Grade 3–5 Mathematics Performance Task Specifications

A Performance Task (PT) presents students with a scenario and various item types, designed to provide students with an opportunity to demonstrate their ability to apply their knowledge and higher-order thinking skills to explore and analyze a complex, real-world scenario. A mathematics performance task elicits evidence of students' ability to "bring it all together" to develop a solution plan to the central challenge of the task.

Key Features of Mathematics Performance Tasks

Performance tasks should:

- integrate knowledge and skills across multiple Claims and Targets—a key component of college and career readiness.
- measure capacities such as depth of understanding, research skills, and/or complex analysis with relevant evidence.
- require student-initiated planning, management of information/data and ideas, and/or interaction with other materials.
- reflect a grade-level, developmentally appropriate real-world problem. Tasks elements (data sets, values provided, etc.) are not restricted to those actualized in the real world, but these elements should be realistic.
- allow for multiple approaches.
- represent content that is relevant and meaningful to students.
- allow for demonstration of twenty-first-century skills, such as critically analyzing and synthesizing information presented in a variety of formats, media, etc.
- require scoring that focuses on the essence of the Claim(s) and Targets for which the task was written.
- be feasible for the school/classroom environment.

Attribute	Details
DOK Levels	1, 2, 3
Item Count	4-6
Independent	1-6; It is recommended that the 1st item, or the 1st and 2nd items, be independent.
Interdependent	0–6
Hand-Scored Items	2–4
Score Points	0, 1, 2, 3, 4 — No fractional points
Construct Relevant Vocabulary	Refer to the Claim 1 specifications to determine Construct Relevant Vocabulary associated with specific content standards.
Stimuli References or Resources	Grade 3 – two or fewer Grade 4–5 – three or fewer

Allowable Tools	Any mathematical tools appropriate to the problem situation and the Claim 1 target(s) are allowed. Some tools are identified in Standard for Mathematical Practice #5, and others can be found in the language of specific standards.
Claim-Specific Attributes	Claim 2 items that are part of a performance task may take 2 to 8 minutes to solve. Claim 3 items that are part of a performance task may take 3 to 10 minutes to solve. Claim 4 items that are part of a performance task may take 5 to 15 minutes to solve.

Accessibility Guidance

Item writers should consider the following Language and Visual Element/Design guidelines[1] when developing items.

Language Key Considerations:

- Use simple, clear, and easy-to-understand language needed to assess the construct or aid in the understanding of the context
- Avoid sentences with multiple clauses
- Use vocabulary that is at or below grade level
- Avoid ambiguous or obscure words, idioms, jargon, and unusual names and references

Visual Elements/Design Key Considerations:

- Include visual elements only if the graphic is needed to assess the construct or it aids in the understanding of the context
- Use the simplest graphic possible, with the greatest degree of contrast, and include clear, concise labels where necessary
- Avoid crowding of details and graphics

Items are selected for a student's test according to the blueprint, which selects items based on Claims and Targets, not task models. As such, careful consideration is given to making sure fully accessible items are available to cover the content of every Claim and Target, even if some item formats are not fully accessible using current technology.[2]

[1] For more information, refer to the General Accessibility Guidelines at: http://www.smarterbalanced.org/wordpress/wp-content/uploads/2012/05/TaskItemSpecifications/Guidelines/AccessibilityandAccommodations/GeneralAccessibilityGuidelines.pdf

[2] For more information about student accessibility resources and policies, refer to http://www.smarterbalanced.org/wordpress/wp-content/uploads/2014/08/SmarterBalanced_Guidelines.pdf

Gatekeeper Criteria for Performance Tasks

A set of cross-cutting criteria has been developed to guide the development and review of Performance Tasks. The term *gatekeeper* indicates these as essential components of a quality PT. Performance Tasks that do not meet these criteria would not be accepted into the PT item pool. The gatekeeper criteria are listed below.

- **Aligned with Claims and Standards**: PTs should go to the heart of the key Claims and Common Core State Standards for Mathematics. In particular, they should elicit evidence of Claims 2, 3, & 4. As such, they should elicit evidence of student engagement in the Common Core Mathematical Practices.
- **Developmentally Appropriate**: PT topics, tasks, and scoring should be appropriate for the age and developmental experience of the students.
- **Engaging**: Topics should be authentic and realistic, engaging students in solving a problem or making a decision they would find relevant.
- **Accessible**: Topics and tasks should minimize sources of bias, allow for multiple pathways, and provide appropriate scaffolds or supports while keeping in mind that sources and response types need to allow access for students with different English language proficiency and students with disabilities.
- **Purposeful and Coherent:** Tasks should have an authentic purpose, and all task components should be connected to achieving that goal.
- **Development Notes**
    - Tasks generating evidence for **Claim 2** in a given grade will draw upon knowledge and skills articulated in the progression of standards up through that grade, though more complex problem-solving tasks may draw upon knowledge and skills from lower grade levels.
    - **Claim 2** items should be written to support two key themes:
        - Solving problems with fractions
        - Solving problems with the four operations
    - Items assessing **Claim 3** may involve application of more than one standard. The focus is on communicating reasoning rather than demonstrating mathematical concepts or simple applications of mathematical procedures.
    - Claim 3 items that require any degree of hand-scoring must be written to primarily assess Target B.
    - Items generating evidence for **Claim 4** in a given grade will draw upon knowledge and skills articulated in the progression of standards up through that grade, though more complex problem-solving tasks may draw upon knowledge and skills from lower grade levels.

Performance Task Development and Scoring Specifications

Task writers should ensure that the mathematics of the task are correct and should use precise mathematical language.

Task Type Considerations

- Plan and Design:
  - For plan-and-design tasks, design constraints and parameters should be clearly labeled and explained in the prompt.
- Evaluate and Recommend:
  - For evaluate-and-recommend tasks, data sets should be drawn from authentic data sets. If they are mocked up, they should conform to reasonable estimates.
  - The audience and format of the recommendation should be clearly stated (e.g., "Write a letter to your school principal with your recommendation.")
- Analysis and Theory:
  - For analysis-and-theory tasks, data sets should include an appropriate amount of data given the expectation that students will develop a theory about relationships within the problem.
  - These tasks provide a natural opportunity to engage students in the refinement of their theories, as additional data can be provided that suggests another theory.

Development Considerations

- **Stimuli Presentation**: When presenting stimuli, the following guidelines apply:
  - There should be a reference (using bold font as an indicator) that connects items to the specific stimulus resource (table, graph, diagram, etc.) required for a response. The name of the reference should be bold in both the stem and stimulus (e.g., Use Table 1 to answer this question.).
  - The number of resources (tables/graphics) within the stimulus of a PT should be limited for grades 3–5, as follows, 0 - 2 for grade 3 and 0 - 3 for grades 4–5. The resources need to be relevant to the context and construct.
- **Sets of Items**: Each grades 3–5 Performance Task should consist of a set of four to six items (total points not critical). Each item may be worth 0–4 points, with guidelines for awarding 0, 1, 2, 3, or 4 points, but no fractional points. Scoring guides should allow for partial credit with items with multiple score points.
- **Ramping and Decision Making**: Grades 3–5 PTs should exhibit appropriate ramping across items. A ramped sequence of items should provide all students access to a task, while maintaining the challenge of the stated goal of the task for higher performers. A ramped sequence of items will begin with items that encourage entry into the task but are still directly related to the stated goal of the task. All PT items should focus on problem solving, reasoning, and modeling as opposed to procedural and computational skills. Ramping is an appropriate part of building toward autonomous un-fragmented chains of reasoning in grades 3 –5.

- **Independent vs. Interdependent Items:**
    - Guidelines for the first 1-2 items:
        - The first 1–2 items are recommended to be independent (i.e., not needed to score subsequent parts of the task), but still directly related to the stated goal of the task.
        - The first 1–2 items should provide entry into the task. Here, "entry" means having low to low-medium difficulty that encourages students to make sense of the stated goal of the task.
        - The first 1–2 items should be machine-scorable.
    - Guidelines for the remaining items:
        - The remaining items in all performance tasks may be hand-scorable.
        - The remaining items should be cohesive and may be interdependent with one another. Interdependent items may ask student to use their answer(s) from preceding items(s) in the PT to answer the item.
        - Rubrics for the interdependent items should explicitly prevent students from being penalized multiple times if a mistake made on a preceding item is correctly carried through subsequent items.
        - At grades 3–5, a minimum of two and a maximum of four items should be hand-scored.

Range Achievement Level Descriptors (ALDs)

Claim 2, Grades 3-5

- **Level 1** Students should be able to identify important quantities in the context of a familiar situation and translate words to equations or other mathematical formulation. When given the correct math tool(s), students should be able to apply the tool(s) to problems with a high degree of scaffolding.
- **Level 2** Students should be able to identify important quantities in the context of an unfamiliar situation and to select tools to solve a familiar and moderately scaffolded problem or to solve a less familiar or a non-scaffolded problem with partial accuracy. Students should be able to provide solutions to familiar problems using an appropriate format (e.g., correct units, etc.). They should be able to interpret information and results in the context of a familiar situation.
- **Level 3** Students should be able to map, display, and identify relationships, use appropriate tools strategically, and apply mathematics accurately in everyday life, society, and the workplace. They should be able to interpret information and results in the context of an unfamiliar situation.
- **Level 4** Students should be able to analyze and interpret the context of an unfamiliar situation for problems of increasing complexity and solve problems with optimal solutions.

Claim 3, Grades 3-5

- **Level 1** Students should be able to base arguments on concrete referents such as objects, drawings, diagrams, and actions and identify obvious flawed arguments in familiar contexts.
- **Level 2** Students should be able to find and identify the flaw in an argument by using examples or particular cases. Students should be able to break a familiar argument given in a highly scaffolded situation into cases to determine when the argument does or does not hold.
- **Level 3** Students should be able to use stated assumptions, definitions, and previously established results and examples to test and support their reasoning or to identify, explain, and repair the flaw in an argument. Students should be able to break an argument into cases to determine when the argument does or does not hold.
- **Level 4** Students should be able to use stated assumptions, definitions, and previously established results to support their reasoning or repair and explain the flaw in an argument. They should be able to construct a chain of logic to justify or refute a proposition or conjecture and to determine the conditions under which an argument does or does not apply.

Claim 4, Grades 3-5

- **Level 1** Students should be able to identify important quantities in the context of a familiar situation and translate words to equations or other mathematical formulation. When given the correct math tool(s), students should be able to apply the tool(s) to problems with a high degree of scaffolding.
- **Level 2** Students should be able to identify important quantities in the context of an unfamiliar situation and to select tools to solve a familiar and moderately scaffolded problem or to solve a less familiar or a non-scaffolded problem with partial accuracy. Students should be able to provide solutions to familiar problems using an appropriate format (e.g., correct units, etc.). They should be able to interpret information and results in the context of a familiar situation.
- **Level 3** Students should be able to apply mathematics to solve unfamiliar problems arising in everyday life, society, and the workplace by identifying important quantities and mapping, displaying, explaining, or applying their relationship and by locating missing information from relevant external resources. They should be able to construct chains of reasoning to justify a model used, produce justification of interpretations, state logical assumptions, and compare and contrast multiple plausible solutions.
- **Level 4** Students should be able to apply mathematics to solve unfamiliar problems by constructing chains of reasoning to analyze a model, producing and analyzing justification of interpretations, stating logical assumptions, and constructing and comparing/contrasting multiple plausible solutions and approaches.

Blueprint

Claim	Assessment Targets	DOK	Items per Claim	Total Items in PT
2. Problem Solving	A. Apply mathematics to solve well-posed problems arising in everyday life, society, and the workplace.	2, 3	1–2	4–6
	B. Select and use appropriate tools strategically. C. Interpret results in the context of a situation. D. Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flow charts, or formulas).	1, 2, 3		
4. Modeling and Data Analysis	A. Apply mathematics to solve problems arising in everyday life, society, and the workplace. D. Interpret results in the context of a situation.	2, 3	1–3	
	B. Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem. E. Analyze the adequacy of and make improvements to an existing model or develop a mathematical model of a real phenomenon.	2, 3, 4		
	C. State logical assumptions being used. F. Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flow charts, or formulas).	1, 2, 3		
	G. Identify, analyze, and synthesize relevant external resources to pose or solve problems.	3, 4		
3. Communicating Reasoning	A. Test propositions or conjectures with specific examples. D. Use the technique of breaking an argument into cases.	2, 3	0–2	
	B. Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures. E. Distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in the argument—explain what it is.	2, 3, 4		
	C. State logical assumptions being used. F. Base arguments on concrete referents such as objects, drawings, diagrams, and actions.	2, 3		

Grade 6-7 Mathematics Performance Task Specifications

A Performance Task (PT) presents students with a scenario and various item types, designed to provide students with an opportunity to demonstrate their ability to apply their knowledge and higher-order thinking skills to explore and analyze a complex, real-world scenario. A mathematics performance task elicits evidence of students' ability to "bring it all together" to develop a solution plan to the central challenge of the task.

Key Features of Mathematics Performance Tasks

Performance tasks should:

- integrate knowledge and skills across multiple Claims and Targets—a key component of college and career readiness.
- measure capacities such as depth of understanding, research skills, and/or complex analysis with relevant evidence.
- require student-initiated planning, management of information/data and ideas, and/or interaction with other materials.
- reflect a grade-level, developmentally appropriate real-world problem. Tasks elements (data sets, values provided, etc.) are not restricted to those actualized in the real world, but these elements should be realistic.
- allow for multiple approaches.
- represent content that is relevant and meaningful to students.
- allow for demonstration of twenty-first-century skills, such as critically analyzing and synthesizing information presented in a variety of formats, media, etc.
- require scoring that focuses on the essence of the Claim(s) and Targets for which the task was written.
- be feasible for the school/classroom environment.
- allow for calculator use in grades 6, 7, 8, and HS

Attribute	Details
DOK Levels	1, 2, 3, 4
Item Count	4 – 6
Independent	1 – 6; It is recommended that the 1st item, or the 1st and 2nd items, be independent.
Interdependent	0 – 6
Hand-Scored Items	1 – 4
Score Points	0, 1, 2, 3, 4 — No fractional points
Construct Relevant Vocabulary	Refer to the Claim 1 specifications to determine Construct Relevant Vocabulary associated with specific content standards.
Stimuli References or Resources	0 – 4

Allowable Tools	Any mathematical tools appropriate to the problem situation and the Claim 1 target(s) are allowed. Some tools are identified in Standard for Mathematical Practice #5, and others can be found in the language of specific standards.
Claim-Specific Attributes	Claim 2 items that are part of a performance task may take 2 to 8 minutes to solve. Claim 3 items that are part of a performance task may take 3 to 10 minutes to solve. Claim 4 items that are part of a performance task may take 5 to 15 minutes to solve.

Accessibility Guidance

Item writers should consider the following Language and Visual Element/Design guidelines[1] when developing items.

Language Key Considerations:

- Use simple, clear, and easy-to-understand language needed to assess the construct or aid in the understanding of the context
- Avoid sentences with multiple clauses
- Use vocabulary that is at or below grade level
- Avoid ambiguous or obscure words, idioms, jargon, and unusual names and references

Visual Elements/Design Key Considerations:

- Include visual elements only if the graphic is needed to assess the construct or it aids in the understanding of the context
- Use the simplest graphic possible, with the greatest degree of contrast, and include clear, concise labels where necessary
- Avoid crowding of details and graphics

Items are selected for a student's test according to the blueprint, which selects items based on Claims and Targets, not task models. As such, careful consideration is given to making sure fully accessible items are available to cover the content of every Claim and Target, even if some item formats are not fully accessible using current technology.[2]

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Gatekeeper Criteria for Performance Tasks

A set of cross-cutting criteria has been developed to guide the development and review of Performance Tasks. The term *gatekeeper* indicates these as essential components of a quality PT. Performance Tasks that do not meet these criteria would not be accepted into the PT item pool. The gatekeeper criteria are listed below.

- **Aligned with Claims and Standards**: PTs should go to the heart of the key Claims and Common Core State Standards for Mathematics. In particular, they should elicit evidence of Claims 2, 3, & 4. As such, they should elicit evidence of student engagement in the Common Core Mathematical Practices.
- **Developmentally Appropriate**: PT topics, tasks, and scoring should be appropriate for the age and developmental experience of the students.
- **Engaging**: Topics should be authentic and realistic, engaging students in solving a problem or making a decision they would find relevant.
- **Accessible**: Topics and tasks should minimize sources of bias, allow for multiple pathways, and provide appropriate scaffolds or supports while keeping in mind that sources and response types need to allow access for students with different English language proficiency and students with disabilities.
- **Purposeful and Coherent:** Tasks should have an authentic purpose, and all task components should be connected to achieving that goal.
- **Development Notes**
    - Tasks generating evidence for **Claim 2** in a given grade will draw upon knowledge and skills articulated in the progression of standards up through that grade, though more complex problem-solving tasks may draw upon knowledge and skills from lower grade levels.
    - **Claim 2** items should be written to support three key themes:
        - Solving problems with ratios, rates, or proportions
        - Solving problems involving understanding of number systems
        - Solving problems with expressions and equations
    - Items assessing **Claim 3** may involve application of more than one standard. The focus is on communicating reasoning rather than demonstrating mathematical concepts or simple applications of mathematical procedures.
    - Claim 3 items that require any degree of hand-scoring must be written to primarily assess Target B.
    - Items generating evidence for **Claim 4** in a given grade will draw upon knowledge and skills articulated in the progression of standards up through that grade, though more complex problem-solving tasks may draw upon knowledge and skills from lower grade levels.

Performance Task Development and Scoring Specifications

Task writers should ensure that the mathematics of the task are correct and should use precise mathematical language.

Task Type Considerations

- Plan and Design:
  - For plan-and-design tasks, design constraints and parameters should be clearly labeled and explained in the prompt.
- Evaluate and Recommend:
  - For evaluate-and-recommend tasks, data sets should be drawn from authentic data sets. If they are mocked up, they should conform to reasonable estimates.
  - The audience and format of the recommendation should be clearly stated (e.g., "Write a letter to your school principal with your recommendation.")
- Analysis and Theory:
  - For analysis-and-theory tasks, data sets should include an appropriate amount of data given the expectation that students will develop a theory about relationships within the problem.
  - These tasks provide a natural opportunity to engage students in the refinement of their theories, as additional data can be provided that suggests another theory.

Development Considerations

- **Stimuli Presentation**: When presenting stimuli, the following guidelines apply:
  - There should be a reference (using bold font as an indicator) that connects items to the specific stimulus resource required for a response. The name of the resource should be bold in both the stem and stimulus (e.g., Use Table 1 to answer this question.).
  - The number of resources (tables/graphics) within the stimulus of a PT is 0-4 for grades 6-7, and they need to be relevant to the context and construct.
- **Sets of Items**: Each grades 6-7 Performance Task should consist of a set of four to six items (total points not critical). Each item may be worth 0–4 points, with guidelines for awarding 0, 1, 2, 3, or 4 points, but no fractional points. Scoring guides should allow for partial credit with items for multiple score points.
- **Ramping and Decision Making**: Grades 6-7 PTs should exhibit appropriate ramping across items. A ramped sequence of items should provide all students access to a task, while maintaining the challenge of the stated goal of the task for higher performers. A ramped sequence of items will begin with items that encourage entry into the task but are still directly related to the stated goal of the task. All PT items should focus on problem solving, reasoning, and modeling as opposed to procedural and computational skills. Ramping is an appropriate part of building toward autonomous un-fragmented chains of reasoning in grades 6-7.

- **Independent vs. Interdependent Items:**
    - Guidelines for the first 1-2 items:
        - The first 1–2 items are recommended to be independent (i.e., not needed to score subsequent parts of the task), but still directly related to the stated goal of the task.
        - The first 1–2 items should provide entry into the task. Here, "entry" means having low to low-medium difficulty that encourages students to make sense of the stated goal of the task.
        - The first 1–2 items should be machine-scorable.
    - Guidelines for the remaining items:
        - The remaining items in all performance tasks may be hand-scorable.
        - The remaining items should be cohesive and may be interdependent with one another. Interdependent items may ask student to use their answer(s) from preceding items(s) in the PT to answer the item.
        - Rubrics for the interdependent items should explicitly prevent students from being penalized multiple times if a mistake made on a preceding item is correctly carried through subsequent items.
        - At grades 6-7, a minimum of two and a maximum of four items should be hand-scored.

Range Achievement Level Descriptors (ALDs)

Claim 2, Grades 6-7

- **Level 1** Students should be able to identify important quantities in the context of a familiar situation and translate words to equations or other mathematical formulation. When given the correct math tool(s), students should be able to apply the tool(s) to problems with a high degree of scaffolding.
- **Level 2** Students should be able to identify important quantities in the context of an unfamiliar situation and to select tools to solve a familiar and moderately scaffolded problem or to solve a less familiar or a non-scaffolded problem with partial accuracy. Students should be able to provide solutions to familiar problems using an appropriate format (e.g., correct units, etc.). They should be able to interpret information and results in the context of a familiar situation.
- **Level 3** Students should be able to map, display, and identify relationships, use appropriate tools strategically, and apply mathematics accurately in everyday life, society, and the workplace. They should be able to interpret information and results in the context of an unfamiliar situation.
- **Level 4** Students should be able to analyze and interpret the context of an unfamiliar situation for problems of increasing complexity and solve problems with optimal solutions.

Claim 3, Grades 6-7

- **Level 1** Students should be able to base arguments on concrete referents such as objects, drawings, diagrams, and actions and identify obvious flawed arguments in familiar contexts.
- **Level 2** Students should be able to find and identify the flaw in an argument by using examples or particular cases. Students should be able to break a familiar argument given in a highly scaffolded situation into cases to determine when the argument does or does not hold.
- **Level 3** Students should be able to use stated assumptions, definitions, and previously established results and examples to test and support their reasoning or to identify, explain, and repair the flaw in an argument. Students should be able to break an argument into cases to determine when the argument does or does not hold.
- **Level 4** Students should be able to use stated assumptions, definitions, and previously established results to support their reasoning or repair and explain the flaw in an argument. They should be able to construct a chain of logic to justify or refute a proposition or conjecture and to determine the conditions under which an argument does or does not apply.

Claim 4, Grades 6-7

- **Level 1** Students should be able to identify important quantities in the context of a familiar situation and translate words to equations or other mathematical formulation. When given the correct math tool(s), students should be able to apply the tool(s) to problems with a high degree of scaffolding.
- **Level 2** Students should be able to identify important quantities in the context of an unfamiliar situation and to select tools to solve a familiar and moderately scaffolded problem or to solve a less familiar or a non-scaffolded problem with partial accuracy. Students should be able to provide solutions to familiar problems using an appropriate format (e.g., correct units, etc.). They should be able to interpret information and results in the context of a familiar situation.
- **Level 3** Students should be able to apply mathematics to solve unfamiliar problems arising in everyday life, society, and the workplace by identifying important quantities and mapping, displaying, explaining, or applying their relationship and by locating missing information from relevant external resources. They should be able to construct chains of reasoning to justify a model used, produce justification of interpretations, state logical assumptions, and compare and contrast multiple plausible solutions.
- **Level 4** Students should be able to apply mathematics to solve unfamiliar problems by constructing chains of reasoning to analyze a model, producing and analyzing justification of interpretations, stating logical assumptions, and constructing and comparing/contrasting multiple plausible solutions and approaches.

Blueprint

Claim	Assessment Targets	DOK	Items per Claim	Total Items in PT
2. Problem Solving	A. Apply mathematics to solve well-posed problems arising in everyday life, society, and the workplace.	2, 3	1–2	4–6
	B. Select and use appropriate tools strategically. C. Interpret results in the context of a situation. D. Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flow charts, or formulas).	1, 2, 3		
4. Modeling and Data Analysis	A. Apply mathematics to solve problems arising in everyday life, society, and the workplace. D. Interpret results in the context of a situation.	2, 3	1–3	
	B. Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem. E. Analyze the adequacy of and make improvements to an existing model or develop a mathematical model of a real phenomenon.	2, 3, 4		
	C. State logical assumptions being used. F. Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flow charts, or formulas).	1, 2, 3		
	G. Identify, analyze, and synthesize relevant external resources to pose or solve problems.	3, 4		
3. Communicating Reasoning	A. Test propositions or conjectures with specific examples. D. Use the technique of breaking an argument into cases.	2, 3	0–2	
	B. Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures. E. Distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in the argument—explain what it is.	2, 3, 4		
	C. State logical assumptions being used. F. Base arguments on concrete referents such as objects, drawings, diagrams, and actions.	2, 3		

Grade 8-HS Mathematics Performance Task Specifications

A Performance Task (PT) presents students with a scenario and various item types, designed to provide students with an opportunity to demonstrate their ability to apply their knowledge and higher-order thinking skills to explore and analyze a complex, real-world scenario. A mathematics performance task elicits evidence of students' ability to "bring it all together" to develop a solution plan to the central challenge of the task.

Key Features of Mathematics Performance Tasks

Performance tasks should:

- integrate knowledge and skills across multiple Claims and Targets—a key component of college and career readiness.
- measure capacities such as depth of understanding, research skills, and/or complex analysis with relevant evidence.
- require student-initiated planning, management of information/data and ideas, and/or interaction with other materials.
- reflect a grade-level, developmentally appropriate real-world problem. Tasks elements (data sets, values provided, etc.) are not restricted to those actualized in the real world, but these elements should be realistic.
- allow for multiple approaches.
- represent content that is relevant and meaningful to students.
- allow for demonstration of twenty-first-century skills, such as critically analyzing and synthesizing information presented in a variety of formats, media, etc.
- require scoring that focuses on the essence of the Claim(s) and Targets for which the task was written.
- be feasible for the school/classroom environment.
- allow for calculator use in grades 6, 7, 8, and HS.

Attribute	Details
DOK Levels	1, 2, 3, 4
Item Count	3 – 5
Independent	1 – 5; It is recommended that the 1st item, or the 1st and 2nd items, be independent.
Interdependent	0 – 5
Hand-Scored Items	1 – 4
Score Points	0, 1, 2, 3, 4 — No fractional points
Construct Relevant Vocabulary	Refer to the Claim 1 specifications to determine Construct Relevant Vocabulary associated with specific content standards.
Stimuli References or Resources	No limitations

Allowable Tools	Any mathematical tools appropriate to the problem situation and the Claim 1 target(s) are allowable. Some tools are identified in Standard for Mathematical Practice #5, and others can be found in the language of specific standards.
Claim-Specific Attributes	Claim 2 items that are part of a performance task may take 2 to 8 minutes to solve. Claim 3 items that are part of a performance task may take 3 to 10 minutes to solve. Claim 4 items that are part of a performance task may take 5 to 15 minutes to solve.

Accessibility Guidance

Item writers should consider the following Language and Visual Element/Design guidelines[1] when developing items.

Language Key Considerations:

- Use simple, clear, and easy-to-understand language needed to assess the construct or aid in the understanding of the context
- Avoid sentences with multiple clauses
- Use vocabulary that is at or below grade level
- Avoid ambiguous or obscure words, idioms, jargon, and unusual names and references

Visual Elements/Design Key Considerations:

- Include visual elements only if the graphic is needed to assess the construct or it aids in the understanding of the context
- Use the simplest graphic possible, with the greatest degree of contrast, and include clear, concise labels where necessary
- Avoid crowding of details and graphics

Items are selected for a student's test according to the blueprint, which selects items based on Claims and Targets, not task models. As such, careful consideration is given to making sure fully accessible items are available to cover the content of every Claim and Target, even if some item formats are not fully accessible using current technology.[2]

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Gatekeeper Criteria for Performance Tasks

A set of cross-cutting criteria has been developed to guide the development and review of Performance Tasks. The term *gatekeeper* indicates these as essential components of a quality PT. Performance Tasks that do not meet these criteria would not be accepted into the PT item pool. The gatekeeper criteria are listed below.

- **Aligned with Claims and Standards**: PTs should go to the heart of the key Claims and Common Core State Standards for Mathematics. In particular, they should elicit evidence of Claims 2, 3, & 4. As such, they should elicit evidence of student engagement in the Common Core Mathematical Practices.
- **Developmentally Appropriate**: PT topics, tasks, and scoring should be appropriate for the age and developmental experience base of the students.
- **Engaging**: Topics should be authentic and realistic, engaging students in solving a problem or making a decision they would find relevant.
- **Accessible**: Topics and tasks should minimize sources of bias, allow for multiple pathways, and provide appropriate scaffolds or supports while keeping in mind that sources and response types need to allow access for students with different English language proficiency and students with disabilities.

- **Purposeful and Coherent:** Tasks should have an authentic purpose, and all task components should be connected to achieving that goal.
- **Development Notes**
    - Tasks generating evidence for **Claim 2** in a given grade will draw upon knowledge and skills articulated in the progression of standards up through that grade, though more complex problem-solving tasks may draw upon knowledge and skills from lower grade levels.
    - **Claim 2 for grade 8** items should be written to support three key themes:
        - Solving problems with functions
        - Solving problems involving geometry
        - Solving problems with expressions and equations
    - **Claim 2 for grade HS** items have no specific guidelines for key themes.
    - Items assessing **Claim 3** may involve application of more than one standard. The focus is on communicating reasoning rather than demonstrating mathematical concepts or simple applications of mathematical procedures.
    - Claim 3 items that require any degree of hand-scoring must be written to primarily assess Target B.
    - Items generating evidence for **Claim 4** in a given grade will draw upon knowledge and skills articulated in the progression of standards up through that grade, though more complex problem-solving tasks may draw upon knowledge and skills from lower grade levels.

Performance Task Development and Scoring Specifications

Task writers should ensure that the mathematics of the task are correct and should use precise mathematical language.

Task Type Considerations

- Plan and Design:
  - For plan-and-design tasks, design constraints and parameters should be clearly labeled and explained in the prompt.
- Evaluate and Recommend:
  - For evaluate-and-recommend tasks, data sets should be drawn from authentic data sets. If they are mocked up, they should conform to reasonable estimates.
  - The audience and format of the recommendation should be clearly stated (e.g., "Write a letter to your school principal with your recommendation.")
- Analysis and Theory:
  - For analysis-and-theory tasks, data sets should include an appropriate amount of data given the expectation that students will develop a theory about relationships within the problem.
  - These tasks provide a natural opportunity to engage students in the refinement of their theories, as additional data can be provided that suggests another theory.

Development Considerations

- **Stimuli Presentation**: When presenting stimuli, the following guidelines apply:
  - There should be a reference (using bold font as an indicator) that connects items to the specific stimulus resource required for a response. The name of the resource should be bold in both the stem and stimulus (e.g., Use Table 1 to answer this question.).
  - The number of resources (tables/graphics) within the stimulus of a PT is 0-6 for grades 8-HS, and they need to be relevant to the context and construct.
- **Sets of Items**: Each grades 8-HS Performance Task should consist of a set of three to five items (total points not critical). Each item may be worth 0–4 points, with guidelines for awarding 0, 1, 2, 3, or 4 points, but no half points. Scoring guides should allow for partial credit with items that have multiple score points.
- **Ramping and Decision Making**: Grades 8-HS PTs should exhibit appropriate ramping across items. A ramped sequence of items should provide all students access to a task, while maintaining the challenge of the stated goal of the task for higher performers. A ramped sequence of items will begin with items that encourage entry into the task but are still directly related to the stated goal of the task. All PT items should focus on problem solving, reasoning, and modeling as opposed to procedural and computational skills. Grades 8-HS tasks should utilize less ramping than previous grades, be less closely guided, and require more autonomous decision-making. At grades 6-HS, a hand scored proof or justification extended response item aligned to Claim 3 will be included in the examination.

- **Independent vs. Interdependent Items:**
    - Guidelines for the first 1-2 items:
        - The first 1–2 items are recommended to be independent (i.e., not needed to score subsequent parts of the task), but still directly related to the stated goal of the task.
        - The first 1–2 items should provide entry into the task. Here, "entry" means having low to low-medium difficulty that encourages students to make sense of the stated goal of the task.
        - The first 1–2 items should be machine-scorable.
    - Guidelines for the remaining items:
        - The remaining items in all performance tasks may be hand-scorable.
        - The remaining items should be cohesive and may be interdependent with one another. Interdependent items may ask student to use their answer(s) from preceding items(s) in the PT to answer the item.
        - Rubrics for the interdependent items should explicitly prevent students from being penalized multiple times if a mistake made on a preceding item is correctly carried through subsequent items.
        - At grades 8-HS, a minimum of one and a maximum of four items should be hand-scored.

Range Achievement Level Descriptors (ALDs)

Claim 2, Grades 8-HS

- **Level 1** Students should be able to identify important quantities in the context of a familiar situation and translate words to equations or other mathematical formulation. When given the correct math tool(s), students should be able to apply the tool(s) to problems with a high degree of scaffolding.
- **Level 2** Students should be able to identify important quantities in the context of an unfamiliar situation and to select tools to solve a familiar and moderately scaffolded problem or to solve a less familiar or a non-scaffolded problem with partial accuracy. Students should be able to provide solutions to familiar problems using an appropriate format (e.g., correct units, etc.). They should be able to interpret information and results in the context of a familiar situation.
- **Level 3** Students should be able to map, display, and identify relationships, use appropriate tools strategically, and apply mathematics accurately in everyday life, society, and the workplace. They should be able to interpret information and results in the context of an unfamiliar situation.
- **Level 4** Students should be able to analyze and interpret the context of an unfamiliar situation for problems of increasing complexity and solve problems with optimal solutions.

Claim 3, Grades 8-HS

- **Level 1** Students should be able to base arguments on concrete referents such as objects, drawings, diagrams, and actions and identify obvious flawed arguments in familiar contexts.
- **Level 2** Students should be able to find and identify the flaw in an argument by using examples or particular cases. Students should be able to break a familiar argument given in a highly scaffolded situation into cases to determine when the argument does or does not hold.
- **Level 3** Students should be able to use stated assumptions, definitions, and previously established results and examples to test and support their reasoning or to identify, explain, and repair the flaw in an argument. Students should be able to break an argument into cases to determine when the argument does or does not hold.
- **Level 4** Students should be able to use stated assumptions, definitions, and previously established results to support their reasoning or repair and explain the flaw in an argument. They should be able to construct a chain of logic to justify or refute a proposition or conjecture and to determine the conditions under which an argument does or does not apply.

Claim 4, Grades 8-HS

- **Level 1** Students should be able to identify important quantities in the context of a familiar situation and translate words to equations or other mathematical formulation. When given the correct math tool(s), students should be able to apply the tool(s) to problems with a high degree of scaffolding.
- **Level 2** Students should be able to identify important quantities in the context of an unfamiliar situation and to select tools to solve a familiar and moderately scaffolded problem or to solve a less familiar or a non-scaffolded problem with partial accuracy. Students should be able to provide solutions to familiar problems using an appropriate format (e.g., correct units, etc.). They should be able to interpret information and results in the context of a familiar situation.
- **Level 3** Students should be able to apply mathematics to solve unfamiliar problems arising in everyday life, society, and the workplace by identifying important quantities and mapping, displaying, explaining, or applying their relationship and by locating missing information from relevant external resources. They should be able to construct chains of reasoning to justify a model used, produce justification of interpretations, state logical assumptions, and compare and contrast multiple plausible solutions.
- **Level 4** Students should be able to apply mathematics to solve unfamiliar problems by constructing chains of reasoning to analyze a model, producing and analyzing justification of interpretations, stating logical assumptions, and constructing and comparing/contrasting multiple plausible solutions and approaches.

Blueprint

Claim	Assessment Targets	DOK	Items per Claim	Total Items in PT
2. Problem Solving	A. Apply mathematics to solve well-posed problems arising in everyday life, society, and the workplace.	2, 3	1–2	3-5
	B. Select and use appropriate tools strategically. C. Interpret results in the context of a situation. D. Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flow charts, or formulas).	1, 2, 3		
4. Modeling and Data Analysis	A. Apply mathematics to solve problems arising in everyday life, society, and the workplace. D. Interpret results in the context of a situation.	2, 3	1–3	
	B. Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem. E. Analyze the adequacy of and make improvements to an existing model or develop a mathematical model of a real phenomenon.	2, 3, 4		
	C. State logical assumptions being used. F. Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flow charts, or formulas).	1, 2, 3		
	G. Identify, analyze, and synthesize relevant external resources to pose or solve problems.	3, 4		
3. Communicating Reasoning	A. Test propositions or conjectures with specific examples. D. Use the technique of breaking an argument into cases.	2, 3	0–2	
	B. Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures. E. Distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in the argument—explain what it is.	2, 3, 4		
	C. State logical assumptions being used. F. Base arguments on concrete referents such as objects, drawings, diagrams, and actions.	2, 3		