



PENNSYLVANIA

Sciences & Life Sciences Achievement

STUDENT ACHIEVEMENT

NAEP Grade 8	PA	U.S. Avg.	State Rank
Science Average, 2005	N/A	147.1	–
Science, 2005 (% at or above “proficient”)	N/A%	27.3%	–
Life Sciences Average, 2005	N/A	148.2	–

ACT	PA	U.S. Avg.	State Rank
Science Average, 2008	21.6	20.8	18
Biology, 2008 (% of students ready for college level)	34%	28%	15

AP	PA	U.S. Avg.	State Rank
Science Scores, 2008 (% with a score of 3 or higher)	60.0%	55.4%	12
Science Exams, 2008 (Exams as % of all H.S. grads)	8.6%	10.5%	28
Biology Scores, 2008 (% with a score of 3 or higher)	55.4%	49.8%	14
Biology Exams, 2008 (Exams as % of all H.S. grads)	3.5%	4.6%	29

SCIENCE TEACHER QUALITY and PROFESSIONAL DEVELOPMENT

	PA	U.S. Avg.	State Rank
Science Teachers with Major in Assigned Field, 2003–04 (% , Grades 7–12)	65%	77%	40
Science Teachers Certified, 2006 (% , Grades 7–8)	N/A%	N/A%	–
Biology Teachers Certified, 2006 (% , Grades 9–12)	98%	88%	11

Note: NAEP = National Assessment of Educational Progress, AP = Advanced Placement
N/A = Data not available.

Key Organization(s) Promoting Bioscience Education

The **Pennsylvania Biotechnology Association** plans to create an affiliated educational foundation in the third quarter of 2009.

The **Life Science Career Alliance** addresses the “pipeline” issue in the Delaware Valley (Philadelphia region), including issues of K-12 education and teacher training.

PA STATE SCIENCE STANDARDS & REQUIREMENTS

STANDARDS PROFILE

- Most recent update of K-12 Science Standards: **2002**
- Current K-12 science standards address “biotechnological systems” as one of three main systems and includes biotechnology as a component of “technology education”

Pennsylvania Department of Education, Appendix B, Academic Standards for Science and Technology and Environment and Ecology, 2002

BIOSCIENCE-RELATED GRADUATION REQUIREMENTS:

Biology is not specified in science requirements



Examples of Bioscience Education Activities

Teacher Preparation and Professional Development

The 14-university Pennsylvania State System of Higher Education has National Science Foundation support for systemic reform of all science, technology, engineering, and mathematics (STEM) teacher preparation within the system. The system also sponsors an **Academy for the Profession of Teaching and Learning**, which networks professional development programs across the system with stakeholders.

Pennsylvania Bio distributes approximately 20 grants totaling \$80,000 annually for teachers to provide informal science education opportunities.

The University of Pennsylvania's **Moelis Access Science Program** works with several local K-12 schools to provide professional development for STEM teachers, classroom support, and adaptation of hands-on activities to local needs. In the most recent year, two doctoral fellows and 30 undergraduate fellows partnered with 27 teachers in seven schools.

The University of Pittsburgh's Department of Biological Sciences operates a range of programs that provide teacher development, including a 1-week summertime **High School Teacher Workshop Program**, which provides graduating teachers with the "Pitt Kit," including all materials and supplies necessary to perform the protocols studied in the workshop.

Penn State's **Eberly College of Science outreach program** offers weeklong summer Science Workshops for Educators and 2-day Teacher Workshops. Also, the university's Center for

Science and the Schools provides funded research sabbatical fellowships for science teachers from urban schools.

Carnegie Mellon University's **Developmental Approaches in Science, Technology and Health** provides professional development for science teachers through 6th grade, with local teachers serving as instructors.

Experiential Learning and Outreach

The University of Pittsburgh operates a **Mobile Science Lab** on a 70-foot tractor-trailer. The program is organized as a collaborative of the Department of Biological Sciences, the Clinical and Translational Sciences Institute, Pittsburgh Life Sciences Greenhouse, Lyceum Group, Thermo Fisher, and Pittsburgh Tissue Engineering Initiative.

The University of Pittsburgh's Department of Biological Sciences also operates a range of other outreach programs including the **Gene Team**, a 7-week summer research experience for high school students and biology teachers.

Carnegie Mellon University's educational outreach program includes a **Minority Science Outreach Program**; a 5-week residential **Governor's School for the Sciences** targeted at juniors; a **Science Van** targeted at grades 5 through 9; and a 6-week college-preparatory **Summer Academy for Mathematics and Science**.

Bioscience-focused Schools and Programs

Several of Pennsylvania's charter schools include a science focus.



Basic Skills Achievement and Other Summary Metrics

STUDENT ACHIEVEMENT

NAEP Grade 8	PA	U.S. Avg.	State Rank
Math Average, 2007	286.2	280.2	14
Math, 2007 (% at or above “proficient”)	38.3%	31.0%	8
Reading Average, 2007	267.7	261.0	11
Reading, 2007 (% at or above “proficient”)	36.4%	29.2%	10
Writing Average, 2007	159.4	154.3	9
Writing, 2007 (% at or above “proficient”)	36.4%	30.6%	9

ACT	PA	U.S. Avg.	State Rank
Percentage of Graduates Tested	13%	43%	47
Math Average, 2008	22.3	21.0	12
Reading Average, 2008	22.5	21.4	15
English Average, 2008	21.8	20.6	12

SAT	PA	U.S. Avg.	State Rank
Percentage of Graduates Tested	75%	48%	8
Math Average, 2008	501	515	43
Critical Reading Average, 2008	494	502	44
Writing Average, 2008	483	494	40

AP	PA	U.S. Avg.	State Rank
Math Scores, 2008 (% with a score of 3 or higher)	71.6%	65.2%	10
Math Exams, 2008 (Exams as % of all H.S. grads)	7.0%	8.7%	32
English Scores, 2008 (% with a score of 3 or higher)	70.6%	59.2%	7
English Exams, 2008 (Exams as % of all H.S. grads)	10.5%	18.9%	44

SUMMARY STATE EDUCATION METRICS

Selected Indicators	PA	U.S. Avg.	State Rank
High School Graduation Rate, 2005–06	83.5%	73.4%	7
Student/Teacher Ratio, 2006–07	15.2	15.5	32*
Low-income Students, 2006–07 (% of all students)	31.7%	41.6%	–
Expenditure per Student (\$), 2005–06	\$10,723	\$9,154	13

Note: NAEP = National Assessment of Educational Progress, AP = Advanced Placement
N/A = Data not available. * Lowest value receives highest ranking.

TABLE SOURCE NOTES:

NAEP Assessments, grade 8: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics (NCES), National Assessment of Educational Progress (NAEP), 2005; **ACT Exam:** ACT, Inc., 2008; **SAT Reasoning Test:** The College Board, 2008.

Advanced Placement (AP): Battelle analysis of data from the College Board, 2008; AP test takers as a share of high school graduates includes graduate data from U.S. Department of Education, NCES for both public (Common Core of Data) and private high schools (Private School Survey).

Science Teacher Indicators: Council of Chief State School Officers (CCSSO) analysis of State Departments of Education data on public schools, 2007; U.S. Department of Education, NCES Schools and Staffing Survey, 2003–04 as reported by CCSSO, 2007.

Summary State Education Metrics: U.S. Department of Education, National Center for Education Statistics (NCES), Common Core of Data (CCD) on public elementary and secondary education.

Note: High school graduation rates are averaged freshman graduation rates—the rate is the number of graduates divided by the estimated count of freshmen 4 years earlier. U.S. figure for share of students eligible for free or reduced-price school lunch (“low-income” students) is available for 2005–06 only (state data are for 2006–07).

