

## 2009 Lessons Learned from Scoring Student Work

One of the privileges of being involved with Range Finding and Scoring the state assessment is the opportunity to see hundreds of student responses at each grade level. The Mathematics Assessment Team would like to share our and committee members' observations about student responses in grades 3–8. This Lessons Learned from Scoring Student Work document lists actions students could take to increase their test scores.

In general, students fail to earn points toward a better score because of incomplete responses and/or incomplete mathematical representations.

Students could improve their scores by:

- reading the entire prompt before beginning their work;
- answering the question or completing the task in the prompt;
- using the bullets as a checklist to make sure the response is complete.

Students should develop an understanding of all mathematical vocabulary given in the K–12 Mathematics Learning Standards for their grade and all previous grades. All items on the state assessment are written at a reading level one grade level below the grade level of the test, i.e., grade 3 test items are written to a grade 2 reading level. However, some performance expectations cannot be assessed without using specific mathematical vocabulary used in the K–12 Mathematics Learning Standards. The vocabulary lists in the Test and Item Specifications indicate which mathematics words students will be expected to read on their own.

Access previous versions of Lessons Learned from Student work at <http://www.k12.wa.us/Mathematics/LessonsLearned.aspx>

### Mathematics Assessment:

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## General Observations:

When a student is asked “What is the quotient?” or told to “Find the quotient.” or “Determine the quotient.”, the student should understand he or she is being asked to determine the answer to a division problem. Students will not be asked to define vocabulary terms on the assessment.

Students are expected to label their answer on short-answer items when labels are not provided. For the question “What is the total distance Henrietta walked?”, the student should label the distance. With “What is the area of the figure, in square inches?”, a label is already given in the question.

When students are asked to “Show their work using words, numbers, and/or pictures,” it is enough to show the work using one of the three forms. Students are not required to show work using all three forms; doing so can lead to conflicting student responses.

With the transition to online testing, students will see various directions prompting them to show their work, depending on the item.

These directions can include:

- “Show your work using words, numbers, and/or pictures.”
- “Show your work using words and/or numbers.”
- “Show the steps you used to solve the problem.”

Students need to:

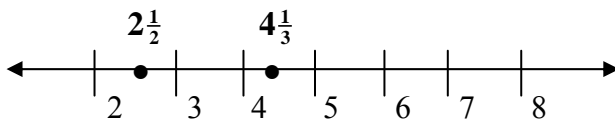
- check their work for accuracy.
- check their answers for reasonableness.
- cross off any work they do not want on short-answer items.
- erase completely any answer they want to change. When a scorer cannot read a student answer because numbers are written over the top of other numbers, students may not receive points for a correct answer.

## All Grades

Students need to be able to:

### Numbers

- **Plot and label points on the number line.** They should include both a mark on the number line (usually a closed dot) and the numerical value for that point. Examples for plotting and labeling  $2\frac{1}{2}$  and  $4\frac{1}{3}$  are shown.



### Operations

- **Simplify fractions to lowest terms.** Although simplifying fractions is a grade 4 performance expectation, students in grades 4-8 make errors simplifying fractions. Students may be asked to identify a multiple-choice answer that is written in simplest form.
- **Select and use the operation(s) need to solve a word problem.** Students need to experience single- and multi-step word problems in a variety of real-world contexts.

### Algebra

- **Differentiate between expressions and equations.** An equation is a statement of equality between expressions.
  - Expressions: 7,  $2+4$ , and  $2h$
  - Equation:  $2+5=3y$

- **Develop an understanding of what the equal sign (=) represents.** This is especially important in equations such as  $5+8=\square+7$  and when showing work for multi-step problems.

- Correct use:  
 $(2+7)\div 3=9\div 3=3$
- Incorrect use:  
 $2+7=9\div 3=3$

### Geometry/Measurement

- **Provide correct labels when labels are not given.**

Correct labels include:

- \$0.35
- 35¢
- 35 inches<sup>2</sup>
- 35 cubic feet

Incorrect labels include:

- \$0.35¢
- 0.35\$
- 0.35¢
- 35<sup>2</sup> inches

### **Data/Statistics/Probability**

- **Complete a graph.** Student graphs are scored on:
  - labeling the axes of the graph.
  - providing an appropriate scale, which includes choosing a scale that includes all the data and uses at least 50% , but not more than 100%, of the graph length/width. “Space scaling” is not appropriate.
  - providing a consistent scale which uses the same spacing as determined by the first two numbers written by the student. On a bar graph, the scale must start at zero.
  - including all the data.

### **Reasoning, Problem Solving, and Communication**

- **Identify missing information needed to solve a problem and sort given information into needed or not needed to solve a problem.**
- **Show or describe mathematical work using the numbers given in the item, leading to their answer.**
- **Determine the reasonableness of a solution.**

This information is organized into bands for grades 3–5 and grades 6–8. For specific grade-level performance information refer to the Washington State K–12 Mathematics Learning Standards document.

### Grade Band Information for grades 3–5

Students need to be able to:

#### Numbers

- **Convert fractions to decimals and vice versa.**
- **Convert mixed numbers to improper fractions and vice versa.**
- **Write equivalent fractions.**  
Students may be asked questions like “What fraction with a denominator of 16 is equivalent to  $\frac{3}{4}$ ?”

#### Operations

- **Develop conceptual understanding and fluency of operations with whole numbers, fractions, and decimals** as designated by grade level. Students should check their work.

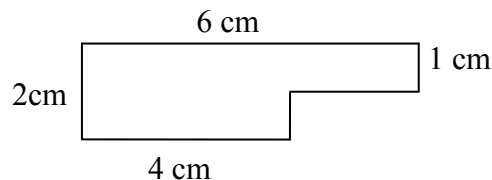
#### Algebra

- **Use inequalities symbols,  $<$  and  $>$ , to compare expressions.**

#### Geometry/Measurement

- **Convert units (U.S. and metric).**  
Students need to know and show the conversion factor(s) used to solve a problem, such as 2 cups = 1 pint or 1 meter = 100 centimeter.
- **Determine elapsed time or convert time measurements.**

- **Differentiate between area and perimeter of the same figure, especially in a context.**
- **Use the formula,  $A = l \times w$ , in grade 4 to determine the area of a rectangle.**
- **Use attributes of rectangles to determine the area of figures that can be broken down into rectangles, such as**



- **Use mathematical vocabulary to describe the attributes of geometric figures.** Correct use of vocabulary includes “Opposite sides of a square are parallel.” Incorrect use of vocabulary includes “All sides of a square are parallel.”

#### Data/Statistics/Probability

- **Differentiate between mean, median, and mode.**
- **Understand the range of a set of data is a single value.** The range is found by calculating the difference between the maximum and minimum value in the set.

This information is organized into bands for grades 3–5 and grades 6–8. For specific grade-level performance information refer to the Washington State K–12 Mathematics Learning Standards document.

### Grade Band Information for grades 6–8

Students need to be able to:

#### Operations

- **Evaluate expressions and solve expressions that include a mix of fractions and decimals.**

- **Recognize the different symbols that indicate multiplication.**

Multiplication can be indicated in these ways:

$$14 \times 7\frac{2}{5}$$
$$2x(3.5 + 7)$$
$$45 \cdot 11$$
$$11y$$

- **Show the numbers and operations they have used on a calculator to determine their answer.**

#### Algebra

- **Define variables in an expression or equation.**
- **Translate among an equation, table, or graph of a proportional relationship or linear function.** Students should be able to describe how the different representations show the same information about the function, such as slope or intercepts of the graph of the function.

- **Evaluate expressions with variable(s).** Example:

Evaluate  $4m + \frac{30}{n}$  when  
 $m = \frac{3}{4}$  and  $n = 4$ .

- **Solve inequalities.** When grade 8 students are given an inequality, students need to understand that to “solve” the inequality means to isolate the variable on one side of the inequality symbol.

- **Graph inequalities on the number line.** Grade 8 students should use the  $\circ$  symbol when graphing inequalities with  $<$  and  $>$  and the  $\bullet$  symbol for inequalities with  $\leq$  or  $\geq$ .

#### Geometry/Measurement

- **Express measurements in terms of  $\pi$  and manipulate measurements expressed in terms of  $\pi$ .**

- **Plot and label points on a coordinate grid.** Students can plot points using a closed dot,  $\bullet$ .

- **Determine the approximate area and volume of figures including circles or parts of circles.** Students should use **3.14** or  $\frac{22}{7}$ , not 3 or 3.1, as approximations of  $\pi$ .

- **Distinguish among labeled dimensions in 2- and 3-dimensional figures.** For example, knowing which measurement is the slant height of a pyramid and which is the height of the pyramid.
- **Describe transformations.**
  - A rotation should include the point of rotation, the direction, and the amount of rotation.
  - A reflection should include the line of reflection.
  - A translation should include the direction and amount of translation.

#### **Data/Statistics/Probability**

- **Represent probability as a decimal, fraction, percent, or with mathematical language.**

Correct representations include:

- $\frac{4}{5}$
- 80%
- 0.8 or 0.80
- 4 out of 5
- 4 in 5
- 4 of 5

Incorrect representations include:

- 80
- 4 to 5
- 4:5

#### **Reasoning, Problem Solving, and Communication**

- **Draw conclusions and use specific data to support conclusions.**