

PREPARING YOUR CHILD FOR THE

COLORADO STUDENT
ASSESSMENT PROGRAM

GRADES 9, AND 10
MATHEMATICS

A
BOOKLET
FOR
PARENTS

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Introduction

The Colorado Student Assessment Program (CSAP) has been underway since 1997. The purpose of this test is to give parents and teachers information about how well students are achieving the *Colorado Model Content Standards*, better known as the state standards.

Research studies show that parent involvement in their child's education is extremely important in helping students do well in school. One way of being involved is to support your child throughout the school year, as well as, at testing time.

The following pages include information on the Mathematics test in **ninth, and tenth** grade. Also included are the CSAP test format, sample test items, and ways in which families can help their children to prepare for the CSAP in mathematics.

We hope the information in this booklet is helpful. We encourage you to communicate often with your child's teachers and principal to continue to support your child's education.

The Colorado Student Assessment Program (CSAP)

Purpose for CSAP Testing

The purpose of the Colorado Student Assessment Program (CSAP) is to give information to parents and teachers about how well students are achieving the state standards.

**CSA Administration Schedule
2001-2002**

Grade 3	Reading, Writing
Grade 4	Reading, Writing
Grade 5	Reading, Writing, Mathematics
Grade 6	Reading, Writing, Mathematics
Grade 7	Reading, Writing, Mathematics
Grade 8	Reading, Writing, Mathematics, Science
Grade 9	Reading, Writing, Mathematics
Grade 10	Reading, Writing, Mathematics
Grade 11	ACT

Reporting to Parents

The results of the student's performance on the CSAP are reported to parents with four performance levels in each subject area:

- Advanced
- Proficient
- Partially Proficient
- Unsatisfactory

Ninth and Tenth Grade Mathematics

Test Construction Information

Grade 9 - 10

60 items – 45 multiple choice, 15 constructed response

Constructed response – 3 are extended constructed response worth 4 pts

- 6 are medium constructed response worth 3 pts

- 6 are short constructed response worth 2 pts

Multiple choice score points – 45 or 52% of total

Constructed response score points – 42 or 48% of total

Test is designed to be given in three 55-minute sessions (an extra 10 minutes is allowed)

- Each session has a similar composition of items types
- In Session 1 and 2 calculators are not used
- In Session 3 calculators are used at grades 9 and 10

Weighting of Standards by Grade Level for Mathematics CSAP

	Grade 5	Grade 6	Grade7	Grade 8	Grade 9	Grade10
Standard	% Scorepoints	% Scorepoints	% Scorepoints	% Scorepoints	% Scorepoints	% Scorepoints
1	20	20	30	25	20	20
6	20	15				
2	20	20	20	25	30	30
3	20	20	20	20	25	25
4 and 5	20	25	30	30	25	25

WHAT SKILLS WILL BE ASSESSED ON THE NINTH GRADE CSAP MATHEMATICS TEST?

Standard 1:

Students develop number sense and use numbers and number relationships in problem-solving situations and communicate the reasoning used in solving these problems.

- 1.1a Compare and order sets of rational numbers and common irrational numbers ($\sqrt{2}$, $\sqrt{5}$, π).
- 1.1b Recognize and use equivalent representations of rational numbers and common irrational numbers ($\sqrt{2}$, $\sqrt{5}$, π), including scientific notation.
- 1.1c Use very large and very small numbers in real life situations to solve problems (scientific notation, powers).
- 1.2a Verify and apply the properties of the operation "to the power of" (for example, $2^3 = 8$, $2^2 = 4$, $2^1 = 2$, $2^0 = \underline{\quad}$, $2^{-1} = \underline{\quad}$, $2^{-2} = \underline{\quad}$).
- 1.3a Use number sense to estimate and justify the reasonableness of solutions to problems involving rational numbers and common irrational numbers (for example, circumference, area of a circle, and Pythagorean Theorem).

Standard 2:

Students use algebraic methods to explore, model and describe patterns and functions involving numbers, shapes, data, and graphs in problem-solving situations and communicate the reasoning used in solving these problems.

- 2.1a Model real world phenomena involving linear and non-linear relationships using multiple representations of rules that can take the form of recursive processes, functions, equations, or inequalities.
- 2.2a Represent functional relationships using written explanations, tables, equations, and graphs, and describe the connections among these representations.
- 2.2b Convert from one functional representation to another.
- 2.2c Interpret a graphical representation of a real-world situation.
- 2.3a Solve problems involving functions and relations using calculators, graphs, tables, and algebraic methods.
- 2.3b Solve simple systems of equations using algebraic, graphic or numeric methods.
- 2.3c Solve equations with more than one variable for a given variable (for example, solve for p in $I=prt$ or for r in $C=2\pi r$).
- 2.4a Identify and interpret x and y intercepts in the context of a problem.
- 2.4b Using a graph, identify the maximum and minimum value within a given domain.
- 2.4c Analyze the effects of change in the leading coefficient and/or the vertical translation (for example, given $y = kx+c$ and $y = kx^2+c$, how do changes in k and/or c affect the graphs?).
- 2.5a Graph solutions to equations and inequalities in one-and two-dimensions and determine solutions.

2.5b Express the perimeter, area, and volume relationships of geometric figures algebraically.

Standard 3:

Students use data collection and analysis, statistics, and probability in problem-solving situations and communicate the reasoning and processes used in solving these problems.

3.1a Identify factors which may have affected the outcome of a survey (for example, biased questions or collection methods).

3.1b Using large populations, formulate hypothesis, draw conclusions, and making convincing arguments based on data analysis.

3.1c Select and use an appropriate display to represent and describe a set of data (for example, scatter plot, line graph and histogram).

3.2a Analyze a graph, table, or summary for misleading characteristics.

3.2b Recognize the misuse of statistical data in written arguments.

3.2c Describe how data can be interpreted in more than one way or be used to support more than one position in a debate.

3.3a Fit curves to scatter plots using informal methods or appropriate technology to make predictions about the data.

3.3b Fit curves to scatter plots using informal methods or appropriate technology to determine the type (positive, negative, or non-existent) of relationship between two data sets.

3.4a Determine, analyze, and use measures of central tendency (such as mean, median, and mode) and measures of variability (such as range and quartiles) in problem-solving situations.

3.4b Use averages (including averages per trial, expected value) to draw conclusions about distributions of data (for example, if there are 10 people with one five dollar bill and one dollar bill in their wallets and they each randomly place one of the bills in a donation box, what will be the average amount of money donated per person?).

3.5a Determine the probability of an identified event using the sample space.

3.5b Make predictions using theoretical probability in real-world problems.

3.5c Use a model (list, tree diagram, area model) to determine theoretical probabilities to solve problems involving uncertainty.

3.6a Solve real-world problems with informal use of combinations and permutations (for example, determining the number of possible meals at a restaurant featuring a given number of side dishes).

Standard 4:

Students use geometric concepts, properties, and relationships in problem-solving situations and communicate the reasoning used in solving these problems.

4.1a Find and analyze relationships among geometric figures using transformation (for example, reflections, translations, rotations, dilations) in coordinate systems.

4.2a Solve problems involving perimeter, area, surface area, volume, and angle measure.

4.2b Use the Pythagorean theorem to solve real-world problems.

4.3a Make and test conjectures about geometric shapes and their properties (for example, parallelism, perpendicularity, similarity, congruence, symmetry).

4.3b Use coordinate geometry to solve problems involving shapes and their properties.

Standard 5:

Student use a variety of tools and techniques to measure, apply the results in problem-solving situations, and communicate the reasoning involved in solving these problems.

5.1a Use appropriate measurements to solve problems indirectly (for example, find the height of a flagpole using similar triangles).

5.1b Use measurement to solve real-world problems involving rate of change (for example, distance traveled using rate and time).

5.1c Describe how changing one attribute of a shape affects its angle measure, perimeter, circumference, area, surface area and volume.

5.2a Select and use appropriate tools and techniques to measure quantities in order to achieve specified degrees of precision, accuracy, and error (or tolerance) or measurements.

Standard 6:

Students link concepts and procedures as they develop and use computational techniques, including estimation, mental arithmetic, paper-and-pencil, calculators, and computers, in problem-solving situations and communicate the reasoning involved in solving these problems.

6.1a Use ratios, proportions, and percents in problem-solving situations that involve rational numbers.

6.1b Convert from one set of units to another using proportions. (for example, feet/minute to miles /hour).

6.1c Apply direct variation to problem solving situations.

6.2a Apply appropriate computational methods to solve multi-step problems involving rational numbers.

***Note: The definitions for words designated with an asterisk(*) in this document may be found in the glossary of the Colorado Model Content Standards for Mathematics.**

WHAT SKILLS WILL BE ASSESSED ON THE TENTH GRADE CSAP MATHEMATICS TEST?

Standard 1:

Students develop number sense and use numbers and number relationships in problem-solving situations and communicate the reasoning used in solving these problems.

- 1.1a Compare and order sets of real numbers.
- 1.1b Recognize and use equivalent representations of real numbers in a variety of forms including scientific notation, radicals, and other irrational numbers* such as π .
- 1.1c Use very large and very small numbers in real-life situations to solve problems (for example, understanding the size of the national debt).
- 1.2a Develop and test conjectures about the properties of the real number system and common subsets of the real number system (for example, counting numbers, integers*, rationales)
- 1.2b Verify and apply the properties of the operation "to the power of".

Standard 2:

Students use algebraic methods to explore, model and describe patterns and functions involving numbers, shapes, data, and graphs in problem-solving situations and communicate the reasoning used in solving these problems.

- 2.1a Model* real world phenomena involving linear, quadratic, and exponential relationships using multiple representations of rules that can take the form of a recursive process, a function, an equation, or an inequality.
- 2.2a Represent functional relationships using written explanations, tables, equations, and graphs and describe the connections among these representations.
- 2.2b Convert from one representation to another.
- 2.2c Interpret a graphical representation of a real-world situation.
- 2.3a Solve problems involving functions and relations using calculators, graphs, tables and algebraic methods*.
- 2.3b Solve simple systems of equations and inequalities using algebraic, graphical, or numeric methods.
- 2.3c Solve equations with more than one variable* for a given variable (for example, solve for p in $I = prt$ or for r in $c = 2\pi r$)
- 2.4a Identify and interpret x- and y-intercepts in the context of a problem.
- 2.4b Using a graph, identify the maximum and minimum value within a given domain.
- 2.4c Demonstrate horizontal and vertical translations on graphs of functions and their meanings in the context of a problem.
- 2.4d Recognize when a relation is a function.
- 2.5a Graph solutions to equations and inequalities in one- and two-dimensions.

2.5b Express the perimeter, area and volume* relationships of geometric figures

2.5c Describe geometric relationships algebraically.

Standard 3:

Students use data collection and analysis, statistics, and probability in problem-solving situations and communicate the reasoning and processes used in solving these problems.

3.1a Identify factors which may have affected the outcome of a survey (for example, biased questions or collection methods).

3.1b Draw conclusions about a large population based upon a properly chosen random sample.

3.1c Select and use an appropriate display to represent and describe a set of data (for example, scatter plot*, line graph, histogram).

3.2a Check a graph, table, or summary for misleading characteristics.

3.2b Recognize the misuse of statistical data in written arguments.

3.2c Describe how data can be interpreted in more than one way or be used to support more than one position in a debate.

3.2d Describe how the responses to a survey can be affected by the way the questions are phrased and/or by the reader's bias.

3.3a Graph data sets, create a scatter plot, and identify the control (independent) variable and dependent variable.

3.3b Determine a line of best fit from a scatter plot using visual techniques.

3.3c Predict values using a line of best fit.

3.3d Show how extrapolation may lead to faulty conclusions.

3.3e Recognize which model, linear or nonlinear, fits the data most appropriately.

3.4a Differentiate between mean, median, and mode and demonstrate the appropriate use of each.

3.4b Recognize and classify various types of distributions (for example, bimodal, skewed, uniform, binomial, normal).

3.4c Use the mean and standard

3.4c Use the mean and standard deviation to determine relative positions of data points in a normal distribution of authentic data.

3.4d Demonstrate how outliers might affect various representations of data and measures of central tendency*.

3.5a Determine the probability of an identified event using the sample space.

3.5b Distinguish between experimental and theoretical probability and use each appropriately.

3.5c Differentiate between independent and dependent events to calculate the probability in real-world situations.

3.5d Calculate the probability of event A **and** B occurring and the probability of event A **or** B occurring.

3.5e Use area models to determine probability (for example, the probability of hitting the bull's eye region in a target).

3.6a Apply organized counting techniques to determine combinations and permutations in problem-solving situations.

Standard 4:

Students use geometric concepts, properties, and relationships in problem-solving situations and communicate the reasoning used in solving these problems.

4.1a Describe and apply the properties of similar and congruent* figures.

4.1b Solve problems involving symmetry* and transformations.

4.1c Use coordinate geometry* and/or tessellations to solve problems.

4.1d Describe cylinders, cones and spheres that result from the rotation of rectangles, triangles and semicircles about a line.

4.2a Use the Pythagorean Theorem and its converse to solve real-world problems.

4.2b Use properties of polygons to find areas of regular and irregular figures.

4.2c Use properties of geometric solids to find volumes and surface areas of regular and irregular geometric solids.

4.3a Make and test conjectures about geometric shapes and their properties to include parallelism and perpendicularity, numerical relationships on a triangle, relationships between triangles, and properties of quadrilaterals and regular polygons.

4.3b Apply geometric relationships such as parallelism and perpendicularity, numerical relationships on a triangle, relationships between triangles, and properties of quadrilaterals and regular polygons to solve problems.

4.4a Use right triangle trigonometry* to solve real-world problems.

Standard 5:

Student use a variety of tools and techniques to measure, apply the results in problem-solving situations, and communicate the reasoning involved in solving these problems.

5.1a Use appropriate measurements to solve problems indirectly (for example, find the height of a flagpole using similar triangles or right triangle trigonometry).

5.1b Use measurement to solve real-world problems involving rate of change (for example, distance traveled using rate and time).

5.1c Given the rate of change, model real-world problems algebraically or graphically.

5.1d Describe how changing the measure of one attribute of a geometric figure affects the other measurements.

5.2a Select and use appropriate tools and techniques to measure quantities in order to achieve specified degrees of precision, accuracy, and error of measurements.

5.2b Given commonly used multi-dimensional figures; determine what units and measurements need to be taken.

5.3a Determine the number of significant digits when measuring and calculating with those measurements.

Standard 6:

Students link concepts and procedures as they develop and use computational techniques, including estimation, mental arithmetic, paper-and-pencil, calculators, and computers, in problem-solving situations and communicate the reasoning involved in solving these problems.

6.1a Use ratios, proportions, and percent in problem-solving situations that involve rational numbers*.

6.1b Convert from one set of units to another (for example, feet/minute to miles/hour).

6.1c Apply direct variation to problem-solving situations.

6.2a Apply appropriate computational methods to solve multi-step problems involving all types of numbers from the real number system.

6.3a Determine when estimation is an appropriate method to solve a problem and describe what error might result from estimation.

***Note: The definitions for words designated with an asterisk(*) in this document may be found in the glossary of the Colorado Model Content Standards for Mathematics.**

Sub-Content Diagnostic Areas:

Multiple Representation of Function - The student represents functional relationships which model real world phenomena using written explanations, tables, equations, and graphs. Describes the connections among these representations and converts from one representation to another.

Note: Focus on the 10th grade benchmarks 2.1, 2.2, 2.4, 2.5, 3.3.

Probability and Counting Techniques - The student applies organized counting techniques to determine a sample space and the theoretical probability of an identified event which includes differentiating between independent and dependent events and using area models to determine probability.

Note: Focus on the 10th grade benchmarks 3.1, 3.5, 3.6.

1 Daniel owns a swimming pool cleaning service. He charges a flat fee of \$75 per month which includes two cleanings per month. Additional cleanings are available for \$25 each. Which of these equations represents the cost per month, C , to a customer whose pool is cleaned x times per month?

$C = 25 + 75x$

$C = 25(x - 2) + 75$

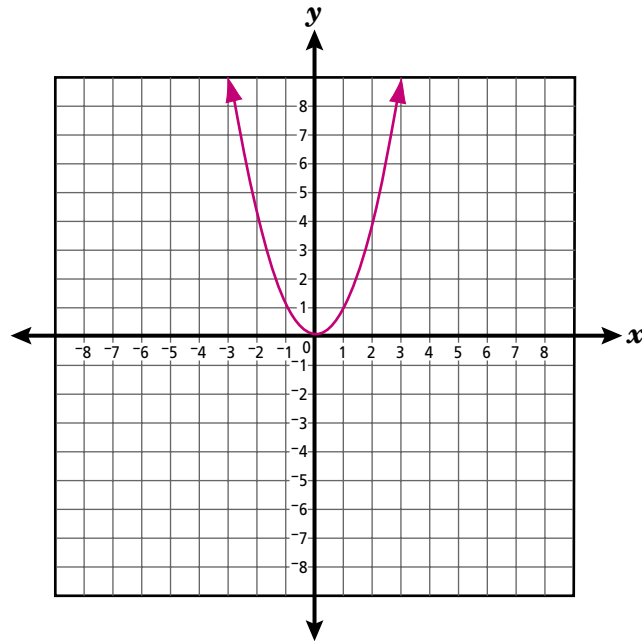
$C = 75(2) + 25x$

$C = (25 + 75)x + 2$

CSAP Grade 10

Mathematics

- 3** Study the graph of $y = x^2$, shown below.



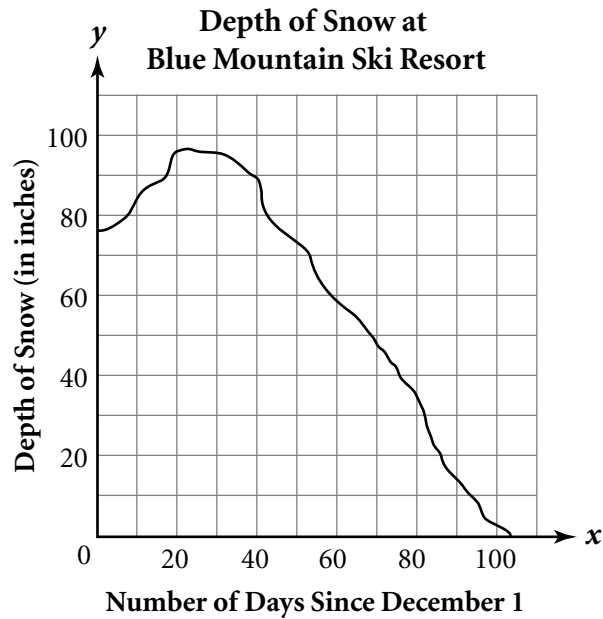
If the graph is moved up 3 units, what equation will it represent?

- $y = x^2 + 3$
- $y = (x + 3)^2$
- $y = (x - 3)^2$
- $y = x^2 - 3$

CSAP Grade 10

Mathematics

- 4 The graph below shows the depth of snow at Blue Mountain Ski Resort last winter.



Part A On the lines below, explain what the y -intercept of the graph represents.

Part B On the lines below, explain what the x -intercept of the graph represents.

CSAP Grade 10

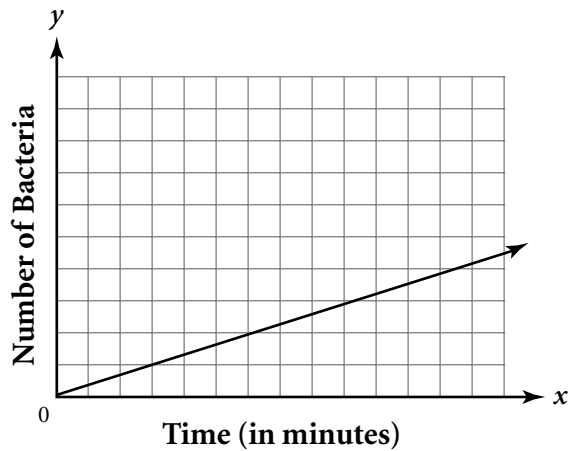
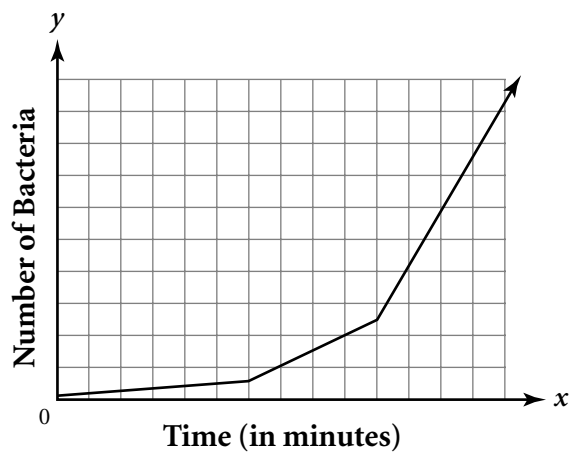
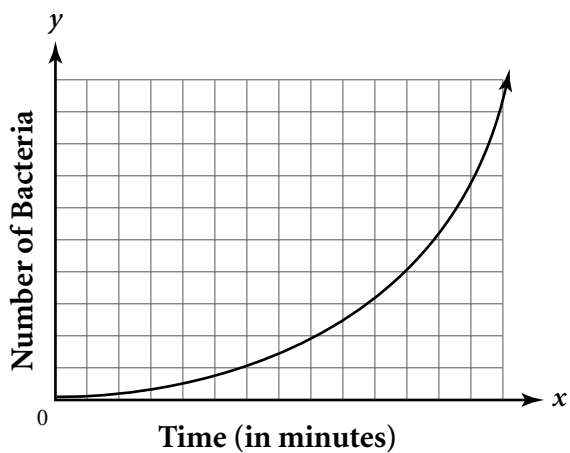
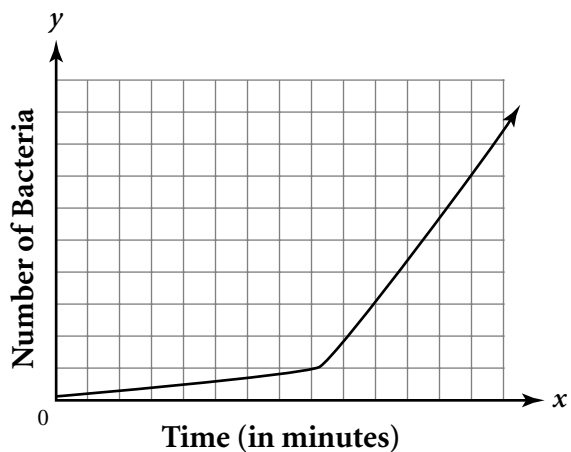
Mathematics

- 6** The table shows the number of bacteria present at 30 minute intervals during a science experiment.

Number of Bacteria Over Time

Time (in minutes)	Number of Bacteria
0	3
30	6
60	12
90	24
120	48
150	96
180	192
210	384

Which of these graphs best shows the relationship between time and the number of bacteria present?



2 - Point Rubric for Short Constructed-Response Items

This rubric is used to score students' responses to short constructed-response items. These items require the students to use problem-solving skills as they apply to all of the Colorado Model Content Standards for mathematics. An item may ask the student to include and communicate reasoning using words and /or numbers, evaluate an answer, or demonstrate the process used to determine an answer. There are several short constructed-response items in CSAP, each taking approximately 3 to 5 minutes to complete. Each short constructed-response item receives a single score of 0,1,or 2 points.

2 Points

The response accomplishes the prompted purpose and effectively communicates the student's mathematical understanding. The student's strategy and execution meet the content (including concepts, technique, representations, and connections), thinking processes, and qualitative demands of the task. Minor omissions may exist, but do not detract from the correctness of the response.

1 Point

The response partially accomplishes the prompted purpose. The student's strategy and execution lack adequate evidence of the learning and strategic tools that are needed to accomplish the task. The response may show some effort to accomplish the task, but with little success. It is clear that the student requires additional feedback and/or instruction from the teacher in order to accomplish the task.

0 Points

The response lacks evidence of mathematical knowledge that is appropriate to the intent of the task.

3 - Point Rubric for Medium Constructed-Response Items

This rubric is used to score students' responses to medium constructed-response items. These items require the student to use problem-solving skills that may require the construction of a graph or a model, the extension of a pattern, or the use of geometric relationships and spatial reasoning. These items may also include an explanation of reasoning, evaluation of methods, or application to real-world situations. There are several medium constructed-response items in CSAP, each taking approximately 10 minutes to complete. Each extended constructed-response item receives a single score of 0, 1, 2, or 3 points.

3 Points

The response accomplishes the prompted purpose and effectively communicates the student's mathematical understanding. The student's strategy and execution meet the content (including concepts, technique, representations, and connections), thinking processes and qualitative demands of the task. Minor omissions may exist, but do not detract from the correctness of the response.

2 Points

The response demonstrates adequate evidence of the learning and strategic tools necessary to complete the prompted purpose. It may contain overlooked issues, misleading assumptions, and/or errors in execution. Evidence in the response demonstrates that the student can revise the work to accomplish the task with the help of written feedback or dialogue.

1 Point

The response demonstrates some evidence of mathematical knowledge that is appropriate to the intent of the prompted purpose. An effort was made to accomplish the task, but with little success. Evidence in the response demonstrates that with instruction the student can revise the work to accomplish the task.

0 Points

The response lacks any evidence of mathematical knowledge that is appropriate to the intent of the task.

4 - Point Rubric for Extended Constructed-Response Items

This rubric is used to score students' responses to extended constructed-response items. These items require the student to use problem-solving skills that may require the construction of a graph or a model, the extension of a pattern, or the use of geometric relationships and spatial reasoning. These items may also include an explanation of reasoning, evaluation of methods, or application to real-world situations.

There are several extended constructed-response items in CSAP, each taking approximately 15 minutes to complete. Each extended constructed-response item receives a single score of 0, 1, 2, 3 or 4 points.

4 Points

The response accomplishes the prompted purpose and effectively communicates the student's mathematical understanding. The student's strategy and execution meet the content (including concepts, technique, representations, and connections), thinking processes and qualitative demands of the task. Minor omissions may exist, but do not detract from the correctness of the response.

3 Points

The response provides adequate evidence of the learning and strategic tools necessary to complete the prompted purpose. It may contain overlooked issues, misleading assumptions, and/or errors in execution. Evidence in the response demonstrates that the student can revise the work to accomplish the task with the help of written feedback. The student does not need a dialogue or additional instructions.

2 Points

The response partially completes the task, but lacks adequate evidence of the learning and strategic tools that are needed to accomplish the prompted purpose. It is not clear that the student is ready to revise the work without more instruction.

1 Point

The response demonstrates some evidence of mathematical knowledge that is appropriate to the intent of the prompted purpose. An effort was made to accomplish the task, but with little success. Minimal evidence in the response demonstrates that with instruction the student can revise the work to accomplish the task.

0 Points

The response lacks any evidence of mathematical knowledge that is appropriate to the intent of the task.
