Statistics Mathematics Instructional Materials Scoring Rubric

Introduction:

The following Instructional Materials Scoring Rubric for Mathematics is designed to score materials in the following categories:

- Instructional Focus
- Math Practices
- Aspects of Rigor
- Accessibility Features

Scoring:

Each section is to be scored using a 0, 1, or 2. For all sections, except for Rigor, use the following rubric when deciding on the appropriate rating:

- 0: The metric is not present within the material.
- 1: The metric is present within the material. The intent and/or frequency component of the metric is not fully met.
- 2: A rating of 2 indicates the metric is present and all aspects of the metric are fully met.

For Rigor:

- 0: The standard is not instructionally present within the material.
- 1: The standard is instructionally present but does not have an instructional focus on the indicated type of rigor.
- 2: The standard is instructionally present and has a clear instructional focus on the indicated type of rigor.

Note: Some standards appear under multiple aspects of rigor (i.e., Conceptual Understanding, Procedural Fluency, or Application). When scoring these standards, only score the part of the standard relevant to that aspect of rigor, which is identified by a bold, italics, larger font.

Gateway: The publisher must provide a Tennessee standards alignment guide as a part of the scope and sequence for the material. If this gateway is not met, the materials will not be scored.

Instructional Focus				
	0	**1**	**2**	**Evidence**
Connections to content from prior grades are clearly identified and explicitly related to grade-level work.				
Materials embed a minimum of 3 tasks in every unit. Each task has multiple entry-points and can be solved using a minimum of 2 solution strategies and/or representations.				
Materials give students opportunities to work problems within each lesson. Each problem set: • Covers the full breadth of the standard(s) covered in the lesson • Is aligned to on grade level expectations as identified in the standard(s)				
Teacher resources indicate common student misconceptions in every unit and provide guidance on how to instructionally address the identified misconceptions.				
Materials provide educative supports (e.g., adult level explanations of the standards and strategies) in every lesson for teachers to ensure standards are taught accurately and to the appropriate level of rigor (i.e., conceptual understanding, procedural fluency, and application) as indicated by the standards.				
Materials develop student understanding of multiple representations (i.e., concrete, representational, abstract) for relevant standards which are identified in the state's Instructional Focus Documents.				
Materials include problems and activities in every unit that connect two or more grade level standards in a domain (e.g., 4.OA.A.1 and 2.OA.A.2).				
Materials include problems and activities in every unit that connect two or more grade level domains. (e.g., 4.MD.A.2 and 4.OA.A.3)				
Materials provide opportunities for students to participate in a spiraled review in every unit.				
Total				

Mathematical Practices				
Math Practices/Literacy Skills for Math Proficiency	**0**	**1**	**2**	**Evidence**
Materials embed the eight math practice standards in every unit.				
Math practice standards are clearly identified in both teacher and student materials.				
Materials use appropriate math vocabulary which is aligned to the grade level standards.				
Materials support students in discussing and articulating mathematical ideas. Within each lesson students either write or verbally justify their thoughts.				
			Total	

Accessibility Features				
Digital Materials	**0**	**1**	**2**	**Evidence**
All lessons within the materials are available in digital form and include a printable option.				
In every lesson, materials include recommended supports, accommodations, and modifications for Students with Disabilities and English Language Learners that will support their regular and active participation in accessing on grade level material (e.g., modifying vocabulary words within word problems, sentence starters, etc.).				
			Total	

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Aspects of Rigor				
Conceptual Understanding: The materials support the intentional development of students' conceptual understanding of key mathematical concepts, especially where called for in specific content standards or clusters.	**0**	**1**	**2**	**Evidence**
S.ID.A.1 Understand the term 'variable' and differentiate between the data types: measurement, categorical, univariate, and bivariate.				
S.ID.A.2 Understand histograms, parallel box plots, and scatterplots, and use them to display and compare data.				
S.ID.A.3 Summarize distributions of univariate data.				
S.ID.A.4 Compute basic statistics and understand the distinction between a statistic and a parameter.				
S.ID.A.5 For univariate measurement data, be able to display the distribution and describe its shape; select and calculate summary statistics.				
S.ID.A.6 Recognize how linear transformations of univariate data affect shape, center, and spread.				
S.ID.A.7 Analyze the effect of changing units on summary measures.				
S.ID.A.8 Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities.				
S.ID.A.9 Describe individual performances in terms of percentiles, z-scores, and t-scores.				
S.ID.B.10 Represent and analyze categorical data.				
S.ID.B.11 Display and discuss bivariate data where at least one variable is categorical.				
S.ID.B.12 For bivariate measurement data, be able to display a scatterplot and describe its shape; use technological tools to determine regression equations and correlation coefficients.				

S.ID.B.13 Identify trends in bivariate data; find functions that model the data and that transform the data so that they can be modeled.			
S.CP.A.1 Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").			
S.CP.A.2 Use permutations and combinations to compute probabilities of compound events and solve problems.			
S.CP.A.3 Demonstrate an understanding of the Law of Large Numbers (Strong and Weak).			
S.CP.B.4 Demonstrate an understanding of the addition rule, the multiplication rule, conditional probability, and independence.			
S.CP.B.5 Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in terms of the model.			
S.MD.A.1 Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.			
S.MD.A.2 Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.			
S.MD.A.3 Design a simulation of random behavior and probability distributions (e.g., drawing by lots, using a random number generator and using the results to make fair decisions.)			
S.MD.A.4 Analyze discrete random variables and their probability distributions, including binomial and geometric.			
S.MD.A.5 Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value. *For example, find the theoretical probability distribution for the number of correct answers obtained by guessing on all five questions of a multiple-choice test where each question has four choices, and find the expected grade under various grading schemes*.			
S.MD.A.6 Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. *For example, find a current data distribution on the number of TV sets per household in the United States, and calculate the expected number of sets per*			

household. How many TV sets would you expect to find in 100 randomly selected households?				
S.MD.A.7 Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.				
S.MD.A.7a Find the expected payoff for a game of chance. *For example, find the expected winnings from a state lottery ticket or a game at a fast-food restaurant.*				
S.MD.A.7b Evaluate and compare strategies on the basis of expected values. *For example, compare a high-deductible versus a low-deductible automobile insurance policy using various, but reasonable, chances of having a minor or a major accident.*				
S.MD.A.8 Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).				
S.MD.B.9 Calculate the mean (expected value) and standard deviation of both a random variable and a linear transformation of a random variable.				
S.MD.B.10 Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.				
S.IC.A.1 Understand the differences among various kinds of studies and which types of inferences can be legitimately drawn from each.				
S.IC.A.2 Compare census, sample survey, experiment, and observational study.				
S.IC.A.3 Describe the role of randomization in surveys and experiments.				
S.IC.A.4 Describe the role of experimental control and its effect on confounding.				
S.IC.A.5 Identify bias in sampling and determine ways to reduce it to improve results.				
S.IC.A.6 Describe the sampling distribution of a statistic and define the standard error of a statistic.				
S.IC.A.7 Demonstrate an understanding of the Central Limit Theorem.				
S.IC.B.8 Select a method to collect data and plan and conduct surveys and experiments.				
S.IC.B.9 Compare and use sampling methods, including simple random sampling, stratified random sampling, and cluster sampling.				
S.IC.B.10 Test hypotheses using appropriate statistics.				

	0	1	2	Evidence
S.IC.B.11 Analyze results and make conclusions from observational studies, experiments, and surveys.				
S.IC.B.12 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.				
S.IC.C.13 Develop and evaluate inferences and predictions that are based on data.				
S.IC.C.14 Use properties of point estimators, including biased/unbiased, and variability.				
S.IC.D.15 Understand the meaning of confidence level, of confidence intervals, and the properties of confidence intervals.				
S.IC.D.16 Construct and interpret a large sample confidence interval for a proportion and for a difference between two proportions.				
S.IC.D.17 Construct the confidence interval for a mean and for a difference between two means.				
S.IC.E.18 Apply the properties of a Chi-square distribution in appropriate situations in order to make inferences about a data set.				
S.IC.E.19 Apply the properties of the normal distribution in appropriate situations in order to make inferences about a data set.				
S.IC.E.20 Interpret the t-distribution and determine the appropriate degrees of freedom.				
Procedural Skill and Fluency: The materials provide intentional opportunities for students to develop procedural skills and fluencies, especially where called for in specific content standards or clusters	**0**	**1**	**2**	**Evidence**
S.ID.A.1 Understand the term 'variable' and differentiate between the data types: measurement, categorical, univariate, and bivariate.				
S.ID.A.2 Understand histograms, parallel box plots, and scatterplots, and use them to display and compare data.				
S.ID.A.3 Summarize distributions of univariate data.				
S.ID.A.4 Compute basic statistics and understand the distinction between a statistic and a parameter.				
S.ID.A.5 For univariate measurement data, be able to display the distribution and describe its shape; select and calculate summary statistics.				
S.ID.A.6 Recognize how linear transformations of univariate data affect shape, center, and spread.				

S.ID.A.7 Analyze the effect of changing units on summary measures.				
S.ID.A.8 Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities.				
S.ID.A.9 Describe individual performances in terms of percentiles, z-scores, and t-scores.				
S.ID.B.10 Represent and analyze categorical data.				
S.ID.B.11 Display and discuss bivariate data where at least one variable is categorical.				
S.ID.B.12 For bivariate measurement data, be able to display a scatterplot and describe its shape; use technological tools to determine regression equations and correlation coefficients.				
S.ID.B.13 Identify trends in bivariate data; find functions that model the data and that transform the data so that they can be modeled.				
S.CP.A.1 Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").				
S.CP.A.2 Use permutations and combinations to compute probabilities of compound events and solve problems.				
S.CP.A.3 Demonstrate an understanding of the Law of Large Numbers (Strong and Weak).				
S.CP.B.4 Demonstrate an understanding of the addition rule, the multiplication rule, conditional probability, and independence.				
S.CP.B.5 Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B|A) = P(B)P(A|B)$, and interpret the answer in terms of the model.				
S.MD.A.1 Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.				
S.MD.A.2 Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.				
S.MD.A.3 Design a simulation of random behavior and probability distributions (e.g., drawing by lots, using a random number generator and using the results to make fair decisions.)				

S.MD.A.4 Analyze discrete random variables and their probability distributions, including binomial and geometric.			
S.MD.A.5 Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value. *For example, find the theoretical probability distribution for the number of correct answers obtained by guessing on all five questions of a multiple-choice test where each question has four choices, and find the expected grade under various grading schemes*.			
S.MD.A.6 Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value. *For example, find a current data distribution on the number of TV sets per household in the United States, and calculate the expected number of sets per household. How many TV sets would you expect to find in 100 randomly selected households?*			
S.MD.A.7 Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.			
S.MD.A.7a Find the expected payoff for a game of chance. *For example, find the expected winnings from a state lottery ticket or a game at a fast-food restaurant*.			
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S.MD.B.9 Calculate the mean (expected value) and standard deviation of both a random variable and a linear transformation of a random variable.			
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Applications: The materials support the intentional development of students' ability to utilize mathematical concepts and skills in engaging applications, especially where called for in specific content standards or clusters.	**0**	**1**	**2**	**Evidence**

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