

Task Background

Domain & Area: Mathematics - Statistics & Probabilities

Target CCR Standard(s) (including level of standard, if needed) and/or adult diploma competency for Science or Social Studies:

Statistics and Probability (MN k-12 Academic Standards): ABE instruction in Levels D and E covering Statistics and Probability (Demonstrated competency mastery in all Level D standards and at least one Level E standard in the CCRS for Statistics and Probability).

CCRS Statistics and Probability Level D standards

1. Summarize and describe distributions. Summarize numerical data sets in relation to their context, such as by:
 - a. Reporting the number of observations.
 - b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
 - c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.
 - d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered. (6.SP.5)
2. Use random sampling to draw inferences about a population. Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences. (7.SP.1)
-Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.

For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be. (7.SP.2)

3. Draw informal comparative inferences about two populations. Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability.

For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable. (7.SP.3)

- Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.

For example, decide whether the words in one chapter of a science book are generally longer or shorter than the words in another chapter of a lower level science book. (7.SP.4) [Also see S.ID.3]

4. Investigate chance processes and develop, use, and evaluate probability models. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. (7.SP.5)

Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.

For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times. (7.SP.6)

- Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. (7.SP.7)

- Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected. (7.SP.7a)
- Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies? (7.SP.7b)

- Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. (7.SP.8a)

- Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event. (7.SP.8b)

5. Investigate patterns of association in bivariate data. Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. (8.SP.1) [Also see S.ID.1]

- Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that

suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line. (8.SP.2)

-Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height. (8.SP.3) [Also see S.ID.7]

-Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. For example, collect data from students in your class on whether or not they like to cook and whether they participate actively in a sport. Is there evidence that those who like to cook also tend to play sports? (8.SP.4) [Also see S.ID.5]

CCRS Statistics and Probability Level E standard

1. Summarize, represent, and interpret data on a single count or measurable variable. Represent data with plots on the real number line (dot plots, histograms, and box plots). (S.ID.1) [Also see 6.SP.4 and 8.SP.1]
-Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). (S.ID.3) [Also see 7.SP.4]
2. Summarize, represent, and interpret data on two categorical and quantitative variables. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. (S.ID.5) [Also see 8.SP.4]

Task Description: The purpose of this task is for a student to demonstrate knowledge in statistics and probabilities, exhibiting knowledge meeting level D and E standards.

Information for the Teacher

- All materials described below are found in a Google Folder here:
https://drive.google.com/drive/folders/1wZl4h8UhMJdeKCmL_rXnvomakBc2JYZ4?usp=sharing
- Student should complete capstone after completing ABE curriculum or achieving knowledge through other accepted means. The student should have already been introduced to the concepts of data, stats & probability and be able to complete problems at level D and level E.

- This task was designed to be completed independently by a learner in an appropriate, quiet testing environment. For learners needing more support, teachers can break up the task into sections, and have the student complete each section individually after providing review, practice and corrections.
- There is an answer key provided for the task. Criteria: Student will achieve a score of 80% or higher overall, and 80% or higher for Level E problems. If a student does not meet mastery scores, additional instruction and replacement problems in the specific standard will be provided.
- Include the following items when submitting this task as evidence for the diploma portfolio:
 - Completed Standard Adult High School Diploma Cover Sheet
 - Graded Student Capstone Assignment

Activities

Title: Stats & Probability Capstone

Materials: This activity includes the capstone document and the capstone answer key.