

Grades 9-12 Unpacked Advanced Math Standards – Statistics & Probability

9-12.S.1.1A. Students are able to **analyze** and **evaluate** the design of surveys and experiments.

Webb Level: 2/3

Bloom: Evaluation

Verbs Defined:

Analyze: Examine

Evaluate: Assess

Key terms defined:

Design: The process of developing a survey or experiment.

Surveys: A study of one or more characteristics of a group.

Experiment: A set of observations of two groups. One group, the experimental group, undergoes a procedure or treatment. The other group, the control group, does not.

Teacher Speak:

Students are able to analyze (examine) and evaluate (assess) the design of surveys and experiments.

Student Speak:

- I can construct and administer a survey and an experiment.
 - I can identify sources of bias: sampling and response.
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9-12.S.1.2A. Students are able to **analyze** and **evaluate** graphical displays of data.

Webb Level: 2

Bloom: Evaluation

Verbs Defined:

Analyze: Examine

Evaluate: Assess

Key terms defined:

Graphical displays: Pictorial representations.

Data: Collection of numbers or information.

Teacher Speak:

Students are able to analyze (examine) and evaluate (assess) graphical displays of data.

Student Speak:

- I can choose alternate displays for a given set of data.

- I can determine if a graph is misleading.
 - I can explain what makes a graph misleading.
 - I can analyze a graphical display and answer questions about the data.
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9-12.S.1.3A. Students are able to compare multiple one-variable data sets, using standard deviation and variance.

Webb Level: 2
Bloom: Analysis

Verbs Defined:
Compare: compare and contrast

Key terms defined:
One-variable data sets: A collection of numbers or information representing one variable.
Multiple: Two or more.
Variance: The mean of the squares of the deviations from the arithmetic mean.
Standard Deviation: A measure of the average amount by which individual items of data deviate from the arithmetic mean of all the data. It is the square root of the variance.

Teacher Speak:
Students are able to compare (compare and contrast) multiple one-variable data sets, using standard deviation and variance.

Student Speak:

- I can calculate and use standard deviation to compare and contrast multiple one-variable data sets.
- I can calculate and use variance to compare and contrast multiple one-variable data sets.

9-12.S.1.4A Students are able to describe the normal curve and use it to make predictions.

Webb Level: 1/2
Bloom: Application

Verbs Defined:
Describe: Tell characteristics

Key terms defined:
Normal Curve: A bell shaped curve whose area underneath it is one. It is symmetric about the mean. About 68% of the data is within one standard deviation of the mean,

about 95% of the data is within two standard deviations of the mean and about 99.7% of the data is within three standard deviations of the mean.

Teacher Speak:

Students are able to describe (tell characteristics of) the normal curve and use it to make predictions.

Student Speak:

- I can use the normal curve to make predictions about probabilities.
 - I can use the normal curve to make predictions about the sample.
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9-12.S.1.5A. Students are able to use scatterplots, best-fit lines, and correlation coefficients to model data and support conclusions.

Webb Level: 2

Bloom: Application

Verbs Defined:

Use:

Model: represent/write

Support: justify

Key terms defined:

Scatterplot: two sets of data plotted as ordered pairs in the coordinate plane

Best-fit line: the line that lies as close as possible to all the data points in a scatterplot

Correlation coefficient: a number between -1 and 1, inclusive, that measures how closely plotted points tend to cluster about the best-fit line

Teacher Speak:

Students are able to use scatterplots, best-fit lines, and correlation coefficients to model (represent) data and support conclusions.

Student Speak:

- I can write the equation of the line of best fit.
- Using the correlation coefficient, I can determine the appropriateness of a line of best fit.
- I can interpret the correlation coefficient.

9-12.S.2.1A. Students are able to use probabilities to solve problems.

Webb Level: 1/2

Bloom: Application

Verbs Defined:

Use: Apply

Solve: solve

Key terms defined:

Probabilities: A number from zero to 1 that describes the likelihood that a given event will take place.

Teacher Speak:

Students are able to use (apply) probabilities to solve problems.

Student Speak:

- I can solve simple counting problems.
 - I can use the fundamental counting principle to solve more complex counting problems.
 - I can compute combinations and/or permutations of an event.
 - I can interpret tables to find probabilities and conditional probabilities.
 - I can construct tree diagrams to solve problems.
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9-12.S.2.2A. Students are able to **determine** probability of compound, complementary, independent, and mutually exclusive events.

Webb Level: 2

Bloom: Application

Verbs Defined:

Determine: Find

Key terms defined:

Probability: A number from zero to 1 that describes the likelihood that a given event will take place.

Compound events: The union or intersection of two events.

Complementary events: Two events whose sum of the probabilities is one.

Independent events: Two events in which the outcome of the first event has no effect on the outcome of the second event.

Mutually exclusive events: Two events (disjoint) that have no outcomes in common.

Teacher Speak

Students are able to determine (find) probability of compound, complementary, independent, and mutually exclusive events.

Student Speak

- I can find the probability of events that are:
 - Simple

- Compound
- Complementary
- Independent/Dependent
- Mutually exclusive
- I can determine if two events are:
 - Complementary
 - Independent/Dependent
 - Mutually Exclusive

9-12.S.2.3A. Students are able to **generate** data and **use** the data to **determine** empirical (experimental) probabilities.

Webb Level: 2

Bloom: Analysis

Verbs Defined:

Generate: perform repeated trials to collect data

Determine: Calculate

Key terms defined:

Data: Collection of numbers or information.

Empirical (experimental) Probabilities: The probability based on performing an experiment, conducting a survey, or looking at the history of an event. The ratio of successes to total outcomes.

Teacher Speak:

Students are able to generate (perform repeated to collect) data and use the data to determine (calculate) empirical (experimental) probabilities.

Student Speak:

- I can perform a probability experiment and calculate the empirical (experimental) probabilities of selected events.
- I can state the relationship between the experimental probability and theoretical probability as the number of trials increases.