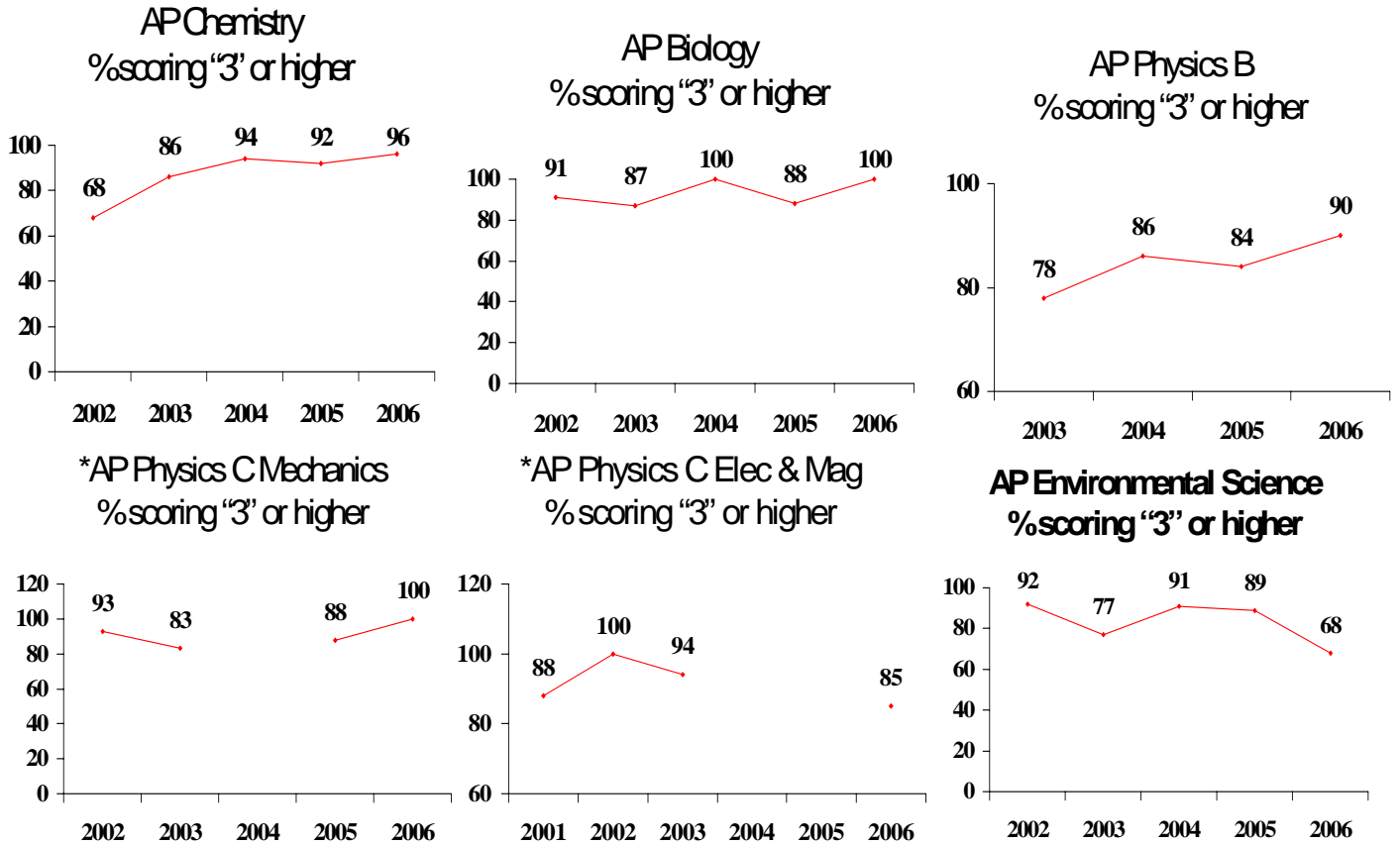
	Physics C, Electricity & Magnetism	Difference over 90%
SHS Percent scoring "3" or Higher	85	-5
Number tested	13	
NYS Percent scoring "3" or higher	70*	
US Percent scoring "3" or higher	66*	

	Environmental Science	Difference over 90%
SHS Percent scoring "3" or Higher	68%	-22
Number tested	22	
NYS Percent scoring "3" or higher	56*	
US Percent scoring "3" or higher	51*	

*Data from NYS and US data are for 2005; data for 2006 are not yet available.

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(2002-2006 Results - CEEB AP)



*AP Physics C Mechanics and AP Physics C Electricity & Magnetism not offered this year.

Regents Competency Tests (RCT)

Grade 9

Subject	Number Failing		Percent of Class	
	2005-06	2004-05	2005-06	2004-05
	17	10	15%	21%

Grade 10

Subject	Number Failing		Percent of Class	
	2005-06	2004-05	2005-06	2004-05
	4	5	.7%	2.1%

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Grade 11

Subject	Number Failing		Percent of Class	
	2005-06	2004-05	2005-06	2004-05
	3	3	.8%	.6%

Grade 12

Subject	Number Failing		Percent of Class	
	2005-06	2004-05	2005-06	2004-05
	2	0	.2%	0%

(Percentage failing is the percentage of the class; it is not the percentage of those taking the test.)

The Shaker High School Science Department is committed to delivering the best science instruction possible. To facilitate this, Mr. Bogert will be looking at results over time. This year, he will utilize data packets that will allow teachers in each of the science disciplines to examine strengths and weaknesses in Regents results across the core programs. Mr. Bogert is also looking to use customized data reports with our new Infinite Campus system to allow individual teachers to track their own statistics compared to departmental results.

As students leave high school, it is apparent that colleges and employers wish to have employees with strong problem solving and critical thinking skills. This is a key emphasis in our science program, and we seek to equip our students with the skills that they will transfer to college and the workplace. Anecdotal feedback provides us with the information that instruction in our science program is essential to success at many of the more prestigious colleges and universities our students attend.