Curriculum Map
Statistics and Discrete Math
Course Number (366)
Saugus High School
Saugus Public Schools
The Standards for Mathematical Practice

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on the following two sets of important “processes and proficiencies,” each of which has longstanding importance in mathematics education:

- The NCTM process standards
  - problem solving
  - reasoning and proof
  - communication
  - representation
  - connections

- The strands of mathematical proficiency specified in the National Research Council’s report “Adding It Up”
  - adaptive reasoning
  - strategic competence
  - conceptual understanding (comprehension of mathematical concepts, operations, and relations)
  - procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently, and appropriately)
  - productive disposition (habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one’s own efficacy)

1. **Make sense of problems and persevere in solving them.**

   Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

2. **Reason abstractly and quantitatively.**

   Mathematically proficient students make sense of the quantities and their relationships in problem situations. Students bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically, and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meanings of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

3. **Construct viable arguments and critique the reasoning of others.**

   Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
4. **Model with mathematics.**
Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

5. **Use appropriate tools strategically.**
Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

6. **Attend to precision.**
Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

7. **Look for and make use of structure.**
Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see $7 \times 8$ equals the well-remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as $2 \times 7$ and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(y - x)^2$ as 5 minus a positive number times a square, and use that to realize that its value cannot be more than 5 for any real numbers $x$ and $y$.

8. **Look for and express regularity in repeated reasoning.**
Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through $(1, 2)$ with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
Connecting the Standards for Mathematical Practice to the Standards for Mathematical Content

The Standards for Mathematical Practice describe ways in which developing student practitioners of the discipline of mathematics increasingly ought to engage with the subject matter as they grow in mathematical maturity and expertise throughout the elementary, middle, and high school years. Designers of curricula, assessments, and professional development should all attend to the need to connect the mathematical practices to mathematical content in mathematics instruction.

The Standards for Mathematical Content are a balanced combination of procedure and understanding. Expectations that begin with the word “understand” are often especially good opportunities to connect the practices to the content. Students who lack understanding of a topic may rely on procedures too heavily. Without a flexible base from which to work, they may be less likely to consider analogous problems, represent problems coherently, justify conclusions, apply the mathematics to practical situations, use technology mindfully to work with the mathematics, explain the mathematics accurately to other students, step back for an overview, or deviate from a known procedure to find a shortcut. In short, a lack of understanding effectively prevents a student from engaging in the mathematical practices.

In this respect, those content standards which set an expectation of understanding are potential “points of intersection” between the Standards for Mathematical Content and the Standards for Mathematical Practice. These points of intersection are intended to be weighted toward central and generative concepts in the school mathematics curriculum that most merit the time, resources, innovative energies, and focus necessary to qualitatively improve the curriculum, instruction, assessment, professional development, and student achievement in mathematics.
## Common Core Standards

**S-ID-1** Represent data with plots on the real number line (dot plots, histograms, and box plots).

**S-ID-2** Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.

**S-ID-3** 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-4** Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.

## Unit One

### Introduction to Statistics
- Overview of Statistical Concepts
- The Nature of Data
- Statistics (Uses and Abuses)
- Design of Experiments

### Objectives

The students will be able to...

- understand what is statistics studies.
- understand how to design an experiment.

### Essential Question

What is important in designing an experiment?

## Teacher Resources

*Essentials of Statistics ©2002*
- Chapter One lessons
- Chapter One exercises
- Teacher Made Worksheets
- Teacher Made Assessments

## Media Resources

*Essentials of Statistics ©2002*
- PowerPoint Presentations
- Test Bank CD
- Data Bank Disk for Data Manipulation
- Internet Resources

## Assesments

**Homework:** To be given daily on each introduced topic. (CT and PSR)

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (EC and PSR)

**Quiz:** Given as warranted by the curriculum. (CT and EC)

**Test:** On concepts involving [Introduction to Statistics](#). (CT and EC)

## Suggested Instructional Practices
### Statistics and Discrete Math  
**Term One**  
**Week 2**

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<td><strong>S-ID-4</strong></td>
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### Unit Two  
**Working with Data**

- Overview of Data Concepts
- Summarizing Data with Frequency Tables
- Pictures of Data
- Measures of Center

### Objectives

**The students will be able to…**

- **display** data in a variety of graphs and pictures.
- **work** with data using frequency tables.

### Essential Question

What are some of the most useful graph display?

### Teacher Resources

*Essentials of Statistics ©2002*

- Chapter Two lessons
- Chapter Two exercises
- Teacher Made Worksheets
- Teacher Made Assessments

### Media Resources

*Essentials of Statistics ©2002*

- PowerPoint Presentations
- Test Bank CD
- Data Bank Disk for Data Manipulation
- Internet Resources

### Assessments

**Homework:** To be given daily on each introduced topic. (CT and PSR)  
**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (EC and PSR)  
**Quiz:** Given as warranted by the curriculum. (CT and EC)

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<td><strong>Essential Question</strong></td>
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<td>The students will be able to…</td>
<td>What is standard deviation and how do you find the percentile ranking?</td>
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<td>• understand the empirical rule.</td>
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<td>• understand variation.</td>
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<td>• understand position of data.</td>
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**Common Core Standards**

**S-CP-1** Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”).

**S-CP-2** Understand that two events \( A \) and \( B \) are independent if the probability of \( A \) and \( B \) occurring together is the product of their probabilities, and use this characterization to determine if they are independent.

**Unit Three**

**Probability**

- Introduction to Probability Concepts
- Fundamentals of Probability
- Addition Rule
- Basic Multiplication Rules

**Objectives**

The students will be able to…

- **work** with basic rules of probability.
- **understand** how to make inference about the population based on probability.

**Essential Question**

How do you use probability to infer about the population?

**Teacher Resources**

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- Chapter Three lessons
- Chapter Three exercises
- Teacher Made Worksheets
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**Assessments**

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**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (EC and PSR)

**Quiz:** Given as warranted by the curriculum. (CT and EC)

**Suggested Instructional Practices**
The students will:

S-CP-3 Understand the conditional probability of $A$ given $B$ as $P(A \text{ and } B)/P(B)$, and interpret independence of $A$ and $B$ as saying that the conditional probability of $A$ given $B$ is the same as the probability of $A$, and the conditional probability of $B$ given $A$ is the same as the probability of $B$.

S-CP-4 Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities.

S-CP-5 Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.

S-CP-6 Find the conditional probability of $A$ given $B$ as the fraction of $B$’s outcomes that also belong to $A$, and interpret the answer in terms of the model.

S-CP-8 Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B|A) = P(B)P(A|B)$, and interpret the answer in terms of the model.

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### Common Core Standards

**The students will:**

- **S-MD-1** Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.
- **S-MD-2** Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.
- **S-MD-3** Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value.
- **S-MD-4** Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value.

### Unit Four

**Probability Distributions**

- Introduction to Probability Distributions
- Random Variables
- Binomial Probability Distributions

### Objectives

**The students will be able to…**

- **understand** binomial distribution.
- **work** with rules of binomial distribution.

### Essential Question

What is binomial distribution?

### Teacher Resources

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- Chapter Four lessons
- Chapter Four exercises
- Teacher Made Worksheets
- Teacher Made Assessments

### Media Resources

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- PowerPoint Presentations
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### Assessments

**Homework:** To be given daily on each introduced topic. (CT and PSR)

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (EC and PSR)

**Quiz:** Given as warranted by the curriculum. (CT and EC)

### Suggested Instructional Practices
### Common Core Standards

**The students will:**

- **S-MD-1** Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.
- **S-MD-2** Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.
- **S-MD-3** Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value.
- **S-MD-4** Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value.

### Unit Four

**Probability Distributions**

- Mean for Binomial Distribution
- Variance for Binomial Distribution
- Standard Deviation for Binomial Distribution

### Objectives

**The students will be able to...**

- **understand** the mean for binomial distribution.
- **understand** variance for binomial distribution.
- **understand** standard deviation for binomial distribution.

### Essential Question

**How do you use binomial distribution to infer about the population?**

### Teacher Resources

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- Chapter Four lessons
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### Media Resources

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### Assessments

**Homework:** To be given daily on each introduced topic. (CT and PSR)

**Class Discussion:** Students will be expected to be prepared to classroom activities and actively participate in class discussion. (EC and PSR)

**Quiz:** Assessments given as warranted by the curriculum. (CT and EC)

**Test:** On concepts involving Probability Distributions. (CT and EC)

### Suggested Instructional Practices
**Common Core Standards**

The students will:

S-MD-1 Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.

S-MD-2 Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.

S-MD-3 Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value.

S-MD-4 Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value.

**Unit Five**

**Normal Probability Distributions**

- Introduction to Normal Probability Distributions
- The Standard Normal Distribution
- Finding Probabilities with Normal Distributions

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<td>What is meant by normal distribution?</td>
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<tr>
<td>• understand normal distribution.</td>
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<tr>
<td>• understand probabilities associated with normal distribution</td>
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**Teacher Resources**

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**Assessments**

**Homework:** To be given daily on each introduced topic. (CT and PSR)

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (EC and PSR)

**Quiz:** Given as warranted by the curriculum. (CT and EC)

**Benchmark Assessment 1:** The Benchmark Assessment will focus on all Statistics Concepts covered during the course of term one. (CT and EC)

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<td><strong>What is the central limit theorem?</strong></td>
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<td>• <strong>understand</strong> the central limit theorem.</td>
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<td>• <strong>understand</strong> its connection to normal distribution</td>
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<td><strong>Assessments</strong></td>
<td><strong>Suggested Instructional Practices</strong></td>
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<td><strong>Quiz:</strong> Given as warranted by the curriculum. (CT and EC)</td>
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</tr>
</tbody>
</table>
The students will:
S-MD-1 Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.
S-MD-2 Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.
S-MD-3 Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value.
S-MD-4 Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value.

Unit Five
Normal Probability Distributions

- Normal Distribution as an Approximation to Binomial Distribution
- Review of Normal Probability Distributions

Objectives
The students will be able to...
- understand the approximation of binomial to a normal distribution.
- understand normal distributions

Essential Question
How do you approximate binomial distribution to normal distribution?

Teacher Resources
Essentials of Statistics ©2002
- Chapter Five lessons
- Chapter Five exercises
- Teacher Made Worksheets
- Teacher Made Assessments

Media Resources
Essentials of Statistics ©2002
- PowerPoint Presentations
- Test Bank CD
- Data Bank Disk for Data Manipulation
- Internet Resources

Assessments
Homework: To be given daily on each introduced topic. (CT and PSR)
Class Discussion: Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (EC and PSR)
Quiz: Given as warranted by the curriculum. (CT and EC)
Test: On concepts involving Normal Probability Distributions. (CT and EC)
### Common Core Standards

**S-IC-1** Understand statistics as a process for making inferences to be made about population parameters based on a random sample from that population.

**S-IC-2** Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.

**S-IC-3** Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.

**S-IC-4** Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.

**S-IC-5** Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.

**S-IC-6** Evaluate reports based on data.

---

### Unit Six

**Estimates and Sample Sizes**

- Introduction to Estimates and Sample Sizes
- Estimating a Population Mean: Large Samples

### Objectives

The students will be able to…

- **work** with large samples of data.
- **estimate** mean of the population from large samples.

### Essential Question

How do you estimate $\mu$ from large samples?

---

### Teacher Resources

**Essentials of Statistics ©2002**

- Chapter Six lessons
- Chapter Six exercises
- Teacher Made Worksheets
- Teacher Made Assessments

### Media Resources

**Essentials of Statistics ©2002**

- PowerPoint Presentations
- Test Bank CD
- Data Bank Disk for Data Manipulation
- Internet Resources

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### Assessments

**Homework:** To be given daily on each introduced topic. (CT and PSR)

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (EC and PSR)

**Quiz:** Given as warranted by the curriculum. (CT and EC)

---

### Suggested Instructional Practices
### Common Core Standards

**S-IC-1** Understand statistics as a process for making inferences to be made about population parameters based on a random sample from that population.

**S-IC-2** Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.

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**S-IC-5** Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.

**S-IC-6** Evaluate reports based on data.

### Unit Six

#### Estimates and Sample Sizes

- Estimating a Population Mean: Small Samples
- Determining Sample Size Required to Estimate $\mu$

### Objectives

**The students will be able to…**

- **understand** how to estimate $\mu$ from small samples.
- **determine** the sample size required to estimate $\mu$.

### Essential Question

How do you decide what is a proper sample size to estimate $\mu$?

### Teacher Resources

*Essentials of Statistics ©2002*

- Chapter Six lessons
- Chapter Six exercises
- Teacher Made Worksheets
- Teacher Made Assessments

### Media Resources

*Essentials of Statistics ©2002*

- PowerPoint Presentations
- Test Bank CD
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### Assessments

**Homework:** To be given daily on each introduced topic. (CT and PSR)

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (EC and PSR)

**Quiz:** Given as warranted by the curriculum. (CT and EC)

### Suggested Instructional Practices
### Common Core Standards

**The students will:**

- **S-IC-1** Understand statistics as a process for making inferences to be made about population parameters based on a random sample from that population.
- **S-IC-2** Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.
- **S-IC-3** Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
- **S-IC-4** Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.
- **S-IC-5** Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.
- **S-IC-6** Evaluate reports based on data.

### Unit Six

#### Estimates and Sample Sizes

- Estimating a Population Proportion
- Estimating a Population Variance

#### Objectives

**The students will be able to…**

- **understand** how to estimate the population proportion.
- **understand** how to estimate the population variance.

#### Essential Question

How do you estimate properly the population proportion and variance?

#### Teacher Resources

*Essentials of Statistics ©2002*

- Chapter Six lessons
- Chapter Six exercises
- Teacher Made Worksheets
- Teacher Made Assessments

#### Media Resources

*Essentials of Statistics ©2002*

- PowerPoint Presentations
- Test Bank CD
- Data Bank Disk for Data Manipulation
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#### Assessments

**Homework:** To be given daily on each introduced topic. (CT and PSR)

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (EC and PSR)

**Quiz:** Given as warranted by the curriculum. (CT and EC)

**Test:** On concepts involving **Estimates and Sample Sizes**. (CT and EC)

#### Suggested Instructional Practices
### Common Core Standards

**S-IC-1** Understand statistics as a process for making inferences to be made about population parameters based on a random sample from that population.

**S-IC-2** Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.

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**S-IC-5** Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.

**S-IC-6** Evaluate reports based on data.

### Unit Seven
**Hypothesis Testing**

- Introduction to Hypothesis Testing
- Fundamentals of Hypothesis Testing

#### Objectives
The students will be able to...

- **understand** why testing is necessary.
- **understand** hypothesis testing.

#### Essential Question
What is the hypothesis testing?

#### Teacher Resources
*Essentials of Statistics ©2002*
- Chapter Seven lessons
- Chapter Seven exercises
- Teacher Made Worksheets
- Teacher Made Assessments

#### Media Resources
*Essentials of Statistics ©2002*
- PowerPoint Presentations
- Test Bank CD
- Data Bank Disk for Data Manipulation
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#### Assessments
**Homework:** To be given daily on each introduced topic. (CT and PSR)
**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (EC and PSR)
**Quiz:** Given as warranted by the curriculum. (CT and EC)

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<th>Statistics and Discrete Math</th>
<th>Term Two</th>
<th>Week 7</th>
</tr>
</thead>
<tbody>
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<td><em>The students will:</em></td>
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<td><strong>S-IC-3</strong> Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.</td>
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<td><strong>S-IC-6</strong> Evaluate reports based on data.</td>
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</tbody>
</table>

### Unit Seven
**Hypothesis Testing**

- Testing a Claim About a Mean: Large Samples
- Testing a Claim About a Mean: Small Samples

#### Objectives
**The students will be able to…**

- **understand** how to test about a mean with large samples.
- **understand** how to test about a mean with small samples.

#### Teacher Resources
*Essentials of Statistics ©2002*

- Chapter Seven lessons
- Chapter Seven exercises
- Teacher Made Worksheets
- Teacher Made Assessments

#### Media Resources
*Essentials of Statistics ©2002*

- PowerPoint Presentations
- Test Bank CD
- Data Bank Disk for Data Manipulation
- Internet Resources

#### Essential Question
How to we test a claim about mean?

#### Assessments

**Homework:** To be given daily on each introduced topic. *(CT and PSR)*

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. *(EC and PSR)*

**Quiz:** Given as warranted by the curriculum. *(CT and EC)*

#### Suggested Instructional Practices
The students will:

S-IC-1 Understand statistics as a process for making inferences to be made about population parameters based on a random sample from that population
S-IC-2 Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.
S-IC-3 Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
S-IC-4 Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.
S-IC-5 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.
S-IC-6 Evaluate reports based on data.

Unit Seven
Hypothesis Testing

- Testing a Claim About a Proportion
- Testing a Claim About a Standard Deviation
- Testing a Claim About a Variance

Objectives

- understand how test about a proportion.
- understand how test about a standard deviation.
- understand how test about a variance.

Essential Question

How do you test a claim about a proportion, standard deviation, or variance?

Teacher Resources

*Essentials of Statistics ©2002*

- Chapter Seven lessons
- Chapter Seven exercises
- Teacher Made Worksheets
- Teacher Made Assessments

Media Resources

*Essentials of Statistics ©2002*

- PowerPoint Presentations
- Test Bank CD
- Data Bank Disk for Data Manipulation
- Internet Resources

Assessments

**Homework**: To be given daily on each introduced topic. (CT and PSR)

**Class Discussion**: Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (EC and PSR)

**Test**: On concepts involving Hypothesis Testing. (CT and EC)

**Benchmark Assessment 2**: The Benchmark Assessment will focus on all Statistics Concepts covered during the course of term two. (CT and EC)

**Mid-Year Exam**: This will cover all of the concepts from semester one and will incorporate the 2nd Benchmark Assessment. (CT and EC)

Suggested Instructional Practices
<table>
<thead>
<tr>
<th>Statistics and Discrete Math</th>
<th>Term Three</th>
<th>Week 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Common Core Standards</strong></td>
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**Unit Eight**  
**Inferences from Two Samples**
- Introduction to Inferences from Two Samples
- Inferences About Two Samples
- Inferences About Two Samples Independent and Large Samples

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Essential Question</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The students will be able to...</strong></td>
<td><strong>How do we infer about the population given two samples that are independent and large?</strong></td>
</tr>
<tr>
<td>• understand what makes two samples independent.</td>
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<tr>
<td>• understand inference about two means that are independent and from large samples.</td>
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</tr>
</tbody>
</table>

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<th>Media Resources</th>
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<td><strong>Suggested Instructional Practices</strong></td>
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</tbody>
</table>
### Common Core Standards

**The students will:**

**S-ID-5** 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-6** Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.*
- Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.
- Informally assess the fit of a function by plotting and analyzing residuals.
- Fit a linear function for a scatter plot that suggests a linear association.

### Unit Eight
**Inferences from Two Samples**

- Inferences About Two Means
- Inferences About Matched Pairs
- Inferences About Two Proportions

### Objectives

**The students will be able to…**

- **understand** what makes two samples matched pairs.
- **understand** inference about two means if they are matched pairs.
- **understand** inference about two proportions.

### Essential Question

What are matched pairs and how do we use them to infer about the population?

### Teacher Resources

_Essentials of Statistics ©2002_

- Chapter Eight lessons
- Chapter Eight exercises
- Teacher Made Worksheets
- Teacher Made Assessments

### Media Resources

_Essentials of Statistics ©2002_

- PowerPoint Presentations
- Test Bank CD
- Data Bank Disk for Data Manipulation
- Internet Resources

### Assessments

**Homework:** To be given daily on each introduced topic. (CT and PSR)

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (EC and PSR)

**Quiz:** Given as warranted by the curriculum. (CT and EC)

**Test:** On concepts involving Inferences from Two Samples. (CT and EC)

### Suggested Instructional Practices
### Statistics and Discrete Math  
**Term Three**  
**Week 3**

#### Common Core Standards

**The students will:**

**S-ID-5** 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.

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- Informally assess the fit of a function by plotting and analyzing residuals.
- Fit a linear function for a scatter plot that suggests a linear association.

---

#### Unit Nine  
**Correlation and Regression**

- Introduction and Overview of Correlation and Regression
- Correlation

---

#### Objectives

The students will be able to...

- **understand** correlation.
- **plot** data.
- **read** a scatter plot.

#### Essential Question

What is correlation?

---

#### Teacher Resources

*Essentials of Statistics ©2002*

- Chapter Nine lessons
- Chapter Nine exercises
- Teacher Made Worksheets
- Teacher Made Assessments

#### Media Resources

*Essentials of Statistics ©2002*

- PowerPoint Presentations
- Test Bank CD
- Data Bank Disk for Data Manipulation
- Internet Resources

#### Assessments

**Homework:** To be given daily on each introduced topic. (CT and PSR)

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (EC and PSR)

**Quiz:** Given as warranted by the curriculum. (CT and EC)

#### Suggested Instructional Practices
Common Core Standards

The students will:

S-ID-7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
S-ID-8 Compute (using technology) and interpret the correlation coefficient of a linear fit.
S-ID-9 Distinguish between correlation and causation.

Unit Nine
Correlation and Regression

- Regression
- Linear Regression
- Quadratic Regression
- Exponential Regression

Objectives
The students will be able to…

- understand the concept of regression.
- interpret a scatter plot by matching the correct function to the correlation.

Essential Question
How do we fit the correct function a given scatter plot?

Teacher Resources
Essentials of Statistics ©2002

- Chapter Nine lessons
- Chapter Nine exercises
- Teacher Made Worksheets
- Teacher Made Assessments

Media Resources
Essentials of Statistics ©2002

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Assessments

Homework: To be given daily on each introduced topic. (CT and PSR)
Class Discussion: Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (EC and PSR)
Quiz: Given as warranted by the curriculum. (CT and EC)

Suggested Instructional Practices
### Unit Nine

**Correlation and Regression**

- Variations and Prediction Intervals
- Rank Correlation
- Percentiles
- Deciles

### Objectives

The students will be able to...

- **understand** variation.
- **understand** prediction intervals.
- **understand** rank correlation.
- **work** with percentiles and deciles.

### Essential Question

What is the importance of rank correlation?

### Teacher Resources

*Essentials of Statistics ©2002*

- Chapter Nine lessons
- Chapter Nine exercises
- Teacher Made Worksheets
- Teacher Made Assessments

### Media Resources

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- PowerPoint Presentations
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### Assessments

**Homework:** To be given daily on each introduced topic. *(CT and PSR)*

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. *(EC and PSR)*

**Quiz:** Given as warranted by the curriculum. *(CT and EC)*

**Test:** On concepts involving Correlation and Regression. *(CT and EC)*

---

**Common Core Standards**

*S-ID-7* Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

*S-ID-8* Compute (using technology) and interpret the correlation coefficient of a linear fit.

*S-ID-9* Distinguish between correlation and causation.
The students will:
S-ID-7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
S-ID-8 Compute (using technology) and interpret the correlation coefficient of a linear fit.
S-ID-9 Distinguish between correlation and causation.

## Unit Ten
**Chi-Square and Analysis of Variance**
- Introduction and Overview of Chi-Square Analysis of Variance
- Multinomial Experiments: Goodness-of-Fit

### Objectives
The students will be able to...
- **understand** Chi-square distribution.
- **understand** the goodness-of-fit.
- **understand** the degrees of freedom for Chi-square distribution.

### Essential Question
What is Chi-squared distribution and what is meant by goodness-of-fit?

### Teacher Resources
*Essentials of Statistics ©2002*
- Chapter Ten lessons
- Chapter Ten exercises
- Teacher Made Worksheets
- Teacher Made Assessments

### Media Resources
*Essentials of Statistics ©2002*
- PowerPoint Presentations
- Test Bank CD
- Data Bank Disk for Data Manipulation
- Internet Resources

### Assessments
**Homework:** To be given daily on each introduced topic. (CT and PSR)
**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (EC and PSR)
**Quiz:** Given as warranted by the curriculum. (CT and EC)

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<td><strong>S-ID-8</strong> Compute (using technology) and interpret the correlation coefficient of a linear fit.</td>
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</table>

### Unit Ten
**Chi-Square and Analysis of Variance**

- Contingency Tables
- Independence and Homogeneity
- Two-Way Frequency Tables
- Test for Independence

#### Objectives
*The students will be able to…*

- **understand** Chi-square distribution for contingency tables.
- **understand** homogeneity and independence.

#### Essential Question
What is contingency tables and how to we test for independence and homogeneity?

#### Teacher Resources
*Essentials of Statistics ©2002*

- Chapter Ten lessons
- Chapter Ten exercises
- Teacher Made Worksheets
- Teacher Made Assessments

#### Media Resources
*Essentials of Statistics ©2002*

- PowerPoint Presentations
- Test Bank CD
- Data Bank Disk for Data Manipulation
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#### Assessments
*Homework:* To be given daily on each introduced topic. (CT and PSR)
*Class Discussion:* Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (EC and PSR)
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#### Suggested Instructional Practices
The students will:
S-ID-5 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-6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
  a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.
  b. Informally assess the fit of a function by plotting and analyzing residuals.
  c. Fit a linear function for a scatter plot that suggests a linear association.
S-ID-7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
S-ID-8 Compute (using technology) and interpret the correlation coefficient of a linear fit.
S-ID-9 Distinguish between correlation and causation.

Unit Ten
Chi-Square and Analysis of Variance

Objectives
The students will be able to...

- **analysis** variance.
- **understand** when a collected data set is homogeneous.

Essential Question
How do we analyze variance?

Teacher Resources
*Essentials of Statistics ©2002*

- Chapter Ten lessons
- Chapter Ten exercises
- Teacher Made Worksheets
- Teacher Made Assessments

Media Resources
*Essentials of Statistics ©2002*

- PowerPoint Presentations
- Test Bank CD
- Data Bank Disk for Data Manipulation
- Internet Resources

Assessments
**Homework:** To be given daily on each introduced topic. (CT and PSR)
**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (EC and PSR)
**Test:** On concepts involving Chi-Square and Analysis of Variance. (CT and EC)
**Benchmark Assessment 3:** The Benchmark Assessment will focus on all Statistics Concepts covered during the course of term three. (CT and EC)

Suggested Instructional Practices
### Common Core Standards

**S-IC-3** Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.

**S-IC-4** Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.

**S-IC-5** Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.

**S-IC-6** Evaluate reports based on data.

### Unit Eleven

**Election Theory**

- An Election Activity
- Group-Ranking Methods
- Group-Ranking Algorithms
- Group-Ranking Paradoxes

### Objectives

**The students will be able to…**

- **work** with various group-ranking situations.
- **understand** how an election is conducted in practice.

### Essential Question

How do we rank or elect the best choice of a group?

### Teacher Resources

*Discrete Mathematics Through Applications* ©1994

- Chapter One lessons
- Chapter One activities
- Teacher Made Worksheets
- Teacher Made Assessments

### Media Resources

- PowerPoint Presentations
- Internet Activities
- TI-nspire Graphing Calculators

### Assessments

**Homework:** To be given daily on each introduced topic. (CT and PSR)

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (EC and PSR)

**Quiz:** Given as warranted by the curriculum. (CT and EC)
The students will:
S-IC-3 Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
S-IC-4 Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.
S-IC-5 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.
S-IC-6 Evaluate reports based on data.

Unit Eleven
Election Theory

- Arrow’s Conditions and Approval Voting
- Weighted Voting
- Voting Power
- Review of Election Theory

Objectives
The students will be able to...
- **understand** how weighted voting works in practice.
- **understand** how voting power works in practice

Essential Question
What is election theory?

Teacher Resources
*Discrete Mathematics Through Applications ©1994*
- Chapter One lessons
- Chapter One activities
- Teacher Made Worksheets
- Teacher Made Assessments

Media Resources
- PowerPoint Presentations
- Internet Activities
- TI-nspire Graphing Calculators

Assessments
**Homework:** To be given daily on each introduced topic. (CT and PSR)
**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (EC and PSR)
**Quiz:** Given as warranted by the curriculum. (CT and EC)
**Test:** On concepts involving Election Theory. (CT and EC)

Suggested Instructional Practices
### Common Core Standards

**S-IC-3** Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.

**S-IC-4** Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.

**S-IC-5** Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.

**S-IC-6** Evaluate reports based on data.

### Unit Twelve

#### Fair Division

- Fair Division Concepts and Activities
- Estate Division
- Apportionment Algorithms
- Apportionment Paradoxes

### Objectives

**The students will be able to…**

- **understand** how to apply fair division.
- fairly **divide** an estate.
- **understand** algorithms.
- **understand** how paradoxes arise in practice.

### Essential Question(s)

- What is considered fair division?
- How do you use an algorithm to understand a paradox?

### Teacher Resources

*Discrete Mathematics Through Applications ©1994*

- Chapter Two lessons
- Chapter Two activities
- Teacher Made Worksheets
- Teacher Made Assessments

### Media Resources

- PowerPoint Presentations
- Internet Activities
- TI-nspire Graphing Calculators

### Assessments

**Homework:** To be given daily on each introduced topic. (*CT* and *PSR*)

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (*EC* and *PSR*)

**Quiz:** Given as warranted by the curriculum. (*CT* and *EC*)

**Suggested Instructional Practices**
## Common Core Standards

**The students will:**

- **S-IC-3** Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
- **S-IC-4** Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.
- **S-IC-5** Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.
- **S-IC-6** Evaluate reports based on data.

## Unit Twelve

### Fair Division

- Fair Division Algorithms
- The Continuous Case
- Mathematical Induction

### Objectives

The students will be able to...

- **understand** the concept of fair division.
- **understand** how mathematical induction works.

### Essential Question

What are some paradoxes that are put to rest with mathematical induction?

### Teacher Resources

*Discrete Mathematics Through Applications ©1994*

- Chapter Two lessons
- Chapter Two activities
- Teacher Made Worksheets
- Teacher Made Assessments

### Media Resources

- PowerPoint Presentations
- Internet Activities
- TI-nspire Graphing Calculators

### Assessments

**Homework:** To be given daily on each introduced topic. (CT and PSR)

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (EC and PSR)

**Quiz:** Given as warranted by the curriculum. (CT and EC)

**Test:** On concepts involving Fair Division. (CT and EC)

### Suggested Instructional Practices
### Statistics and Discrete Math

**Term Four**

**Week 5**

**Common Core Standards**

**The students will:**

N-VM-6 Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.

N-VM-7 Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled.

N-VM-8 Add, subtract, and multiply matrices of appropriate dimensions.

N-VM-9 Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties.

### Unit Thirteen

Matrix Operations and Applications

- Addition and Subtraction of Matrices
- Multiplication of Matrices

#### Objectives

The students will be able to...

- add and subtract matrices.
- multiply matrices.

#### Essential Question

How do you multiply and when can you multiply two matrices?

### Teacher Resources

*Discrete Mathematics Through Applications ©1994*

- Chapter Three lessons
- Chapter Three activities
- Teacher Made Worksheets
- Teacher Made Assessments

### Media Resources

- PowerPoint Presentations
- Internet Activities
- TI-nspire Graphing Calculators

### Assessments

**Homework:** To be given daily on each introduced topic. (CT and PSR)

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (EC and PSR)

**Quiz:** Given as warranted by the curriculum. (CT and EC)

### Suggested Instructional Practices
Statistics and Discrete Math  

Term Four  

Week 6  

Common Core Standards  

The students will:  
none  

Unit Thirteen  
Matrix Operations and Applications  

- Population Growth  
- The Leslie Model  

Objectives  
The students will be able to…  

- understand population growth under the Leslie Model.  
- understand the mathematics behind population growth.  

Essential Question  
How does the Leslie Model explain population growth?  

Teacher Resources  
*Discrete Mathematics Through Applications ©1994*  

- Chapter Three lessons  
- Chapter Three activities  
- Teacher Made Worksheets  
- Teacher Made Assessments  

Media Resources  

- PowerPoint Presentations  
- Internet Activities  
- TI-nspire Graphing Calculators  

Assessments  
**Homework:** To be given daily on each introduced topic. (CT and PSR)  
**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (EC and PSR)  
**Quiz:** Given as warranted by the curriculum. (CT and EC)  
**Test:** On concepts involving Matrix Operations and Applications. (CT and EC)  

Suggested Instructional Practices
The students will:  
none

## Common Core Standards

## Unit Fourteen  
Graphs, Applications, and Subgraphs

- Modeling Projects
- Critical Paths
- Graphs (Vocabulary and Representations)
- Euler Circuits and Paths

## Objectives

The students will be able to…

- **understand** the mathematical representation of graphs.
- **understand** the concepts of critical paths.
- **understand** Euler circuits and paths.

## Essential Question

What is Euler Circuit?

## Teacher Resources

*Discrete Mathematics Through Applications ©1994*

- Chapter Four lessons
- Chapter Four activities
- Teacher Made Worksheets
- Teacher Made Assessments

## Media Resources

- PowerPoint Presentations
- Internet Activities
- TI-nspire Graphing Calculators

## Assessments

**Homework:** To be given daily on each introduced topic. (CT and PSR)  
**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (EC and PSR)  
**Quiz:** Given as warranted by the curriculum. (CT and EC)  

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### Suggested Instructional Practices
<table>
<thead>
<tr>
<th>Statistics and Discrete Math</th>
<th>Term Four</th>
<th>Week 8</th>
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<tbody>
<tr>
<td>The students will:</td>
<td>Common Core Standards</td>
<td></td>
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<tr>
<td>none</td>
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</tr>
</tbody>
</table>

**Unit Fourteen**

**Graphs, Applications, and Subgraphs**

- Hamiltonian Circuits and Paths
- Graph Coloring
- Planarity and Coloring
- The Traveling Salesperson Problem
- Shortest Route Problems

**Objectives**

The students will be able to…

- **understand** Hamiltonian circuits and paths.
- **work** with concept of graph coloring.
- **understand** the traveling salesperson problem.
- **work** with and understand the shortest route problem.

**Essential Question**

What is a Hamiltonian path?

**Teacher Resources**

*Discrete Mathematics Through Applications ©1994*

- Chapter Four lessons
- Chapter Four activities
- Teacher Made Worksheets
- Teacher Made Assessments

**Media Resources**

- PowerPoint Presentations
- Internet Activities
- TI-nspire Graphing Calculators

**Assessments**

**Homework:** To be given daily on each introduced topic. (CT and PSR)

**Class Discussion:** Students will be expected to be prepared for class, participate in class activities and actively engage in class discussion. (EC and PSR)

**Test:** On concepts involving **Graphs, Applications, and Subgraphs.** (CT and EC)

**Benchmark Assessment 4:** The **Benchmark Assessment** will focus on all **Discrete Mathematics Concepts** covered during the course of term four. (CT and EC)

**Final Exam:** This will cover all of the concepts from semester one and two, and will incorporate the 4th Benchmark Assessment. (CT and EC)

**Suggested Instructional Practices**