

Instructions for Giving the Survey

1. Introduce the survey in any way that you are used to doing when you ask students to give you feedback about their learning.
2. Students should not put their names on their papers.
3. Read the instructions with students.
4. In grades 4–12, point out that each statement begins with the words “In this class . . .”
5. Tell students there are no right or wrong answers. Assure students that you just want to know their opinion, so please be honest.
6. Remind students to fill in the bubble that represents their answer.
7. It’s okay to answer student clarifying questions and help students read the questions. (Note: Question 10 of the grade 4–12 survey and question 5 of the Primary Survey refer to rubrics and scoring guides. If these are not the terms used in your classroom, you may want to alter the wording.)

Dear Student:

I am interested in how YOU see your learning and assessment in this class. Your opinions will help me improve classroom assessment. There are no right or wrong answers. Read each statement and rate how you feel using the following rating scale. “1” means that you strongly disagree with the statement, “and “5” means that you strongly agree. If you feel somewhere in-between, select the number that best represents how you feel. Fill in the circle that best describes how you feel. Thank you for answering these questions honestly.

Student Survey, Grades 4–12

Strongly Disagree 1 / 2 / 3 / 4 / 5 Strongly Agree

In this class ...

- | | |
|---|-------------------|
| 1. I understand what I am supposed to learn. | 1 / 2 / 3 / 4 / 5 |
| 2. I know when a test is coming up, and I know what will be covered on the test. | 1 / 2 / 3 / 4 / 5 |
| 3. I can judge how good my work is. | 1 / 2 / 3 / 4 / 5 |
| 4. I know what subjects and skills I'm good at. | 1 / 2 / 3 / 4 / 5 |
| 5. I know what I need to get better at. | 1 / 2 / 3 / 4 / 5 |
| 6. I know what I will learn next. | 1 / 2 / 3 / 4 / 5 |
| 7. I set goals for my learning. | 1 / 2 / 3 / 4 / 5 |
| 8. I learn how to look back on my work to see how I have improved. | 1 / 2 / 3 / 4 / 5 |
| 9. I know how to assemble a portfolio of my work. | 1 / 2 / 3 / 4 / 5 |
| 10. I can write or use scoring guides or rubrics to judge how good work is. | 1 / 2 / 3 / 4 / 5 |
| 11. I learn how to write practice test questions that cover what I am learning. | 1 / 2 / 3 / 4 / 5 |
| 12. I have learned how to lead a conference with my parents or other adults on what I have learned. | 1 / 2 / 3 / 4 / 5 |
| 13. I enjoy the experience of taking tests and assessments. | 1 / 2 / 3 / 4 / 5 |
| 14. I enjoy learning how I did on my tests and assessments. | 1 / 2 / 3 / 4 / 5 |

Primary Student Survey, Grades 1–3

I am interested in how YOU know what you are supposed to learn in this class. Your opinions will help me improve classroom assessment. There are no right or wrong answers. Read each statement, and then rate how you see things.

- If you disagree with the sentence, circle ☹️.
- If you don't know, circle 😐.
- If you agree with the sentence, circle 😊.



Disagree



Don't Know



Agree

1. I can explain why my work is good or not.
☹️ ☹️ ☹️
2. I know what I will learn next.
☹️ ☹️ ☹️
3. I can see my work get better.
☹️ ☹️ ☹️
4. I can select work for a portfolio.
☹️ ☹️ ☹️
5. I can use rubrics and scoring guides.
☹️ ☹️ ☹️
6. After learning something, I can explain what I have learned.
☹️ ☹️ ☹️
7. I enjoy taking tests and assessments.
☹️ ☹️ ☹️
8. I enjoy learning how I did on my work.
☹️ ☹️ ☹️

Checklist: Solving Mathematics Problems, Grades 5–12 (p. 72)**My work will be more successful when I . . .**

1. Problem solve correctly. That means I . . .
 - Made a plan and used it to solve the problem.
 - Verified or checked my solution.

2. Use mathematical language correctly. That means I . . .
 - Used correct math terms.
 - Used mathematical language that is clear and appropriate so that my solution is meaningful.

3. Communicate clearly. That means I . . .
 - Used a diagram, chart, table, graph, and/or word picture to help solve the problem.
 - Made the representations in my solution clear to read when they are read by others.

4. Make connections. That means I . . .
 - Know of other ways to get the answer.
 - Extended the solution to the general case.
 - Showed how this problem related to other problems, mathematical ideas, or applications.

5. Make a quality presentation. That means I . . .
 - Showed the steps to getting the solution.
 - Had a solution that was clear for others to follow and understand.

Four-Trait Mathematics Assessment (p. 13)

<p>Conceptual Understanding (CU) “‘What’ of it”</p> <p>A. Understanding of problem is 5 THOROUGHLY demonstrated. 4 BASICALLY demonstrated. 3 PARTIALLY demonstrated 2 INCORRECTLY demonstrated. 1 Not demonstrated.</p> <p>B. Problem information/data are 5 Used CLEARLY & WELL. 4 Used ENOUGH. 3 MOSTLY used. 2 Used INCORRECTLY. 1 Not used.</p>	<p>Process & Strategies “‘How’ of it”</p> <p>A. Graphs, pictures, or models 5 VERY CLEARLY support the solution. 4 Support BASIC solution. 3 PARTIALLY support the solution. 2 Are NOT CONNECTED to the solution. 1 Are Missing.</p> <p>B. Strategy/Skills are 5 MULTIPLE and appropriate to problem. 4 APPROPRIATE to problem. 3 PARTIALLY appropriate to problem. 2 INAPPROPRIATE to problem. 1 Missing.</p> <p>C. Plan is/does 5 EFFECTIVELY IMPLEMENTED to find solution. 4 APPLIES to problem. 3 Applies to PART of problem. 2 Not apply to problem. 1 Missing.</p>
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<p>Communication of Reasoning (CR) = “Explain it”</p> <p>A. Math terms are 5 ALL used correctly. 4 MOSTLY used correctly. 3 PARTIALLY used correctly. 2 Used INCORRECTLY. 1 Not used.</p> <p>B. Thinking is 5 THOROUGHLY explained. 4 BASICALLY explained. 3 PARTIALLY explained. 2 ATTEMPTED to be explained. 1 Not explained.</p> <p>C. Solution explanation is 5 COMPLETELY understandable. 4 BASICALLY understandable. 3 PARTIALLY understandable. 2 CONFUSING. 1 Not given.</p> <p>D. Work is/has 5 Clearly presented and VERY logical. 4 CLEARLY presented with some logic. 3 SOME logic. 2 WITHOUT logic. 1 Not (or little) given.</p>	<p>Accuracy & Reasonableness (AR) “Defending/Connecting it”</p> <p>A. Calculations/diagrams are 5 COMPLETELY accurate. 4 BASICALLY accurate. 3 PARTIALLY accurate. 2 ATTEMPTED, but incorrect. 1 Missing.</p> <p>B. Solution is 5 Justified, verified, AND extended. 4 Justified, verified, OR extended. 3 PARTIALLY justified, verified, or extended. 2 UNSUCCESSFULLY justified or verified. 1 Missing or there is only an answer.</p> <p>C. Connections are 5 Made between solution and general situations. 4 BASICALLY made. 3 PARTIALLY made. 2 ARE ATTEMPTED. 1 Not made.</p> <p>D. Work is 5 Checked a DIFFERENT way. 4 Checked same way as originally. 3 Checked SOMEWHAT. 2 Checked with INAPPROPRIATE method(s). 1 Not checked.</p>
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Source: Everett, WA Public Schools. Used with permission.

Students often take tests without knowing what the test measures beyond the most general level—“reading,” “social studies,” or “science.” When asked to use test results to set goals, without more specific understanding of what learning the test represents, students write in the most general terms—“study more,” “take my book home,” or “try harder.” Although noble, these goals do not focus on what students actually need to learn, and therefore are of limited use.

This activity has two versions, one for secondary and one for elementary students. Both versions require that you make a numbered list of the learning targets to be assessed. Both versions also require that you know the learning target covered by each item on the test.

Secondary Version

Transfer the information on learning targets covered by each item to the chart entitled “Identifying Your Strengths and Focusing Further Study.” Fill out the “Learning Target” column, identifying the learning target each item addresses. Copy the chart for each student and hand it out with the test.

As students take the test, they note on the chart whether they feel confident or unsure of the correct response to each item. Correct the tests and hand them back, along with the numbered list of learning targets. Students identify their own specific strengths and areas for further study by following the steps explained in “Analyzing Your Results.”

Analyzing Your Results

My Strengths

To identify your areas of strength, write down the learning target numbers corresponding to the problems you felt confident about and got right. Then write a short description of each target or problem.

Learning Target No.	Learning Target or Problem Description

My Highest Priority for Studying

To determine what you need to study most, write down the learning targets numbers corresponding to your marks in the “Further Study” column (problems you got wrong, *not* because of a simple mistake). Then write a short description of each target or problem.

Learning Target No.	Learning Target or Problem Description

What I Need to Review

Do the same thing for the problems you were unsure of and for the problems on which you made simple mistakes.

Learning Target No.	Learning Target or Problem Description

Elementary Version

Transfer the actual learning targets to the chart entitled “Self-Reflection and Goal Setting.” Copy the chart for each student. Hand it out when you return the test and have students mark whether they got each problem right or wrong. Have them review the ones they got wrong to decide if they understand what they did wrong (simple mistake), or if they don’t know why it’s wrong (more study). Have them mark the corresponding column.

Students analyze their results by determining which learning targets they have learned well, which ones could stand a little review, and which ones need most work. Have them fill out the form that follows the chart. Students can use this information to set specific goals for further study.

Self-Reflection and Goal Setting

Problem	Learning Target	Right?	Wrong?	Simple Mistake?	More study?
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Name: _____

Subject: _____ Test Date: _____

I Am Good at These!

Learning targets I got right:

I Am Pretty Good at These, But Need to Do a Little Review

Learning targets I got wrong because of a simple mistake:

I Need to Keep Learning These

Learning targets I got wrong and I'm not sure what to do to correct them:

Source: Adapted from *Assessment FOR learning: An Action Guide for School Leaders* (p. 199), by S. Chappuis, R. J. Stiggins, J. Arter, & J. Chappuis, 2004, Portland, OR: Assessment Training Institute. Adapted by permission.

Name: _____ Date: _____

What I need to learn:
Evidence of current level of achievement:
Plan of action:
Help needed—what and who:
Time frame:
Evidence of achieving my goal:

Name: _____ **Date:** _____

I will learn _____

My “before” picture—evidence I used to choose my goal: _____

My plan is to _____

I need these materials: _____

I will ask for help from _____

I will be ready to show my learning on this day: _____

My “after” picture—I will show my learning by _____

TRAIT(S): _____ **NAME:** _____

NAME OF PAPER: _____ **DATE:** _____

MY OPINION

My strengths are _____

What I think I need to work on is _____

MY TEACHER'S OPINION

Strengths: _____

Work on: _____

MY PLAN

What I will do now: _____

Next time I'll ask for feedback from: _____

Source: Adapted from *Assessment FOR Learning: An Action Guide for School Leaders* (p. 193), by S. Chappuis, R. J. Stiggins, J. Arter, and J. Chappuis, 2004, Portland, OR: Assessment Training Institute. Adapted by permission.

Name: _____ Date: _____

Goal I have met	Evidence of where I started	Evidence of where I am now	What I did to improve

Date of conference:

Start and end times:

Participant(s):

Comments from participant(s):

Name: _____ **Date:** _____

Learning Target(s)	
Evidence of where I started	
Evidence of where I am now	
What I did to improve	
What I can do now that I couldn't do before	
What to notice about my work	

Date of conference:

Start and end times:

Participant(s):

Comments from participant(s):

Context of the conference	
Purpose for the conference	
My role in the conference	
Student's role in the conference	
Focus of the conversation	

Example:

Context of the conference	End of the first grading period; report card has just gone home.
Purpose for the conference	To discuss daughter's performance over the past quarter.
My role in the conference	Parent
Student's role in the conference	None
Focus of the discussion	Daughter's grades and connection to her achievement in each subject area.

Example 1: Math Problem

The following problem is one of several given to students to assess problem solving in math. Student work is assessed using a rubric (not included here) that covers mathematical understanding, problem-solving processes, and communication.

A group of 8 people are all going camping for 3 days and need to carry their own water. They read in a guidebook that 12.5 liters are needed for a party of 5 people for 1 day. Based on the guidebook, what is the minimum amount of water the 8 people should carry all together? Explain your answer.

Source: Used on various assessments in Oregon and Idaho.

Example 2: Motorized Vehicle—High School

This is a problem in applied physics. It is a culminating project to assess knowledge of motion, written and oral communication proficiency, and reasoning.

Design and construct a motorized vehicle that can produce at least two simultaneous motions in different directions to accomplish an action. When your work is done, you will demonstrate your device and explain how it works. In addition, you will be asked why you made certain design decisions, relying on your understanding of physics concepts. Finally, you will also be asked how well your device worked and to explain how you might modify your vehicle to make it better. The attached criteria (here not reproduced, but given to the students) will be used to judge your work.

Source: Abstracted from Dorothy Bennett, Assessment and Technology Videotape, Center for Technology in Education, Bank St. College of Education, 610 W. 112th St. New York, NY 10025.

Example 3: Create a Flag—Middle School

The following is a task, as given to students. There is no additional explanation.

As a group, you have been asked to submit a design for the flag for the new Pacific Island nation of Koluhra.

Koluhra is located in the Caroline Islands of Micronesia approximately 400 miles SE of the state of Yap at 3 degrees N. latitude, and 147 degrees E. longitude.

The inhabitants of this new nation have migrated over time from outer islands of three surrounding island nations following a series of typhoons. Traditional chiefs have formed

a governing body and share a vision of unity among the people upheld by extended family relationships. They hope to carefully expand their economy around ecotourism.

Using what you know about the islands of the western Pacific, the information provided above and your joint creativity, design a flag that can serve as a visual symbol of Koluhran identity. You will need to prepare to exhibit your design to the council of chiefs and explain how each element of the flag contributes to the identity of Koluhra.

Source: Abstracted from Regional Educational Laboratories (1998), Toolkit98, Appendix B, Sample B5, contributed by Kathy Busick.

Example 4: Ken Griffey, Jr.—Grade 3

This is one of a series of problems. The goal is to match the tasks on the state assessment with the instructions in the table. Student responses were scored on correct answer, solving the problem in more than one way, checking the answer, and drawing a picture.

The problem:

Ken Griffey, Jr. hit 36 home runs in 9 games. How many home runs did he hit in each game?

Writing Mathematics Write to help explain your best thinking using words, numbers, or pictures.	
Investigation	<p>Did I understand the problem?</p> <p><i>Suggestion:</i> Read the problem carefully. Decide what you're looking for. Find the important information.</p>
Planning	<p>Did I make a plan to solve the problem?</p> <p><i>Ideas:</i> guess & check . . . draw a picture . . . use logic look for a pattern . . . make a model . . . act it out work backward . . . use easier numbers make an organized list . . . make a table or chart write a number sentence . . .</p>
Solution	<p>Did I carry out my plan?</p> <p><i>Think again:</i> Check any arithmetic you may have done. Make sure you used all the important information. Decide if your answer makes sense. Write your answer in complete sentences.</p>

Example 5: Sow Bugs—Grades 4–6

This task was one of three given to students to assess science process skills.

Students receive five sow bugs, a round dish to contain them, a bright light and strips of dark cardboard to create regions of light and dark, filter paper, a spray bottle for creating damp regions, and a stopwatch. The students are to answer the following questions:

- Do sow bugs prefer light or dark environments?
- Do sow bugs prefer damp or dry environments?
- Do dampness and amount of light in combination make a difference in sow bug preferences?

Scoring is procedure based (task specific). For each experiment, observers focus on the method used to solve the problem, the adequacy with which conditions are manipulated, the measurement strategies used to determine the results, and the correctness of the solution generated.

Source: Adapted from "On the Stability of Performance Assessments," by M. A. Ruiz-Primo, G. P. Baxter, and R. J. Shavelson, 1993, *Journal of Educational Measurement*, 30, pp. 41–51; "Performance Assessments: Political Rhetoric and Measurement Reality," by R. J. Shavelson, G. P. Baxter, and J. Pine, 1993, *Educational Researcher*, May, pp. 22–27.

Example 6: Fruit—Grade 7

The following is a seventh-grade math problem. Scoring is based on the correctness of the answers and the steps used to solve the problem.

Lisa put some fruit in a large bowl for her friends. The bowl had twice as many apples as oranges, and half as many pears as oranges. Altogether, there were 14 pieces of fruit in the bowl.

- How many apples did Lisa put in the bowl?
- How many oranges?
- How many pears?
- Explain or show how you found each answer.

Example 7: The Car Problem—Post High School

The following problem was given to students to determine their ability to solve problems. It was scored for the correctness of each step.

From the classified section of a newspaper, select one particular brand and model of automobile that appears several times. Collect data on the age (number of years old) of the vehicle versus the asking price. You should have at least 8 points.

- a. Plot the data you have gathered. Carefully label your graph.
- b. Draw an “eyeball fit” line through the data. (You next task will be easier if the line goes through two of the data points.)
- c. Write an algebraic linear model to describe the line you have drawn.
- d. Interpret the meaning of the slope in your model.
- e. Interpret the meaning of the vertical-intercept of your model. (Include the numerical value and the units.)
- f. In there are other data points that do not seem to fit the overall linear pattern of the other data, try to explain why.

Source: Collected from a mathematics teacher at Mt. Hood Community College, approximately 1990.

Example 8: Math Portfolio—Grades 4, 8

Students are asked to assemble a portfolio that demonstrates their mathematical ability. Each portfolio should contain 10-20 selections.

5-7 of these should be “best pieces” and must include: 1 puzzle, 1 investigation, 1 application, and no more than 2 pieces of group work.

- The student can select other pieces that demonstrate ability.
- The student should write a letter to the evaluator that describes what he or she has chosen for his or her portfolio and what it shows about the student.

The portfolios are assessed using rubrics that cover the following:

Problem Solving: How well does the student understand the problem, how does the student solve the problem, why does the student solve it the way she or he did, and what observations, connections, generalizations does the student make about the problem?

Communication: What terminology, notation, symbols does the student use to communicate his or her math thinking, what representations (graphs, charts, tables, models, diagrams, pictures, manipulatives) does the student use, how clear is the student's communication of mathematical thinking and problem solving?

Source: Abstracted from Vermont State Department of Education, Portfolio Assessment, about 1984.

Central Kitsap Mathematical Problem Solving Three-Trait Scoring Guide—Adult Version

Mathematical Concepts and Procedures

Definition: A student demonstrates a grasp of the mathematical concepts, chooses and performs the appropriate mathematical operations, and performs computations correctly.

Problem Solving

Definition: A student demonstrates problem solving skills by showing that he/she understands what the problem asks by framing the problem so that appropriate mathematical process(es) can be selected and used, by developing or selecting and implementing a strategy to find a solution, and by checking the solution for reasonableness.

Mathematical Communication

Definition: A student demonstrates communication skills in mathematics by explaining the steps and reasoning used in a solution process with words, numbers, and diagrams.

Mathematical Concepts and Procedures

- 5 A strong performance occurs when the student demonstrates extensive understanding of the mathematical concepts and related procedures and uses them correctly. The student:
- Understands mathematical concepts and related procedures.
 - Uses all necessary information from the problem.
 - Performs computation(s) accurately or with only minor errors.
- 3 A developing performance occurs when the student demonstrates general understanding of the mathematical concepts and related procedures, but there may be some gaps or mis-application. The student:
- Partially understands mathematical concepts and related procedures.
 - Uses some necessary information from the problem.
 - May make some computational errors.
- 1 A weak performance occurs when the student demonstrates little or no understanding of mathematical concepts and related procedures. Application, if attempted, is incorrect. The student:
- Does not appear to understand mathematical concepts and related procedures.
 - Does not use information from the problem or uses irrelevant information.
 - Does no computation; or does computation that is unrelated to the problem.

Problem Solving

- 5 A strong performance occurs when the student selects or devises and uses an efficient, elegant, or sophisticated strategy to solve the problem.
- The student translates the problem into a useful mathematical form.
 - The student applies the selected plan(s) or strategy(ies) through to completion; no pieces are missing.
 - The plan or strategy may incorporate multiple approaches.
 - Pictures, models, diagrams and symbols (if used) enhance the strategy.
 - The solution is reasonable and consistent with the context of the problem.
- 3 A developing performance occurs when the student selects or devises a plan or strategy, but it is partially unworkable.
- The student leaves gaps in framing or carrying out the strategy.
 - The strategy may work in some parts of the problem, but not in others.
 - The strategy is appropriate but incomplete in development or application.
 - Results of computation, even if correct, may not fit the context of the problem.
- 1 A weak performance occurs when the student shows no evidence of a strategy or has attempted to use a completely inappropriate strategy.
- The student shows no attempt to frame the problem or translate the problem into an unrelated mathematical form.
 - The strategy is inappropriate, misapplied, or disconnected.
 - Pictures, models, diagrams, and symbols, if used, may bear some relationship to the problem.
 - The solution is not reasonable and/or does not fit the context of the problem.

Mathematical Communication

- 5 A strong performance occurs when a student clearly explains in words, numbers, and diagrams the strategy used to solve the problem and the solution itself.
- The problem could be solved following the explanation. It is clearly explained and organized.
 - The explanation is coherent and complete. There are no gaps in reasoning. Nothing is left out.
 - The student presents logical arguments to justify strategy or solution.
 - The explanations may include examples and/or counterexamples.
 - Charts, pictures, symbols, and diagrams, when used, enhance the reader's understanding of what was done and why it was done.
 - Few inferences are required to figure out what the student did and why.
 - Correct mathematical language is used.
- 3 A developing performance occurs when the student's problem-solving process is partially explained, but requires some inferences in order to figure it out completely.
- The student attempts to use mathematical language, but may not have used all terms correctly.
 - Some key elements are included in the explanation.
 - The student explains the answer, but not the reasoning or explains the process, but not the solution.
 - Charts, pictures, symbols, and diagrams, if used, provide some explanation of the major elements of the solution process.
- 1 A weak performance occurs when the student's explanation does not describe the process used or the solution to the problem.
- Charts, pictures, symbols, and diagrams, when used, interfere with the reader's understanding of what was done and why it was done.
 - The explanation appears to be unrelated to the problem.
 - The reader cannot follow the student's explanation.
 - Little or no explanation of the thinking/reasoning is shown.
 - The explanation only restates the problem.
 - Many inferences are required to follow the student's work.
 - Incorrect or misapplied mathematical language interferes with the reader's ability to understand the explanation.

Source: *Mathematical Problem Solving: A Three-Trait Model*, 2001, Central Kitsap School District, Department of Curriculum and Instruction, P.O. Box 8, Silverdale, WA 98383. 360-692-3101. Reprinted by permission.

Central Kitsap Student-Friendly Guide to Mathematics Problem Solving at a Glance

Mathematical Concepts and Procedures

- I understand which math operations are needed.
- I have used all of the important information.
- I did all of my calculations correctly.

Problem Solving

- I knew what to do to set up and solve this problem.
- I followed through with my strategy from beginning to end.
- The way I worked the problem makes sense and is easy to follow.
- I may have shown more than one way to solve the problem.
- I checked to make sure my solution makes sense in the original problem.

Communication

- I used mathematical terms correctly.
- My work shows what I did and what I was thinking while I worked the problem.
- I've explained why my answer makes sense.
- I used pictures, symbols, and/or diagrams when they made my explanation clearer.
- My explanation was clear and organized.
- My explanation includes just the right amount of detail not too much or too little.

Mathematical Concepts and Procedures

The student understands mathematical concepts and performs related operations, chooses the appropriate math operations, and performs computations correctly.

- Understands the mathematical ideas and operations selected
 - Performs appropriate computations
 - Chooses the right operations and does them correctly
- 5 I completely understand the appropriate mathematical operation and use it correctly.
- I understand which math operations are needed.
 - I have used all of the important information.
 - I did all of my calculations correctly.
- 3 I think I understand most of the mathematical operations and how to use them.
- I know which operations to use for some of the problem, but not for all of it.
 - I have an idea about where to start.
 - I know what operations I need to use, but I'm not sure where the numbers go.
 - I picked out some of the important information, but I might have missed some.
 - I did the simple calculations right, but I had trouble with the tougher ones.
- 1 I wasn't sure which mathematical operation(s) to use or how to use the ones I picked.
- I don't know where to start.
 - I'm not sure which information to use.
 - I don't know which operations would help me solve the problem.
 - I don't think my calculations are correct.

Problem Solving

The student selects and carries out a strategy to find a solution, and checks results for reasonableness.

- Translates the problem into mathematical terms
- Chooses or creates a strategy
- Uses a strategy to solve the problem
- Checks solution to make sure it makes sense in the problem

Some Strategies for Problem Solving

Draw a picture or diagram.

Look for patterns.

Use trial and error.

Make a table.

Work with special cases, then generalize.

Try simpler numbers.

Work backwards from the solution.

Problem Solving (Continued)

- 5 I came up with and used a strategy that really fits and makes it easy to solve this problem.
- I knew what to do to set up and solve this problem.
 - I knew what math operations to use.
 - I followed through with my strategy from beginning to end.
 - The way I worked the problem makes sense and is easy to follow.
 - I may have shown more than one way to solve the problem.
 - I checked to make sure my solution makes sense in the original problem.
- 3 I came up with and used a strategy, but it doesn't seem to fit the problem as well as it should.
- I think I know what the problem is about, but I might have a hard time explaining it.
 - I arrived at a solution even though I had problems with my strategy at some point.
 - My strategy seemed to work at the beginning, but did not work well for the whole problem.
 - I checked my solution and it seems to fit the problem.
- 1 I didn't have a plan that worked.
- I tried several things, but didn't get anywhere.
 - I didn't know which strategy to use.
 - I didn't know how to begin.
 - I didn't check to see if my solution makes sense.
 - I'm not sure what the problem asks me to do.
 - I'm not sure I have enough information to solve the problem.

Communication

The student explains the process, reasoning, and strategy used in solving the problem.

- Explains the strategy and processes used
- Explains why what was done was done
- Explains why answer works

First I did . . .

because . . .

Next I did . . .

I did this because . . .

Finally, I did . . .

I did this because . . .

Communication (Continued)

- 5 I clearly explained the process I used and my solution to the problem using numbers, words, pictures, or diagrams.
- My explanation makes sense.
 - I used mathematical terms correctly.
 - My work shows what I did and what I was thinking while I worked the problem.
 - I've explained why my answer makes sense.
 - I used pictures, symbols, and/or diagrams when they made my explanation clearer.
 - My explanation was clear and organized.
 - My explanation includes just the right amount of detail, not too much or too little.
- 3 I explained part of the process I used, or I only explained my answer.
- I explained some of my steps in solving the problem.
 - Someone might have to add some information for my explanation to be easy to follow.
 - Some of the mathematical terms I use make sense and help in my explanation.
 - I explained my answer, but not my thinking.
 - My explanation started out well, but bogged down in the middle.
 - When I used pictures, symbols, and/or diagrams, they were incomplete or only helped my explanation a little bit.
- 1 I did not explain my thinking or my answer, or I am confused about how my explanation relates to the problem.
- I'm not sure how much detail I need in order to help someone understand what I did.
 - I don't know what to write.
 - I can't figure out how to get my ideas in order.
 - I'm not sure I used math terms correctly.
 - My explanation is mostly copying the original problem.
 - The pictures, symbols, and/or diagrams I used would not help someone understand what I did.

Source: Source: *Mathematical Problem Solving: A Three-Trait Model*, 2001, Central Kitsap School District, 2000, Department of Curriculum and Instruction, P.O. Box 8, Silverdale, WA 98383. 360-692-3101. Reprinted by permission.

Everett Rubric for Instructing and Assessing Self-Directed Learner

Criterion	4: Accomplished	3: Competent	2: Needs Improvement	1: Limited
<p>Conscientious</p> <p>Striving for Excellence</p> <p>Self-Evaluation</p> <p>Taking Initiative</p> <p>Persevering</p>	<p>Takes pride in own work: constantly strives for excellence, works hard, aims to exceed standards, and fulfills all commitments in a timely manner.</p> <p>Is skilled in valuating own work to determine whether it meets standards, expectations, or job requirements.</p> <p>Takes the initiative in accomplishing tasks and solving problems: looks for opportunities to improve work, acts without prompting, makes appropriate decisions as needed.</p> <p>Perseveres to accomplish even the most difficult tasks, being willing to make numerous attempts, trying different approaches as necessary until a good workable solution is discovered.</p>	<p>Assumes responsibility for own work and works hard to produce quality work which meets standards; meets almost all commitment.</p> <p>Has some skill in evaluating own work, but on particularly complex assignments, or in difficult situations, needs to check with a teacher or supervisor.</p> <p>Often takes the initiative, acting without prompting or being asked to solve problems/ accomplish tasks; makes some decisions.</p> <p>Generally perseveres to complete/accomplish tasks, except perhaps in especially difficult or complex tasks; tries different approaches, but tends to stop searching when any workable solution is discovered.</p>	<p>Does not assume ownership of work and strives to get by more than to excel; misses many commitments.</p> <p>Has limited skill/ confidence in evaluating own work, and often has to check progress or decisions with a teacher or supervisor.</p> <p>Sometimes takes the initiative, but usually requires prompting or assistance to solve problems or accomplish tasks/generally avoids responsibility, offering excuses; makes few decisions.</p> <p>Has difficulty persevering to complete/ accomplish tasks; completes simple and familiar tasks, but with complicated tasks, tends to fix on one approach or solution, struggling to force that approach to work in the situation.</p>	<p>Displays no pride in own work; shows no concern for standards of excellence; often fails to meet commitments.</p> <p>Has no skill or does not attempt to evaluate own work; checks all progress and/or decisions with a teacher or supervisor.</p> <p>Almost never displays initiative; most often requires prompting to accomplish tasks; relies on others to make decisions.</p> <p>Rarely perseveres to complete/accomplish tasks that have any degree of difficulty; tends to give up if the first attempt does not yield a solution.</p>

Everett Rubric for Instructing and Assessing Self-Directed Learner (Continued)

Criterion	4: Accomplished	3: Competent	2: Needs Improvement	1: Limited
<p>Self-Disciplined</p> <p>Respects Property</p> <p>Respects Others' Rights/Feelings</p> <p>Resolves Conflicts</p>	<p>Is respectful of school property and that of others; never disturbs or damages others' property.</p> <p>Respects the rights and feelings of others; does not harm or bother others at any time.</p> <p>Knows conflict resolution techniques and uses them to solve problems which emerge in interacting with others.</p>	<p>Respects the property of others, including school property; does not intentionally disturb or damage property; may occasionally disturb or damage some property inadvertently, primarily due to carelessness.</p> <p>Generally respects the rights and feelings of others; may occasionally be involved in disturbances when provoked or pressured by peers.</p> <p>Knows conflict resolution techniques and is most often successful in using them to solve problems; occasionally needs the intervention of others.</p>	<p>Is not as mindful of school and others' property as he/she should be; is sometimes careless or takes risks with others' property; occasionally has trouble controlling impulses.</p> <p>Does not respect the rights and feelings of others as much as is expected to him/herself; is sometimes responsible for disputes/conflicts, both with peers and authorities.</p> <p>Has some understanding of conflict resolution techniques and can use them to solve some problems; often needs the intervention of others.</p>	<p>Has problems controlling behavior with school and others' property; is often careless, takes risks, and does not control impulses.</p> <p>Has a serious problem interacting with others in polite and respectful ways; frequently causes disputes or conflicts with others.</p> <p>Is mostly unaware or unskilled in using conflict resolution techniques, most often requires the intervention of others to resolve problems.</p>

Source: Everett School District, 2000, Comprehensive Assessment Program, Curriculum and Assessment Dept., PO Box 2098, 4730 Colby Ave., Everett, Washington 98203. Copyright © 2000 Everett School District. Used with permission.

Self-Reflection Rubric

Trait	Sophisticated	Developing	Beginning
Skill Analysis	Detailed, many things covered, insightful, examples provided, good reasons and explanations, considers content as well as process, accurate, discussion refers to criteria, looks at both strengths and weaknesses, specific, thorough, synthesis across work.	Describes performance, but leaves things out, considers content or process but not both, sometimes accurate and sometimes not, some insights, descriptions of individual pieces of work but little synthesis across work.	Vague, simple restatements, focuses mainly on surface features, obvious, same old same old, “I like it/I don’t like it”; no examples, not accurate, little reference to criteria, few insights.
Sincerity	Honest, there is ownership, there is a personal reaction, revealing, takes a risk.	Beginning to take ownership, not completely accurate, shows then hides.	Mechanical, superficial, takes no risks, doesn’t seem honest, little ownership
Goal Setting	Looks ahead, accurately infers next steps from analysis of work, specific.	Some attempt at goal setting, somewhat accurate based on current status, some specific and some broad or vague.	No goal setting, little inference on next steps, next steps broad, vague, or unrelated to status.
Presentation	Consider one or more of the following traits from the 6+ 1 Trait Writing Rubric: organization, word choice, sentence fluency, conventions.		

Source: Assessment Training Institute. Based on examination of many student self-reflections.