

# **Iowa End-of-Course Assessment Programs**

## **Spring 2010 Results**

## Iowa End-of-Course Assessments (IEOC)

Ten end-of-course assessments in Algebra 1, Algebra 2, Biology, Chemistry, Geometry, Matrix Algebra, Physical Science, Probability and Statistics, U.S. Government, and U.S. History were made available to Iowa schools in the spring of 2010. All Iowa school districts were invited to administer the assessments. Results are reported for the 68 participating public schools and 5 private schools, representing 45 districts. Table 1 displays the distribution of district enrollment size.

**Table 1**  
**Distribution of District Size**  
**Spring 2010 IEOC**

Enrollment Category	Number of Districts
<400	3
400-599	9
600-999	8
1000-2499	12
2500-7499	9
7500+	4

Table 2 describes the student level characteristics of the spring 2010 End-of-Course administration.

The range of performance, mean, median, standard deviation, and quartile values for each subject area are provided in Table 3.

Each End-of-Course form consists of 16-30 total items in two to six content strands. Descriptive information by test and content strand is provided in Table 4.

Table 2  
Student-level Characteristics  
2010 IEOC

Students by: Grade*	Algebra 1	Algebra 2	Biology	Chemistry	Geometry	Matrix Algebra**	Physical Science	Probability and Statistics	U.S. Govt	U.S. History
6th	0.03%	0.00%	0.00%	0.03%	0.00%	-	0.00%	0.00%	0.00%	0.00%
7th	1.35%	0.00%	0.03%	0.00%	0.00%	-	0.00%	0.00%	0.00%	0.00%
8th	23.95%	0.20%	0.00%	0.00%	0.60%	-	1.74%	0.00%	0.00%	0.00%
9th	47.325	7.15%	29.27%	0.08%	23.52%	-	75.27%	0.83%	1.27%	24.04%
10th	10.47%	34.01%	41.59%	14.54%	42.74%	-	4.41%	0.83%	1.27%	1.81%
11th	4.57%	46.94%	12.73%	71.23%	19.17%	-	10.75%	18.18%	97.47%	74.15%
12th	0.00%	0.00%	0.00%	0.00%	0.00%	-	0.03%	0.00%	0.00%	0.00%
Missing	12.30%	11.70%	16.38%	14.08%	13.97%	-	7.79%	80.17%	0.00%	0.00%

Ethnicity

African American	2.78%	3.07%	2.88%	1.90%	1.27%	-	3.75%	2.00%	4.64%	1.50%
American Indian/ Alaskan Native	0.26%	0.20%	0.35%	0.17%	0.06%	-	0.38%	0.00%	0.00%	0.19%
Asian	2.03%	2.35%	1.57%	2.23%	2.43%	-	1.79%	4.00%	0.42%	1.31%
Hispanic or Latino	8.25%	5.88%	10.20%	9.92%	7.52%	-	10.15%	2.00%	5.49%	11.78%
Hawaiian/Pacific Islander	0.12%	0.10%	0.12%	0.17%	0.06%	-	0.30%	0.00%	0.00%	0.00%
White	84.81%	87.48%	83.24%	84.79%	86.90%	-	81.37%	90.00%	88.19%	83.55%
Multiple	1.73%	0.92%	1.57%	0.74%	1.64%	-	2.17%	2.00%	1.27%	1.68%
Other	0.00%	0.00%	0.08%	0.08%	0.12%	-	0.09%	0.00%	0.00%	0.00%

Gender

Female	49.21%	51.81%	50.52%	50.87%	52.06%	-	49.09%	46.00%	59.92%	48.46%
Male	50.79%	48.19%	49.48%	49.13%	47.94%	-	50.91%	54.00%	40.08%	51.54%

\* Grade was attained through matching procedures and those not matched are shown in the "Missing" row.

\*\* Student-level characteristics were unavailable for Matrix Algebra.

Table 3  
**Raw Score Descriptive Information by Test**  
 Spring 2010 IEOC

	Algebra 1	Algebra 2	Biology	Chemistry	Geometry	Matrix Algebra	Physical Science	Probability and Statistics	U.S. Govt	U.S. History
N	3324	1958	3205	1293	1654	211	2697	121	248	552
Score Range	4-30	3-30	2-30	4-30	5-30	2-14	2-30	7-16	4-29	5-30
Mean	15.68	16.67	17.49	16.97	20.63	9.13	16.07	11.24	19.07	17.60
SD	5.24	6.07	5.28	4.73	5.32	2.64	5.04	2.05	5.50	5.61
90th percentile	23	25	24	23	27	12	23	14	26	25
75th percentile	19	21	21	20	25	11	20	13	23	22
50th percentile	15	16	18	17	21	10	16	11	20	17
25th percentile	12	12	14	14	17	7	12	10	15	14
10th percentile	9	9	10	11	13	5	9	8	11	10

Table 4  
 Descriptive Information by Test and Content Strand  
 Spring 2010 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	0-11	0-4	0-5	0-10
Mean	6.77	1.74	2.37	4.8
Median	7	2	2	5
SD	2.10	1.01	1.35	2.26

**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	6.27	2.87	6.27	1.26
Median	6	3	6	1
SD	2.48	1.07	2.82	1.03

## Descriptive Information by Test and Content Strand

### Spring 2010 IEOC

#### Biology

	Molecular Basis of Heredity	Behavior of Organisms	Interdependence of Organisms, Matter, Energy, and Organization in Living Systems	Biological Evolution	The Cell
Form A					
Number of Items	8	5	4	4	9
Score Range	0-8	0-5	0-4	0-4	0-9
Mean	4.38	3.49	2.22	2.67	4.74
Median	4	4	2	3	5
SD	1.65	1.42	1.08	1.18	1.92

#### Chemistry

	Conservation of Energy and Increase in Disorder	Structure of Atoms	Structure and Properties of Matter	Chemical Reactions
Form A				
Number of Items	2	3	14	11
Score Range	0-2	0-3	0-14	0-11
Mean	1.21	1.74	7.68	6.32
Median	1	2	8	6
SD	0.66	0.90	2.51	2.10

## Descriptive Information by Test and Content Strand

### Spring 2010 IEOC

#### Geometry

	Points, Lines and Planes	Triangles	Other Polygons and Solid Figures	Circles	Transformations
Form A					
Number of Items	5	7	11	4	3
Score Range	0-5	0-7	1-11	0-4	0-3
Mean	3.79	5.44	7.19	2.39	1.81
Median	4	6	7	2	2
SD	1.13	1.51	2.16	1.13	0.97

#### Matrix Algebra

	Matrix Arithmetic	Solving Equations using Matrices
Form A		
Number of Items	8	8
Score Range	1-8	0-8
Mean	5.22	3.91
Median	6	5
SD	1.58	1.53

## Descriptive Information by Test and Content Strand

### Spring 2010 IEOC

#### 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	2	6	3	3
Score Range	0-11	0-5	0-2	0-6	0-3	0-3
Mean	7.07	1.85	1.12	3.28	1.52	1.24
Median	7	2	1	3	2	1
SD	2.09	1.35	0.75	1.49	0.93	0.84

#### Probability and Statistics

	Counting Principles and Simple Probabilities	Descriptive Statistics	Analyzing Data and Making Predictions	Independent and Compound Events
Form A				
Number of Items	4	4	4	4
Score Range	2-4	1-4	0-4	0-4
Mean	3.21	3.23	2.16	2.64
Median	3	3	2	3
SD	0.72	0.68	0.95	1.13



## Descriptive Information by Test and Content Strand

### Spring 2010 IEOC

#### U.S. Government

	Foundations of U.S. Government	Institutions and Elections	Public Policy	State and Local Government	Individuals and Groups in U.S. Politics
Form A					
Number of Items	8	9	4	4	5
Score Range	0-8	0-9	0-4	0-4	0-5
Mean	4.75	5.48	2.7	2.81	3.33
Median	5	6	3	3	3
SD	1.71	2.03	1.16	1.06	1.29

#### U.S. History

	Building a Powerful Nation (1870-1920)	From Prosperity to Depression and Recovery (1920-1941)	U.S. Foreign Policy: WWII to the Cold War (1941-1968)	Domestic Policy (1945-1980)
Form A				
Number of Items	8	8	8	6
Score Range	0-8	0-8	0-8	0-6
Mean	4.33	4.89	4.91	3.47
Median	4	5	5	4
SD	1.77	1.67	2.06	1.63

## **Algebra I Descriptions**

### 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 Descriptions**

### 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; inverse functions; step and piecewise functions

### Complex numbers:

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

## **Biology Strand Descriptions**

### 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

## **Geometry Descriptions**

### 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

## **Matrix Algebra Strand Descriptions**

### Matrix arithmetic

Topics may include determining the dimensions of a matrix; knowing and using matrix terminology and notation; scalar multiplication; addition, subtraction, and multiplication of matrices; and knowing and using properties of matrix operations.

### Solving equations using matrices

Topics may include determining the determinate and inverse of a matrix, representing systems of equations as matrices and vice versa, solving matrix equations, and using matrices to transform geometric figures.

## **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

## **Probability & Statistics Strand Descriptions**

### Descriptive statistics

Topics may include measures of central tendency, measures of variability, range, and outliers.

### Analyzing data and making predictions

Topics may include analyzing data using different types of representations, using correlation and regression techniques, and using probability distributions.

### Counting principles and simple probabilities

Topics may include calculating possible sequences for  $N$  trials, permutations, combinations, and Bernoulli trials; determining simple probabilities and expressing probabilities in terms of odds.

### Independent and compound events

Topics may include independent of events, mutual exclusivity, joint probability, and conditional probability.

## **U.S. Government Strand Descriptions**

### Foundations of U.S. Government

Philosophical foundations and fundamental principles, values, and consequences of the U.S. constitution, limited government, separation of powers, checks and balances, federalism, republicanism, civil liberties, civil rights and ways these ideas have changed over time

### Individuals and Groups in U.S. Politics

Levels and patterns of political knowledge and beliefs, effects that nongovernmental actors, such as individuals, political parties, news media, and interest groups, have in U.S. politics as well as strategies for effective political action at the national, state, and local levels

### Institutions and Elections

Election and campaign process, effects of the Electoral College, purpose and function of each of the three branches of government, party and committee systems within Congress, organization of the Executive Office of the President, bureaucratic agencies, and judicial philosophies

### Public Policy

The policy process at the local, state, and national levels, including social, economic, and foreign policy issues, the role of the U.S. in world affairs, strategies for affecting public policy

### State and Local Government

The role of state and local government within the federal system, the changing role of the national government in relation to the states, branches of government at the state level, and citizens' rights and responsibilities to state and local governments

## **U.S. History Strand Descriptions**

### Building a Powerful Nation (1870 – 1920)

Rise of corporations, industrialization, urbanization, immigration, progressive reforms, cultural diffusion, cause and effect relationships, role of innovation, role of individuals and groups within society, causes and outcomes of the Spanish-American War and WWI

### From Prosperity to Depression and Recovery (1920 – 1941)

Causes of economic prosperity, the stock market crash, and the Great Depression, as well as their effects on politics and society, the transformation of politics and society through New Deal programs

U.S. Foreign Policy: WWII to the Cold War (1941 – 1968)

Changing role of the U.S. in world affairs including the causes, course, and effects of WWII, effects of geographic factors and historical patterns on the Cold War, conflicts in Korea and Vietnam, and political, economic, and social consequences of these wars

Domestic Policy (1945 – 1980)

Effects of individuals and groups, historical patterns, geographic factors, and innovation on economic, political, social, and cultural developments in contemporary American society, the post-war period, New Frontier, Great Society, struggle for civil rights, civil liberties, and immigration