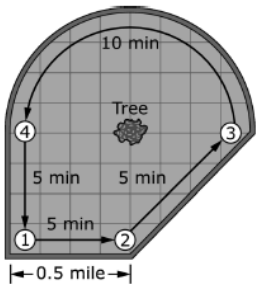
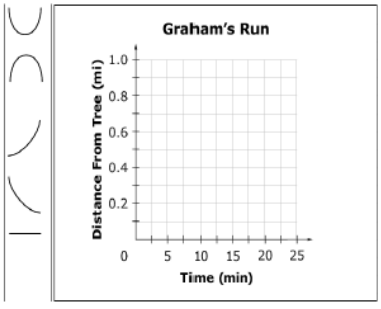
Claim 4: Modeling and Data Analysis
Items and tasks of this sort require students to apply mathematical concepts at a significantly deeper level of understanding of mathematical content than is expected by Claim 1.

Gr 6-8 and 11: 23-24% of Q's (56% of which will come from PT)) – for both Claims 2 and 4

CCSS verbs associated with Claim 4:	**model, construct, compare, investigate, build, interpret, estimate, analyze, summarize, represent, solve, evaluate, extend, apply**

Assessment Targets	Expectations
Target A: Apply mathematics to solve problems arising in everyday life, society, and the workplace. (DOK 2, 3)	**Task Expectations:** A student can be expected to solve problems that involve – • Extracting relevant information from within the problem • Finding missing information through research or the use of reasoned estimates, • Identifying extraneous information **Example:** Darcy likes to eat peanut butter and raisins on apple slices. On each apple slice she puts $\frac{1}{16}$ cup of peanut butter and 8 raisins. Darcy has $\frac{2}{5}$ cup of peanut butter and 80 raisins. She eats a whole number of apple slices until the peanut butter is all gone. What fraction of the 80 raisins did she eat? Enter the fraction in the response box.
Target B: Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem. (DOK 2, 3, 4)	**Task Expectations:** The student either: • Justifies the mathematical model(s) used • Justifies the interpretation(s) shown • Justifies the solution(s) given to a complex problem. **Example Stems:** 1) Explain whether (the model is greater than, equal to, or less than the actual area of the surface). Use specific examples and mathematics to support your answer. 2) Use the ideas of center and spread to justify your choice. 3) What does the graph show about the relationship between … 4) Approximate the …. Explain how you got your answer 5) Label your answers to both parts of the problem in the response box. Be sure to use information from the …to support your answers.

Target C: State logical assumptions being used. (DOK 1, 2)	**Task Expectations:** The student • Will use stated assumptions, definitions, and previously established results in developing their reasoning. • May be required to provide missing information by researching or providing a reasoned estimate. **Example:** There is a traffic jam on a highway. A reporter is trying to estimate the number of vehicles involved in the traffic jam. Select all of the information that will help the reporter make a reasonable estimate of the number of vehicles in the traffic jam. A. The cause of the traffic jam B. The average length of a vehicle C. The number of lanes on the highway D. The average distance between vehicles E. The average number of people in each vehicle F. The distance from the beginning to the end of the traffic jam
Target D: Interpret results in the context of a situation. (DOK 2, 3)	**Task Expectations:** Tasks should ask students to link their response back to the problem's context, e.g., a judgment by the student of whether to express an answer to a division problem or a rationalization for the domain of a function being limited to positive integers. **Example:** [Given a scatter plot and table of values] The table shown lists the animal weights and heart rates used to construct the scatter plot. Select **two** rows containing data that demonstrate an error greater than 30 beats per minute between the heart rate estimated by the line and the animal's actual heart rate.
Target E: Analyze the adequacy of and make improvements to an existing model or develop a mathematical model of a real phenomenon. (DOK 3, 4)	**Task Expectations:** Focus on developing a mathematical model of a real phenomenon. Any of the following scenarios can be used to assess this target. • Given a situation, the student will identify or create a symbolic or graphical model to represent the situation (includes equations, diagrams, and graphs). • Given data (table of values, scatterplot, etc.) the student will identify the type of function that might best model the situation. • The student will assess the fit of a particular model being used, including models used in two and three-dimensional geometry. • May use a simulation that mirrors the functioning of a formula-based online calculator. **Example:** Select **all** situations that can be modeled by the linear equation $y = 2x+5$. A. There are initially 5 rabbits on the farm. Each month thereafter the number of rabbits is 2 times the number in

	the month before. How many rabbits are there after *x* months? B. Joe earns $2 for each magazine sale. He also earns $5 for each hour he spends trying to sell magazines. How much money will he earn after selling magazines for *x* hours? C. Sandy charges $2 an hour for babysitting. Parents are charged $5 if they arrive home later than scheduled. Assuming the parents arrived late, how much money does she earn for *x* hours? D. Sneak Preview is a members-only video rental store. There is a $2 initiation fee and a $5 per video rental fee. How much would Laney owe on her first visit if she becomes a member and rents *x* videos? E. Andre is saving money for a new CD player. He began saving with a $5 gift and will continue to save $2 each week. How much money will he have saved at the end of *x* weeks?
Target F: 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)	**Task Expectations:** • The mapping of relationships should be part of the problem posing and solving related to Claim 4 Targets A, B, E, and G. • Data is presented in a table or graph, or extracted from a context. • The student may be asked to determine conclusions that are plausible based on the data. **Example:** Graham has a running route that follows a fence surrounding a field. The diagram shows four locations along the fence. It also shows the time it takes Graham to run from one location to the next. • Graham starts his run at location ①, which is about 0.7 mile from a tree in the field. • His speed varies during his entire run but is constant from one location to the next. • Graham finishes his run back at location ①. Use the diagram to construct a graph of Graham's distance from the tree as a function of time. Construct the graph by dragging pieces of the graph to the appropriate location on the coordinate grid. • Each piece represents a 5-minute interval. • The pieces of the graph may be used more than once.  

Target G*: Identify, analyze and synthesize relevant external resources to pose or solve problems. (DOK 3, 4) ***Measured in Performance Tasks only**	

Primary emphases for Claim 4 Items for grade 6-7:

- **Ratios and Proportional Relationships**
- **The Number System**
- **Expressions and Equations**

Primary emphases for Grade 8 Claim 4 Items:

- **Expressions and Equations**
- **Geometry**

Grade 6	Grade 7	Grade 8
6.RP.A	7.RP.A	8.EE.3
6.NS.A	7.NS.A	8.EE.4
6.NS.C	7.EE.B	8.EE.B
6.EE.B	7.G.A*	8.EE.C
6.EE.C	7.G.B*	8.F.B*
6.G.A*	7.SP.A*	8.G.B
6.SP.A*	7.SP.B*	8.G.C*
6.SP.B*	7.SP.C*	8.SP.A*

* Denotes additional and supporting clusters

High School	
N-Q.A	S-ID.A
A-SSE.B	S-ID.B
A-CED.A	S-IC.1
A-REI.A	S-IC.B
A-REI.B	F-LE.A
A-REI.C	F-LE.B
F-IF.B	F-TF.5
F-IF.C	G-GMD.3
F-BF.A	G-MG

REMINDER: Claim 4 tasks may also ask students to apply content from prior grades in sophisticated applications.