M & M's Packing and Shipping Problem

Setting: Your group of two people is one of many in the packing department for M & M's. The company is asking each work group in the packing department to help solve the problem:

What fully closed container, built out of the given material, will hold the largest volume of M&M's for safe and economical shipping?

1. Prove to the company executives that both the shape and dimensions of your group's container idea maximize the volume safely. You will turn in a convincing written report. Your group will also be asked to make a three-minute oral report at the next manager staff meeting. The reports will be judged for accuracy, thoroughness, and persuasiveness.

2. Build multiple models out of the posterboard to help your case. The models are not proof; they will illustrate the claims you offer in the report.

Criteria Used to Evaluate Reports

Accuracy:

- The volume of the final container is correct within 1% margin of error
- Formulas used are the right ones, and the computations using them are 100% correct
- The shape and size selected maximize the volume

Thoroughness of Research:

- Enough tests were made to support the group's claim for their container idea.
- The report explains some of the underlying math principles for the change in volume that occurs when shapes and dimensions are varied
- The report makes clear what differences, if any, there are between "pure" math answers and the math of this container; and why there are differences, if any.
- The "history" of your group's work—initial group member ideas, strategies followed, and key insights that occurred (and why)—are well documented in a separate section of the report

Persuasiveness:

- The written and oral reports are interesting, smoothly presented, and to the point; and the models are attractive and convincingly used
- The report would convince anyone, even other groups, that the container you propose is most likely to be the right one for the job
- All group members are equally knowledgeable; have some direct role in either the writing, speaking, model building, or responding to questions; and clearly have a good working relationship with one another.

APU science task, age 11

Find out relation of distance to wind-up with toy in shape of caterpillar

At the end of the play period the tester said: "Now see if you can find out how far it goes when the winder is turned completely round different numbers of times. Try three different numbers of complete turns..." After the student records results, answer predictive question with 'x' filled in by tester based on student's answer: Suppose you turned the winder *x* times, how far do you think it will go?

Scoring of tasks

1. Detailed checklists were used for each task. A sample from the wind-up toy experiment:

   - Makes good use of available space
   - turns winder exact number of complete turns, holding wheels
   - allows no unwinding before run begins
   - uses tape measure accurately (nearest 1/2 cm.)
   - makes reasonable prediction of distance with extra turns
   - uses quantitative pattern in evidence to make prediction
   - reports results consistent with evidence

2. During phase 3 (discussion with student), the same question was asked, and the answer scored:

   If you could do this experiment again, using the same things that you have here, would you do it in the same way or change some things that you did, to make the experiment better?

Responses were rated on a 3-point scale as follows:

	Rating
shows awareness of variables which were not controlled, procedures which turned out to be ineffective, the need to repeat measurement, or criticizes other factors which are central, not peripheral, to the investigation	**2**
shows awareness of alternative procedures but unaware of particular deficiencies of those used (does not have very good reasons for suggesting changes)	**1**
uncritical of procedures used, can suggest neither deficiencies nor alternative procedures	**0**

History Portfolio

narrative of primary-source documents and accounts

- conduct an oral history
- write a Supreme Court brief
- family history or biography
- school history

analysis of multiple conflicting secondary accounts

- US history as seen by British and Chinese textbooks
- research a famous/controversial past local event
- research an artifact - e.g. Standard of Ur

informative displays of artifacts

- museum exhibits, with audiotape and print support
- a web site,with links, on the history of a student interest: games, cars, fast food, school furniture, etc.

essay journalism

- history of a present-day event

research the history of an important idea

- democracy, privacy, manners, children's rights

uncoverage of an idea that the textbook simplistically covers

- "George Washington broke the rules of war…"

a historiography - what is history and what is its value?

- study US history textbooks over time and their emphases/changes of viewpoint
- research the problem of inadequate, incomplete, or questionable sources
- historical primary causes - people, ideas, events?
- essay on aphorisms about history - Ford, Santayana
- "Is history the history of the winners?"

Math and English Portfolios: New Standards

High School MATH Portfolio	High School ENGLISH Portfolio
Number and Operation (2-3 entries)	Reading Accomplishment in Literature
Geometry and Measurement (2-3 pieces)	Reading Accomplishment in Informational Materials
Functions and Algebra (2-3 pieces)	Reading Accomplishment in Public Documents
Probability and Statistics (2-3 pieces)	Reading Accomplishment in Functional Documents
Problem Solving (4 pieces)	Quantity, Range, and Depth in Reading
Mathematical Modeling (public audience)	A Literary Genre
Management and Planning (public audience)	A Report
Pure Mathematical Investigation (public audience)	A Narrative Procedure
History of a mathematical idea (public audience)	A Persuasive Essay
Evidence of Mathematical Skill (8-12 entries)	A Free Choice
Evidence of Mathematical Communication (5-6 prior entries)	Control of Writing Conventions
	Processes and Strategies in Writing
	Informal Speaking and Listening
	Speaking Accomplishment: Information
	Speaking Accomplishment: Influencing an Opinion
	Viewing
	Reflective Essay

Vignettes for Possible Task Ideas

1. You are an editor, and the following short story has been submitted to you from an unknown author. It reads very well. Maybe a little too well. You suspect plagiarism. Check out your suspicion and write a tactful but firm letter back to the "author" on the likely source.

2. Design and build a model of a science museum to proper scale and to budget. Propose the major people whose lives will be highlighted, and outline all the hands-on exhibits; build one of the exhibits. All the exhibits will be judged, in part, by students from younger grade-levels.

3. Investigate the packaging of foods. Why is a tuna fish can the size and shape it is? Why is milk often packaged in tetrahedron-shaped cartons in Europe?

4. Investigate the price of new technologies vs. the price of products five or six years after the innovation. What can we predict will be the price of new versions of today's CD players and computers in 2010?

5. You write for the *New York Times*. Do a "backwards history" feature article explaining a current event in light of its history (e.g. right-wing terrorism in America, The O.J. Simpson and other famous trials, etc.).

6. You find various artifacts in a simulated "dig." Determine their likely purpose and origin, and the likely traits of the people in question.

7. Build a "Rube Goldberg" machine for accomplishing a simple task in a complex mechanical way. It must exhibit or imply as many major physics principles studied as possible. Be prepared for an oral exam on your machine.

8. Develop a "Meeting of Minds" series on authors/scientists/historical figures related to the work being studied. Write the script, rehearse it, and give it on audiotape, in polished form, for use on a new NPR radio series based on the old Steve Allen shows.

Sample Tasks

A Machine Makes It Simple—Move it! Move it! Move it! How can you get wood to make a treehouse up that tree? Students will plan and diagram a simple machine to do just that. In a written report, they will explain how their machine works and the principles of physics involved to accomplish this task. (Science and Writing—Grades 6–12)

Arg-U Civic Minded?—The student will articulate and support one of six community stockholders' positions in a divisive civic issue (whether a much-needed recreation center should be built on a wooded tract popular with hikers and outdoor enthusiasts). Students then switch roles to that of a city council member who, after hearing all classmates' presentations, synthesize the information from all sides and arrive at a well-reasoned decision. The task assesses, in particular, a student's ability to empathetically assume a role, develop and argue persuasively a point of view, and synthesize information so as to arrive at a reasoned and well-supported decision. It is appropriate in grades 4–12 for persuasive writing, oral presentation, information synthesis, and decision making. It is also particularly appropriate for civics courses. (Writing, Oral Communication, and Social Studies—Grades 4–12)

Birds and Soldiers—Wildlife officials and politicians are at odds because of the rare red-cockade woodpecker on the Fort Bragg military base. Fort Bragg officials have to limit military training exercises because of the protection required for the birds under the Endangered Species Act. The Act states that an endangered bird's environment cannot be tampered with. Almost half the known red-cockade woodpecker population is located on the base. Your task is to propose a workable solution to the problem, based on a careful review of the military's needs and the relevant law. You will write a report and make a speech to a simulated EPA review board. (Grades 9-12)

Careers in Anthology Analysis!—A famous publishing house is assembling a new poetry anthology for students. They want students' input, and they are willing to pay for it! To find the student talent, they have organized a contest. Students around the country must be able to classify and explain poems. The winning student will get a $3,000 cash prize and a paid summer job with the publishing company helping them create the publishing anthology. You must choose six poems for this collection and write an introductory paragraph for each poem. Your paragraph should explain to the publishers why you think this poem should be included in an anthology (e.g. why would students want to read this poem?) and under what heading.

Federation/Confederation—This task involves three parts: (1) the student is asked to assume the role of a resident of a southern state on the eve of secession and deliver a speech from that person's perspective on whether or not the state should secede from the Union; (2) the student then

synthesizes the points from all speeches given and writes a letter to the editor of the local newspaper reflecting this person's re-examined point of view; and (3) the student writes a reflective piece in the person's journal, fifteen years later, re-examining the wisdom of the earlier stands. (Reading, Writing, Oral Communication, and Social Studies—Grades 9–12)

Garden Design—Students will plan a flower garden for a company with a logo that has side by side circular, rectangular, and triangular shapes. The product will be a labeled scale drawing and a list of how many plants of each type and color will be needed. (Mathematics—Grades 6–8)

Hazards Consultant—Sulfuric acid, lead nitrate, barium chloride dihydrate, and benzene represent common industrial waste materials—and environmental hazards. Propose a treatment for each in writing and demonstrate the success of that treatment in the lab. Your treatment must yield products at or below the lowest rating allowed by the National Fire Prevention on each of the four criteria rated: reactivity, flammability, health, and specific hazards of each. Your final write-up should state the degree of the danger of the waste, the effectiveness of the solution, and the approximate cost per use of the treatment. (Grades 10-12)

Moving Van Go—The student works for a moving company that plans to submit a bid for moving the contents of an office building to a new location. The student has the responsibility for determining the minimum volume of furniture and equipment that must be moved. The exemplary product will take into account (a) the stackability of the items, (b) the interlocking nature of non-cubical pieces, (c) the padding to protect the furniture, and (d) the number and size of the boxes needed to pack the small items. The students will prepare a written report setting out the volume of items to be moved and a rationale for the findings, and a chart showing how the items will be placed to minimize the volume needed. (Writing and Math—Grades 6-12)

Mythic Job Search—Select an epic hero from the literature we have read, and write a letter to the hero in which you apply for a job as a crew member on his expeditions. In the letter, you must be specific about the position for which you are applying, your qualifications for the job, and why you feel you would be an asset to the crew. Be sure to make your letter persuasive by making it clear you understand the particular struggles and adventures the hero and crew have already undertaken, and how you might be of value to them in handling such situations and difficulties. Write in business letter form, and include a résumé. (Grades 7-10)

News Hounds at the Tabard—You are a group of journalists in England during the Middle Ages for the *Good Morning, Canterbury* show. You are responsible for the full broadcast of the daily morning show. While hanging out at the Tabard Tavern, you notice a very diverse and noisy group of pilgrims and decide to make their stories the focus of your report. In journeying with them, you decide to incorporate the themes of

their stories into a news show that gives viewers a good understanding of the temperament of the times. This show will include: national news of England, the local news, job opportunities, fashion, entertainment, and editorial comment. After watching your show, a viewer should have an excellent understanding of what it must have been like to live in England during that time. (Reading, Writing, and Display—Grades 10-12)

One if by Mecklenburg...—Who started the American Revolution? North Carolina? Let's see. On April 30, 1819, *The Raleigh Register* published an article setting forth the claim that a group of leading citizens in Mecklenburg county declared their independence from Great Britain on May 19, 1775. In this task the student is asked to read original resources and do historical research to investigate the claim of the article. The task assesses processing information, problem solving, and communication**.** The student will prepare an essay setting forth his or her conclusion and the rationale for it. At the high school level, the student will also prepare a daily learning log citing problems faced and overcome. (Writing and Reading—Grades 7-12)

Sheetrocking a Home—Don't you hate being "ripped off!" We all do, but sometimes it's hard to tell. When contractors give us an estimate on home repairs, how can we know if the cost is reasonable? In this task, students will determine whether a sheetrocking contractor is giving accurate information, or trying to overcharge an uninformed customer. The task assesses knowledge of properties and relationships in geometry, as well as problem-solving skills. (Mathematics—Grades 8-12)

Towering Trees—Students must determine a linear function relating height and another appropriate variable. Using that equation, the student must use the most appropriate and cost effective size of plywood to construct some props for the North Carolina Summer Theater Arts Guild productions. The students must support their findings in an oral presentation and written report to their boss utilizing the necessary graphics and other visuals. (Oral Communication, Writing, and Mathematics/Linear Equations—Grades 8-12)

Troubled Waters—Headline News: "CONFLICT ON THE COAST—FRIENDLY RIVER BECOMES DEADLY. Major fish kills... 100,000 fish wash ashore; child returns from swim with hives; seafood harvest plummets; and scientist discovers fish killing invader!" What is the problem? In this task students take on the role of the "Riverkeeper," whose job it is to maintain healthy rivers. Students will analyze data gathered along the Anywhere River, pinpoint pollution hotspots, and research to determine potential sources. Two letters will be drafted: (1) an informative letter to fisherman; and (2) a powerful, convincing letter to an agency convincing them to address this situation. (Writing, Mathematics, and Science—Grades 10-12)

True Concessions—Students will use data from the previous two years to decide on an amount of food to order for this

year's concession stand at the local football stadium. A list of food and amounts of each must be generated and be accompanied by a written justification. (Mathematics/Pre-Algebra—Grades 7-8)

Water Treatment—"How can we sell new lakeside houses with dirty lakes? We've got to clear the sediment in this water, but we also must save the fish!" After reading memos from an environmental lab describing a problem with sediment in five area lakes, student teams will propose a solution to the problem. (Reading, Mathematics–Geometry, Technology, and Communications—Grades 9-12)

What a Find—You are a professor of literature at a local college. A friend is on the board of the local library, which has just burned down. All the records about the library's history were destroyed. In the ruins, the original corner stone was found. Inside the corner stone is a collection of literature. The friend feels confident that this collection will be key in determining when the library was originally built. The friend asks you to identify when the literature was written. In addition, the corner stone is to be re-used in the reconstructed library. You should suggest a collection of literature to be placed in the corner stone that best reflects the post-Viet Nam era in American history. (Reading and Writing—Grade 12)

Task Design Criteria

Authentic, Credible, User-Friendly

Authentic:

- realistic problem/task
- realistic options and constraints
- realistic criteria
- realistic standards
- realistic audience
- genuine purpose

Credible:

- valid
- reliable
- rigorous content standards
- rigorous performance standards

User-Friendly

- feasible
- appropriate (given experience/age of students)
- enticing and engaging
- feedback rich
- rehearsal and revision built in
- clear and complete set of instructions, guidelines, models, troubleshooting available

Rating Criteria

❒ Yes ❒ No Credible OVERALL RATING: 1----2----3----4

❒ Yes ❒ No Does it measure what it says it measures?
Is this a valid assessment of the targeted achievement?
❒ Yes ❒ No Are the scoring criteria and rubrics clear, descriptive and explicitly related to district goals and standards?
❒ Yes ❒ No Is the scoring system based on genuine standards and criteria, derived from analysis of credible models?
❒ Yes ❒ No Does the task require a sophisticated understanding of required content?
❒ Yes ❒ No Does the task require a high degree of intellectual skill and performance quality?
❒ Yes ❒ No Does the task simulate authentic, real-world challenges, contexts, and constraints faced by adult professionals, consumers or citizens?
❒ Yes ❒ No Does the scoring system enable a reliable yet adequately fine discrimination of degree of quality?

Instructionally Worthy OVERALL RATING: 1----2----3----4

❒ Yes ❒ No Does the task require learnings at the heart of the curriculum?
❒ Yes ❒ No Is the task worthy of the time and energy required to complete it well?
❒ Yes ❒ No Is the task challenging – an apt "stretch" for students?
❒ Yes ❒ No Will the feedback to students en route enable them to self-assess and self-adjust?
❒ Yes ❒ No Will the students likely be able to verify resultant scores and use feedback to improve later performance?

User Friendly OVERALL RATING: 1----2----3----4

❒ Yes ❒ No Is the task an engaging one for students?
❒ Yes ❒ No Does the task permit an *appropriate* latitude in style and approach necessary for the student to display her/his own strength?
❒ Yes ❒ No Are the directions to the student and teacher clear and thorough, but concise?
❒ Yes ❒ No Are the responsibilities of the student/teacher/assessor self-evident and well integrated?
❒ Yes ❒ No Will teachers likely gain useful feedback about instruction from the overall results?

What is Authenticity?

Typical test	"Authentic" task	Indicators of authenticity
Requires correct responses only	Requires quality product and/or performance, and justification	We assess whether the student can explain, apply, self-adjust, or justify answers, not just the correctness of answers using facts & algorithms.
Must be unknown in advance to insure validity	Known as much as possible in advance; the 'test' involves excelling at predictable demanding and core tasks; not a "gotcha!" experience	The tasks, criteria, and standards by which work will be judged are predictable or known—like the recital piece, the play, engines to be fixed, proposals to a client, etc.
Disconnected from a realistic context and realistic constraints	"Real-world" use of knowledge is required: the student must 'do' history, science, etc. in realistic simulation or actual use	A challenge and set of constraints that are authentic—likely to be encountered by the professional, citizen, or consumer. (Know-how, not plugging in, is required.)
Isolated "items" requiring use or recognition of known answers or skills	An integrated challenge in which knowledge and judgment must be innovatively used to fashion a quality product or performance	The task is multi-faceted and non-routine, even if there is a "right" answer. The task thus requires problem clarifying, trial and error, adjustments, adapting to the case or facts at hand, etc.
Simplified so as to be easy to score reliably	Complex and non-arbitrary tasks, criteria, and standards	The task involves the important aspects of performance and/or core challenges of the field of study, not the easily-scored; does not sacrifice validity for reliability.
One-shot	Iterative: recurring essential tasks, genres, and standards	The work is designed to reveal whether the student has achieved real vs. pseudo mastery or understanding vs. mere familiarity over time.
Depends upon highly-technical correlations	Provides direct evidence, involving tasks that have been validated against core adult roles and discipline-based challenges	The task is valid and fair on its face. It thus evokes student interest and persistence; seems apt and challenging to students and teachers.
Provides a score, and/or limited feedback after the fact	Provides usable, diagnostic (sometimes concurrent) feedback: the student is able to confirm result and self-adjust as needed	The assessment is designed not merely to audit performance but to improve future performance. The student is seen as the primary 'customer' of information.

Rubrics

Assessing Assessment Reform

	Assessing Assessment Reform	% of staff
7	Assessment reform is internalized. Staff member has a full understanding of principles and practice; effectively uses the techniques independently, comfortably and naturally; teaches others why reform is vital and how to design and/or critique new assessments.	
6	Reform has been actively engaged. Staff member uses new approaches to assessment frequently, as part of expanded repertoire, and seeks opportunities to engage in dialogue about questions which arise from classroom practice.	
5	Reform has been engaged. Staff member uses the new methods occasionally, working to incorporate the change, but needs some incentive, extra time and/or frequent coaching in the planning and implementation stages.	
4	Reform has come to be a shared vision. Staff member seeks to incorporate the new methods, even if only tentatively, but is committed to support the shift. Staff member also seeks opportunities to see new assessments in practice, to see "how it works" in the classroom, and to support on-going staff inquiry.	
3	Reform is grasped as desirable in principle. The staff member can talk about the whys and whats of reform with knowledge, seeing the need at both the institutional and classroom levels. Knowledge of design and use issues is mostly abstract.	
2	Assessment is a source of curiosity. Staff member may or may not seek opportunities to explore new approaches to assessment but is supportive of reform work, and can talk about the possible benefits of change (even if talk is tempered by qualifications, skepticism, or anxiety about such change).	
1	Staff member is satisfied with current practice in assessment, seeing no need for reform. "It ain't broke."	

Criteria for evaluating reform:

- depth of commitment to assessment reform by individuals
- breadth of commitment to assessment reform across faculty
- degree of mastery of ideas about assessment reform, design
- degree of mastery of assessment design and use

	novice	**apprentice**	**practitioner**	**expert**
designer attitudes and insights:				
designer comfort and attitude	I sense the value of rubrics, but it all seems too daunting and time-consuming. I can't imagine how I will find the time to do this. It seems like more work than can ever repay the effort. I am unclear about the differences between good and bad rubrics. I am unsure how this work will help my students who don't get what I am after, although I see the theoretical value in knowing what is expected.	I find this a worthy challenge but just when I think I get it, the ground shifts under me. The work does not come easily. Though I can see the benefits, I fear that rubrics don't go much beyond what I am now offering as feedback or that they will stifle creativity in students. And I don't see how it is feasible to assess for the 'impact' or desired effect since that is so controversial or subjective. I can write rubrics but I haven't yet seen firsthand how student performance improves through them.	I am comfortable using rubrics for tasks - but it's still hard work. I have seen their value for students and for me in clarifying goals and improving performance, and I see how they become cost-effective over time. I am not yet able to design complex developmental rubrics or rubrics for hard-to-measure things like habits of mind or ethical conduct, nor am I confident that it would be worth my while to try.	I can't imagine a world without rubrics. I can design and critique all types of rubrics. I am comfortable teaching others how to design and edit their rubrics. I see that anything to be scored can be made into a rubric, that it enables better performance, and doesn't stifle innovation - as long as we agree on the purposes of performance, stick to the right impact-related criteria, and don't fixate on arbitrary methods or formats in scoring work.

Seminar Rubrics

	Conduct	Leadership	Reasoning	Listening	Reading
Excellent	Demonstrates respect, enthusiasm , and skill for the purpose of seminar: insight into important texts and ideas, gained through the interplay of collaborative and personal inquiry into a text. Demonstrates in speech and manner a habitual respect for the the text, reasoned discussion, and shared inquiry. Effectively contributes to deepen and broaden the conversation, revealing exemplary habits of mind.	Takes clear responsibility for the seminar's progress or lack of it. Takes stock of the overall direction and effectiveness of the discussion, and takes apt steps to refocus or redirect conversation and/or to cause others to rethink previous statements. Offers apt feedback and effective guidance to others. Takes steps to involve reticent participants and to insure that unnoticed points are attended to.	Arguments are so reasonable, apt, logical and substantiated with evidence from the text as to consistently move the conversation forward and deepen the inquiry effectively. The analyses made are helpful in clarifying complex ideas. Criticisms made are never ad hominen.	Listens unusually well. Takes steps routinely to comprehend what is said, is consistently attentive (as reflected in direct and indirect evidence). Later responses (actions, comments, and writings) indicate accurate and perceptive recall of what was said and by whom.	Conduct and written work indicate student has read the text carefully, is thoroughly familiar with the text its main ideas, can offer insightful interpretations and evaluations of it, is respectful of the text while also reading it critically, and has come prepared with thoughtful questions and reactions.
Good	Demonstrates in speech and manner an overall respect for and understanding of the goals, processes, and norms of reasoned discussion and shared inquiry. Participates to advance conversation and displays mature habits of mind, but may be sometimes ineffective in sharing insights, advancing inquiry or working with others.	Is generally willing to take on facilitative roles and responsibilities. Either: makes regular efforts to be helpful (in moving the conversation forward and/or including others in it) but is sometimes ineffective in doing so. Or: does not typically take a leadership role but is effective when does so.	Arguments are generally reasonable, apt, and logical. There may be some minor flaws in reasoning, evidence, or aptness of remarks, but the ideas contribute to an understanding of the text or comments made by others. Criticisms are rarely ad hominem.	Listens well. Takes steps to comprehend what is said. Generally pays attention and/or responds appropriately to ideas and questions offered by other participants. Later responses involve accurate recall of what was said, and by whom.	Conduct and written work generally indicate student has read the text carefully, grasps the main ideas, can offer reasonable (if sometimes incomplete or surface) interpretations, has come with apt questions and ideas regarding the text.

	Conduct	Leadership	Reasoning	Listening	Reading
Fair	Speech and manner suggest the student misunderstands the purpose of the discussion and/or is undisciplined concerning seminar practices and habits of mind. May contribute, even frequently, to the conversation, but is ineffective due to opinionated,unclear and/or inadequately explicit views.	Takes on facilitative roles and responsibilities infrequently and/or ineffectively. When taking on a leadership role, may misconstrue the responsibility by lobbying for favored opinions or speakers only, and/or by trying to close off discussion of diverse and unresolved views in favor of neat-and-clean premature closure.	Unsubstantiated or undeveloped opinions are offered more than sound arguments. Comments suggest the student has some difficulty in moving beyond mere reactions to more thorough arguments, or difficulty in following the complex arguments of others (as reflected in questions asked and/or non sequiturs). Student may sometimes resort to ad hominem attacks instead of focusing on the critique of claims and arguments	Does not regularly listen very well and/or is not always attentive, as reflected in comments and body language. Verbal reactions reflect an earlier difficulty or failure to listen carefully to what was said. Behavior may signify either that the stduent lacks effective note-taking strategies and/or does not grasp the importance of listening to different points of view and reflecting upon them.	Comments indicate that the student may have read the text but that the student has EITHER misunderstood the text (due to difficulties in reading and/or from assuming a stance that is too ego-centric or present-centered). OR the student has not put enough disciplined and focused effort into preparing for seminar. Varying patterns of participation also suggest that the student's preparation is inconsistent.
Unsatisfactory	Speech and manner display little respect for and/or understanding of the seminar process. Student appears to lack essential habits of mind: is either routinely argumentative, distracting, and/or obstinate OR student is disengaged -- extremely reluctant to participate, even when called upon (to the point of making others feel the detachment).	Plays no active facilitation role of any kind OR actions are consistently counter-productive in that role.	Comments suggest student has great difficulty with analytical requirements of seminar. Remarks routinely appear to be *non sequiturs* and/or so illogical or without substantiation as to be not followable by others. Student may often resort to ad hominem comments to text author and other students.	Does not listen adequately, as reflected in later questions or comments (e.g. non sequiturs and repetition of earlier points as if they hadn't been spoken) and/or body language that is very suggestive of inattentiveness.	Student is EITHER generally unable to make adequate meaning of texts OR has generally come to class unprepared. The student may be unable to read complex texts and/or may not know or use disciplined strategies for understanding and taking notes on such texts.

Rubric for Mathematics: Sophistication

6 Shows a sophisticated understanding of numbers and how to use mathematics in context. The collected body of work shows insightful control of key concepts, evidence, proofs, qualifications made, questions posed, and/or methods. Grasps the essence of complex problems and applies the most powerful mathematical tools in solving them. Can understand particular challenges as instances of more abstract and powerful mathematical models. The work shows that the student is able to adapt models and concepts to particular and varied situations, and make subtle distinctions.

5 Shows a mature understanding of numbers and how to use mathematics in context. The concepts, evidence, arguments and methods used are appropriate for solving a variety of challenging problem(s) efficiently and effectively. Grasps the essence of the problems and applies appropriate and effective (though not necessarily the most sophisticated) tools in solving them.

4 Shows a good understanding of numbers and mathematics. The concepts, evidence, arguments and methods used are appropriate for solving the problem efficiently and effectively. Frames the problems appropriately and applies apt methods. There may be limits to their understanding or naivete in their response, but the work is on target, basic mathematical tools, concepts, and procedures are used. There are few misunderstandings or overly-simplistic approaches to problem solving in their work.

3 Shows an adequate understanding of numbers and how to use mathematics in context. Work reveals control of knowledge, concepts, and/or methods that enable the problem(s) to be solved, but there may be evidence of some misunderstanding of key ideas. There is less subtlety/discrimination/ nuance than found in the more sophisticated work. The tools used may well yield correct or complete answers but the approach/concepts/methods used are more simplistic and less mature than we would expect at this level of experience.

2 Shows a basic understanding of numbers and how to use mathematics in context. Simple rules/formulae/approaches/concepts are used. The student's work may be adequate to address all or most aspects of the problems encountered, but the concepts and methods used are limited to elementary approaches or formulaic problem-solving.

1 Shows a rudimentary understanding of numbers, basic operations, and how to use mathematics in context. The work shows limited experience in problem-framing: plug-in approaches are taken, and there is little evidence of checking the appropriateness of the method and/or answer against the nature of the problem and needed solutions in context.

Other rubrics for:

- Accuracy
- Reasoning
- Presentation

NAEP Mathematics Scoring (adapted)

Level 5 - Problem-solving with Multi-Step Problems and Algebra:

Learners can routinely solve simple algebra problems and tasks involving fractions and percents,

- They recognize properties of geometric figures,
- They work comfortably with exponents and square roots.
- They can solve a variety of two-step problems using variables, identify equivalent algebraic expressions
- They can solve linear equations and inequalities.
- They are developing an understanding of functions and coordinate systems.

Level 4 - Problem-Solving With Complex Pre-Algebra Procedures, Concepts, And Reasoning:

Learners are developing an abstract understanding of number systems. They can:

- compute with decimals, simple fractions and commonly-encountered percents.
- identify geometric figures, measure lengths and angles, and calculate areas of rectangles.
- interpret simple inequalities, evaluate formulas and solve simple linear equations.
- find averages, make decisions on information drawn from graphs, and use logical reasoning to solve problems.
- operate with basic problems with signed numbers, exponents and square roots.

Level 3 - Problem-solving with Advanced Arithmetic:

Learners have an initial understanding of the four basic operations. They can:

- apply whole number addition and subtraction skills to 1-step word problems and money situations.
- find the product of a 2-digit and 1-digit number.
- compare information from graphs and charts.
- analyze logical relations

Level 2 - Beginning Skills & Understanding:

Learners at this level have considerable understanding of 2-digit numbers. They can:

- add 2-digit numbers, but are still developing an ability to regroup in subtraction
- use some basic multiplication and division facts
- recognize relations among coins
- read information from charts and graphs
- use simple measurement instruments
- demonstrate basic reasoning skill in justifying answers and approaches

Level 1 - Simple Arithmetic:

Learners at this level know some basic addition and subtraction facts. They can:

- add 2-digit numbers without regrouping
- recognize simple situations in which addition and subtraction apply
- classify and group numbers and problems by type

Science Rubric: Great Britain K–12

6 Pupils use scientific knowledge and understanding to identify the key factors they need to consider and, where appropriate, to make predictions. They make observations and measure with precision a variety of quantities, using instruments with fine divisions. They make enough measurements and observations for the task. They choose scales for graphs that enable them to show appropriate data effectively. They identify measurements and observations that do not fit the main pattern or trend shown. They draw conclusions that are consistent with the evidence and explain these using scientific knowledge and understanding.

5 Pupils identify the key factors they need to consider in contexts that involve only a few factors. Where appropriate, they make predictions based on their scientific knowledge and understanding. They select apparatus for a long range of tasks and use it with care. They make a series of observations or measurements with precision appropriate to the task. They begin to repeat observations and measurements and to offer simple explanations for any differences they encounter. They record observations and measurements systematically and present data as line graphs. They draw conclusions that are consistent with the evidence and begin to relate these to scientific knowledge and understanding.

4 Pupils recognize the need for fair tests, describing, or showing in the way they perform their task, how to vary one factor while keeping others the same. Where appropriate, they make predictions. They select suitable equipment to use and make a series of observations and measurements that are adequate for the task. They present their observations and measurements clearly, using tables and bar charts. They begin to plot points to form simple graphs and use these graphs to point out and interpret patterns or trends in their data. They take account of these patterns when they draw conclusions, and begin to relate their conclusions to scientific knowledge and understanding.

3 Pupils respond to suggestions, put forward their own ideas and, where appropriate, make simple predictions. They make relevant observations and measure quantities, such as length or mass, using a range of simple equipment.
With some help they carry out a fair test, recognizing and explaining why it is fair. They record their observations in a variety of ways. They provide explanations for observations and, where they occur, for simple patterns in recorded measurements. They say what they have found out from their work.

2 Pupils respond to suggestions of how to find things out and, with help, make their own suggestions. They use simple equipment provided and make observations related to their task. They compare objects, living things and events they observe. They describe their observations and record them using simple tables where it is appropriate to do so. They say whether what happened was what was expected.

1 Pupils describe simple features of objects, living things and events they observe, communicating their findings in simple ways, such as by talking about their work or through drawings or simple charts.

Scoring rubric for AP essay

9-8 These well-written essays identify clearly connotative differences between each pairs of words they describe; and they illustrate those differences with apt examples, providing a full context in which the words' extended meanings can be understood. The essays demonstrate stylistic maturity by an effective command of sentence structure, diction, and organization. The writing need not be without flaws, but it reveals the writer's ability to choose from and control a wide range of the elements of effective writing.

7-6 These essays generally locate important differences between each pairs of words, but their discussion is less detailed than that in the best essays, and those that treat more than a single pair are less unified. They are also likely to provide fewer means of understanding the words in their context. The essays are well written in an appropriate style, but with less maturity than the top papers. Some lapses in diction or syntax may be present, but the writing demonstrates sufficient control over the elements of composition...

5 These essays touch on most of the relevant matters but do so in a manner that is less than wholly convincing. They may blur the differences or make use of weak examples. They are adequately written, but without demonstrating control over the full range of the elements of composition. Organization will be evident, but it may not be fully realized or particularly effective.

4-3 These essays identify the distinctions...but they do not define a context that establishes the words' connotations, or they fail to make the differences clear. The writing is sufficient, but it suggests weak control over diction, syntax, or organization...Essays may contain consistent spelling errors or some errors in grammar...The statements are seldom supported with specific or persuasive evidence.

2-1 These essays fail to provide convincing distinctions between the words...and they do not demonstrate an adequate sense of the contexts in which the words acquire their connotative meanings. They are unacceptably brief or poorly written on several counts...Although some attempt to answer the question has been made, there is little evidence supplied for the writer's assertions.

Writing Rubric: CLASS K-12

Level	
6	• Writing has mature and significant impact, achieving striking effects in all genres. Papers are polished and engaging, with hardly any distracting mistakes. • The work is well developed and clear, with control of each genre as well as of diverse purposes and audiences. Writing is rarely formulaic or predictable. • Writing reveals ability to organize complex or subtle subject matter or narrative ideas clearly and effectively. Intellectual risks are taken in subject matter and writing style. • Writing reveals an assured, selective, and appropriate use of a wide range of grammatical constructions, vocabulary, and writing techniques. A chosen style is consistently maintained. • The work reveals a distinctive and mature personal style, an obvious control over, and comfort with polished written expression.
5	• Writing has impact: writings reveal a consistent ability to inform, persuade, describe carefully rather than tell, reveal astute observations about people, etc. • Fine samples exist in all key genres, written at appropriate length, with a clear sense of purpose and audience. • There are well-structured, well-developed and fluid pieces of writing, some of which handle more demanding narratives or subject-matter, e.g. going beyond first-hand experience, describing complex theories or events, etc. • Writing reveals an assured and deliberate use of a wide range of syntax, vocabulary, and sophisticated techniques (such as irony) in addition to control over standard English.
4	• Writing reveals control of all key genres of writing, showing consistent ability to present subject matter effectively and differently for various specified audiences. • Writing reveals good use of literary stylistic features, such as alteration of word order for emphasis or the deliberate repetition of words or sentence patterns. Student is taking risks beyond formulaic approaches to form and content. • Writing is in standard English (except in contexts where non-standard forms are appropriate), and shows an increasing differentiation between speech and writing. • Some writing shows polish and consistent control of standard English.

3

- Writing samples exist in a variety of genres and are often effective (persuasive, imaginative, clear, etc.)
- The main features of different genres of writing are used appropriately, beginning to be adapted to different readers and purposes.
- Words and phrasings are varied and clearly chosen for interest and variety. Writing is typically formulaic, but shows signs of style.
- Writing is in standard English (except in contexts where non-standard forms are appropriate).

2

- Writing samples exist in most, if not all, genres.
- There are some successful attempts to structure and craft words to achieve a desired effect.
- Vocabulary and writing techniques are more varied but typically limited to formulaic approaches
- Writing reveals that the student has some control over the basic features of standard English.

1

- Writing reveals a basic ability to present basic subject matter in a structured way, typically in brief stories, first-person accounts, or in simple descriptions.
- Stories have an opening, a setting, characters, a series of events, and a resolution.
- Non-chronological writings (descriptions, directions, etc.) are written in orderly ways
- Writing reveals limited control over standard English.

Feedback

What is good feedback?[1]

Effective Feedback	Ineffective Feedback
Provides confirming (or disconfirming) useful evidence of effect, given intent, e.g. a map and road signs • compare work to anchor papers and rubrics	Provides non-specific advice, praise/blame, or exhortations, e.g. "try harder," "Your writing is awful," or "Good job!" • a mere score on the paper
Compares current performance and trend vs. successful result (standard), e.g. the taste and appearance of the food, not the recipe, guarantee the meal will come out as described • student work compared against exemplars and criteria	Naively assumes that "process" (instructions, hard work, and advice) are sufficient to reach goal, e.g. planting seeds and diligently watering according to package does not ensure a successful garden • students given only directions on how to complete assignment, no guidance on specific standards of final products
Timely: immediate or performer-friendly in its immediacy • feedback from audience and conductor during recital	Not timely: too long a delay in usability; or too late to use • feedback weeks later, in the summer, on a standardized test
Frequent and on-going	Infrequent, given once
Descriptive language predominates in assessing aspects of performance (e.g. you made a left turn onto Main St. instead of a right turn) • rubrics describe qualities of performance using concrete indicators and traits unique to each level	Evaluative or comparative language predominates in assessing performance (e.g. you made many correct turns and one incorrect turn; your navigating is greatly improved and better than most of your peers) • rubrics basically amount to "excellent" "good" "fair" and "poor" with no insight into the characteristics that lead to such value judgment

[1] This chart and these ideas are discussed at length in Grant Wiggins', *Educative Assessment: Designing Assessment to Inform and Improve Student Performance*, Jossey-Bass Publishers (1998).

Effective Feedback	Ineffective Feedback
The performer perceives a specific, tangible effect, later symbolized by an apt score that the performer sees is an apt reflection of the effect • the score given by a band judge, in competition, in terms of specific criteria the grade or score confirms what was apparent to the performer about the quality of the performance after it happened	There is no tangible effect or useful result visible to the performer (beyond a score) • a grade at the top of a paper handed back the evaluation process remains mysterious or arbitrary to the performer, no matter how valid and reliable the test and score are to the expert
The result sought is derived from true models (exemplars) first-grade evaluation of reading is linked to the capacities of successful adult reader: the reading rubric is longitudinal and anchored by expert reading behaviors i.e. feedback in terms of the goal—the specific accomplishments of those who effectively read to learn	The result sought is derived from an simplistic goal statement • the feedback to first-grade readers relates only to checklists: the reading rubric is limited to age-grade skills i.e. too much feedback in terms of learning to read, not enough in terms of reading to learn
Enables performers to improve through self-assessment and self-adjustment	Keeps the performers constantly dependent upon the judge to know how they did

"The best writing is vigorous, committed, honest, and interesting."—English for ages five to 16, National Curriculum, United Kingdom

Student to Teacher Bi-Weekly Feedback Sheets

IN THIS CLASS I FEEL:

important	1	2	3	4	5	ignored, useless
comfortable	1	2	3	4	5	Uncomfortable
involved	1	2	3	4	5	bored
part of a team	1	2	3	4	5	Alone
good about my work	1	2	3	4	5	bad about my work
sure of where I stand	1	2	3	4	5	not sure where I stand

THE TEACHER HAS BEEN:

prepared	1	2	3	4	5	unprepared
fair	1	2	3	4	5	unfair
helpful	1	2	3	4	5	unhelpful
well-organized	1	2	3	4	5	lacking organization
clear about what's expected	1	2	3	4	5	unclear about expected
sensitive to my needs	1	2	3	4	5	insensitive to my needs
fully engaged and excited	1	2	3	4	5	seemingly bored
knowledgeable	1	2	3	4	5	not on top of their subject
able to make difficult ideas accessible and interesting	1	2	3	4	5	over our heads

OUR WORK HAS GENERALLY BEEN:

thought-provoking	1	2	3	4	5	dull
effective in helping me learn	1	2	3	4	5	ineffective in helping me learn
too fast	1	2	3	4	5	too slow
too easy	1	2	3	4	5	too hard
too much the same	1	2	3	4	5	too unpredictable
too abstract	1	2	3	4	5	too simplistic
too little	1	2	3	4	5	too much

Comments: what worked this week? What didn't? Why?

Workshop Evaluation

My purpose as presenter is to establish a clear vision of educative assessment, and to suggest, in general terms, what we must do to honor that vision. My talk is meant to be as thought provoking, suggestive, and useful as is possible in this setting and time frame.

1. So far the presentation has been:

useful	1	2	3	4	not useful
thought-provoking	1	2	3	4	boring
clear	1	2	3	4	confusing
filled with helpful examples	1	2	3	4	poor or too few apt examples
visionary	1	2	3	4	unrealistic
important	1	2	3	4	unimportant

Comments:

2. As speaker, I have been:

friendly	1	2	3	4	aloof, arrogant
open to your questions and concerns	1	2	3	4	unresponsive

Comments:

3. To what extent am I achieving my purpose so far?

successful	1	2	3	4	unsuccessful

Comments:

4. Your aim today may be different from mine. To what extent am I en route to addressing your needs and questions?

successful	1	2	3	4	unsuccessful

Comments:

5. Summarize the main points I am making in a few phrases (What is clearly important to me?).

6. Summarize what is most noteworthy (What has thus far been most important or illuminating to you?).

7. What are the main raised and/or unanswered questions you have to this point?

8. What one or two things should I do or address in the remaining time to make the session most helpful to you?