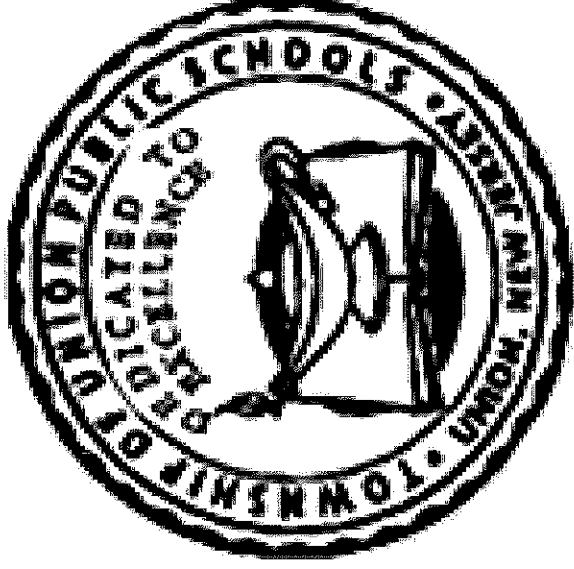


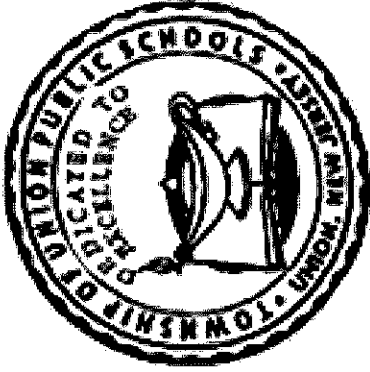
TOWNSHIP OF UNION PUBLIC SCHOOLS



DRAFTING AND DESIGN / CAD II
TE 250

Curriculum Guide

Curriculum Guide Approved June 2015



Board Members

David Arminio, President

Vito Nufrio, Vice President

Guy Francis

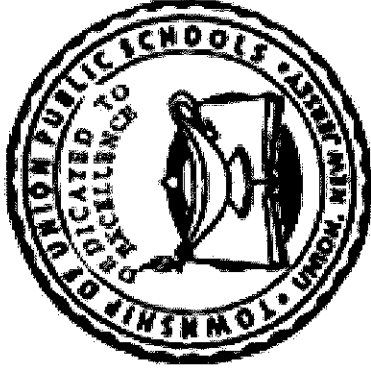
Richard Galante

Lois Jackson

Ronald McDowell

Angel Salcedo

Nancy Zuena



TOWNSHIP OF UNION PUBLIC SCHOOLS
Administration

Superintendent**Mr. Gregory Tatum**

Assistant Superintendent**Dr. Noreen Lishak**

Director of Student Information/Technology**Ms. Ann M. Hart**

Director of Athletics, Health, Physical Education and Nurses.....**Ms. Linda Ionta**

DEPARTMENT SUPERVISORS

All Academic Areas K-2	Ms. Maureen Corbett
Language Arts/Social Studies 3-5	Mr. Robert Ghiretti
Mathematics/Science 3-5	Ms. Theresa Matthews
Guidance K-12/SAC	Ms. Nicole Ahern
Language Arts.....	Ms. Mary Malyska
Math 8-12.....	Mr. Jason Mauriello
Science 6-12.....	Ms. Maureen Guilfoyle
Social Studies/Business.....	Ms. Libby Galante
World Language/ESL/Career Education/G&T/Computer Technology.....	Ms. Yvonne Lorenzo
Art/Music	Mr. Ronald Rago

DRAFTING AND DESIGN / CAD II
TE 250

Curriculum Committee Members

Edwin Oyola

Table of Contents

Title Page	
Board Members	
Administration	
Department Supervisors	
Curriculum Committee	
Table of Content	
District Mission/Philosophy Statement	
District Goals	
Course Description	
Recommended Texts	
Course Proficiencies	
Curriculum Units	
Appendix: New Jersey Core Curriculum Content Standards	

Mission Statement

The Township of Union Board of Education believes that every child is entitled to an education designed to meet his or her individual needs in an environment that is conducive to learning. State standards, federal and state mandates, and local goals and objectives, along with community input, must be reviewed and evaluated on a regular basis to ensure that an atmosphere of learning is both encouraged and implemented. Furthermore, any disruption to or interference with a healthy and safe educational environment must be addressed, corrected, or when necessary, removed in order for the district to maintain the appropriate educational setting.

Philosophy Statement

The Township of Union Public School District, as a societal agency, reflects democratic ideals and concepts through its educational practices. It is the belief of the Board of Education that a primary function of the Township of Union Public School System is to formulate a learning climate conducive to the needs of all students in general, providing therein for individual differences. The school operates as a partner with the home and community.

Statement of District Goals

- **Develop reading, writing, speaking, listening, and mathematical skills.**
- **Develop a pride in work and a feeling of self-worth, self-reliance, and self-discipline.**
- **Acquire and use the skills and habits involved in critical and constructive thinking.**
- **Develop a code of behavior based on moral and ethical principles.**
- **Work with others cooperatively.**
- **Acquire a knowledge and appreciation of the historical record of human achievement and failures and current societal issues.**
- **Acquire a knowledge and understanding of the physical and biological sciences.**
- **Participate effectively and efficiently in economic life and the development of skills to enter a specific field of work.**
- **Appreciate and understand literature, art, music, and other cultural activities.**
- **Develop an understanding of the historical and cultural heritage.**
- **Develop a concern for the proper use and/or preservation of natural resources.**
- **Develop basic skills in sports and other forms of recreation**

Course Description

DRAFTING & DESIGN CAD II TE 250 (prerequisites: Intro to CAD)

Enrollment: Grades 10-12

Purpose and Overview

CAD II enhances the skills learned during the first level offering and continues the study in the use of the computer with attention to more challenging projects and the fine points of drafting standards.

Instruction in: advanced dimensioning and sectional views, threads and fasteners, developments and intersections, introduction to architecture, architectural models, 3D CAD, reading and designing floor plans will be explored.

Recommended Textbooks

Drafting and Design for Architecture & Construction – Donald Hepler, Paul Wallach, Dana Hepler, Delmar Cengage Learning
9th Edition

AutoCAD and Its Applications: Comprehensive 2015 – Terence M Shumaker, David P. Madsen, Jeffrey A. Laurich,
J.C. Malitzke, and Craig P. Black
22nd Edition

Course Proficiencies

Students will be able to...

CAD II

At the completion of CAD II the student will demonstrate:

1. enhanced knowledge of AutoCAD.
2. the ability to construct industry grade working drawing in the areas covered
3. an understanding of basic and proper commands to produce quality drawings
4. the ability to construct industry grade working drawing in the areas covered
5. the ability to problem solve higher level projects
6. the ability to properly use dimensioning rules and apply them to a drawing.
7. the proper care for the computer and peripherals and equipment
8. appropriate classroom rules and regulations

Curriculum Units

Unit 1: Introduction to CAD II

Unit 2: Advanced Dimensioning

Unit 3: Pattern Development

Unit 4: Advanced Sectional Views

Unit 5: Threads and Fasteners

Unit 6: Introduction to Architecture

Unit 7: Architectural History and Design

Unit 8: Design and Problem Solving

Unit 9: Floor Plans

Unit 10: Architectural Models

Unit 11: Basic 3D CAD

Unit 12: Careers in Drafting

Pacing Guide- Course

<u>Content</u>	Number of Days
<u>Unit 1:</u> Introduction to CAD II	5 days
<u>Unit 2:</u> Advanced Dimensioning	5 days
<u>Unit 3:</u> Pattern Development	15 days
<u>Unit 4:</u> Advanced Sectional Views	10 days
<u>Unit 5:</u> Threads and Fasteners	15 days
<u>Unit 6:</u> Introduction to Architecture	20 days
<u>Unit 7:</u> Architectural History and Design	15 days
<u>Unit 8:</u> Design and Problem Solving	20 days
<u>Unit 9:</u> Floor Plans	20 days
<u>Unit 10:</u> Architectural Models	20 days
<u>Unit 11:</u> Basic 3D CAD	15 days
<u>Unit 12:</u> Careers in Drafting	5 days
	<u>1 week block</u> 33 weeks +/- 3 weeks +/- testing, assessments, writing

Unit 1:

Essential Questions	Instructional Objectives/ Skills and Benchmarks (CPIs)	Activities	Assessments
<p>What is drafting?</p> <p>Why study drafting?</p> <p>What do drafters do?</p> <p>Why are drawings used?</p> <p>What does CAD mean?</p> <p>What careers are in the drafting field?</p>	<p><u>SWAT:</u></p> <p>Understand what drafters do.</p> <p>Understand drafting as a Universal Language.</p> <p>List five (5) specialized areas of drafting.</p> <p>9.3.12.AC.1 9.3.12.AC.3 9.3.12.AC.5 9.3.12.AC.6 9.3.12.AC.7</p>	<p>List occupations that require the ability to read and understand drawings.</p> <p>Make a collection of pictures that show products made by the industries using CAD</p> <p>Research Autodesk and select 2 programs that you would want to learn so you can advance your drafting career.</p>	<ul style="list-style-type: none"> • Teacher observations • Presentations • Projects • Rubrics • Checklists • Tests / quizzes • Self-evaluation

Unit 2:

Essential Questions	Instructional Objectives/ Skills and Benchmarks (CPIs)	Activities	Assessments
<p>What is the command to modify dimensions?</p> <p>What tool palette is used to draw your linear lines?</p> <p>How can text height be change?</p>	<p>SWAT:</p> <p>Understand the concepts and utilize the following:</p> <ul style="list-style-type: none"> • Complete Description of Objects • Learning to Dimension • Setting Computer Parameters • Direction of Dimension Figures • Dimensioning Angles • Placement of Dimensions • Steps in Applying Dimensions • Leaders and Notes <p>9.3.12.AC-DES.2 9.3.12.AC-DES.5 9.3.12.AC-DES.6 9.3.12.AC-DES.8</p>	<p>Research samples of drawings used in the aerospace, building, structural, manufacturing, map making and the electrical and electronics industries.</p> <p>Assign students a variety of drawing problems to show proficiency.</p>	<ul style="list-style-type: none"> • Teacher observations • Presentations • Projects • Rubrics • Checklists • Tests / quizzes • Self-evaluation

Unit 3:

Essential Questions	Instructional Objectives/ Skills and Benchmarks (CPIs)	Activities	Assessments
<p>What are examples of patterns?</p> <p>How are patterns used in the fast food industry?</p> <p>How are patterns used in the HVAC industry?</p> <p>What would a box look like unfolded?</p>	<p>SWAT:</p> <p>Understand the concepts and utilize the following:</p> <ul style="list-style-type: none"> • Understand Sheet metal Work • Use skills to Model Construction • Understand the Elements of Developments • True Length of Lines • Intersections • Layout <p>9.3.12.AC.1 9.3.12.AC.6 9.3.12.AC-CST.4 9.3.12.AC-CST.8 9.3.12.AC-DES.1</p>	<p>Research samples of patterns and developments. How drawings are used in the aerospace, building, structural, manufacturing, map making and the electrical and electronics industries.</p> <p>Assign students a variety of drawing problems to show proficiency.</p> <p>Student's will design and construct a fast food container.</p>	<ul style="list-style-type: none"> • Teacher observations • Presentations • Projects • Rubrics • Checklists • Tests / quizzes • Self-evaluation

Unit 4;

Essential Questions	Instructional Objectives/ Skills and Benchmarks (CPIs)	Activities	Assessments
<p>Why do we show objects in sectional views?</p> <p>What are the different types of sectional drawings?</p> <p>What type of lines is used in sectional drawings?</p> <p>When should hidden lines behind the cutting plane be shown?</p>	<p>SWAT:</p> <p>Understand the concepts and utilize the following:</p> <ul style="list-style-type: none"> • Full Sections • Section Lining • Visible, Hidden and Center Lines • Half Sections • Broken Out Sections • Revolved sections • Offset Sections • Conventional Breaks • Dimensioning a Section Drawing <p>Apply conventional practices in sectioning.</p> <p>9.3.12.AC.1 9.3.12.AC.3 9.3.12.AC-CST.8 9.3.12.AC-DES.6</p>	<p>Research samples of advanced sectional drawings used in the building, structural, manufacturing, and the electrical and electronics industries.</p> <p>Study the drawings, draw and dimension the necessary views for each problem.</p> <p>Assign students a variety of drawing problems to show proficiency.</p>	<ul style="list-style-type: none"> • Teacher observations • Presentations • Projects • Rubrics • Checklists • Tests / quizzes • Self-evaluation

Unit 5:

Essential Questions	Instructional Objectives/ Skills and Benchmarks (CPIs)	Activities	Assessments
<p>How can you describe a thread?</p> <p>What are the parts of a thread?</p> <p>What terminology is used with threads?</p> <p>Can you name 3 different types of threads?</p>	<p>SWAT:</p> <p>Understand the concept and represent the following:</p> <ul style="list-style-type: none"> • The Helix • Screw Threads • Components of a Thread • Thread forms • Thread Pitch • Right and Left Hand Threads • Symbolic and detailed threads • V threads • Acme Threads • Square threads • Thread Notes • How to read a note • Nuts and Bolts <p>Describe the standard methods used to represent threads on drawings.</p> <p>9.3.12.AC.1 9.3.12.AC.3 9.3.12.AC.6</p>	<p>Research samples of threads and fasteners used in the aerospace, building, structural, manufacturing, map making and the electrical and electronics industries.</p> <p>List applications for rivets, pin fasteners, and keys.</p> <p>Construct a detailed representation of acme threads.</p> <p>Draw a two view drawing for a spindle bearing adjustment nut. Make the circular view a full section.</p>	<ul style="list-style-type: none"> • Teacher observations • Presentations • Projects • Rubrics • Checklists • Tests / quizzes • Self-evaluation

Unit 6:

Essential Questions	Instructional Objectives/ Skills and Benchmarks (CPIs)	Activities	Assessments
<p>How can you describe a thread?</p> <p>What are the parts of a thread?</p> <p>What terminology is used with threads?</p> <p>Can you name 3 different types of threads?</p>	<p>SWAT:</p> <p>Understand the concept and represent the following:</p> <ul style="list-style-type: none"> • The Helix • Screw Threads • Components of a Thread • Thread forms • Thread Pitch • Right and Left Hand Threads • Symbolic and detailed threads • V threads • Acme Threads • Square threads • Thread Notes • How to read a note • Nuts and Bolts. <p>9.3.12.AC.1 9.3.12.AC.6 9.3.12.AC-CST.1 9.3.12.AC-CST.6 9.3.12.AC-DES.4</p>	<p>Research samples of threads and fasteners used in the aerospace, building, structural, manufacturing, map making and the electrical and electronics industries.</p> <p>Assign students a variety of drawing problems to show proficiency.</p>	<ul style="list-style-type: none"> • Teacher observations • Presentations • Projects • Rubrics • Checklists • Tests / quizzes • Self-evaluation

Unit 7:

Essential Questions	Instructional Objectives/ Skills and Benchmarks (CPIs)	Activities	Assessments
<p>List the elements of design?</p> <p>List the basic principles of design?</p> <p>Describe complementary, monochromatic, and triadic colors ?</p> <p>How would make a small house seem larger?</p>	<p>SWAT:</p> <p>Understand and relate design concepts to Architecture.</p> <p>Understand why form follows function</p> <p>Identify six elements of design.</p> <p>Apply design principles to a work of architecture.</p> <p>9.3.12.AC.2 9.3.12.AC.4 9.3.12.AC.6 9.3.12.AC-CST.2 9.3.12.AC-CST.7 9.3.12.AC-DES.8</p>	<p>Draw samples of homes used in the different eras.</p> <p>Research Architectural styles by region.</p> <p>Assign students a variety of drawing problems to show proficiency.</p>	<ul style="list-style-type: none"> • Teacher observations • Presentations • Projects • Rubrics • Checklists • Tests / quizzes • Self-evaluation

Unit 8:

Essential Questions	Instructional Objectives/ Skills and Benchmarks (CPIs)	Activities	Assessments
<p>How are problems solved?</p> <p>What is brainstorming?</p> <p>Is the first idea you think of the best?</p> <p>What are concepts?</p> <p>What is prototyping?</p> <p>What is a design loop?</p>	<p>SWAT:</p> <p>Understand the concepts and utilize the following:</p> <ul style="list-style-type: none"> • Create a Design Loop with specific steps to solve a problem • Identify the problem • Research how others have solved a similar problem • Generate solutions • Choose the best one • Prototype • Test • Revise if necessary • Utilize brainstorming techniques • Develop communication skills • Develop manipulative skills <p>9.3.12.AC.2 9.3.12.AC.4 9.3.12.AC.7</p>	<p>Student review TLA's (Technology Learning Activities) and components of the Design Loop</p> <p>Assign students a variety of TLA problems to show proficiency.</p>	<ul style="list-style-type: none"> • Teacher observations • Presentations • Projects • Rubrics • Checklists • Tests / quizzes • Self-evaluation

Unit 9:

Essential Questions	Instructional Objectives/ Skills and Benchmarks (CPIs)	Activities	Assessments
<p>What measurements are most important?</p> <p>Name and explain the types of floor plans?</p> <p>What is the correct term for floor plans?</p> <p>Which floor plan is used to layout the studs?</p>	<p>SWAT:</p> <p>Understand and gather information to designing a structure.</p> <p>Identify and use the design process to prepare functional floor plans.</p> <p>Analyze a building.</p> <p>Understand the concept of building codes.</p> <p>9.3.12.AC.2 9.3.12.AC.4 9.3.12.AC.6 9.3.12.AC-CST.4 9.3.12.AC-CST.6 9.3.12.AC-DES.4</p>	<p>Draw floor plans according to a sequence of CAD and manual steps.</p> <p>Use information on a scaled floor plan to draw a complete floor plan.</p> <p>Draw dimensions that convey precise, accurate information for builders</p>	<ul style="list-style-type: none"> • Teacher observations • Presentations • Projects • Rubrics • Checklists • Tests / quizzes • Self-evaluation

Unit 10:

Essential Questions	Instructional Objectives/ Skills and Benchmarks (CPIs)	Activities	Assessments
<p>What are the basic purposes of architectural models?</p> <p>Describe the types of design study models and explain their functions?</p> <p>What features does a presentation model usually include?</p> <p>Which type of model is used to promote the sale of land parcels?</p>	<p>SWAT:</p> <p>Understand design and study models.</p> <p>Explain the differences between presentation and design study models.</p> <p>Describe architectural models made for design study purposes.</p> <p>List the steps for creating a model.</p> <p>9.3.12.AC.2 9.3.12.AC.5 9.3.12.AC.6 9.3.12.AC-CST.3 9.3.12.AC-CST.4 9.3.12.AC-CST.8</p>	<p>Design and study models.</p> <p>Complete a computer model of a house you designed.</p> <p>Construct an architectural model.</p>	<ul style="list-style-type: none"> • Teacher observations • Presentations • Projects • Rubrics • Checklists • Tests / quizzes • Self-evaluation

Unit 11:

Essential Questions	Instructional Objectives/ Skills and Benchmarks (CPIs)	Activities	Assessments
<p>How do you locate points in 3d space?</p> <p>Describe the right hand rule of 3d visualization?</p> <p>What is a visual style?</p> <p>What is the function of the ribbon in the tool palette?</p>	<p><u>SWAT:</u></p> <p>Understand drawing protocols.</p> <p>Produce 3d drawings.</p> <p>Discuss 3d surfaces and 3d solids.</p> <p>Analyze counter bored and countersunk holes.</p> <p>Use computer software to produce 3d models.</p> <p>Identify the functions of the viewport.</p> <p>9.3.12.AC.1</p> <p>9.3.12.AC.2</p> <p>9.3.12.AC.6</p> <p>9.3.12.AC-CST.4</p> <p>9.3.12.AC-CST.6</p> <p>9.3.12.AC-DES.7</p>	<p>Create objects in 3d using autocad.</p> <p>Create simple objects with hole, protrusions and cuts.</p> <p>Create a 3d model of a house foundation.</p>	<ul style="list-style-type: none"> • Teacher observations • Presentations • Projects • Rubrics • Checklists • Tests / quizzes • Self-evaluation

Unit 12:

Essential Questions	Instructional Objectives/ Skills and Benchmarks (CPIs)	Activities	Assessments
<p>What type of career can drafting and design provide?</p> <p>Where would you look for careers in this area?</p> <p>What qualifications are required?</p> <p>What is the pay scale?</p>	<p><u>SWAT:</u></p> <p>Make informed career decisions based on trends in the economy.</p> <p>Understand the variety of opportunities available.</p> <p>9.3.12.AC.3 9.3.12.AC.5 9.3.12.AC.7 9.3.12.AC-CST.5 9.3.12.AC-DES.7</p>	<p>Research careers in the aerospace, building, structural, manufacturing, map making and the electrical and electronics industries.</p>	<ul style="list-style-type: none"> • Teacher observations • Presentations • Projects • Rubrics • Checklists • Tests / quizzes • Self-evaluation

New Jersey Core Curriculum Content Standards
Academic Area

9.3- Career & Technical Education (CTE)
Content Area: 21st Century Life and Careers

CONTENT AREA:	STANDARD 9.3 CAREER AND TECHNICAL EDUCATION
ARCHITECTURE & CONSTRUCTION CAREER CLUSTER	
Number	Standard Statement
By the end of Grade 12, Career and Technical Education Program completers will be able to:	
Career Cluster:	Architecture & Construction (AC)
9.3.12.AC.1	Use vocabulary, symbols and formulas common to architecture and construction.
9.3.12.AC.2	Use Architecture and construction skills to create and manage a project.
9.3.12.AC.3	Comply with regulations and applicable codes to establish and manage a legal and safe workplace.
9.3.12.AC.4	Evaluate the nature and scope of the Architecture & Construction Career Cluster and the role of architecture and construction in society and the economy.
9.3.12.AC.5	Describe the roles, responsibilities, and relationships found in the architecture and construction trades and professions, including labor/management relationships.
9.3.12.AC.6	Read, Interpret and use technical drawings, documents and specifications to plan a project.
9.3.12.AC.7	Describe career opportunities and means to achieve those opportunities in each of the Architecture & Construction Career Pathways.

PATHWAY:	Construction (AC-CST)
9.3.12.AC-CST.1	Describe contractual relationships between all parties involved in the building process.
9.3.12.AC-CST.2	Describe approval procedures required for successful completion of a construction project.
9.3.12.AC-CST.3	Implement testing and inspection procedures to ensure successful completion of a construction project.
9.3.12.AC-CST.4	Apply scheduling practices to ensure the successful completion of a construction project.
9.3.12.AC-CST.5	Apply practices and procedures required to maintain jobsite safety.
9.3.12.AC-CST.6	Manage relationships with internal and external parties to successfully complete construction projects.
9.3.12.AC-CST.7	Compare and contrast the building systems and components required for a construction project.
9.3.12.AC-CST.8	Demonstrate the construction crafts required for each phase of a construction project.
9.3.12.AC-CST.9	Safely use and maintain appropriate tools, machinery, equipment and resources to accomplish construction project goals.
PATHWAY:	Design/Pre-Construction (AC-DES)
9.3.12.AC-DES.1	Justify design solutions through the use of research documentation and analysis of data.
9.3.12.AC-DES.2	Use effective communication skills and strategies (listening, speaking, reading, writing and graphic communications) to work with clients and colleagues.
9.3.12.AC-DES.3	Describe the requirements of the integral systems that impact the design of buildings
9.3.12.AC-DES.4	Apply building codes, laws and rules in the project design.
9.3.12.AC-DES.5	Identify the diversity of needs, values and social patterns in project design, including accessibility standards.

9.3.12.AC-DES.6	Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
9.3.12.AC-DES.7	Employ appropriate representational media to communicate concepts and project design.
9.3.12.AC-DES.8	Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design
PATHWAY:	Maintenance/Operations (AC-MO)
9.3.12.AC-MO.1	Recognize and employ universal construction signs and symbols to function safely in the workplace.
9.3.12.AC-MO.2	Use troubleshooting procedures when solving a maintenance problem in buildings.
9.3.12.AC-MO.3	Apply construction skills when repairing, restoring or renovating existing buildings.
9.3.12.AC-MO.4	Determine work required to repair or renovate an existing building.
9.3.12.AC-MO.5	Plan and practice preventative maintenance activities to service existing buildings.
9.3.12.AC-MO.6	Maintain and inspect building systems to achieve safe and efficient operation of buildings.

New Jersey Scoring Rubric

New Jersey Registered Holistic Scoring Rubric - GEPA/HSPA

	Inadequate Command	Limited Command	Partial Command	Adequate Command	Strong Command	Superior Command
	1	2	3	4	5	6
In Scoring, consider the grid of written language						
Score						
Content & Organization	<ul style="list-style-type: none"> May lack opening and/or closing Minimal response to topic; uncertain focus No planning evident; disorganized Details random, inappropriate, or barely apparent No apparent control Severe/numerous errors 	<ul style="list-style-type: none"> May lack opening and/or closing Attempts to focus May drift or shift focus Attempts organization Few, if any, transitions between ideas Details lack elaboration, i.e., highlight paper Numerous errors Excessive monotony/ same structure Numerous errors Numerous serious errors 	<ul style="list-style-type: none"> May lack opening and/or closing Usually has single focus Some lapses or flaws in organization May lack some transitions between ideas Repetitious details Several unelaborated details Errors/ patterns of errors may be evident Little variety in syntax Some errors Patterns of errors evident 	<ul style="list-style-type: none"> Generally has opening and/or closing Single focus Ideas loosely connected Transition evident Uneven development of details Some errors that do not interfere with meaning Some errors that do not interfere with meaning No consistent pattern of errors Some errors that do not interfere with meaning 	<ul style="list-style-type: none"> Opening and closing Single focus Sense of unity and coherence Key ideas developed Logical progression of ideas Moderately fluent Attempts compositional risks Details appropriate and varied Few errors Few errors Few errors 	<ul style="list-style-type: none"> Opening and closing Single, distinct focus Unified and coherent Well-developed Logical progression of ideas Fluent, cohesive Compositional risks successful Details effective, vivid, explicit, and/or pertinent Very few, if any, errors Very few, if any, errors Very few, if any, errors
Usage						
Sentence Construction						
Mechanics						

Holistic Scoring Guide for Mathematics Open-Ended (OE) Items (Generic Rubric)

3 - Point Response

The response shows complete understanding of the problem's essential mathematical concepts. The student executes procedures completely and gives relevant responses to all parts of the task. The response contains few minor errors, if any. The response contains a clear, effective explanation detailing how the problem was solved so that the reader does not need to infer how and why decisions were made.

2 - Point Response

The response shows nearly complete understanding of the problem's essential mathematical concepts. The student executes nearly all procedures and gives relevant responses to most parts of the task. The response may have minor errors. The explanation detailing how the problem was solved may not be clear, causing the reader to make some inferences.

1 - Point Response

The response shows limited understanding of the problem's essential mathematical concepts. The response and procedures may be incomplete and/or may contain major errors. An incomplete explanation of how the problem was solved may contribute to questions as to how and why decisions were made.

0 - Point Response

The response shows insufficient understanding of the problem's essential mathematical concepts. The procedures, if any, contain major errors. There may be no explanation of the solution or the reader may not be able to understand the explanation. The reader may not be able to understand how and why decisions were made.