

The following standards are from the Massachusetts Mathematics Curriculum Frameworks on Probability and Statistics.

(<http://www.doe.mass.edu/frameworks/math/2000/final.pdf>)

Activities are found at <http://members.tripod.com/~ozpk/000000Prob2>

Students are expected to know the basics of probability and statistics from their earliest grades. For example, below are the "Exploratory Concepts and Skills for Grades 7-8" (page 67).

Data Analysis, Statistics, and Probability

- Investigate the notion of fairness in games.
- Make predictions, conduct experiments, and discuss discrepancies to develop understanding of actual versus predicted outcomes.
- Conduct repetitive experiment (e.g. repeated throwing of three or more dice) and compare outcomes to predicted probabilities.

From the 9-10 Grade Standards (page 75), students will have to know the following for the high stakes Mathematics Exam (MCAS) given at the end of their sophomore year:

Data Analysis, Statistics, and Probability

- Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.
- Select and use appropriate statistical methods to analyze data.
- Develop and evaluate inferences and predictions that are based on data.
- Understand and apply basic concepts of probability.

Grades 9-10 Learning Standards

Students engage in problem solving, communicating, reasoning, connecting, and representing as they

- 10.D.1 Select, create and interpret an appropriate graphical representation (e.g. scatterplot, table, stem-and-leaf plots, box-and-whisker plots, circle graph, line graph, and line plot) for a set of data and use appropriate statistics (e.g. mean, median, range, and mode) to communicate information about the data. Use these notions to compare different sets of data.
- 10.D.2 Approximate a line of best fit (trend line) given a set of data (e.g. scatterplot). Use technology where appropriate.
- 10.D.3 Describe and explain how the relative sizes of a sample and population affect the validity of predictions from a set of data.

Exploratory Concepts and Skills for Grades 9-10 (pages 76, 82) include:

Data Analysis and Probability

- Explore designs of surveys, polls, and experiments to assess the validity of their results and to identify potential sources of bias; identify the types of conclusions that can be drawn.
- Describe the differences between the theoretical probability of simple events and the experimental outcome from simulations.

Exploratory Concepts and Skills for Grades 11-12 (page 85)

Data Analysis and Probability

- Use technology to perform linear, quadratic, and exponential regression on a set of data.
- Design surveys and apply random sampling techniques to avoid bias in the data collection.

The specific standards for various courses (Pages 84, 95, 100, and 103) are:

Data Analysis, Statistics, and Probability

- Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.
- Select and use appropriate statistical methods to analyze data.
- Develop and evaluate inferences and predictions that are based on data.
- Understand and apply basic concepts of probability.

Grades 11-12 Learning Standards

Students engage in problem solving, communicating, reasoning, connecting, and representing as they

- 12.D.1 Design surveys and apply random sampling techniques to avoid bias in the data collection.
- 12.D.2 Select an appropriate graphical representation for a set of data and use appropriate statistics (e.g. quartile or percent distribution) to communicate information about the data.
- 12.D.3 Apply regression results and curve fitting to make predictions from data.
- 12.D.4 Apply uniform, normal, and binomial distributions to the solutions of problems.
- 12.D.5 Describe a set of frequency distribution data by spread (i.e. variance and standard deviation), skewness, symmetry, number of modes, or other characteristics. Use these concepts in everyday applications.
- 12.D.6 Use combinatorics (e.g. “fundamental counting principle,” permutations, and combinations) to solve problems, in particular, to compute probabilities of compound events. Use technology as appropriate.
- 12.D.7 Compare the results of simulations (e.g. random number tables, random functions, and area models) with predicted probabilities.

Data Analysis, Statistics, and Probability

- AI.D.1 Select, create and interpret an appropriate graphical representation (e.g. scatterplot, table, stem-and-leaf plots, circle graph, line graph, and line plot) for a set of data and use appropriate statistics (e.g. mean, median, range, and mode) to communicate information about the data. Use these notions to compare different sets of data. (10.D.1)
- AI.D.2 Approximate a line of best fit (trend line) given a set of data (e.g. scatterplot). Use technology where appropriate. (10.D.2)
- AI.D.3 Describe and explain how the relative sizes of a sample and population effect the validity of predictions from a set of data. (10.D.3)

Data Analysis, Statistics, and Probability

Students engage in problem solving, communicating, reasoning, connecting , and representing as they

- PC.D.1 Design surveys and apply random sampling techniques to avoid bias in the data collection.(12.D.1)
- PC.D.2 Apply regression results and curve fitting to make predictions from data. (12.D.3)
- PC.D.3 Apply uniform, normal, and binomial distributions to the solutions of problems. (12.D.4)
- PC.D.4 Describe a set of frequency distribution data by spread (i.e. variance and standard deviation), skewness, symmetry, number of modes, or other characteristics. Use these concepts in everyday applications. (12.D.5)
- PC.D.5 Compare the results of simulations (e.g. random number tables, random functions, and area models) with predicted probabilities. (12.D.7)

Many of the lesson plans and activities in "Demystifying Scientific Data" will meet the criteria outlined in the Massachusetts Mathematics Framework.

