

Virginia

Standards of Learning Assessments

Blueprint

Grade 8

Mathematics Test

for the

2001 Mathematics Standards of Learning

This revised blueprint will be effective with the 2005-2006 administration of the Standards of Learning Tests.

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Mathematics Grade 8 Blueprint

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Standards of Learning (SOL) Test Blueprint

Introduction

What is a test blueprint?

A test blueprint is a guide for test construction and use. The Standards of Learning (SOL) test blueprints serve a number of purposes. They serve as a guide to test developers as they write test questions and construct the SOL tests. These blueprints also serve as a guide to educators, parents, and students in that they show:

- (a) the SOL covered by the test and which, if any, have been excluded;
- (b) which SOL are assigned to each reporting category;
- (c) the number of test items in each reporting category and on the total test;
- (d) general information about how the test questions were constructed; and
- (e) the materials that students are allowed to use while taking the test.

How is the test blueprint organized?

The blueprint contains the following information:

1. **Test Development Guidelines**: guidelines used by the testing contractor and the members of the Content Review Committees in developing the SOL tests. This section contains two parts:
 - A. **General Considerations** — lists general considerations that are used in developing the test as well as considerations specific to a particular content area.
 - B. **Ancillary Materials** — lists any materials that students are allowed to use while taking the test.
2. **Blueprint Summary Table**: a summary of the blueprint which displays the following information:
 - reporting categories for the test;
 - number of test items in each reporting category;
 - Standards of Learning (SOL) included in each reporting category. SOL are identified by numbers and letters that correspond to the original SOL document;
 - SOL which are excluded from the SOL test;
 - number of operational items on the test;
 - number of field-test items on the test; and
 - total number of items (operational and field-test items) on the test.
3. **Expanded Blueprint**: provides the same information as the **Blueprint Summary Table** except that the full text of each SOL is included.

What is a reporting category?

Each test assesses a number of SOL. In the test blueprint, SOL are grouped into categories that represent related content or skills. These categories are labeled *Reporting Categories*. For example, a reporting category for the Grade 5 Mathematics test is “Computation and Estimation.” Each of the SOL in this reporting category addresses computation using addition, subtraction, multiplication, or division or requires the student to estimate the answer to a problem. When the results of the SOL tests are reported, the scores will be presented in terms of scores for each reporting category and a total test score.

Are some SOL assigned to more than one reporting category?

In grade 8 mathematics, each standard, as well as each letter under a standard, is assigned to only one reporting category.

Will all SOL listed in the blueprint be assessed each time the SOL tests are given?

Each SOL will not be assessed on every SOL test form. To keep the length of a test reasonable, the test will measure a selection of the SOL within a reporting category. However, every SOL that is not excluded in the blueprint is eligible for inclusion on each form of an SOL test. Over time all SOL in a reporting category will be assessed.

Grade 8 Mathematics Test Development Guidelines

A. General Considerations

1. All items included in this test will address the knowledge and skills specified in the 2001 Virginia Standards of Learning in mathematics for grade 8.
2. Items will be examined for any content or context that stereotypes, offends, or unfairly penalizes students based on age, gender, economic status, race, ethnicity, religion, or geographic region.
3. The test will be untimed.
4. There is no penalty for guessing. Students' scores will be based on the number of correct answers out of the total number of operational items on the test.
5. Where appropriate, "real-life" examples and situations that the student would likely encounter will be used to present data or ask questions.
6. Items will be grade-appropriate in terms of difficulty, interest, and reading level.
7. Students will be permitted scratch paper at any time during the test.
8. Students will be permitted to use a state approved scientific calculator during the test.
9. Students will be provided a formula sheet and an approximation for pi (π). A copy of the formula sheet follows the expanded blueprint.

B. Ancillary Materials

Refer to the current examiner's manual or the Department of Education's Web site for ancillary materials that may be used.

Grade 8 Mathematics Test Blueprint Summary Table

Reporting Categories	Number of Items	Grade 8 SOL
Number and Number Sense	7	8.1a,b,c 8.2
Computation and Estimation	7	8.3 8.4 8.5
Measurement and Geometry	12	8.6 8.7 8.8 8.9 8.10a,b
Probability and Statistics	8	8.11 8.12 8.13
Patterns, Functions, and Algebra	16	8.14a,b 8.15 8.16 8.17 8.18
SOL Excluded from This Test		None
Total Number of Operational Items	50	
Field Test Items*	10	
Total Number of Items	60	

*These field test items will *not* be used to compute students' scores on the test.

Expanded Blueprint

Reporting Category: Number and Number Sense Number of Items: 7

Grade 8 SOL in This Reporting Category:

- 8.1 The student will
- a) simplify numerical expressions involving positive exponents, using rational numbers, order of operations, and properties of operations with real numbers;
 - b) recognize, represent, compare, and order numbers expressed in scientific notation; and
 - c) compare and order decimals, fractions, percents, and numbers written in scientific notation.
- 8.2 The student will describe orally and in writing the relationship between the subsets of the real number system.

Reporting Category: Computation and Estimation Number of Items: 7
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Grade 8 SOL in This Reporting Category:

- 8.3 The student will solve practical problems involving rational numbers, percents, ratios, and proportions. Problems will be of varying complexities and will involve real-life data, such as finding a discount and discount prices and balancing a checkbook.
- 8.4 The student will apply the order of operations to evaluate algebraic expressions for given replacement values of the variables. Problems will be limited to positive exponents.
- 8.5 The student, given a whole number from 0 to 100, will identify it as a perfect square or find the two consecutive whole numbers between which the square root lies.

Reporting Category: Measurement and Geometry
Number of Items: 12

Grade 8 SOL in This Reporting Category:

- 8.6 The student will verify by measuring and describe the relationships among vertical angles, supplementary angles, and complementary angles and will measure and draw angles of less than 360° .
- 8.7 The student will investigate and solve practical problems involving volume and surface area of rectangular solids (prisms), cylinders, cones, and pyramids.
- 8.8 The student will apply transformations (rotate or turn, reflect or flip, translate or slide, and dilate or scale) to geometric figures represented on graph paper. The student will identify applications of transformations, such as tiling, fabric design, art, and scaling.
- 8.9 The student will construct a three-dimensional model, given the top, side, and/or bottom views.
- 8.10 The student will
- verify the Pythagorean Theorem, using diagrams, concrete materials, and measurement; and
 - apply the Pythagorean Theorem to find the missing length of a side of a right triangle when given the lengths of the other two sides.

Reporting Category: Probability and Statistics
Number of Items: 8

Grade 8 SOL in This Reporting Category:

- 8.11 The student will analyze problem situations, including games of chance, board games, or grading scales, and make predictions, using knowledge of probability.
- 8.12 The student will make comparisons, predictions, and inferences, using information displayed in frequency distributions; box-and-whisker plots; scattergrams; line, bar, circle, and picture graphs; and histograms.
- 8.13 The student will use a matrix to organize and describe data.

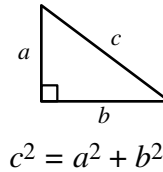
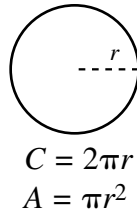
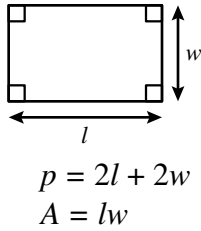
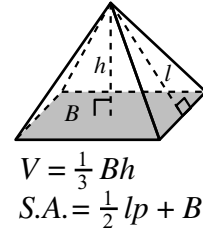
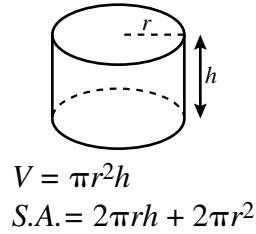
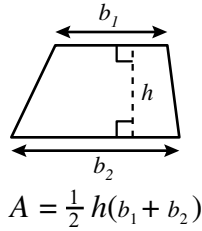
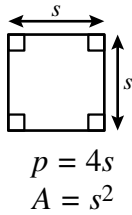
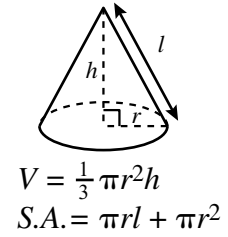
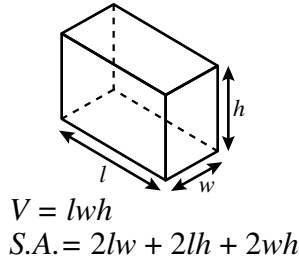
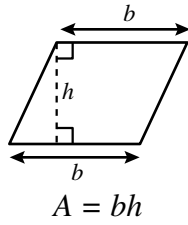
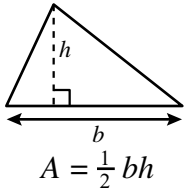
Reporting Category: Patterns, Functions, and Algebra Number of Items: 16

Grade 8 SOL in This Reporting Category:

- 8.14 The student will
- a) describe and represent relations and functions, using tables, graphs, and rules; and
 - b) relate and compare tables, graphs, and rules as different forms of representation for relationships.
- 8.15 The student will solve two-step equations and inequalities in one variable, using concrete materials, pictorial representations, and paper and pencil.
- 8.16 The student will graph a linear equation in two variables in the coordinate plane, using a table of ordered pairs.
- 8.17 The student will create and solve problems using proportions, formulas, and functions.
- 8.18 The student will use the following algebraic terms appropriately: *domain*, *range*, *independent variable*, and *dependent variable*.

Grade 8 Mathematics Formula Sheet

Geometric Formulas



Abbreviations

milligram	mg
gram	g
kilogram	kg
milliliter	mL
liter	L
kiloliter	kL
millimeter	mm
centimeter	cm
meter	m
kilometer	km
square centimeter	cm ²
cubic centimeter	cm ³

ounce	oz
pound	lb
quart	qt
gallon	gal.
inch	in.
foot	ft
yard	yd
mile	mi.
square inch	sq in.
square foot	sq ft
cubic inch	cu in.
cubic foot	cu ft

volume	V
total surface area	S.A.
area of base	B

year	yr
month	mon
hour	hr
minute	min
second	sec

Pi

$\pi \approx 3.14$
 $\pi \approx \frac{22}{7}$