ILLINOIS STATE BOARD OF EDUCATION

MATHEMATICS HIGH SCHOOL STATISTICS & PROBABILITY

Theory of Action: Academic standards represent a collective commitment around what students should learn each year. The state assessment asks students to demonstrate their knowledge, skills, and understanding related to these standards using a common measure. The resulting data allows us to see patterns in performance that should guide school and district improvement, helping identify areas of strength and opportunity.

Role of Performance Level Descriptors in Defining Proficiency: Performance level descriptors bridge the state assessment to classroom instruction and the systems of formative assessments that guide local instruction and choices about individual students. ***Academic proficiency represents a range of observable student performance characteristics***. There are multiple pathways to proficiency, and students rely upon their strengths differently within that range of performance.

Proficiency and Difficulty: A student's ability to demonstrate proficiency is influenced by the complexity of the texts or stimuli presented, tasks they're asked to complete, and the contexts in which they are engaged. As student performance improves, students are typically able to handle more challenging texts/stimuli, tasks, and contexts, and are able to demonstrate their skills and knowledge more accurately and consistently.

Statistics & Probability *Student performance indicates the ability to…*

Claim 1	Below Proficient	Approaching Proficient	Proficient	Above Proficient
ID.1-4	Arrange data points from lowest to highest.	Identify descriptive statistics for center (such as mean, median, and mode) and spread (such as IQR and standard deviation).	Identify box plots with raw data.	In a real-world situation, compare the difference in spread for two different types of data sets -- skewed vs. symmetric.
	Given a data set, identify an appropriate histogram as related to the type of modes -- unimodal, bimodal, multimodal.	Calculate the median for skewed data or mean for roughly symmetric data based on the shape.	Identify appropriate histograms with raw data.	In a real-world situation, compare shape, center, and spread when outliers are removed to the original shape, center, and spread with the outliers.
	Identify possible outliers of a data set, if present.	Given a box plot, identify possible outliers in the data set.	Given a set of raw data, describe the shape (e.g., skewed left/right or symmetric).	In a real-world situation, determine the appropriate type of model and justify the decision.
			Identify appropriate methods to describe the center (median vs mean) and spread (IQR vs standard deviation) based on the shape of the given data.	Calculate the z-score when given the mean, standard deviation, and data point.
			Determine when to retain or remove outliers based on the context of the problem.	In In a real-world situation, utilize the area under the normal curve to determine the z-score or vice versa.
ID.5	Given sample spaces, interpret and calculate one-variable probabilities.	Determine missing pieces of information from a two-way frequency table.	Represent and interpret relative frequencies in context.	Use conditional probabilities to determine if two events are independent or dependent.

Claim 1	Below Proficient	Approaching Proficient	Proficient	Above Proficient
ID.5		Correctly identify the given population for a conditional probability statement. For example, find the probability that a bat tests positive for rabies, given it was active during the day.	Calculate conditional probabilities given a completed two-way table.	
ID.6-9	Given a scatter plot, visually estimate an appropriate linear model.	Use technology to calculate a linear regression for a data set.	Use technology to calculate quadratic or exponential equations to model scatterplots, when appropriate.	In a real-world situation, be able to determine the line of best fit and utilize it to infer what could happen in the future.
	Visually Identify linear relationships as positive or negative correlations.	Calculate the slope and y-intercept of the line of best fit.	Use residual plots to compare appropriateness of different regressions (e.g., are these data better modeled using linear or quadratic regression?).	In a real-world situation, be able to extrapolate based on trends in the data.
			Interpret correlation coefficient as a measure of the strength of an association.	
			Explain the difference between correlation and causation and be able to identify correlation or causation given a situation.	
IC.1-6	Understand usable processes that underlie statistical experiments of population parameters. For example, we can randomly select 25 students to try to determine the average height of all students in a school.	Identify usable processes that underlie statistical experiments of population parameters. (For example, given a description of an experiment, identify how random samples were located.)	Critically evaluate the processes taken in randomized samples of population parameters.	Make inferences about a population based on randomized processes.
	Identify the purpose of a single survey, experiment, or observational study.	Identify the purpose of surveys, experiments, or observational studies.	Justify if a model is consistent with a data-generated process.	Create a model that is consistent with a data-generating process.
			Describe purposes and differences between different sample surveys, experiments, and observational studies.	Utilize a margin of error through the use of simulation models for random sampling to make inferences. For example, is our result significant?)
				Evaluate reports based on data.