Analysis of TASC Readiness Assessment, Forms 4 & 5 (GHI)

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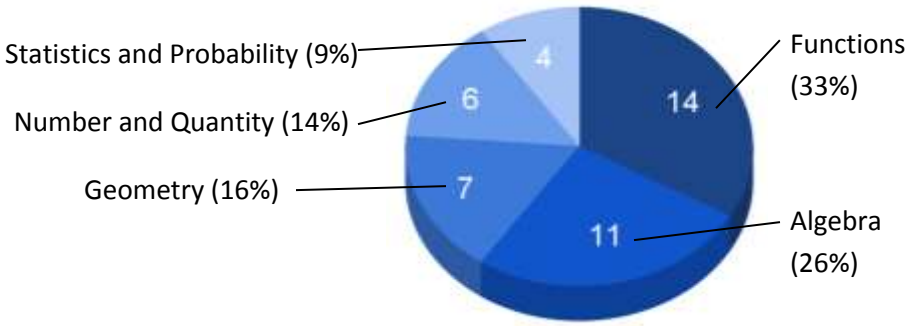
Domain/ Reporting Category	Subdomain/Core Idea	Subdomain %	Domain %
Algebra	Arithmetic with Polynomials and Rational Expressions	6%	26%
	Reasoning with Equations and Inequalities	8%	
	Creating Equations	6%	
	Seeing Structure in Expressions	6%	
Geometry	Geometric Measurement with Dimension	6%	23%
	Modeling with Geometry	7%	
	Congruence	5%	
	Similarity, Right Triangles, and Trigonometry	5%	
Functions	Interpreting Functions	10%	26%
	Linear, Quadratic, and Exponential Models	8%	
	Building Functions	8%	
Number and Quantity	Quantities	10%	13%
	The Real Number System	3%	
Statistics and Probability	Making Inferences and Justifying Conclusions	3%	12%
	Interpreting Categorical and Quantitative Data	6%	
	Conditional Probability and Rules of Probability	3%	

TASC Math Blueprint

The TASC Blueprint[i] offers a quick overview of the breakdown of the math content. As you can see, the TASC is 52% functions and algebra combined. Our students need extensive study in those areas of math. We sometimes hear from teachers that they teach operations with fractions, decimals and percent before introducing functions or algebra to students. However, students cannot wait to learn "the basics" first and then squeeze these high emphasis areas in at the end of a semester. It is possible to teach these fundamental subjects at the same time as functions. The CUNY HSE Math Curriculum Framework offers lessons and a scaffolded approach that allows students to develop a conceptual understanding of functions as well as learning the formal notation and contextualized applications.

Note: The Blueprint has a subdomain with trigonometry in the title, but if you look in the TASC Item Specifications[ii], trigonometry is a low emphasis area. It is mentioned in the subdomains because that is the name of the subdomain in the Common Core Standards. Our students are very unlikely to see any questions dealing with trigonometry.

If we look at the domain breakdown based on an analysis of the actual readiness tests (4 & 5), we see an even greater emphasis on functions than is suggested on the Blueprint.

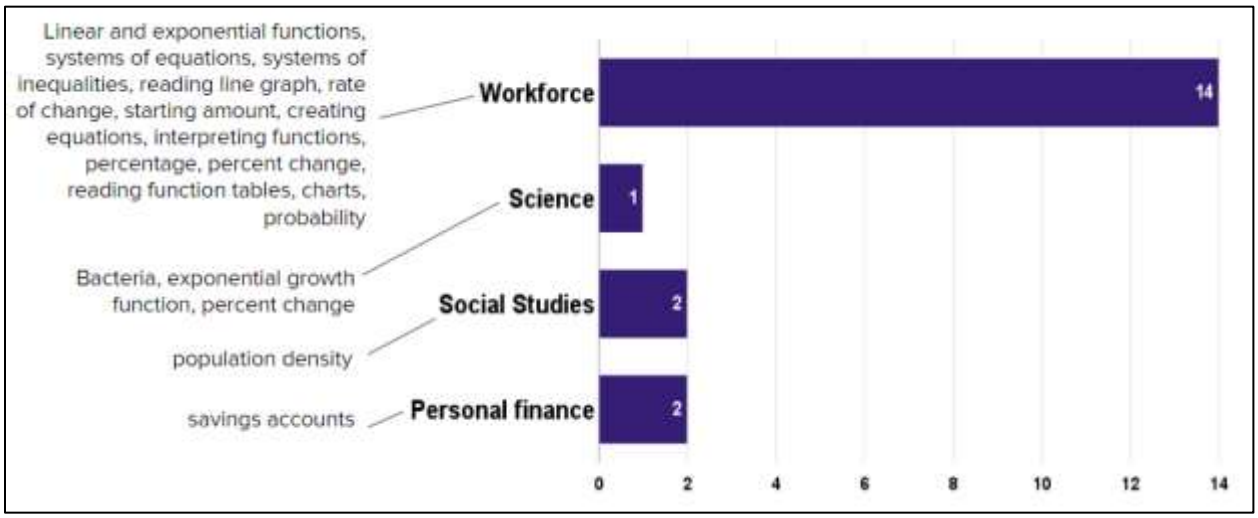


Out of 42 unique questions on ORT 4 & 5

Each math problem on the readiness assessments corresponds to a specific content domain. We need to take that with a grain of salt. The domain emphases are helpful, but there are often other things students need to know to answer these problem. For example, a problem that is classified as a function problem, might also require students to understand percent change, order of operations or operations with signed numbers.

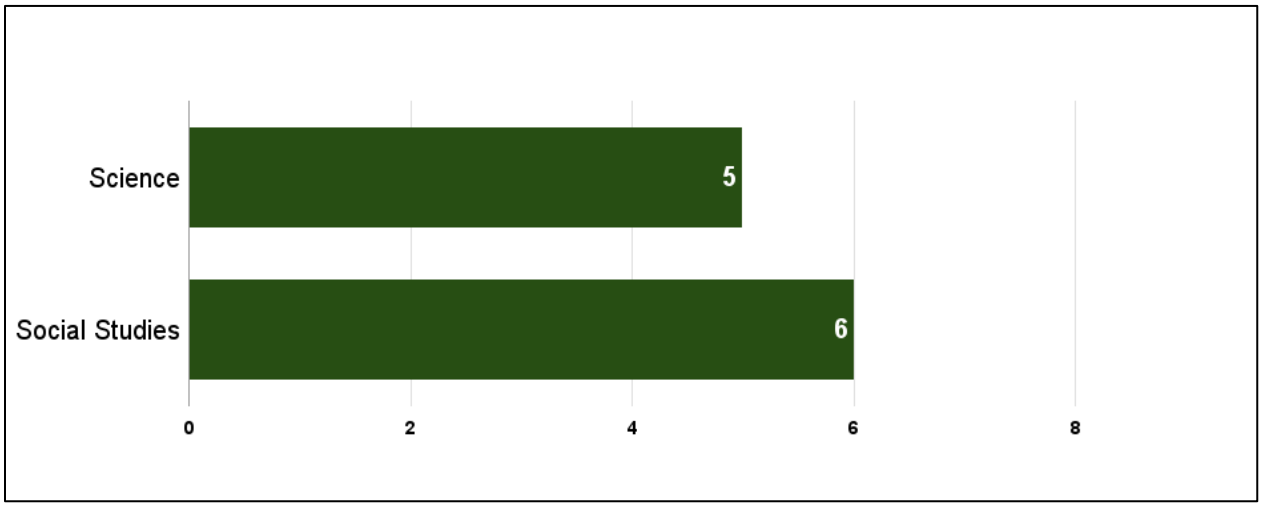
Mathematics in a Context

Forty-five percent (45%) of the math problems on readiness tests 4 and 5 have a real-world context. The following is a breakdown of the contexts and the mathematical content:



Since almost half of the math problems involve a real-world context, it is important that our students work with contexualized math problems in our classes. Please note the math content in the graph above. A high-emphasis is placed on students being able to connect real-world situations with functions, equations and graphs and vice-versa. Students have to be able to recognize different ways to represent a situation. They also need to be able to understand how the different elements of the function/equation connect to the real-world situation.

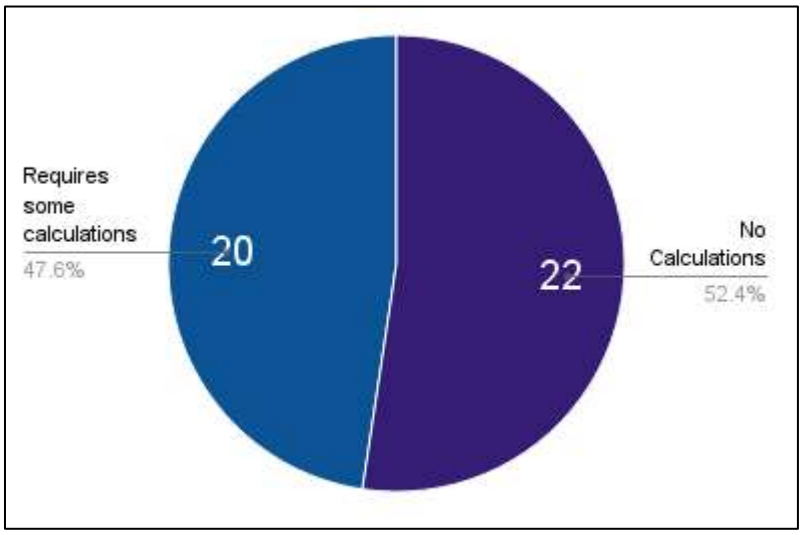
Math in Other Content Areas



In addition to the math section, there is math on both the science and social studies sections. On Readiness Assessments 4 and 5 the following math topics are present: Line graphs, line of best fit, charts, interpreting data, using formula, pie charts, pictograph, and an equilibrium price graph. Note that there is more data and statistics than the blueprint would suggest because it is found in the science and social studies sections. When possible, math teachers should confer with reading/writing teachers to look for opportunities to integrate math into other disciplines, especially through the use of data, charts, and graphs.

Conceptual Understanding

The following graph gives us a window into the kinds of questions our students will be facing on the TASC:



Students need to be able to do a lot more than simply calculate an answer. This has serious implications for the kind of problems we have students work on in our classes. These questions that do not require calculations emphasize students conceptual understanding – they are assessing whether our students know why they are doing the things they do. This kind of understanding is emphasized in the CUNY HSE Math Curriculum Framework.

Sample Question Stems from TASC Math Readiness Assessment, Forms 4 & 5

To get a sense of how the TASC assesses students' conceptual knowledge without requiring calculations, let's look at some sample question stems for the TASC Readiness Assessments, forms 4 & 5. By looking at the question stems, we can look for patterns and get a sense of the kinds of questions students will have to answer. We can also use these stems to build questions in class, to ensure students have experience with these types of problems.

Here is one "genre" of question stems from the Readiness Assessment:

- *Which statement is true about...?*
- *What is the correct interpretation of…?*
- *Which interpretation of this… is correct?*
- *Which statement is correct?*
- *Which statement about the… is true?*

These stems ask students to be able to interpret a mathematical situation (often a function, equation, or graph) and choose the answer that best fits. These types of problems almost always contain reasonable *in*correct answers and require students to read the problem and consider each answer choice carefully.

Here is another "genre" of question stems from the Readiness Assessment:

- *What type of function should be used... and why?*
- *Which linear function models the relationship between...?*
- *Which equation represents…?*
- *Which graph represents...?*
- *Which system of equations can be used to...?*
- *Which system of inequalities can...?*
- *What is another way to write…?*

These stems usually come from the kinds of problems discussed above in the Mathematics in Context section of this document. They require students to make connections between tables, graphs, equations, functions, real-life situations and back again. They often ask students to either build or interpret a function, equation or graph.

Sample Equations and Inequalities from TASC Readiness Assessment, Forms 4 & 5

Below are a range of equations/inequalities, adapted from those that appear on forms 4 and 5. The range makes clear that students need to be fluid and flexible in their understanding of different forms of formal notation. Let's look at three groups of equations/inequalities used on the Readiness Assessment.

Here's the first group:

$E = 0.08d + 275$	$A = 1.15x + 11.50$	$C = 20b + 50$
$A = 0.75m + 600$	$y = -32x + 800$	

All of these equations are in standard $y = mx + b$ form, though most use different variables. On the readiness assessment, all of these functions are used to represent real-world situations.

- Three questions ask students to consider a series of statements. Students must choose which statement is a true/correct interpretation of the function equation.
- Two of these equations come from questions that ask students to identify the function or equation that represent a given situation.

A second kind of function representation that students should understand involves *f(x)* notation. Here are a few examples of this type of notation similar to what is found on the TASC Readiness Assessment:

$f(x) = 450x + 7500$	$P(t) = 15.25t + 45$	$B(t) = (1.08)^t$
$p(t) = -\frac{1}{8}t^2 + 3t - 3$		$p(x) = 2^x$ $q(x) = x^2$

- All of the functions in this group were used in problems to represent real-world situations.
- Three of these equations are from problems asking students to choose which statement is correct/true.
- One of these functions appears in a collected response, short-answer question.
- We see linear, exponential and quadratic functions using this notation. We also see that different variables are used.

The *f(x)* notation can be challenging for students because it goes against their prior knowledge. Instead of reading *f(x)* as equivalent to "y" or "the output for a value of x", the most common misconception is for students to treat the "f" and the "x" in *f(x)* as two separate variables that are multiplied together. This is understandable since many have learned parentheses mean multiply. Unit 3 of the CUNY HSE Math Curriculum Framework has activities for helping students and teachers draw connections between the *y = mx + b* form and the *f(x)* notation.

A third type of problem uses systems of equations/systems of inequalities. Here are some examples adapted from the TASC Readiness Assessment:

$J + 25 = A$ $J + A = 179$	$r + b < 300$ $b < \frac{1}{2}r$
$x - 4y = -20$ $6x + 8y = 136$	

- The two systems in the top row were used in problems to represent real-world situations, were students have to choose the system that best fits the situations.
- Other types of systems questions ask students to identify which of a given set of ordered pairs are solutions to the system.

The following resources were used in conjunction with our analysis of the TASC Readiness Assessments for TASC forms G, H, and I.

[i] The TASC Math Blueprint document provides an overview of the domain and subdomain content for the math section of the TASC. It also lists out the standards assessed within each domain and the degree to which each standard is emphasized (high, medium, or low).

[ii] The TASC Math Item Specifications document is a guide created for test question writers that provides some insight into the test. It is 82 pages long and can be a little intimidating. The most useful materials here for teachers are probably (1) the sample items and sample item stems for each standard, (2) information about what *is* (called "evidence statements") and what *isn't* (called "assessment limits") fair game within each standard, (3) information about the different kinds of questions (Multiple-selected response items, multiple-choice, gridded response, constructed response), and (4) the sample rubrics for the constructed response questions.