

**Iowa End-of-Course
Assessment Programs
Spring 2008 Results**

Math & Science

Prepared at The University of Iowa by Iowa Testing Programs

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Iowa End-of-Course Assessments (IEOC)

Six end-of-course assessments in Algebra 1, Geometry, Algebra 2, Physical Science, Biology, and Chemistry were made available to Iowa schools in the spring of 2008. All Iowa school districts were invited to administer the currently available assessments. The results are reported for the 93 participating schools, 87 public schools and 6 private schools, representing 53 districts. The results are typically referred to as “user norms” since they are representative of those that participated but are not necessarily representative of the entire state of Iowa. Table 1 displays the distribution of district enrollment size and Table 2 describes the student-level characteristics of the spring 2008 administration.

Table 1
Distribution of District Size
Spring 2008 IEOC

Enrollment Category	Number of Districts
< 250	1
250 – 399	3
400 – 599	11
600 – 999	13
1,000 – 2,499	13
2,500 – 7,499	7
7500+	5

*Six private schools that participated are not included in Table 1.

Table 2
Student-level Characteristics
Spring 2008 IEOC

	Algebra 1	Algebra 2	Geometry	Physical Science	Biology	Chemistry
Students by Grade						
8th	16.4%	0.6%	1.8%	1.1%	1.2%	0.0%
9th	56.3%	26.3%	36.3%	79.7%	18.3%	14.7%
10th	24.6%	41.9%	49.3%	19.2%	77.6%	32.7%
11th	2.7%	28.1%	12.6%	0.0%	1.4%	50.0%
12th	0.0%	3.2%	0.0%	0.0%	1.5%	2.6%
Ethnicity						
African American	5.3%	2.5%	4.2%	4.1%	3.8%	2.7%
American Indian or Alaskan Native	0.6%	0.5%	0.5%	0.7%	0.8%	0.5%
Asian	2.0%	3.4%	2.6%	2.8%	2.7%	2.6%
Hispanic or Latino	4.2%	3.3%	3.2%	6.6%	4.6%	3.0%
Hawaiian/Pacific Island	0.3%	0.3%	0.3%	0.4%	0.2%	0.4%
White	80.8%	84.1%	83.0%	77.0%	80.4%	84.6%
Other	5.4%	4.6%	5.4%	6.8%	6.4%	5.1%
No response	1.4%	1.3%	0.9%	1.5%	1.1%	1.1%
Gender						
Female	49.0%	51.8%	50.3%	46.9%	50.9%	52.9%
Male	49.8%	46.8%	48.7%	51.9%	47.8%	46.1%
No response	1.2%	1.4%	1.0%	1.2%	1.2%	0.9%

Table 3 provides descriptive information for the six operational end-of-course assessments. Two parallel forms (Form A and Form B) were administered in the spring of 2008. Summary statistics for the two forms of each assessment are provided in Table 3. Each form contained 30 multiple-choice items. The range of performance, mean, standard deviation and quartile values are provided in Table 3.

Table 3
Raw Score Descriptive Information by Test and Form
Spring 2008 IEOC

	Algebra 1 Form A	Algebra 1 Form B	Algebra 2 Form A	Algebra 2 Form B	Geometry Form A	Geometry Form B
N	2,677	2,949	1,802	2,350	2,326	2,654
Score Range	3 – 30	3 – 30	3 – 30	2 – 30	2 – 30	3 – 30
Mean	14.3	15.2	14.1	14.8	18.0	19.4
SD	4.4	5.4	5.3	5.1	5.6	5.8
90th percentile	20	23	21	22	26	27
75th percentile	17	19	17	18	22	24
Median	14	15	13	14	18	20
25th percentile	11	11	10	11	14	15
10th percentile	9	9	8	8	11	12

	Biology Form A	Biology Form B	Chemistry Form A	Chemistry Form B	Phys. Sci. Form A	Phys. Sci. Form B
N	2,288	1,944	1,526	1,358	1,655	1,383
Score Range	2 – 30	3 – 30	2 – 30	4 – 29	3 – 29	4 – 28
Mean	18.0	19.1	17.4	16.6	15.9	16.1
SD	4.9	5.1	5.1	4.2	4.9	4.3
90th percentile	24	25	24	22	23	22
75th percentile	22	23	21	20	19	19
Median	18	20	17	16	16	16
25th percentile	15	16	14	14	12	13
10th percentile	11	12	11	11	10	10

The test specifications for each IEOC indicated four to six content strands. These strands included a limited number of items ranging from 3 to 11. A summary of performance for each strand is provided in Table 4.

Table 4
Descriptive Information by Test and Content Strand
Spring 2008 IEOC

ALGEBRA 1

	Basic Algebra	Linear Equations and Inequalities	Systems of Linear Equations and Inequalities	Polynomials
Form A				
Number of items	11	4	5	10
Score Range	1 – 11	0 – 4	0 – 5	0 – 10
Mean	6.3	1.6	2.1	4.3
Median	6	2	2	4
SD	2.0	0.9	1.3	2.0
Form B				
Number of items	11	4	5	10
Score Range	0 – 11	0 – 4	0 – 5	0 – 10
Mean	6.5	1.8	2.2	4.6
Median	6	2	2	4
SD	2.2	1.0	1.3	2.4

ALGEBRA 2

	Foundations of Algebra	Quadratics	Functions	Complex Numbers
Form A				
Number of items	11	4	12	3
Score Range	0 – 11	0 – 4	0 – 12	0 – 3
Mean	5.5	2.6	5.1	0.9
Median	5	3	5	1
SD	2.3	1.1	2.5	1.0
Form B				
Number of items	11	4	12	3
Score Range	0 – 11	0 – 4	0 – 12	0 – 3
Mean	5.8	2.4	5.4	1.2
Median	6	2	5	1
SD	2.3	1.1	2.3	1.0

**Descriptive Information by Test and Content Strand
Spring 2008 IEOC**

GEOMETRY

	Points, Lines and Planes	Triangles	Other Polygons	Circles	Transformations
Form A					
Number of items	5	7	11	4	3
Score Range	0 – 5	0 – 7	0 – 11	0 – 4	0 – 3
Mean	3.4	4.9	6.4	2.0	1.4
Median	3	5	6	2	1
SD	1.2	1.6	2.4	1.2	1.0
Form B					
Number of items	5	7	11	4	3
Score Range	0 – 5	0 – 7	0 – 11	0 – 4	0 – 3
Mean	3.9	4.8	7.2	2.0	1.5
Median	4	5	7	2	1
SD	1.0	1.6	2.5	1.3	1.0

BIOLOGY

	Molecular Basis of Heredity	Behavior of Organisms	Interdependence of Organisms	Biological Evolution	Matter, Energy, and Organization in Living Systems	The Cell
Form A						
Number of items	8	5	3	4	4	6
Score Range	0 – 8	0 – 5	0 – 3	0 – 4	0 – 4	0 – 6
Mean	3.7	1.9	2.9	1.6	3.5	3.4
Median	4	4	2	3	2	4
SD	1.6	1.4	0.9	1.1	1.0	1.5
Form B						
Number of items	8	5	3	4	4	6
Score Range	0 – 8	0 – 5	0 – 3	0 – 4	0 – 4	0 – 6
Mean	4.6	3.8	2.1	2.9	2.2	3.4
Median	5	4	2	3	2	4
SD	1.8	1.3	0.9	1.1	1.1	1.2

**Descriptive Information by Test and Content Strand
Spring 2008 IEOC**

CHEMISTRY

	Measurement	Structure of Atoms and the Periodic Table	Structure and Properties of Matter	Chemical Reactions
Form A				
Number of items	3	6	12	9
Score Range	0 – 3	0 – 6	0 – 12	0 – 9
Mean	1.6	3.6	6.8	5.3
Median	2	4	7	5
SD	0.9	1.4	2.4	2.0
Form B				
Number of items	3	6	12	9
Score Range	0 – 3	0 – 6	1 – 12	0 – 9
Mean	1.8	3.5	5.8	5.6
Median	2	3	6	6
SD	0.9	1.4	2.0	1.8

PHYSICAL SCIENCE

	Motion and Forces	Structure and Properties of Matter	Chemical Reactions	Conservation of Energy and Increase in Disorder	Structure of Atoms	Interactions of Energy and Matter
Form A						
Number of items	11	5	1	7	3	3
Score Range	0 – 11	0 – 5	0 – 1	0 – 7	0 – 3	0 – 3
Mean	7.1	1.7	0.6	3.7	1.5	1.2
Median	7	1	1	4	2	1
SD	2.1	1.3	0.5	1.7	0.9	0.8
Form B						
Number of items	11	5	1	7	3	3
Score Range	1 – 11	0 – 5	0 – 1	0 – 7	0 – 3	0 – 3
Mean	6.8	2.2	0.8	3.5	1.6	1.2
Median	7	2	1	3	2	1
SD	2.1	1.1	0.4	1.6	0.9	0.8

Content descriptions for the six assessments are provided below. If you need additional information please visit our website at: www.education.uiowa.edu/itp.

Algebra I Content Categories

Basic Algebra

Topics may include number systems and properties, variable expressions, equations, inequalities, and functions

Linear equations and inequalities

Topics may include equation of a line, parallel and perpendicular slopes, and graphs of lines and inequalities on the coordinate plane

Systems of linear equations and inequalities

Topics may include systems of equations that can be solved by substitution, elimination, or graphing; and graphs of systems of equations and inequalities on the coordinate plane

Polynomials

Topics may include arithmetic with polynomials, simplification of polynomials, solving polynomials by factoring or the Quadratic Formula, and graphs of polynomials

Algebra II Content Categories

Foundations of Algebra

Topics may include radicals and exponents; absolute value equations and inequalities; linear equations and inequalities; and systems of linear equations and inequalities

Quadratics

Topics may include solving quadratics by factoring or the Quadratic Formula, and graphs of quadratic equations

Functions

Topics may include polynomials and rational functions; logarithms, exponential functions, and logarithmic functions; composite functions; and inverse functions

Complex numbers

Topics may include arithmetic with complex numbers, complex conjugates, and simplifying to $a + bi$ form

Geometry Content Categories

Points, lines, and planes

Topics may include points on the coordinate plane, angles formed by intersecting lines, angles formed by parallel lines cut by transversals, vertical angles, complementary and supplementary angles

Triangles

Topics may include properties, special triangles, Pythagorean Theorem, congruence, and similarity

Other polygons and solid figures

Topics may include properties, similarity, perimeter, area, surface area, and volume

Circles

Topics may include circumference, area, sectors, tangents, and arc length

Transformations

Topics may include dilation, reflection, rotation, and translation

Biology Strand Descriptions
(Interdependence of organisms collapsed with
matter, energy, and organization in living systems)

The cell

Cell types, cell components and their functions, cell membranes (absorption and transport), the cell cycle, mitosis, cell differentiation, photosynthesis, cellular respiration, enzymes as catalysts of biological reactions

Molecular basis of heredity

DNA, RNA, DNA replication, transcription, translation, sexual reproduction, gametes, meiosis, fertilization, genes, alleles, Mendel's laws, Punnett square, genotype, phenotype, mutations

Biological evolution

Diversity of organisms, descent from common ancestors, natural selection, survival and reproductive success, genetic variation, biological classification, binomial nomenclature

Interdependence of organisms/Matter, energy, and organization in living systems

Cycling of materials, symbiotic interactions, competition, predation, population, community, food chains, food webs, energy flow through trophic levels, effects of environmental factors and finite resources, impact of human activities on ecosystems, the Sun as the primary source of energy for life, energy aspects of photosynthesis and cellular respiration, ATP, conservation of matter and energy, levels of biological organization

Behavior of organisms

Nerve cell structure and function, neurotransmitters, CNS and PNS, ectothermy and endothermy, innate behavior, learning, behavioral responses to external and internal stimuli, plant behavior, human immune system, human endocrine system and hormones

Chemistry Strand Descriptions

Structure of atoms

Masses, charges, and locations of protons, neutrons, and electrons in an atom; atom volume, atomic number, mass number, isotopes, decay, half-life, nuclear forces, fission, fusion

Structure and properties of matter

Atomic mass, valence electrons, periodic table and trends, ionic and covalent bonding, mole, molar mass, physical and chemical properties of substances, states of matter, gas laws

Chemical reactions

Reaction components, writing and balancing chemical equations, types of chemical reactions, thermochemistry, conservation of mass, acids and bases, electrochemistry, radical reactions, kinetics and equilibrium, stoichiometry, catalysts

Conservation of energy and increase in disorder

Work and energy, conservation of energy, types of energy, heat and temperature, thermal properties of matter, kinetic theory of gases, entropy, energy transformations, energy transfers, thermodynamics

Physical Science Strand Descriptions

Structure of atoms

Masses, charges, and locations of protons, neutrons, and electrons in an atom; atom volume, atomic number, mass number, isotopes, decay, half-life, nuclear forces, fission, fusion

Structure and properties of matter

Atomic mass, valence electrons, periodic table and trends, ionic and covalent bonding, mole, molar mass, physical and chemical properties of substances, states of matter, gas laws

Chemical reactions

Reaction components, writing and balancing chemical equations, types of chemical reactions, thermochemistry, conservation of mass, acids and bases, electrochemistry, radical reactions, kinetics and equilibrium, stoichiometry, catalysts

Motions and forces

Newton's laws, gravity, mass versus weight, force, speed, velocity, acceleration, momentum, buoyancy, electricity and magnetism

Conservation of energy and increase in disorder

Work and energy, conservation of energy, types of energy, heat and temperature, thermal properties of matter, kinetic theory of gases, entropy, energy transformations, energy transfers, thermodynamics

Interactions of energy and matter

Light, sound, wave properties, wave phenomena, electromagnetic spectrum, conductors and insulators, electrical circuits, spectroscopy