State of Rhode Island and Providence Plantations
DEPARTMENT OF EDUCATION
Shepard Building
255 Westminster Street
Providence, Rhode Island 02903-3400

Peter McWalters
Commissioner

September, 2005

TO: K-12 Educators

FROM: Diane Schaefer, Director, Office of Instruction

RE: Lessons for Statewide Curricula

The state legislature has passed a bill requiring the Department of Education to create statewide curricula in mathematics, reading, and writing by August 2006. The Department of Education developed a plan to accomplish this task which focuses on creating web-based curricula that are interactive, dynamic and highlight lessons aligned with the state's grade level expectations (GLEs) and grade span expectations (GSEs). The curricula will include video clips of lessons, samples of lesson plans, samples of assessed student work, and other resources.

In order to accomplish this task, we need your help. We are currently looking for teachers to submit lesson plans that highlight specific GLEs or GSEs. These lessons will provide a resource from which teachers may select specific lessons to use in their classrooms. Since it is important to look at teaching and learning as a single entity, we are also requesting three samples of assessed student work exhibited from these lessons. In order to provide consistency, please use the submission packet, which includes the following:

- Lesson Plan Packet Procedures
- Cover Sheet
- List of Essential Components of a Lesson
- Lesson Planning Guidelines
- Rubric for Lesson Plan
- Teacher Release Form
- Sample Parent Letter with Student Work Release Form
- Depth of Knowledge (Webb)

We are thrilled to have the opportunity to showcase the many effective lessons occurring in our schools, each and every day throughout Rhode Island. Should you choose to submit a lesson it may be eligible for the web-based curricula. As a bonus for sharing your lesson(s), you will receive fifteen (15) RIDE professional development hours once your lesson has met the rubric criteria and all the Checklist items have been received and reviewed.

Thank you for your continued support and effort.

Lesson Plan Packet Procedures

1. **Lesson Development:**

- Develop a lesson plan based on the *Essential Components of a Lesson (*Page 4); *Lesson Planning Guidelines* (Pages 5-7); and the *Rubric for Lesson Plan* (Pages 8-9).

2. **Lesson Implementation:**

- Teach the lesson
- Collect student work- student work includes a sample of each: Approaching Proficiency, Proficient, Exceeds Proficiency
- Reflect on student work
- Reflect on lesson implementation

3. **Lesson Submission:**

- ONLY complete packets will be considered
- Cite original sources and acknowledge adaptations or resources used within the lesson
- Use MICROSOFT WORD™ for all submitted documents
- Number all pages
- Include your name on all pages (as a footer)
- Attach *Teacher Release Form* to each Lesson Plan
- Remove student names from student work samples
- Attach signed *Student Work Release Forms* to appropriate sample
    - Please note: *Sample Teacher Letter* to send to parents may be adapted to meet your needs; however, the legal language in the *Student Work Release* portion of the letter may NOT be altered
    - Make a copy of the signed *Student Work Release Form* for your school/district's records
- Complete the *Cover Sheet* and attach to Lesson Packet

Submit a hard copy of the entire Lesson Packet:
by January 1 for inclusion in the winter review
by May 1 for inclusion in the spring review

Send a **hard copy** of the entire Lesson Plan Packet to:

Office of Instruction
Rhode Island Department of Education
255 Westminster Street
Providence, RI 02903

Attention: Lesson Plan Packet Enclosed

An electronic version of the lesson plan and any accompanying documents (rubrics, examples used during lesson, worksheets, etc.) will be requested once your packet has been received.

More than one lesson packet may be submitted.

All materials become the property of the Rhode Island Department of Education. We reserve the right to revise and edit the work.

Cover Sheet

Teacher Name:	
NEW Applicant ID # *:	
District:	
School:	
Home Address:	
City, State, Zip Code:	
Home Phone:	
Fax:	
Email:	

Submission Checklist:

_____ Hard copy of Lesson Plan

_____ Teacher Release Form- Completed and Signed

_____ Student Work Release Form-Completed and Signed by Parent/Guardian for all 3 samples submitted

_____ Hard copy of 3 samples of assessed student work (Approaching Proficiency, Proficient, Exceeds Proficiency) exhibited in your lesson

Electronic version of Lesson Plan will be requested once your submission has been received.

*Applicant ID # ~ Teacher Certification is no longer using Social Security Numbers as IDs. Every teacher has been assigned a new number. Please contact Teacher Certification if you need your NEW ID number. Your ID # is needed to process your 15 RIDE Professional Development Hours.

Please return this cover sheet with your lesson package.

Please maintain this sequence and address all of the following components.

Essential Components of a Lesson

I. **Grade/Content Area**

II. **Title**

III. **GLEs/GSEs**

IV. **Context for the Lesson**

V. **Opportunities to Learn**

VI. **Objectives**

VII. **Instructional Procedures**
- **Opening**
- **Engagement**
- **Closure**

VIII. **Assessment**

IX. **Reflection**
- **Student Work**
  - **Sample #1- Approaching Proficiency**
  - **Sample #2- Proficient**
  - **Sample #3- Exceeds Proficiency**
- **Lesson Implementation**

Lesson Planning Guidelines

Use the following questions to facilitate and foster your lesson development. Be sure to incorporate your responses to these questions within your lesson plan.

Grade/Content Area:

Title:

A short, simple, direct title that summarizes lesson content.

GLEs/GSEs:

- The following format must be used to indicate the GLE/GSE's. Example:
  W-6-4.2 In written narratives, students organize and relate a story line/plot/series of events by…Establishing problem/conflict/challenge and maintaining point of view.
  The use of underlines, examples, and the identification of state versus local should not be included.
- Which Grade Level Expectation(s) or Grade Span Expectation(s) is the primary focus of this lesson?
- Which specific indicator(s) will be addressed within this lesson?

Context for the Lesson:

Include any important background information that is relevant for understanding the lesson. Cite original sources and acknowledge adaptations or resources used within the lesson.

- What is the reason for using this lesson?
- What data/evidence supports the need for using this lesson?
- How much time is required for this lesson*?*
- What other information supports using this lesson?

Opportunities to Learn:

***If any of these components are embedded within the lesson, then a notation must be made within this section.*

- How are you using multiple ways of approaching or engaging students in the lesson activities?*
- How are students given an opportunity to apply skills and concepts learned?*
- What is the rigor of the activity/activities in which students are engaged? (Depth of Knowledge) *
- How do you differentiate instruction to accommodate different learning styles of your students?*
- How do you group the class to best engage students in this lesson?*
- What does the student need to have prepared prior to this lesson?*
- What materials do you need to prepare prior to this lesson?
  - Handouts, writing implements, manipulatives, texts, etc.
- What conditions must exist to facilitate or enhance this lesson?
  - Access to technology, special equipment, structure of working space
  - Integration across content areas

Objectives:

- What do you want the students to learn and be able to do from this lesson? (Not just the activity they will complete)
- What are the objectives of this lesson? How do the objectives match and/or correspond with the GLEs/GSEs?
- Do all of your objectives align with your assessment(s)?
- SMART Goals:
    - Specific: Does the objective clearly specify what will be accomplished and by how much?
    - Measurable: Is the objective measurable?
    - Appropriate: Does the objective make sense in terms of what the activity is trying to accomplish?
    - Realistic: Is the objective achievable given the available resources and experience?
    - Time-based: Does the objective specify by when it will be achieved?

Instructional Procedures: Opening/ Engagement/Closure:

Effective lessons have three components: an opening, an engagement, and a closure. In order to ensure all components are included, percentages have been provided to illustrate approximate times for each component within the lesson.

Opening (10-15% of lesson):

- How do you activate students' prior knowledge and connect it to this new learning?
- How do you get students interested in this lesson?

Engagement (60-70% of lesson):

- What questions can you pose to encourage students to take risks and to deepen students' understanding?
- How do you facilitate student discourse?
- How do you facilitate the lesson so that all students are active learners and reflective during this lesson?
- How do you monitor students' learning throughout this lesson?

Closure (20-25% of lesson):

- How do you ensure that the salient points of this lesson are highlighted to guide student understanding?
- What kinds of questions do you ask to get meaningful student feedback?
- What opportunities do you provide for students to share their understandings of the task?

Assessment:

Assessments both summative (overall) and formative (on-going) need to be appropriate to the task and aligned with the objectives.

- How do you assess students' learning? (Assessment[s] needs to be aligned with lesson objective[s].)
- How do you provide specific, constructive, and timely feedback to your students to promote student learning?

Reflections:

Taking time to reflect on student work and the lesson taught gives new insights for future instruction and student learning.

Reflection on Student Work:

Student work includes a sample of each:

- Sample #1- Approaching Proficiency
- Sample #2- Proficient
- Sample #3- Exceeds Proficiency

Utilize the following questions when reflecting on each piece of student work:

- What does the student work tell you about the students' understanding and the effectiveness of your lesson? (Cite examples)
- How will you provide instructional support to improve student learning?

Reflection on Lesson Implementation:

Were the lesson objectives met?

- Did your lesson meet your objective(s), in conjunction with GLEs/GSEs?
- Was your assessment(s) appropriate for your objective(s)?

What worked well in this lesson?

- How do you know that this lesson was effective?
- How do you determine the effectiveness of the assessment?
- Were the modifications appropriate for students?
- How were all the students engaged in this lesson?

What changes would you propose for the next time you implement this lesson?

- What part of this lesson proved easy or difficult for students?
- How will you connect students' new learning from this lesson to the next lesson?
- How will you summarize students' learning to inform your instruction?
- What did you learn from the assessment(s) used in this lesson?
- When you use this lesson again, what will you do differently or similarly?

What did you learn from teaching this lesson?

- How did this lesson enhance your own understanding as a teacher and further your own professional development?
- How do you know you were successful in engaging all students to be active and reflective learners?

Rubric for Lesson Plan

KEY: ☑ Sufficient information has been provided for this indicator
N/A Not applicable for this particular lesson

Essential Components	Indicators	Revision(s) Needed
Objectives:	□States clearly in measurable terms □Aligns with the GLEs/GSEs	
Instructional Procedures:	Teachers explicitly include three components to each lesson: an opening, an engagement, and a closure. (Throughout the lesson, students should have the opportunity to reflect.) **Opening** □ Activates prior knowledge □ Motivates new learning **Engagement** □ Provides multiple levels of questioning □ Provides opportunity for relevant student discourse □ Provides differentiated modes of learning □ Provides the opportunity to be active learners and/or to be engaged in meaningful reflection **Closure** □ Promotes student reflection □ Provides opportunities for students to share their understanding of the task □ Highlights salient points of lesson to guide understanding	**Opening** **Engagement** **Closure**
Assessment:	□ Aligns with lesson objectives and appropriate to task □ Includes multiple opportunities for assessing work □ Provides constructive feedback to promote learning	
Reflections:	**Student Work** □ Analyzes in depth and cites evidence of student work that demonstrates the level of student understanding of lesson objectives □ Synthesizes student learning and determines future instruction/next steps **Lesson Implementation** □ Reviews key components of the lesson and identifies strengths and area(s) in need of improvement □ Identifies revisions or modifications for future instruction □ Connects students' new learning from this	**Student Work** **Lesson Implementation**

	lesson to the next lesson	
Other Components:	□ Grade/Content Area □ GLEs/GSEs □ Context of the Lesson □ Opportunities to Learn	

CONSENT

I, _____, understand that the Rhode Island Department of Elementary and Secondary Education is engaged in the development of statewide curricula in reading, writing and mathematics. I also understand that, as part of the curricula development process, the Department of Education is soliciting lesson plans that highlight lessons aligned with the state's grade level expectations and grade span expectations. In response to that solicitation, I am submitting the enclosed lesson plan(s) and hereby giving my consent to the Department of Elementary and Secondary Education to use the enclosed lesson plan(s) in the development of the statewide curricula, which will be made available on the Internet. By giving this consent, I grant to the Department of Elementary and Secondary Education permission to modify the lesson plan(s) as it, in its sole discretion, deems proper in the development of the curricula. I further attest that, where applicable, I have disclosed (1) the original source(s) of the lesson plan(s) and (2) any adaptations or resources used within the lesson plan(s). I also attest that I have obtained permission from my employer, where necessary, to submit the enclosed material(s).

_____ _____

Signature Date

_____ Please check here if you wish to be publicly acknowledged by the Department of Elementary and Secondary Education for the submission of any lesson plan material used to develop the statewide curricula.

Dear Parent or Guardian,

The Rhode Island Department of Elementary and Secondary Education has started on the development of statewide curricula in reading, writing and mathematics. The statewide curricula are intended to help improve teaching and learning throughout Rhode Island. I am excited about being a part of this initiative and the collaborative effort of sharing and building upon what educators know to be effective teaching.

The Department of Education is seeking examples of student work for inclusion in the curricula. I would like to submit your child's work to the Department of Education to be considered for this purpose. Prior to submission, your child's name will be removed from the work.

If you wish to submit your child's work to be considered for inclusion in the statewide curricula, please sign the consent form below. Thank you for your continued support.

Sincerely,

Name
Title

CONSENT

I, _____ (please print), am the parent or guardian of _____ (please print). I hereby give my consent to the _____ school district to submit examples of my child's schoolwork, with personally identifiable information removed, to the Rhode Island Department of Elementary and Secondary Education to be considered for inclusion in a statewide curricula. I agree that, upon submission, my child's schoolwork will become the property of the Department of Education for use in the development of a statewide curricula, which will be made available on the Internet. I hereby grant to the Department of Education rights to use my child's schoolwork in the statewide curricula project.

_____ _____

Parent/Guardian Signature Date

Depth-of-Knowledge (DOK) Levels for Reading

According to Norman L. Webb, Wisconsin Center for Educational Research ("Depth-of-Knowledge Levels for Four Content Areas," March 28, 2002), "interpreting and assigning Depth-of-Knowledge Levels to both objectives within standards and assessment items is an essential requirement of alignment analysis. Four levels of Depth-of-Knowledge are used for this analysis." Norman Webb's "Depth-of-Knowledge Levels for Four Content Areas" include: Language Arts (Reading, Writing), Mathematics, Science, and Social Studies.

A general definition for each of the four (Webb) Depth-of-Knowledge levels is followed by Table 1, which provides further specification and examples for each of the DOK levels. Webb recommends that large-scale, on-demand assessments in reading should only assess Depth-of-Knowledge Levels 1, 2, and 3. Depth-of-Knowledge at Level 4 in reading should be reserved for local assessment only.

Descriptors of DOK Levels for Reading (based on Webb and Wixson, March 2002)

Level 1 requires students to use simple skills or abilities to recall or locate facts from the text. The focus is on basic initial comprehension, not on analysis or interpretation. Items require only a shallow/literal understanding of text presented and often consist of verbatim recall from text, or simple understanding of a single word or phrase.

Level 2 requires both initial comprehension and subsequent processing of text or portions of text. Important concepts are covered, but not in a complex way. Items (including GLEs/GSEs) at this level may include words such as paraphrase, summarize, interpret, infer, classify, organize, collect, display, compare, and determine whether fact or opinion. Literal main ideas are stressed. Items may require students to apply skills and concepts that are covered in Level 1.

Level 3 requires deep knowledge. Students are encouraged to go beyond the text and are asked to explain, generalize, or connect ideas. Students must be able to support their thinking, citing references from the text or other sources. Items may involve abstract theme identification, inferences between or across passages, students' application of prior knowledge, or text support for an analytical judgment made about a text.

Level 4 requires complex reasoning, planning, developing, and thinking most likely over an extended period of time, such as comparing multiple works by the same author or from the same time period. The extended time period is not a distinguishing factor if the required work is only repetitive and doesn't require applying a significant conceptual understanding and higher-order thinking.

Table 1: Detailed Descriptions of Depth-of-Knowledge Levels for Reading
(Adapted by Karin Hess, Center for Assessment/NCIEA, 2004, Based on Webb)

Level 1 **Recall of Information**	**Level 2** **Basic Reasoning**	**Level 3** **Complex Reasoning**	**Level 4** **Extended Reasoning**
Examples represent, but do not constitute all Level 1 reading performances: • Read words orally in isolation • Read words orally in connected text • Read multi-syllabic words • Locate or recall facts or details explicitly presented in text • Identify or describe characters, setting, sequence of events • Use language structure (pre/suffix) or word relationships (synonym/antonym) to determine meaning of words • Select appropriate words to use in context (e.g., content-specific words, shades of meaning) when intended meaning is clearly evident	**Examples represent, but do not constitute all Level 2 reading performances**: • Use context cues or resources to identify the meaning of unfamiliar words • Predict a logical outcome based on information in a reading selection • Make basic inferences or draw basic conclusions about information presented in text (e.g., According to this report what caused…?) • Recognizing appropriate generalizations about text (e.g., possible titles, main ideas) • Identify and summarize the major events, problem, solution, conflicts in a literary text • Determine whether a text is fact or fiction • Distinguish between fact and opinion • Describe the characteristics or features of various types of text • Obtain information using text features of informational text (e.g., Table of Contents, sidebar, chart) • Organize information presented in informational text using mapping, charting, or summarizing • Locate information to answer questions related to explicit or implicit central ideas in informational texts • Identify (e.g, imagery, idioms, exaggeration, alliteration, etc.)	**Examples represent, but do not constitute all Level 3 reading performances:** • Explain, generalize, or connect ideas, using supporting evidence from the text or from other sources • Draw inferences about author's purpose, author's message or theme (explicit or implied) • Make and support inferences about implied causes and effects • Describe how word choice, point of view, or bias affects the interpretation of a reading selection • Summarize or compare information within and across text passages • Analyze interrelationships among elements of the text (plot, subplots, characters, setting) • Analyze or interpret use of author's craft (literary devices) to analyze or critique a literary text	**Examples represent, but do not constitute all Level 4 reading performances:** • Compare or analyze multiple works by the same author, including author's craft • Compare or analyze multiple works from the same time period or from the same genre • Gather, analyze, organize, and interpret information from multiple (print and non-print) sources for the purpose of drafting a reasoned report • Evaluate the relevancy and accuracy from multiple (print and non-print) sources (e.g., verifying factual information or assertions with other sources; researching the source of information)

Depth-of-Knowledge (DOK) Levels for Writing

According to Norman L. Webb, Wisconsin Center for Educational Research ("Depth-of-Knowledge Levels for Four Content Areas," March 28, 2002), "interpreting and assigning depth-of-knowledge levels to both objectives within standards and assessment items is an essential requirement of alignment analysis. Four levels of depth-of-knowledge are used for this analysis." Norman Webb's "Depth-of-Knowledge Levels for Four Content Areas" include: Language Arts (Reading, Writing), Mathematics, Science, and Social Studies.

A general definition for each of the four (Webb) Depth-of-Knowledge levels is followed by Table 1, which provides further specification and examples for each of the DOK levels. Webb recommends that large-scale, on-demand assessments in writing should only assess Depth of Knowledge Levels 1,2, and 3. Depth of Knowledge at Level 4 in writing should be reserved for local assessment.

Descriptors of DOK Levels for Writing (based on Webb and Wixson, March 2002)

Level 1 requires the student to write or recite simple facts. This writing or recitation does not include complex synthesis or analysis, but basic ideas.

Level 2 requires some mental processing, such as beginning to connect ideas using a simple organizational structure. At this level, students are engaged in first draft writing for a limited number of purposes and audiences. Students are beginning to connect ideas using a simple organizational structure.

Level 3 requires some higher level mental processing. Students are developing multiparagraph compositions that may include complex sentence structures or demonstrate some synthesis and analysis.

Level 4 Higher-level thinking is central to this level. Multi-paragraph compositions demonstrate synthesis and analysis of complex idea or themes and evidence of a deep awareness of purpose and audience.

Table 1- Detailed Descriptions of Depth of Knowledge Levels for Writing
(Adapted by K. Hess, Center for Assessment/NCIEA, 2003, Based on Webb)

Level 1 Recall of Information	Level 2 Basic Reasoning	Level 3 Complex Reasoning	Level 4 Extended Reasoning
Examples represent, but do not constitute all Level 1 reading performances: • Listing/generating ideas or words prior to developing written composition (e.g., brainstorming, webbing) • Selecting or recalling appropriate vocabulary (words, phrases, idioms) to achieve intended meaning in writing • Writing simple sentences • Using punctuation marks and capitalization correctly in writing and editing • Using Standard English conventions in writing and editing to correct errors • Identifying misspelled words in a written passage • Applying conventional spelling patterns/rules to new situations in writing • Using resources (dictionary, thesaurus) to correct spelling in written passages • Using resources to identify Standard English grammatical structures for correction • Using resources to apply basic formats for documentation	**Examples represent, but do not constitute all Level 2 reading performances:** • Note-taking or outlining as a means of organizing ideas for writing • Developing text which may be limited to one paragraph • Using simple organizational strategies to structure written work (e.g., basic paragraph form: indenting main idea, supporting details; simple transitions) • Constructing a variety of sentence types (e.g., simple and compound, sentences with embedded phrases) • Writing summaries that contain the main idea of a reading selection and pertinent details • Demonstrating basic understanding and appropriate use of such reference materials as a dictionary, thesaurus, or web site • Editing final drafts of compositions for mechanics and conventions, including grammar, punctuation, and capitalization	**Examples represent, but do not constitute all Level 3 reading performances:** • Developing compositions that include multiple paragraphs • Using complex or varied sentence structures in written compositions • Demonstrating some synthesis and analysis in writing (making inferences; determining relationships; generalizing, or connecting ideas) • Showing awareness of audience and purpose through focus, organization, voice/tone • Using appropriate organizational text structures (e.g., description; chronology; proposition/support; compare/contrast; cause/effect) • Editing and revising to improve the quality of the composition • Supporting ideas with details, examples, quotations, text references, and/or citations • Editing final drafts to produce a logical progression of ideas • Summarizing information from multiple sources to address a specific topic	**Examples represent, but do not constitute all Level 4 reading performances:** • Developing multi-paragraph compositions that demonstrate synthesis and analysis of complex ideas or themes • Analyzing author's craft (e.g., style, bias, literary techniques, point of view) • Demonstrating evidence of a deep awareness of purpose and intended audience. (e.g., in informational reports including hypotheses and supporting evidence) • Creating compositions that demonstrate a distinct voice and that stimulate the reader or listener to consider new perspectives on the addressed ideas or themes • Writing an analysis of two selections identifying the common theme and generating a purpose that is appropriate for both • Gathering, analyzing, and evaluating written information for the purpose of drafting a reasoned report that supports and appropriately illustrates inferences and conclusions drawn

Depth-of-Knowledge (DOK) Levels for Mathematics

According to Norman L. Webb, Wisconsin Center for Educational Research ("Depth-of-Knowledge Levels for Four Content Areas," March 28, 2002), "interpreting and assigning depth-of-knowledge levels to both objectives within standards and assessment items is an essential requirement of alignment analysis. Four levels of depth-of-knowledge are used for this analysis." Norman Webb's "Depth-of-Knowledge Levels for Four Content Areas" include: Language Arts (Reading, Writing), Mathematics, Science, and Social Studies.

A general definition for each of the four (Webb) Depth-of-Knowledge levels is followed by Table 1, which provides further specification and examples for each of the DOK levels. Webb recommends that large-scale, on-demand assessments in mathematics should only assess Depth of Knowledge Levels 1,2, and 3. Depth of Knowledge at Level 4 in mathematics should be reserved for local assessment.

Level 1 (Recall) includes the recall of information such as fact, definition, term, or a simple procedure, as well as performing a simple algorithm or applying a formula. That is, in mathematics a one-step, well-defined, and straight algorithmic procedure should be included at this lowest level. Other key words that signify a Level 1 include "identify," "recall," "recognize," "use," and "measure." Verbs such as "describe" and "explain" could be classified at different levels depending on what is to be described and explained.

Level 2 (Skill/Concept) includes the engagement of some mental processing beyond a habitual response. A Level 2 assessment item requires students to make some decisions as to how to approach the problem or activity, whereas Level 1 requires students to demonstrate a rote response, perform a well-known algorithm, follow a set procedure (like a recipe), or perform a clearly defined series of steps. Keywords that generally distinguish a Level 2 item include "classify," "organize," "estimate," "make observations," "collect and display data," and "compare data." These actions imply more than one step. For example, to compare data requires first identifying characteristics of the objects or phenomenon and then grouping or ordering the objects. Some action verbs, such as "explain," "describe," or "interpret" could be classified at different levels depending on the object of the action. For example, if an item required students to explain how light affects mass by indicating there is a relationship between light and heat, this is considered a Level 2. Interpreting information from a simple graph, requiring reading information from the graph, also is a Level 2. Interpreting information from a complex graph that requires some decisions on what features of the graph need to be considered and how information from the graph can be aggregated is a Level 3. Caution is warranted in interpreting Level 2 as only skills because some reviewers will interpret skills very narrowly, as primarily numerical skills, and such interpretation excludes from this level other skills such as visualization skills and probability skills, which may be more complex simply because they are less common. Other Level 2 activities include explaining the purpose and use of experimental procedures; carrying out experimental procedures; making observations and collecting data; classifying, organizing, and comparing data; and organizing and displaying data in tables, graphs, and charts.

Level 3 (Strategic Thinking) requires reasoning, planning, using evidence, and a higher level of thinking than the previous two levels. In most instances, requiring students to explain their thinking is a Level 3. Activities that require students to make conjectures are also at this level. The cognitive demands at Level 3 are complex and abstract. The complexity does not result from the fact that there are multiple answers, a possibility for both Levels 1 and 2, but because the task requires more demanding reasoning. An activity, however, that has more than one possible answer and requires students to justify the response they give would most likely be a Level 3. Other Level 3 activities include drawing conclusions from observations; citing evidence and developing a logical argument for concepts; explaining phenomena in terms of concepts; and using concepts to solve problems.

Level 4 (Extended Thinking) requires complex reasoning, planning, developing, and thinking most likely over an extended period of time. The extended time period is not a distinguishing factor if the required work is only repetitive and does not require applying significant conceptual understanding and higher-order thinking. For example, if a student has to take the water temperature from a river each day for a month and then construct a graph, this would be classified as a Level 2. However, if the student is to conduct a river study that requires taking into consideration a number of variables, this would be a Level 4. At Level 4, the cognitive demands of the task should be high and the work should be very complex. Students should be required to make several connections–relate ideas *within* the content area or *among* content areas–and have to select one approach among many alternatives on how the situation should be solved, in order to be at this highest level. Level 4 activities

include designing and conducting experiments; making connections between a finding and related concepts and phenomena; combining and synthesizing ideas into new concepts; and critiquing experimental designs.

Table 1: *Math Descriptors* - Combined Webb Depth of Knowledge Levels for Mathematics (Webb, 2002), NAEP 2002 Mathematics Levels of Complexity, and Other Descriptors Related to NECAP GLEs. (M. Petit, Center for Assessment 2003, K. Hess, Center for Assessment, updated 2005)

Level 1 **Recall**	**Level 2** **Skills/Concepts**	**Level 3** **Strategic Thinking**	**Level 4** **Extended Thinking**
Examples represent, but do not constitute all Level 1 mathematics performances: • Recall or recognize a fact, definitions, or term • Apply a well known algorithm • Apply a formula • Determine the area or perimeter of rectangles or triangles given a drawing and labels • Identify a plane or three dimensional figure • Measure a length • Perform a specified or routine procedure • Evaluate an expression • Solve a one-step word problem • Retrieve information from a table or graph • Recall, identify, or make conversions between and among representations or numbers (fractions, decimals, and percents), or within and between customary and metric measures • Locate numbers on a number line, or points on a coordinate grid • Solves linear equations • Represent math relationships in words, pictures, or symbols	**Examples represent, but do not constitute all Level 2 mathematics performances:** • Classify plane and three dimensional figures • Interpret information from a simple graph • Use models to represent mathematical concepts • Solve a **routine** problem requiring multiple steps, or the application of multiple concepts • Compare figures or statements • Compare and contrast figures • Provide justifications for steps in a solution process • Extend a pattern • Retrieve information from a table, graph, or figure and use it solve a problem requiring multiple steps • Translate between tables, graphs, words and symbolic notation • Select a procedure according to criteria and perform it	**Examples represent, but do not constitute all Level 3 mathematics performances:** • Interpret information from a complex graph • Explain thinking when more than one response is possible • Make and/or justify conjectures • Develop logical arguments for a concept • Use concepts to solve problems • Perform procedure with multiple steps and multiple decision points • Generalize a pattern • Describe, compare, and contrast solution methods • Formulate a mathematical model for a complex situation • Provide mathematical justifications • Solve a multiple-step problem, supported with a mathematical explanation that justifies the answer • Formulate an original problem, given a situation	**Examples represent, but do not constitute all Level 4 mathematics performances:** • Relate mathematical concepts to other content areas • Relate mathematical concepts to real-world applications in new situations • Apply a mathematical model to illuminate a problem, situation • Conduct a project that specifies a problem, identifies solution paths, solves the problem, and reports results • Design a mathematical model to inform and solve a practical or abstract situation ***NOTE**: Level 4 requires applying one approach among many to solve problems. Involves complex restructuring of data, establishing and evaluating criteria to solve problems.*