

Wilson Area School District Planned Course Guide

Title of planned course: Probability and Statistics

Subject Area: Mathematics

Grade Level: 12

Course Description: This course is a study of efficient counting, permutations and combinations, organizing and reporting data, probabilities, and theoretical distributions.

Time/Credit for this Course: 0.5 Academic Year / 0.5 Credits

Curriculum Writing Committee: BethAyn Tarsi, Michael Fowler

Curriculum Map

Semester 1

- August:** Random Samples
Experimental Design
- September:** Experimental Design
Organizing Data
Averages and Variation
- October:** Averages and Variation
Correlation and Regression
- November:** Probability Theories
Binomial Probability
- December:** Binomial Probability
The Normal Distribution
Hypothesis Testing
- January:** Hypothesis Testing
Chi-Square Distribution

Semester 2

- January:** Random Samples
Experimental Design
- February:** Experimental Design
Organizing Data
Averages and Variation
- March:** Averages and Variation
Correlation and Regression
- April:** Probability Theories
Binomial Probability
- May:** Binomial Probability
The Normal Distribution
Hypothesis Testing
- June:** Chi-Square Distribution

Planned Course Materials

Course Title: Probability and Statistics

Textbook:

Understanding Basic Statistics
Brase/Brase Fifth Edition
2010
Brooks/Cole Cengage Learning

Supplemental Books:

Statistics and Probability in Modern Life (old textbook)

Teacher Resources:

- Teacher created handouts/activities
- Internet resources
- Student Notetaking Guide

Curriculum Scope & Sequence

Planned Course: Probability and Statistics

Unit: Random Samples & Experimental Design

Time frame: 3 – 4 blocks

State Standards: 2.6.11A

Essential content/objectives: At end of the unit, students will be able to:

- Identify variables in a statistical study
- Distinguish between different types of variables
- Identify populations and samples
- Distinguish between parameters and statistics
- Compare and contrast descriptive and inferential statistics

Core Activities: Students will complete/participate in the following:

- Define applicable vocabulary
- Apply vocabulary to statistical situations
- Analyze statistical data to apply vocabulary
- Interpret statistical data for flaws

Extensions: Find statistical references in paper media (newspaper and magazines) and apply vocabulary and interpret the results for plausibility.

Remediation:

- Chapter review exercises which revisits concepts and vocabulary.
- Teacher/peer tutoring

Instructional Methods:

- Lecture notes
- Small group activities
- Higher order thinking questions
- SmartNotebook Presentations
- Warm-ups
- Book examples

Materials & Resources:

- PowerPoint Notes
- Graphing Calculators
- Pre-written notes/handouts/activities
- Textbook
- Student notetaking guide

Assessments:

- Teacher observation
- Homework
- Warm-ups
- Questioning
- Worksheets
- Tests/quizzes

Curriculum Scope & Sequence

Planned Course: Probability and Statistics

Unit: Organizing Statistical Data

Time frame: 3 – 4 blocks

State Standards: 2.6.11C

Essential content/objectives: At end of the unit, students will be able to:

- Create graphical representations of statistical data
- Analyze graphical representations of statistical data

Core Activities: Students will complete/participate in the following:

- Define different types of graphical representations of statistical data
- Practice creating graphical representations for statistical data
- Analyze statistical data to determine the best graphical representation to apply

Extensions: Create a book of graphical representations found in print media

Remediation:

- Chapter review exercises which revisits concepts and vocabulary.
- Teacher/peer tutoring

Instructional Methods:

- Lecture notes
- Small group activities
- Higher order thinking questions
- SmartNotebook Presentations
- Warm-ups
- Book examples

Materials & Resources:

- PowerPoint Notes
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- Pre-written notes/handouts/activities
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Assessments:

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Curriculum Scope & Sequence

Planned Course: Probability and Statistics

Unit: Determine Averages and Variation of Data

Time frame: 4 - 5 blocks

State Standards: 2.6.11C

Essential content/objectives: At end of the unit, students will be able to:

- Determine measures of central tendency
- Determine the percentile rank when given a set of data
- Determine the variance and standard deviation of a set of data
- Interpret the standard deviation of a set of data

Core Activities: Students will complete/participate in the following:

- Practice problems at board and seat
- Apply the formula for percentile rank given a set of data and interpret the results
- Apply the formulas for variance and standard deviation and interpret the results

Extensions: Collection and presentation of statistical data within the students area of interest.

Remediation:

- Chapter review exercises which revisits concepts and vocabulary.
- Teacher/peer tutoring

Instructional Methods:

- Lecture notes
- Small group activities
- Higher order thinking questions
- Power-Point Presentations
- Warm-ups
- Book examples

Instructional Methods:

- Lecture notes
- Small group activities
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- SmartNotebook Presentations
- Warm-ups
- Book examples

Materials & Resources:

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Assessments:

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Curriculum Scope & Sequence

Planned Course: Probability and Statistics

Unit: Correlation and Regression

Time frame: 4 - 7 blocks

State Standards: 2.6.11A, 2.6.11C, 2.6.11.E

Essential content/objectives: At end of the unit, students will be able to:

- Determine the correlation coefficient of a given set of data
- Determine, statistically, the line of best fit for a set of data
- Determine the equation of the least squares regression
- Make predictions utilizing a least squares regression line

Core Activities: Students will complete/participate in the following:

- Practice problems at board and seat
- Apply the formula to determine the correlation coefficient
- Analyze the correlation coefficient of a set of data to determine accuracy of fit
- Apply the formula for least squares regression
- Determine the accuracy of the least squares regression line

Extensions: Class data collection for applying the least squares regression to determine which variable has the largest impact. (stomp rocket activity)

Remediation:

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- Teacher/peer tutoring

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Curriculum Scope & Sequence

Planned Course: Probability and Statistics

Unit: Probability

Time frame: 7 – 10 blocks

State Standards: 2.7.11A, 2.7.11.C, 2.7.11.E

Essential content/objectives: At end of the unit, students will be able to:

- Determine the number of permutations and combinations
- Determine the sample space of a particular situation
- Determine the probability of a particular event within a particular situation
 - Independent/dependent events
 - Mutually exclusive events
- Utilize probability rules to determine the likelihood of a particular event
 - Addition rule
 - Multiplication rule

Core Activities: Students will complete/participate in the following:

- Practice problems at board and seat
- Apply the formulas for permutations and combinations
- Create the sample space utilizing tree diagrams
- Apply the formulas for probability given a particular situation
- Analyze a given situation to determine which probability formula to apply

Extensions: Create a probability distribution relevant to student interest and present to the class. Students will need to explain which they would fit within the data and explain the impact on their lives and future decisions.

Remediation:

- Chapter review exercises which revisits concepts and vocabulary.
- Teacher/peer tutoring

Instructional Methods:

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Curriculum Scope & Sequence

Planned Course: Probability and Statistics

Unit: Binomial Distribution

Time frame: 3 – 5 blocks

State Standards: 2.7.11A, 2.7.11E

Essential content/objectives: At end of the unit, students will be able to:

- Differentiate between types of random variables
- Determine if a random variable fits the criteria for a binomial distribution
- Determine the probability of an event within a binomial distribution
- Determine the mean, variance and standard deviation of binomial distribution

Core Activities: Students will complete/participate in the following:

- Define the different types of random variables
- Practice problems at board and seat
- Apply the formula for the binomial distribution
- Apply the formulas for determining the mean, variance and standard deviation of a binomial distribution
- Utilize the binomial distribution table of values to assist in finding the probability

Extensions: Find binomial probability results in print media and interpret their results on our everyday lives

Remediation:

- Chapter review exercises which revisits concepts and vocabulary.
- Teacher/peer tutoring

Instructional Methods:

- Lecture notes
- Small group activities
- Higher order thinking questions
- SmartNotebook Presentations
- Warm-ups
- Book examples

Materials & Resources:

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Curriculum Scope & Sequence

Planned Course: Probability and Statistics

Unit: Normal Distribution

Time frame: 3 – 5 blocks

State Standards: 2.7.11A, 2.7.11E

Essential content/objectives: At end of the unit, students will be able to:

- Determine if the data supports a normal distribution
- Determine the probability of an event within a normal distribution
- Normalize a set of data to be able to utilize the normal distribution table of values
- Determine a data point within a set for a particular outcome
- Determine the mean, variance and standard deviation of normal distribution

Core Activities: Students will complete/participate in the following:

- Practice problems at board and seat
- Apply the formula for normalizing a set of data
- Apply the formulas for determining the mean, variance and standard deviation of a normal distribution
- Apply the formulas to determine a specific data point for a particular situation within a normal distribution

Extensions: Relate the normal distribution to the area under the curve and the mean value theorem in calculus

Remediation:

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- Teacher/peer tutoring

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Curriculum Scope & Sequence

Planned Course: Probability and Statistics

Unit: Chi-Square Distribution

Time frame: 3 – 5 blocks

State Standards: 2.7.11E

Essential content/objectives: At end of the unit, students will be able to:

- Determine if the data supports a chi-square distribution
- Determine whether the null hypothesis of a chi-square distribution should be accepted or rejected
- Determine the degrees of freedom within a chi-square distribution

Core Activities: Students will complete/participate in the following:

- Practice problems at board and seat
- Apply the formula for testing the null hypothesis within a chi-square distribution
- Apply the formulas to determine the degrees of freedom within a chi-square distribution

Extensions:

- Compare and contrast probability distributions and hypothesis testing.
- Analyze recent print media for probability distributions and hypothesis testing to relate unit to real world

Remediation:

- Chapter review exercises which revisits concepts and vocabulary.
- Teacher/peer tutoring

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