Grade 7 Math Claim 2

Primary Claim 2: Problem Solving Students can solve a range of well-posed problems in pure and applied mathematics, making productive use of knowledge and problem-solving strategies.
Secondary Claim(s): Items/tasks written primarily to assess Claim 2 will necessarily involve some Claim 1 content targets. Related Claim 1 targets should be listed below the Claim 2 targets in the item form. If Claim 3 or 4 targets are also directly related to the item/task, list those following the Claim 1 targets in order of prominence.
Primary Content Domain: Each item/task should be classified as having a primary, or dominant, content focus. The content should draw upon the knowledge and skills articulated in the progression of standards leading up to Grade 7.
Secondary Content Domain(s): While tasks developed to assess Claim 2 will have a primary content focus, components of these tasks will likely produce enough evidence for other content domains that a separate listing of these content domains needs to be included where appropriate.
Assessment Targets: Any given item/task should provide evidence for several Claim 2 assessment targets. Each of the following targets should not lead to a separate task: it is in *using* content from different areas, including work studied in earlier grades, that students demonstrate their problem solving proficiency. Multiple targets should be listed in order of prominence as related to the item/task.
Target A: Apply mathematics to solve well-posed problems arising in everyday life, society, and the workplace. (DOK 2, 3) Under Claim 2, the problems should be completely formulated, and students should be asked to find a solution path from among their readily available tools. **Target B: Select and use appropriate tools strategically. (DOK 1, 2)** Tasks used to assess this target should allow students to find and choose tools; for example, using a "Search" feature to call up a formula (as opposed to including the formula in the item stem) or using a protractor in physical space. **Target C: Interpret results in the context of a situation. (DOK 2)** Tasks used to assess this target should ask students to link their answer(s) back to the problem's context. In early grades, this might include a judgment by the student of whether to express an answer to a division problem using a remainder or not based on the problem's context. In later grades, this might include a rationalization for the domain of a function being limited to positive integers based on a problem's context (e.g., understanding that the number of buses required for a given situation cannot be 32½, or that the negative values for the independent variable in a quadratic function modeling a basketball shot have no meaning in this context). **Target D: Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flowcharts, or formulas). (DOK 1, 2, 3)** For Claim 2 tasks, this may be a separate target of assessment explicitly asking students to use one or more potential mappings to understand the relationship between quantities. In some cases, item stems might suggest ways of mapping relationships to scaffold a problem for Claim 2 evidence.

Relevant Verbs:	understand (often in conjunction with one or more other relevant verbs), solve, apply, describe, illustrate, interpret, and analyze

DOK Target(s):	1, 2, 3
Claim 2 Rationale:	**Mathematical Practice 1: Make sense of problems and persevere in solving them.** Mathematically proficient students: • explain to themselves the meaning of a problem and look for entry points to its solution. • analyze givens, constraints, relationships, and goals. • make conjectures about the form and meaning of the solution attempt. • plan a solution pathway rather than simply jumping into a solution. • consider analogous problems and try special cases and simpler forms of insight into the solutions. • monitor and evaluate their progress and change course if necessary. • transform algebraic expressions or change the viewing window on their graphing calculator to get information. • explain correspondences between equations, verbal descriptions, tables, and graphs. • draw diagrams of important features and relationships, graph data, and search for regularity or trends. • use concrete objects or pictures to help conceptualize and solve a problem. • check their answers to problems using a different method**.** • ask themselves, “Does this make sense?” • understand the approaches of others in solving complex problems and identify correspondences between approaches. **Mathematical Practice 5: Use appropriate tools strategically.** Mathematically proficient students: • consider available tools when solving a mathematical problem. (Tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software.) • are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. • detect possible errors by using estimations and other mathematical knowledge. **Mathematical Practice 7: Look for and make use of structure.** Mathematically proficient students: • look closely to discern a pattern or structure.

	○ Young students might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. ○ Later, students will see 7 x 8 equals the well remembered 7 x 5 + 7 x 3, in preparation for the distributive property. ○ In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 x 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. • step back for an overview and can shift perspective. • see complicated things, such as some algebraic expressions, as single objects or composed of several objects. **Mathematical Practice 8: Look for and express regularity in repeated reasoning.** Mathematically proficient students: • notice if calculations are repeated. • look for both general methods and shortcuts. ○ Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations and conclude they have a repeated decimal. ○ Middle school students might abstract the equation (y-2)/(x-1) =3 by paying attention to the calculation of slope as they repeatedly check whether the points are on the line through (1, 2) with a slope 3. • maintain oversight of the process of solving a problem, while attending to the details. • continually evaluate the reasonableness of intermediate results.
Allowable Item Types*:	SR, CR, ER, TE
Task Models:	**Problems in pure mathematics.** These are well-posed problems within mathematics where the student must find an approach, choose which mathematical tools to use, carry the solution through, and explain the results. **Design problems.** These are well-posed problems within a real- or fantasy-world context where the student must find an approach, choose which mathematical tools to use, carry the solution through, and explain the results. **Planning problems.** Planning problems involve the coordinated analysis of time, space, cost, and people. They are design tasks

	with a time dimension added. Well-posed problems of this kind assess the student's ability to make the connections needed between different parts of mathematics. Note: This is not a complete list; other types of tasks that fit the criteria above may be included.
Allowable Tools:	protractor, ruler, calculator, spreadsheet, mathematical software
Key Nontargeted Constructs:	
Target-Specific Attributes:	Items/tasks must be real-world and should take from 5-15 minutes to solve.
Accessibility Concerns:	Real-world problems may sometimes be text-heavy. Translation tools and dictionaries should be available to ELL students. Text readers should be available to students, as necessary.
Sample Items:	MAT.07.CR.2.000EE.D.158, MAT.07.ER.2.0000G.A.295, MAT.07.ER.2.0000G.F.501

*SR = selected-response item; CR = constructed-response item; TE = technology-enhanced item; ER = extended-response item; PT = performance task