

Guide Book

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**Los Angeles Learning Center
Alternative Assessment Guidebook**

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Chapter 1: Los Angeles Learning Center Alternative Assessment Guidebook

Pamela Aschbacher

SECTION 1: INTRODUCTION

As we set our sights on excellence and try to track our progress, assessment plays a very important role. It should be able to help teachers answer two critical questions: How well are students doing? How can we and they do better? In addition, assessment also helps educators set standards or expectations for what students should know, motivate students to learn, and communicate progress to others.¹

Assessment, as well as curriculum and instruction, should reflect our best understanding of how students learn and what they should know. According to contemporary (“constructivist”) theories of learning, to *know* something is not just to receive passively and memorize new information, but to organize and interpret it in light of one’s prior knowledge and experience, to manipulate the ideas in various ways to build up layers of understanding, and to use this new information to revise one’s understanding of the world. Thus learning is a very personal process that is enriched by opportunities to elaborate, collaborate, and discuss. Furthermore, modern theories of learning recognize the value of having not only deep content knowledge but also processes and strategies—for example, knowing *how* to do certain things, *when* it is appropriate or inappropriate to do them or to apply information, and how to *adapt* performances to new settings or problem situations (Resnick & Klopfer, 1989). In the Los Angeles Learning Centers, such desired outcomes or learning goals grow out of the *LALC Standards for Student Learning*.

Research has shown that many of the tests commonly used in school tend to focus on easily measured basic skills and facts (Stiggins, 1989). In so doing, we may fail to measure important and complex areas of student knowledge, skills, and strategies. But even more importantly, what is tested becomes the de facto standard for what students are expected to know. Tests of low level skills and facts not only reflect but also reinforce low expectations for student achievement. Students, parents, and teachers come to believe that if something is not tested, it is probably not very important to learn. To reverse this trend, teachers and other stakeholders need to have a sharp focus on high standards for student learning and to have an array of assessment tools to motivate and monitor progress in student learning.

LALC teachers are continually expanding their repertoire of assessment skills to support excellent instruction towards high standards of achievement. Their repertoire includes performance-based assessments and portfolios. Using a

¹ For a more thorough discussion of assessment see *A Practical Guide to Alternative Assessment* by Herman, Aschbacher, and Winters, 1992.

variety of measures helps teachers obtain a more valid and comprehensive picture of what students know and can do.

Guidebook Contents

Most teachers have had little preservice training in assessment, so it is important that they have access to good professional development on how to develop and use good assessment tools. The LALC Program provides for professional development in assessment as well as other topics, and it also provides models for developing performance assessments and portfolios that LALC teachers can use in their classrooms. These models can also be used by the Learning Centers to monitor schoolwide progress in a variety of different grade levels and content areas. The models are based on research done at the National Center for Research on Evaluation, Standards, and Student Testing (CRESST). This guidebook describes each model, its rationale, and how it may be applied in the classroom or to monitor school progress as part of a comprehensive school assessment system.

The guidebook provides some other useful information for potential new LA Learning Centers: an outline of professional development that stakeholders in a Learning Center might find useful; typical obstacles to implementation that may be encountered and suggestions for dealing with them; and a list of good resources on student assessment.

SECTION 2: IMPLEMENTING ASSESSMENTS

CRESST Performance Assessment Model

CRESST's model of performance assessment is comprised of several types of assessment tasks keyed to the kinds of important cognitive performances called for in the *LALC Standards for Student Learning* (see Figure 1). The model serves as a kind of menu for some of the many different types of learning experiences and assessment tasks that teachers might have their students do. These assessments should be developed so that they provide insights into students' prior knowledge about the topic at hand, important conceptual understandings and misconceptions, ability to explain what they know, solving problems, seeing connections, and evaluating their work. With information about this array of student abilities, teachers can more readily diagnose student learning needs and adjust their curriculum and instruction to improve learning.

Not all of the tasks described in the model need to be used at any point in time, and teachers may want to create their own components as well. This model has been used with upper elementary through high school students in a variety of subject areas. It can also be adapted for use with lower elementary students by relying less on reading and writing. With appropriate professional development, LALC teachers learn to create such alternative assessments to use in their classrooms.

Figure 1
The Components of the CRESST Performance Assessment Model

Test Component	Cognitive Performances	Scoring Dimensions
Part 1: Basic Knowledge	Recollection of basic concepts, vocabulary, calculations, and misconceptions	Accuracy of factual and conceptual knowledge and basic procedures or algorithms
Part 2: Inquiry (optional: group process)	Obtaining information through experimentation, observation or reading; may involve group inquiry and discussion or products such as synthesizing new information and applying complex thinking skills, e.g., interpretation, prediction	This part represents learning opportunities and is not scored; however, in the classroom, a teacher might score group participation and interaction skills, and appropriate synthesis or application of new concepts and factual knowledge
Part 3: Explanation	Deep understanding of important issues; written explanation	Quality of content; Use of concepts and principles; Factual knowledge; Misconceptions; Argumentation; Interdisciplinary ideas; Writing mechanics
Part 4: Problem Solving	Solving problem; explaining solution	Analysis of problem; application of relevant knowledge; feasibility of solution
Part 5: Representation of knowledge	Creation of a concept map showing links among important concepts	Number of connections; quality or sophistication of links
Part 6: Metacognition	Reflections on learning; evaluation of performance; setting future goals	Depth or sophistication; accuracy of evaluation; feasible yet challenging goals

Developing performance assessments for use in a classroom, whether or not they match the CRESST model, entails several steps, summarized here but described in detail in *A Practical Guide to Alternative Assessment* by Herman, Aschbacher, and Winters, 1992:

- Know why you are assessing your students;
- Decide what desired learning outcomes to measure;
- Design assessment tasks that elicit these outcomes (e.g., the knowledge, skills, processes, attitudes, and so forth that students should have);
- Specify criteria for judging the quality of student work (grading);

- Plan how to judge or grade the work fairly, consistently, and accurately;
- Use the results to meet your assessment purpose, for example, to communicate findings to students, parents and others; to draw implications for improving your teaching; to make generalizations about how well students are learning from the curriculum.

The CRESST assessment model can be used to develop standard tests (i.e., the same prompts are given to all fifth graders) to assess schoolwide learning, as was done to evaluate the program at the first two Learning Centers during the 1994-95 school year. Chapter 3 provides an example of one of several 6-part tests used to assess students. Similar tests are available in other topics and subject areas at Grades 5, 8, and 10. Teachers may develop similar tests that match their own curriculum, using the CRESST model and the process outlined in the Herman et al. book cited above. Schoolwide results can be reported as the proportion of students achieving a particular level of attainment on each type of task used. For example, *“60% of the 8th-grade students at Greenway Learning Center were able to explain one or more important concepts or principles related to the science topic ‘gravity’ (i.e., their essays were scored 3 or better on a 5-point scale of conceptual understanding).”*

Portfolio Assessment

The term *portfolio* is used here to mean a purposeful collection of student work over time that is reviewed against criteria in order to judge an individual student or a program. Portfolios tell the story of student or group effort, progress and/or achievement. They are most useful in the classroom, but with care and effort a portfolio system may also be used for schoolwide monitoring of progress towards the LALC Standards. They are *not* meant to be used for high-stakes decisions for individual students (such as a critical graduation requirement), as this would require quite high technical quality of the portfolio content specifications and scoring, and great attention to fairness and opportunity issues, making their use infeasible for many schools.

For portfolios to serve as a good assessment tool, they must have three critical elements just like any solid assessment: (1) a specified assessment purpose; (2) specified contents planned to match the assessment purpose; and (3) criteria for judging student work that match the assessment purpose as well. A brief overview of these elements follows.

Step 1: Specify Purpose

Classroom portfolios can fulfill several assessment purposes, including the following:

- To diagnose student needs (to inform instruction and improve learning);
- To monitor and evaluate progress over time, or the achievement level of individual students, and to assign grades;

- To communicate with students and parents about specific and credible evidence of achievement or growth; and
- To evaluate the effectiveness of curriculum and instruction.

Portfolios are also useful for instructional purposes: to motivate students, to encourage students to reflect upon and take responsibility for their own progress and their own learning, and to celebrate or showcase students' best work. They often also serve a professional development function for teachers by reminding them to align curriculum, instruction, and assessment with each other and to link them to the standards for what students should know and be able to do. Portfolios also encourage teachers and students to see a year's work as a coherent whole, with relationships between what was taught and learned from one unit to the next.

Step 2: Specify Contents

The contents of a portfolio should match the purpose for which the contents are collected and assessed. Table 1 illustrates how contents vary with purpose.

To diagnose student learning needs, contents should include student work that reveals how well the student understands important concepts and big ideas, possible misconceptions, evidence of process skills, and other high-priority goals for student learning in the classroom and school. Good resources to help determine or refine curriculum goals include the *LALC Standards for Student Learning*, the state curriculum frameworks, national standards documents in various disciplines, the SCANS report on skills that business and industry highly value, and other, similar reports. Good assignments or other contents to include in a portfolio are those that provide ample evidence about how well a student is working towards those goals. For example, if one goal is that students will be able to design and carry out a science experiment and analyze the results, their portfolios might contain at least a couple of assignments in which they design an experiment, describe their method, collect data, analyze results, and draw conclusions.

Table 1
Assessment Purpose Determines Portfolio Contents

Purpose	Contents
Diagnose student needs (to guide instruction and improve learning)	Evidence of student thinking, misconceptions, process, how much and what kind of help was provided to student.
Monitor/evaluate student progress over time in key goal areas	Several pieces over time of the <i>same</i> type of task, possibly of progressive difficulty. Note goal areas may include learning to evaluate their work and set future learning goals.
Evidence for grades, parent conferences, sharing with next teacher	Notes, drafts, and other evidence of the process; possibly with feedback from peers and teacher. Evidence of misconceptions may be diagnostically helpful. Work on some standard assignments for comparison purposes.
Evaluate curriculum and instruction	Sample of assignments throughout the year representing important goals and use of class time.

To monitor student growth over time towards a particular goal, contents should include student efforts from early in the year as well as later efforts from the middle and/or end of the year.

To provide evidence for grades, conferencing with parents, or sharing with other teachers, portfolios probably need to contain evidence of the student's process, such as early drafts with peer reviews and revisions so as to see what the student is capable of under different conditions. It may also be helpful to design the portfolio contents to include some standard assignments for everyone for comparison purposes to share with parents and other teachers, rather than allowing students to choose all the pieces that comprise their portfolios.

Step 3: Specify Criteria

Without scoring criteria, a portfolio is merely a collection of student work—not an assessment tool. Teachers may want to grade the individual assignments that eventually are placed in a portfolio, and/or they may want to grade the portfolio as a whole (particularly if they want to emphasize the body of work, improvement over time, or the creation of the portfolio as an assignment in itself). In any case, it is useful to provide grades or other feedback that communicates well to students, parents, and other teachers what the teacher saw of value in the portfolio and what the body of work says about the student's strengths and weaknesses. It is also helpful to save examples of selected past work or whole portfolios to show later students as benchmarks of excellence.

Three elements of scoring criteria are important:

- **dimensions** (What are the characteristics of excellent work in the content area and type of cognitive skills targeted? e.g., written reports on social studies might be excellent in conceptual understanding of key concepts or principles, lack of misconceptions or factual errors, synthesis of information from several sources, good logical flow of explanation, and good mechanics.)
- **scale** (What distinctions do you want to make? e.g., A, B, C, D, F or 100 points, with 5 for spelling, 10 for organization, 10 for completeness, 20 for understanding important concepts, principles and vocabulary, and so forth; or perhaps each dimension is scored on a 1 to 4 scale); and
- **performance standards** (How much is “good enough?” e.g., How many points or what combination of characteristics are required for an A?)

Consult Herman et al. (1992) for greater detail about developing scoring criteria.

Step 4: Handling Logistics and Other Issues

Among the logistical issues that need to be addressed are: Who selects the work that goes in the portfolio? How and where are portfolios stored? Who has access to them? When and how will conferencing occur? How often may students make additions and deletions to their portfolios? Who gets the portfolio at the end of the year? Several resources cited at the end of this guidebook offer solutions to these questions.

A Comprehensive Assessment System

In addition to assessing individual students' progress in the classroom, Learning Centers also need to monitor overall student progress towards the high standards they have set. To do so requires measures that directly reflect the high priority learning goals set by the LALC (the Standards) and the ways they are infused in the classroom curriculum. Since commercial multiple-choice tests provide limited information about important student outcomes, the LALC recommends supplementing such information with performance assessments.

The LALC Assessment System is comprised of several integrated measures to provide information about individual students for classroom purposes and about groups of students to monitor progress towards LALC standards and to evaluate the program.

The LALC Assessment System uses the following measures:

- Sound classroom assessments that include performance assessments and student portfolios, designed by teachers and based on the CRESST² models;
- Long-term student portfolios, projects, or exhibitions for students leaving each major level of schooling (grades 5, 8, and 12) to demonstrate critical elements of the LALC Standards. This work is an indicator of whether the students had sufficient opportunity to learn key outcomes and how well they achieved the standards. A sample of these portfolios or projects is used to monitor school progress towards the LALC Standards and evaluate the program; and
- On-demand standardized tests, including (1) alternative assessments designed to address the LALC Standards in language arts, social studies, math, and science (such as those developed with the CRESST model described above). These standardized tests may be administered annually to students near the end of each level of schooling (e.g., Grades 5, 8, 10-11) to monitor school progress; (2) a norm-referenced multiple-choice test (e.g., the district-selected CTBS in Los Angeles); and (3) state assessments, if required, which may include both alternative and traditional measures. (Note, however, that the California state assessment program is not being implemented as of this writing but may be in future.)

An important asset of the LALC Assessment System is the link between ongoing classroom learning and assessment activities and school-level assessments. In the typical school, teachers “cover the book,” and students take a commercial, norm-referenced test once a year. Often the curriculum and the test have little relationship to one another—or to high-priority student learning goals. The LALC Assessment System changes this.

In the LALCs, teachers plan their curricula around the Standards and use a variety of assessment tools to assess student progress towards important learning goals. Assessments used to monitor a Learning Center’s progress and evaluate the program grow out of and reflect classroom and school goals and practices. This system is unlike the typical school where reliance on traditional tests tends to narrow the curriculum to reflect the content and form of what publishers put on their tests and in their texts. The standard performance assessments advocated here for use at the school level are designed on the same basic model as assessments used by teachers in the classrooms. The sample of portfolios or projects used to assess school progress contains or reflects work done in actual classrooms over time. Thus, the curriculum and assessments are well integrated to avoid the problem in which standardized test scores give a different view of student achievement than students’ daily work. Also, a single, strong message is sent from both classroom and schoolwide assessments about what students should be learning.

² CRESST is the National Center for Research on Evaluation, Standards, and Student Testing at UCLA. CRESST was one of the design partners in the LALC Project.

SECTION 3: OVERCOMING BARRIERS

Developing performance assessments, designing portfolios, and implementing either form of alternative assessments is complex and often reveals how little training most teachers have had in assessment issues and techniques. This lack of knowledge, together with uncertainties about grading practices, can act as a barrier to school reform. The following barriers often occur in schools, and potential solutions are offered from experience with a number of schools implementing changes in assessment practices.

Barrier: Resistance of stakeholders to new ways of assessing students.

- Some parents or other stakeholders may not understand or support alternative assessments. Some may see alternatives to traditional norm-referenced, multiple-choice testing as “fluffy” or as “intrusive to personal life” (for example if an essay prompt asks students to relate what they are learning to what happens in their family). It is helpful to provide information and professional development not only for teachers but for administrators, classroom aides, parents, and others involved in the school so that they develop a balanced view of assessment and understand the value of having different types of assessment tools for different purposes. Stakeholders may also be involved in defining desired learning goals (standards) for students, thereby having a greater stake in adequate assessment of student attainment of those goals. Professional development on standard setting and judging the quality of student work will lead to stakeholders’ understanding of the need for new assessments.
- In addition, care should be taken to develop or select assessments carefully, with consideration for their match to school and classroom curricular goals, content quality and scope, technical quality (e.g., reliability and validity), avoidance of bias, and meaningfulness to students, teachers, and parents.
- Involvement of parents and community members in reviewing or judging student work (e.g., exhibitions, performances, or portfolios) will help these groups understand the value of new assessment approaches.

Barrier: Lack of alignment of curriculum and instruction with desired learning outcomes (standards), assessment tasks, and grading criteria.

- Teachers typically focus their teaching around classroom learning activities and fail to articulate desired learning goals for students or what constitutes excellent achievement. Without understanding and making the necessary alignment of outcomes, activities, and grading practices, teachers cannot develop sound assessments. Professional development needs to bring teachers to this level before addressing the development of alternative assessments or portfolios. Teachers may also need to learn how to make outcomes and grading criteria explicit to

students at the beginning of a unit, and how to give specific, constructive feedback to students to promote change.

Barrier: Insufficient time for professional development, planning assessments or portfolios, and grading student work.

- Learning to use alternative assessment well involves a major paradigm shift from an activities-orientation to a learning goals-orientation for teachers, as noted above. This requires *significant* time for professional development on curriculum planning, standards and assessment as well as lots of planning time to become familiar with national and local standards documents, to articulate high-priority goals for the classroom, and then to plan learning activities, assessment tasks, and criteria for judging student work. Even more time is required when teachers work in groups to develop shared assessment tasks, portfolio designs, and/or grading rubrics.
- Adequate time needs to be scheduled for ongoing support for development and implementation of new assessments. Teachers may appreciate being able to participate in an action research group that meets at least once a month to discuss readings about assessment and share practices and concerns. Facilitators or occasional assessment consultants may come from local universities, R&D centers, or other schools in the area.
- Development of alternative assessments, particularly those involving complex thinking skills in a discipline, requires that teachers have deep knowledge in the content area. Few teachers actually have very deep knowledge in the disciplines, however, particularly elementary teachers who are responsible for several subjects. Thus, teachers may need time to research topics within the content areas to be tested in depth. The actual development of tasks or prompts usually takes more time and iterations than are expected, too.
- Grading alternative assessments and portfolios also can take an enormous amount of time, partly accounting for why many teachers do not routinely assign a lot of extensive written work or many demonstrations and exhibitions. Teachers are more willing to make this effort if they see that it really helps students learn more or better than they do otherwise. Thus sharing evidence of positive results is very helpful as is sharing of strategies to “make time” through combining classes to release teachers to grade work, having peers do much of the editing and reviewing of work, finding time for conferences with a few students while others work on small group activities, and other creative solutions to the time dilemma.

Barrier: Inadequate support and resources to help teachers implement new assessment practices.

- It is important that teachers who dare to try out new assessment strategies in their classroom be supported by their peers and the

administration. For example, a classroom where students are compiling portfolios or preparing small-group presentations or exhibitions may be noisier or look less organized than a traditional class, yet it may be a far richer learning environment. Such classrooms may need more and different resources than in the past, such as field trips, special hands-on materials, or school visits by community members to review student exhibitions. Administrators and staff need to understand the value of such change and provide clear support and reasonable resources.

Barrier: Student skill level, English language proficiency, transience rate, and motivation.

- Students who have had little chance to develop their critical thinking skills or little practice producing extensive written or oral work may tend to do poorly at first on rigorous alternative assessments. It is important to recognize that poor performance is not intractable. With strong teaching founded on constructivist learning theory, students can learn better, become more engaged, and perform better eventually. The ultimate need is not to raise test scores but to improve learning.
- Students who are learning English as a second language sometimes perform poorly on alternative assessments due to low reading or writing skills as much as or more than low content knowledge, and this needs to be considered in planning assessments and scoring criteria, and in drawing inferences from test results.
- A high transience rate makes it difficult to look at student growth over time in a portfolio, since the student may be in a given school for only a few months. It may be helpful to transferring students to send their portfolios home to be shared with their next teacher and school.
- Teachers need to share rubrics and exemplary pieces of work with students *before* instruction. Students may even be involved in developing the grading rubrics, thereby developing their capacity for self-evaluation. Knowing ahead of time what is expected can help motivate students to put in more effort and produce better work. As one teacher said, “We can either make our criteria crystal clear for students, or we can make ‘em guess! If they don’t know what’s wrong, how can they improve next time?”

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Chapter 2: Curriculum-Embedded Assessments

Gina Koency

Curriculum-embedded assessments are those assessments teachers develop and utilize to determine mastery of curriculum objectives in their classrooms. Because assessment is such a broad and critical task, teachers should employ a variety of assessment formats including but not limited to:

- observation checklists
- criterion-referenced tests
- portfolios for classroom use
- journals
- homework
- student project presentations
- group work
- oral reports
- student interviews
- peer reviews
- extended projects

Using such assessment methods requires that teachers create suitable scoring schemes and interpretation guidelines. The results obtained from these varied assessment efforts will serve to identify areas where students are experiencing difficulties, to guide instructional decision making, and to assist in assigning grades.

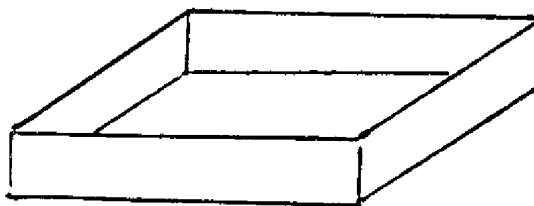
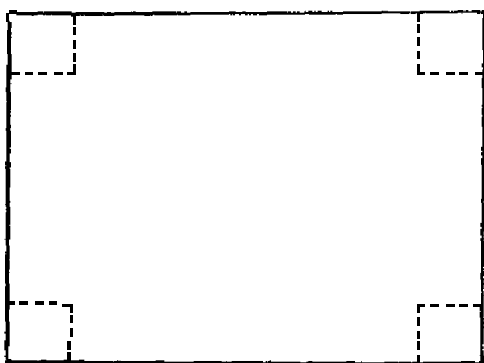
The assessments employed here are examples of practices used to measure problem-solving knowledge, a recognized mathematics instructional goal. These techniques may easily be adapted to other content areas. The following is an example of a problem that can be assessed in a variety of different ways such as group observation, oral presentation, problem-solving explanation, journal writing, or interviews and conferencing.

PROBLEM

<p>You are the owner of a container manufacturing company, and you have been contracted to design and manufacture a box for 1 x 1 cm sugar cubes for the Sweet Tooth sugar company. This box, without a lid, is to be manufactured from a piece of cardboard measuring 15 x 25 cm. In order to minimize production costs, Sweet Tooth wants a box that will hold the largest number of sugar cubes. What should the dimensions of this box be?</p>
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ACTIVITY

The class is divided into small groups. Each group is given several pieces of 15 x 25 cm grid paper and asked to make boxes by cutting out pieces from the corners. Students cut and fold the paper to make boxes sized 13 x 23 x 1 cm, 11 x 21 x 2 cm, etc. They are challenged to find a box that holds the *maximum volume of sugar cubes (an organized list of the dimensions and resulting volume will facilitate this process)* and *prepare a presentation* and accompanying materials to convince Sweet Tooth that they have found the maximum volume. To increase interest, students might also be asked to design the exterior package wrap.



CURRICULUM-EMBEDDED ASSESSMENTS FOR THIS TASK

I. Group Observation

One method of assessing problem solving is through **group observation**. Through observation, the teacher can assess how the group functions as a whole, and whether the group understands the problem, plans a solution and reaches a satisfactory solution to the problem. Group observations are also suitable activities for evaluating *effort*, a trait not always emphasized in educational settings. Note that these observations describes the group as a whole, not each individual student.

To keep a record of this group evaluation, a teacher may decide to employ a group checklist like the one shown below. Checklists allow teachers to quickly and easily document the acquisition or application of skills during the process of learning. Although the checklist that follows uses a descriptive scale, teachers may decide to use a checklist as a measure to simply indicate the presence or absence of a behavior. Note that the items on this checklist will vary depending on the behaviors, skills, and attitudes a teacher would like to foster and evaluate.

Sample Group Checklist			
	<u>Seldom</u>	<u>Occasionally</u>	<u>Often</u>
Group Behaviors			
Cooperation	___	___	___
Discussion	___	___	___
Broad participation	___	___	___
Stays on task (effort)	___	___	___
Uses positive support	___	___	___
Demonstrates role playing	___	___	___
Problem-Solving Behaviors			
Understands the problem	___	___	___
Selects appropriate strategies	___	___	___
Suggests alternative strategies	___	___	___
Monitors progress	___	___	___
Solves the problem	___	___	___
Reviews the solution(s)	___	___	___

II. Oral Presentation

The final solution to this cooperative problem-solving task can also be assessed through an **oral presentation**. Oral presentation evaluation criteria, such as those outlined on the following form, could be utilized to evaluate the group presentation designed to “sell” the Sweet Tooth box product. This form is designed for a presentation that should include (a) the most cost-effective box size found in the problem-solving activity, and (b) the exterior box design created by the group. Graphs, actual box examples and other visuals should support these student presentations.

The rubric for judging student oral presentations is based on the outcomes that are important for students to achieve. Furthermore, points assigned to each criterion can be weighted according to a teacher’s priorities for student learning. It is a good idea to give the student groups a copy of the evaluation

form at the onset of the activity so that they are aware of the criteria for evaluation.

Sample Oral Presentation Assessment

Group Members _____

1. Overall Presentation

Presentation well-prepared (20 pts) _____

All members participate (10 pts) _____

Mathematical concepts, terms and facts correctly used (20 pts) _____

Arguments convincing (10 pts) _____

2. Visuals

Accurately depict information (20 pts) _____

Enhance presentation (5 pts) _____

Used appropriately (10 pts) _____

3. Solutions

Box size convincingly most cost-effective (20 pts) _____

Box design visually interesting, appealing (5 pts) _____

Total points: _____

Total possible points: 120 points

III. Problem-Solving Explanation

Yet another curriculum-embedded technique, **problem-solving explanation**, involves asking students to write down their thought processes while solving problems. The purpose of this task is to evaluate the problem-solving skills of individual students. Either an analytic or holistic scoring rubric can be used. The instructional priorities assigned to different parts of the problem-solving process are reflected in the point values assigned to each part on the scale, and teachers should change these as needed. A benefit of these rubrics designed for assessing problem solving is their adaptability for use in other content areas with minimal or no changes to the criteria listed.

An advantage of an analytic rubric, such as the one that follows, is that it allows for analysis of specific areas of strength and weaknesses in the students' solution processes, a characteristic that facilitates making decisions regarding instructional improvements. This type of rubric may also provide information helpful in identifying instructional techniques that are already proving successful. The broader range of point values on this scale has the

advantage of allowing teachers to assign scores to those parts of the solution that do not fall neatly into the existing descriptors.

Sample Analytic Scoring Scale	
Student or Group Name	_____
_____	Understanding the problem
	0: Complete misunderstanding of the problem
	3: Misunderstanding or misinterpreting part of the problem
	6: Complete understanding of the problem
_____	Planning a solution
	0: No attempt or totally inappropriate plan
	3: Partially correct plan based on part of the problem's being interpreted correctly
	6: Plan that leads or could have led to a correct solution if implemented properly
_____	Getting an answer
	0: No answer or wrong answer based on inappropriate plan
	1: Copying error, computational error, or partial for a problem with multiple answers
	2: Incorrect answer following from an incorrect plan that was implemented properly
	3: Correct answer and correct label for the answer.
_____	Total points
15	Total possible points

The holistic rubric that follows offers teachers a different approach to grading student work. In this case, the student's work is considered as a whole and one grade or score is assigned to it. To help teachers be consistent from one paper to another, this rubric describes the kind of response for each scale point. This detail also helps students know what is expected. Having a narrower point distribution than an analytical scale, a holistic scale is often faster and easier to implement.

Sample Holistic Scoring Scale

- 4 – Response is characterized by **all** of the following:**
- The student selects and implements relevant concepts and procedures/strategies needed to solve this problem.
 - The student considers all constraints of the problem situation.
 - The solution and all relevant work is correct; or, there is a mistake due to some minor computational or copying error.
- 3 – Response is characterized by **one** of the following:**
- The student selects appropriate procedures/strategies to solve this problem; however, the response/solution is not entirely correct because one of the following is apparent:
 - a. There is evidence the student has a misconception or has failed to consider a relevant concept needed to solve the problem correctly.
 - b. The student fails to consider a constraint of the problem situation.
 - c. The student has considered an irrelevant variable or failed to consider a relevant variable.
 - The response/solution is generally correct; however, from the information provided it is not completely clear how the student arrived at this solution.
- 2 – Response is characterized by **one** of the following:**
- The student selects appropriate procedures/strategies to solve this problem; however, the response/solution is not correct because one or more of the following are apparent:
 - a. There is evidence that the student has several misconceptions or has failed to consider several relevant concepts needed to solve the problem correctly.
 - b. The student fails to consider several constraints of the problem situation.
 - c. The student has also considered several irrelevant variables or failed to consider several relevant variables.
 - d. The student did not carry the procedures/strategies far enough to reach a solution.
 - The response/solution is generally correct; however, there is no information showing how the student arrived at this response/solution.
- 1 – Response is characterized by the following:**
- An incomplete and/or incorrect response/solution is provided evidencing an attempt to solve the problem. In addition, one or more of the following are apparent:
 - a. The student did consider a constraint or relevant variable in the problem situation.
 - b. The student understands some concepts relevant to the problem task.
 - c. The student selected a totally inappropriate procedure/strategy.
- 0 – Response is characterized by the following:**
- It is blank.
 - The student response only repeats information in the problem task.
 - An incorrect solution/response is given and no other information is shown.

- The solution/response and supportive information is totally irrelevant to the problem task.

IV. Journal Writing

Journal writing is another curriculum-embedded method for gathering information about students' understanding of important concepts. Writing in journals may take many forms ranging from structured responses to specific questions, to a general review of the events in a lesson or day. Furthermore, journals provide a setting in which students not only display their knowledge, but reflect on the learning activity and ask questions or indicate a need for additional help.

The reflective feature of journal writing offers some unique and important opportunities for students. By encouraging students to think about the learning activity and their thought processes during this activity, a notion called *metacognition*, students can become more aware of how they learn. Developing control over their learning helps students use their strengths to improve achievement.

To guide the writing process, students should be asked to respond to prompts, usually in the form of questions. These prompts can be general or specific, and should be written clearly to ensure that student responses contain the assessment information the teacher is seeking. For the problem-solving activity contained in this overview, students could explain their concept of volume or the strategies they use to solve the problems, or analyze their own strengths and weaknesses in doing such problems. Some suitable sample journal writing questions are listed next:

Sample Journal Writing Questions

1. In your own words, what was the goal, or goals, of this activity?
2. What strategies did you use in this activity?
3. Did you have an "Aha" experience during this activity? What was it?
4. What are you confused about after completing this activity?
5. How did you feel in class during this activity?

Other possible, more open-ended writing prompts include:

6. The most important thing I learned in math today is . . .

7. Write a letter to a classmate who could not attend class today, explaining what we did so that she will understand and learn as much as you did. Be as complete as possible.
8. How do you know your solution is correct?
9. How would trying harder have helped you learn better during this activity?

A teacher should have some general criteria for examining the content of the journal writing if the purpose is to determine the students' level of understanding of specific concepts. Of course, these criteria would vary depending on the grade level and prior experiences of the students. Using the criteria for evaluating the written content, the teacher can provide useful feedback in the form of comments in the margins of the journal entry, or by incorporating it into subsequent class lessons or discussions.

The criteria should be based on the level of expertise the teacher expects the students to demonstrate with respect to problem solving and/or measurement. For example, a teacher could expect all (or some) of the following information to be included in a journal response to the question "What strategies could you use to solve this problem?"

1. At least two strategies are described. The student described using two or more of the following strategies: trial-and-error, looking for patterns, making an organized list, drawing a picture or logical reasoning.
2. There is evidence that the student carried through the strategies selected in an appropriate manner.
3. The strategies selected led to a correct solution of the problem.

V. Interviews

Interviewing (or conferencing) with students is yet another assessment technique that can provide teachers with information about students' thoughts and understanding of specific concepts. This information helps teachers make instructional modifications and evaluate students' progress. Admittedly, interviews are very time-consuming and difficult to incorporate in a tight schedule; however, they can help a teacher diagnose students' learning difficulties. Teachers are encouraged to use them. Some guidelines follow that should help facilitate the interview process.

- The list of questions should be prepared ahead of time. Keep in mind that these questions are guidelines, and may need to be changed during the interview. Be prepared to probe for clarity and for deeper meaning.
- Allow as much time as possible for the interview so students will not feel rushed and can listen to your questions and provide thoughtful responses.

- Explain to the students the purpose of the interview. This will help to put them at ease.
- Make a record of the interview. It may be better to tape-record the interview so you can give the student your undivided attention.
- Use feedback that is nonjudgmental, yet indicates to the student that you are interested in the student's comments, such as nodding your head.
- One of the purposes of the interview is to uncover areas of students' misconceptions and misunderstandings; therefore, avoid the temptation to make corrections or tutor during the interview. You can do the necessary instructional intervention at a later time.

Like journal writing, interviews help students acquire metacognitive skills. By listening to the questions the teacher asks, students learn to appreciate the information such questions elicit. Furthermore, by organizing the questions in a format reflective of important processes, students are offered an opportunity to further internalize these processes. For example, questions about the problem-solving process that a teacher could use include:

In your own words, what is the problem about?

What is a good first step?

How are you going to find the answer?

What is a good next step?

What do we still need to know?

Is there another explanation?

What if we changed this part?

How are you sure your answer is correct?

How would the method(s) you used to solve this problem work with other problems?

CONCLUSION

This overview was developed to help interested teachers begin the process of becoming involved in assessment reform. The curriculum-embedded assessments described here are just a few of the tools available to teachers. Portfolios, for example, are an assessment technique not discussed in this brief paper that teachers should also consider using to monitor student growth of knowledge and skills. In addition to developing skill in using many different assessment tools, teachers should also follow these sound assessment practices:

1. Tell students in advance how their work will be judged or graded. Knowing how they will be assessed allows students to focus on the specific aspects of their academic performances that will be evaluated. Sharing assessment criteria with students enhances students' attitudes toward learning because it gives them more control over what they learn and how well they achieve.
2. Use assessments not just to grade students but to help them improve, that is, to shape learning during a unit, not just at the end to grade the result. Teachers should use assessment results to help ensure that students achieve their full potential.
3. To ensure that curriculum-embedded assessments tell what you need to know about students, make every effort to align measures with the goals and content of the curriculum, that is, what students should know and be able to do by the end of that unit, class, or grade.

Chapter 3: A Guide to Designing Performance Assessments

John Schacter

Filling in bubbles in response to multiple-choice items, whether on standardized tests or teacher-generated measures, has been a part of testing life for generations of students. Because this testing approach is highly economical, it continues to be a mainstay in our schools today. But in recent years a new vision of assessment is leading to a gradual shift away from the selected-response format towards a performance-based orientation. Performance-based assessments require students to make, build, generate, and construct complex responses to challenging real-world questions.

FORCES INFLUENCING ASSESSMENT

Several forces underlie the new assessment approach that is evolving in our schools. First, responding to the need to maintain our leadership and competitiveness in the global economy, a number of organizations have developed or are developing national “world class” standards for most academic subjects. These standards describe what American students should know and be able to do by the end of high school. Assessments that measure whether and how well students are achieving these standards are a natural need and outgrowth from the standards movement.

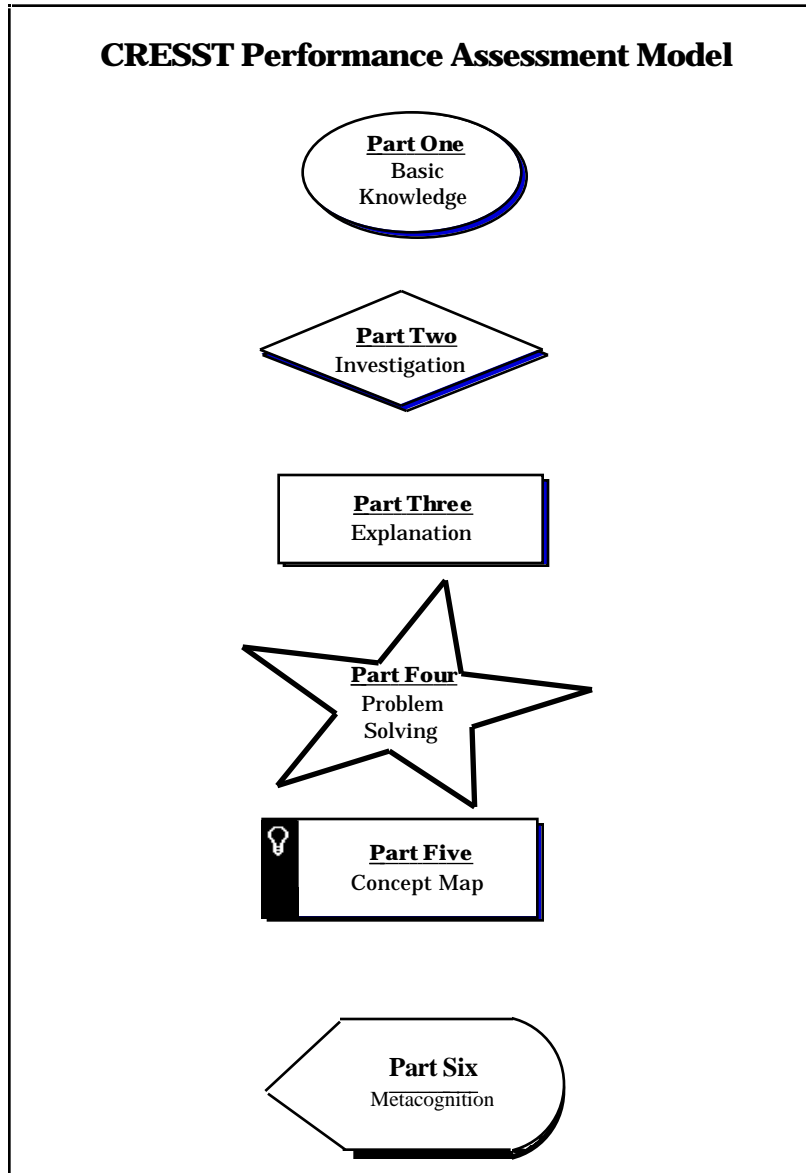
Second, cognitive theories of learning, developed and researched over the past few decades, have shifted the focus on learning from *product* to *process*, stressing the need for students to become active participants in the acquisition of knowledge and development of understanding rather than primarily memorizing facts and formulas. These theories also emphasize the importance of dialogue and collaboration in learning, the making of connections between old and new knowledge, students’ reflection on what they have learned, and the metacognitive processes by which students monitor and manage their thinking. Assessments are needed therefore, that measure complex student skills.

Finally, research on learning points out that there are many different ways of knowing or understanding—from recognizing familiar terms on a list, to generating definitions or explanations, or applying knowledge to a new problem or situation. To evaluate students more fully, to identify their misconceptions, and to help them improve their learning, research suggests that teachers need instruments that assess a variety of such aspects of student understanding.

THE CRESST PERFORMANCE ASSESSMENT MODEL

Based on contemporary theories of learning and assessment, the CRESST Performance Assessment Model has been adapted for use in the Los Angeles Learning Centers (LALC), a project of the New American Schools

Development Corporation. The 6-part assessment model is designed to measure how well students:



- recall information they already know that is relevant to what they are about to learn;
- understand important concepts and principles;
- synthesize new information with prior knowledge and experience;
- communicate ideas to others;
- apply knowledge to solve problems in new settings;
- organize key ideas and see relationships among them; and

- reflect on their own learning process in order to improve future learning.

The assessments derived from this model integrate instruction and assessment. Typically, students first work on short-answer questions about what they already know about the assessment topic. Next, they collaborate in groups performing hands-on experimental tasks in science and math, or analyzing primary source historical documents in social studies. Students then synthesize this new information with what they already know to construct essays that explain their revised understanding of the topic. Students then apply their knowledge of the subject and problem-solving skills to solve complex problems. Through concept maps, students make connections between key concepts in the topic. Finally, reflecting back on their learning strategies and experiences, students evaluate their own work and articulate criteria for judging it.

An In-Depth Look at a CRESST/LALC Performance Assessment

The CRESST/LALC performance assessments were designed to show whether students were achieving several of the LALC standards for student learning. These assessments measure important student content knowledge and how well students use complex thinking, communicate clearly, work well alone and in groups, identify and access resources, and reflect on their own learning. CRESST performance assessments developed for the LALC were aligned with the California State frameworks, national standards documents, and texts used in the Learning Centers.

Described below is one of the fifth-grade science tests developed for this project. The topic of the test is gravity.

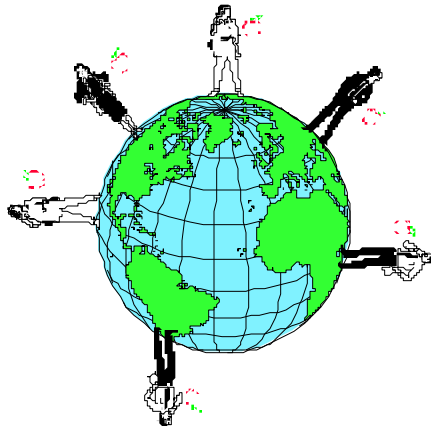
Part One: Basic Knowledge

The first section of CRESST's **Gravity** Assessment for upper elementary school students is designed to assess whether students possess important knowledge related to the subject **gravity** including key concepts, terms, and misconceptions.

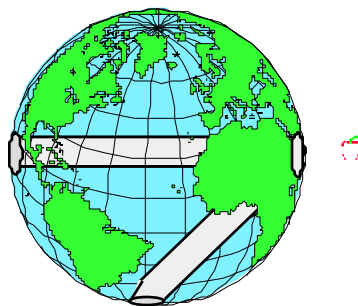
Basic Knowledge Tasks

Imagine that you started to walk towards the west. Imagine that you can walk forever and that you can even walk on water. If you walk in the same direction forever, what will happen? Where will you end up? In the space below explain your answer.

Look at the drawing below. It looks like there are six really big people standing on the Earth. These are *not* super giants! They are just regular people. The drawing is funny because these people are too big. They are drawn this way so you can see them. Suppose this is the real Earth and these people are standing on different places on the real Earth. Imagine now that each of these people is holding an apple. What will happen when each person drops an apple? For each apple use your pencil and draw a line on this drawing to show what will happen, or where it will fall, when it is dropped.



Imagine now that there are TWO tunnels which look something like this picture.



If you were to drop the apple from where it is, what will happen? Will it fall down one of these tunnels? Explain what you think will happen and why. You can draw on this picture.

Part Two: Investigation

The second part of this performance assessment, investigation, requires students to participate in cooperative groups, gather new information from group experiments or investigations, and discuss observations and ideas with each other to enrich their understanding of the topic they are studying.

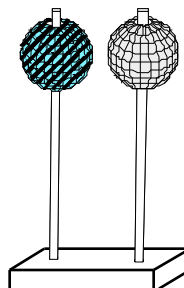
This portion of the test provides students new information to synthesize with what they already know about gravity. It is similar to learning activities that might occur while students are studying gravity. While this portion of the test was not scored for use in the Learning Centers, it could be scored for group process and/or products.

Small Group Investigation

In this experiment you will be asked to do several things with two sets of objects. Work together in groups of 4 or 5 people. After you have finished these experiments return to your seat and answer the questions about your experiences and the results of your experiments.

(1) The first set of materials are two balls about the size of a baseball. You should have two balls: one white and one silver. Pick up the two balls: one in each hand. Do they feel heavy? One of the balls should feel heavier than the other.

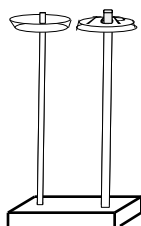
(2) One person in your group should hold the two balls at the top of the two wooden poles, like the picture below:



Let go of the two balls **at the same time** so they fall to the bottom of the poles. The other people in the group should be watching the balls as they fall. Repeat this several times and observe carefully. Does one ball hit the piece of wood before the other? Does one ball fall faster than the other?

(3) The second set of materials are two disks. These are plastic lids for cups. You should have two disks: one white and one silver. Pick up the two disks: one in each hand. Do they feel heavy? Is one of them lighter than the other?

(4) Look at the picture below. Place one disk face up and the other down.



Let go of the two disks at the same time, so they fall to the bottom of the poles. The other people in the group should be watching the disks as they fall. Repeat this several times. Does one disk hit the piece of wood before the other? Does one disk fall faster than the other? Has anything changed because you turned one disk face up?

Part Three: Explanation

To assess how well students understand key concepts related to gravity and how well they can express their knowledge clearly and concisely, CRESST designed an explanation task. This task requires students to explain to another student the important concepts, terms, and vocabulary that they have learned about the topic. Students are prompted to use all they know about the topic, regardless of whether they learned it in class or outside of school.

Explanation Task

(1) Your teacher has asked you to help tutor some new students your age about gravity (the force that tends to draw things with mass towards each other). What important ideas and information should you teach them? Use what you have learned about gravity in school, outside of school, from TV, games, books, and even this test. Explain below what these students should know about gravity. You can make drawings to help explain your ideas.

(2) Some of these new students have a few more questions to ask you. Write your explanations.

(a) If you drop a book and a piece of paper at the same time from the same height, which one will hit the ground first? Why?

(b) If you drop 2 books at the same time from the same height, and they have the same size and shape but one is a lot heavier, what will happen? Why?

(c) Are there any places in the universe where gravity does not exist? If so, where? Why or why not?

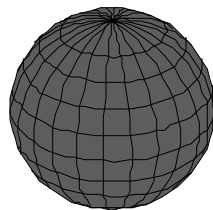
Part Four: Problem-Solving

CRESST developed problem-solving items for their assessments to measure students' ability to apply creative and complex planning, thinking, reasoning, and problem-solving skills to new situations. The complex skills students must use to solve these problems include: designing, prioritizing, synthesizing, analyzing, interpreting, hypothesizing, predicting, generalizing, and making important connections within and across disciplines.

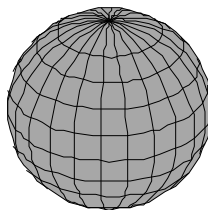
Critical Thinking Task

Did you know that the Earth's moon is smaller than the Earth? And did you know that the force of gravity on the moon is less than on Earth? Maybe you have seen a TV show about the American astronauts who went to the moon. The moon's mass is about $\frac{1}{6}$ the mass of Earth, and therefore its gravity is about $\frac{1}{6}$ of Earth's gravity. If a man weighed 180 pounds on Earth, then he would weigh only about 30 pounds on the moon. How high do you think you could jump if you weighed only 30 pounds?

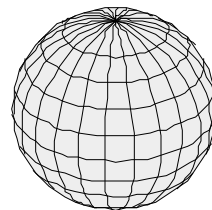
Here is a puzzle for you. See if you can figure out the answer to this puzzle. Below are three balls. These balls are about the same size as the ones you used in your experiments. However these balls are much heavier. On Earth these three balls weigh 600 pounds, 60 pounds, and 6 pounds. On the moon they will weigh less than this.



600 lbs



60 lbs



6 lbs

Here is your puzzle: Imagine that an astronaut has taken these balls to the moon. He does the same experiment which you did today in class. The astronaut holds these three balls above the moon's surface and drops them at the same time. Which ball will hit the ground first? Why? What evidence do you have to support your prediction? You can make drawings to help explain your ideas.

Part Five: Concept Maps

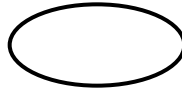
Concept Maps make up the fifth component of the CRESST performance assessment model. These maps are one way to assess how students organize their knowledge and the relationships they understand. Concept maps may be used as an effective study skill to help students understand and organize the complex relationships among concepts in a discipline.

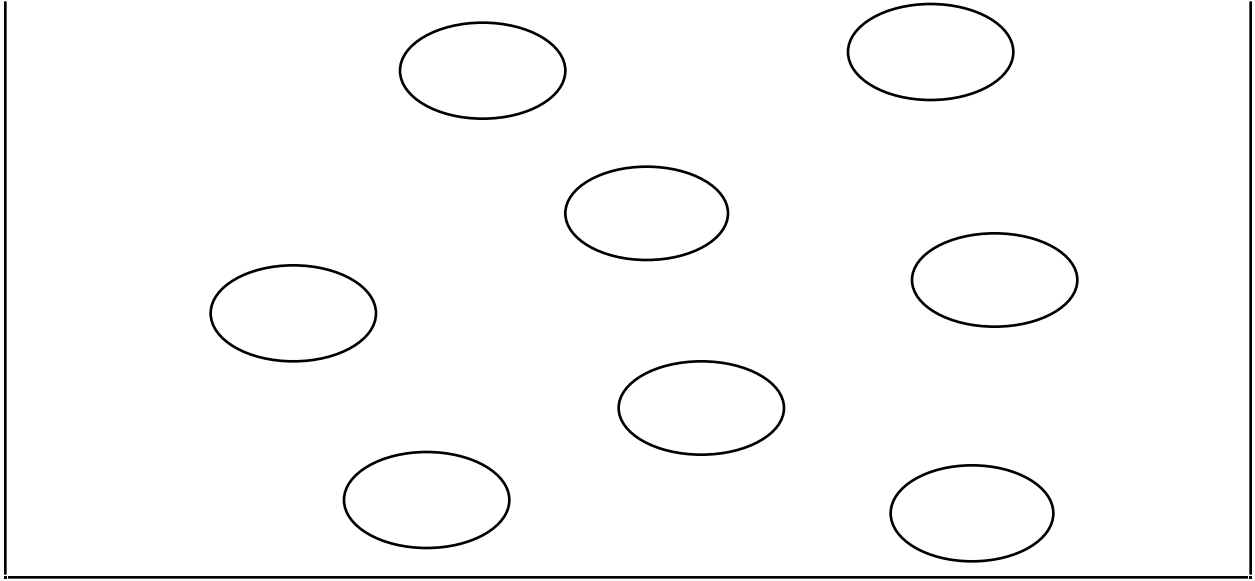
Concept Map Task

Directions: Draw a concept map using the 10 terms in the box below. They are related to gravity. Write the terms in the bubbles below. Then draw lines with arrowheads on them between the bubbles to show which terms are related to each other. Then write one or a few words on each line to tell how the terms are related in your thinking. Remember, there isn't one "right answer." Everybody's map will be different. Just show the way YOU think about these things. Draw all the relationships you can think of that seem important.

Terms

gravity
mass
weight
force
orbit
air resistance
moon
earth
falling object
center of gravity





Part Six: Metacognition

The metacognition portion of this assessment looks at how well students monitor their thinking processes during the test. Recent studies show that good metacognitive skills can be a more effective predictor of reading comprehension than IQ. This part of the model reminds teachers that students can learn to improve their thinking processes by recognizing and learning to control their thinking strategies and effort.

Reflections

1. From working on this test, I learned

2. I would like to learn more about _____

3. Things I did well on this test: _____

4. The grade I would give my work on this test is a _____ because _____

DEFINING RUBRICS AND CRITERIA FOR SCORING PURPOSES

In order to determine whether students were achieving the challenging LALC standards, CRESST constructed scoring rubrics to measure the quality of student work.

Scoring rubrics for *Basic Knowledge*, *Explanation*, and *Problem Solving*, are provided. These rubrics may be applied across disciplines, making it easier for students and teachers to internalize key criteria of good learning. Such rubrics also help teachers avoid the time consuming task of creating separate rubrics for each assessment.