

MATHEMATICS – PROBABILITY AND STATISTICS

Subject: Probability and Statistics

Academic Standard: PS.1

Academic Standard Indicator: PS.1.1

Core Standard: No

Standard Description (Academic or Indicator): Create, compare and evaluate different displays of the same data, using histograms, frequency polygons, cumulative distribution functions, pie charts, scatter plots, stem-and-leaf plots, and box-and-whisker plots. Draw these by hand or use a computer spreadsheet program.

Suggestion for Integrating International Content: Have students conduct a survey (census, if possible) to determine what percent of the students in each class of the high school, freshmen to seniors, can name the seven continents. Then have them graft the resulting data in numerous ways to compare the results by class, such as pie chart and side-by-side bar graph.

Subject: Probability and Statistics

Academic Standard: PS.1

Academic Standard Indicator: PS.1.2

Core Standard: No

Standard Description (Academic or Indicator): Compute and use mean, median, mode, weighted mean, harmonic mean, geometric mean, range, quartiles, variance and standard deviation.

Suggestion for Integrating International Content: Have students calculate the five-number summary, plus mean and standard deviation, of the data by continent. *Examples:* Oil production and oil consumption; rainfall and water consumption; rice production and rice consumption. Then have them write a paragraph comparing and contrasting each data pair.

Subject: Probability and Statistics

Academic Standard: PS.2

Academic Standard Indicator: PS.2.1

Core Standard: No

Standard Description (Academic or Indicator): Understand the counting principle, permutations, and combinations, and use them to solve problems.

Suggestion for Integrating International Content: Calculate the number of ways (combinations) by which a given country can choose two trading partners from adjacent first tier and second tier (two away) countries.

Subject: Probability and Statistics

Academic Standard: PS.2

Academic Standard Indicator: PS.2.3

Core Standard: No

Standard Description (Academic or Indicator): Understand and use the multiplication rule to calculate probabilities for independent and dependent events.

Suggestion for Integrating International Content: Have students calculate the probability that it will rain for three days in a row for each individual month in a given year for the U.S. and selected other countries of their choice.

Subject: Probability and Statistics

Academic Standard: PS.2

Academic Standard Indicator: PS.2.5

Core Standard: No

Standard Description (Academic or Indicator): Understand conditional probability and Bayes' Theorem and use them to solve problems.

Suggestion for Integrating International Content: Have students explore probability by considering if a random person is chosen from a country (assigned by the teacher), what the probability is that the person is a doctor. Then have students assess if the person from the student's assigned country is a millionaire, what the probability is that s/he is a government official.

Subject: Probability and Statistics
Academic Standard: PS.2
Academic Standard Indicator: PS2.8
Core Standard: No

Standard Description (Academic or Indicator): Use and apply the normal distribution.

Suggestion for Integrating International Content: Have students research and gather data from various countries to determine if the data are normally distributed. Then have them locate the 1-2-3 standard deviation points from the mean. *Examples:* Water consumption; oil consumption; percent wetlands; percent desert; rice production; life expectancy; active military personnel.

Subject: Probability and Statistics
Academic Standard: PS.3
Academic Standard Indicator: PS.3.1
Core Standard: No

Standard Description (Academic or Indicator): Compute and use confidence intervals to make estimates.

Suggestion for Integrating International Content: Have students research upcoming government elections throughout the globe. Have them find recent poll results and create a 95% confidence interval for the percentage of expected votes for a specific candidate. Have students conduct follow up research at a later date to see who won the election.

Subject: Probability and Statistics
Academic Standard: PS.3
Academic Standard Indicator: PS.3.3
Core Standard: No

Standard Description (Academic or Indicator): Use the principle of least squares to find the curve of best fit for a set of data.

Suggestion for Integrating International Content: Have students draw a scatterplot of the data pairs by continent. Then have them determine the line of best fit to predict the next

explanatory variable. *Examples:* Carbon dioxide production vs Number of species extinctions over time; Cost of health care vs Life expectancy; Percent desert vs Percent malnourished population.

Subject: Probability and Statistics
Academic Standard: PS.3
Academic Standard Indicator: PS.3.4
Core Standard: No

Standard Description (Academic or Indicator): Calculate and interpret the correlation coefficient of a set of data.

Suggestion for Integrating International Content: Have students draw a scatterplot and calculate the correlation coefficient for data sets by continent. *Examples:* Carbon dioxide production vs Number of species extinctions over time; Cost of health care vs Life expectancy; Percent desert vs Percent malnourished population. Then have students interpret the coefficient of determination (r^2) in the context of the data set.