# COLLEGE MATH
# PACING GUIDE
# TEXTBOOK: EXCURSIONS IN MATHEMATICS, 8TH EDITION BY PETER TANNENBAUM

| UNIT 1: Social Choice | | |
|---|---|---|
| **Chapter 1: The Mathematics of Elections - Paradoxes of Democracy** | | |
| **Total Number of Days** | **Section** | **Assessments** |
| 4 | 1.1 - The Basic Elements of an Election | ● Do Now<br>● DEJ/CEA<br>● Homework<br>● Tests/Quizzes<br>● MathLab<br>● Projects (Choose at least one): 1.Collect real data from a municipal, state, and/or national election to analyze with various methods and make conclusions. 2.Projects and Papers at the End of Chapter 1 ( 1, 2, or 5) on page 35 |
| 2 | 1.2 - The Plurality Method | |
| 2 | 1.3 - The Borda Count Method | |
| 3 | 1.4 - The Plurality - With - Elimination Method | |
| 3 | 1.5 - The Method of Pairwise Comparisons | |
| 3 | 1.6 - Fairness Criteria and Arrow's Impossibility Theorem | |
| **ESSENTIAL QUESTIONS:** 1. How do people analyze information to make a good and fair decision? 2. What are the advantages and disadvantages of the different election processes?<br>**ESSENTIAL SKILLS:** 1. Students will apply election theory methods including plurality, majority, borda count, run-off, sequential run-off, condorcet and approval voting. | | |
| Total Days: 17 days | | |

**UNIT 1: Social Choice**

**Chapter 2: The Mathematics of Power - Weighted Voting**

| Total Number of Days | Section | Assessments |
|---|---|---|
| 2 | 2.1 - An Introduction to Weighted Voting | <ul><li>Do Now</li><li>DEJ/CEA</li><li>Homework</li><li>Tests/Quizzes</li><li>MathLab</li><li>Projects: 1.The Past, Present, and Future of the Electoral College. 2.Mathematical Arguments in Favor of the Electoral College (Found in Projects and Papers at the end of Chapter 2)</li></ul> |
| 4 | 2.2 - Banzhaf Power | |
| 4 | 2.3 - Shapley- Shubik Power | |
| 2 | 2.4 - Subsets and Permutations | |

**ESSENTIAL QUESTION:** 1. How does the number of votes correlate to voting power?

**ESSENTIAL SKILLS:** 1.Students will analyze each voter's power in a weighted voting election process.

Total Days: 12 days

**UNIT 1: Social Choice**

**Chapter 3: The Mathematics of Sharing - Fair Division Games**

| Total Number of Days | Section | Assessments |
|---|---|---|
| 2 | 3.1 - Fair-Division Games | <ul><li>Do Now</li><li>DEJ/CEA</li><li>Homework</li><li>Tests/Quizzes</li><li>MathLab</li><li>Projects (Choose One): 1.Envy-Free Fair Division, 2. Fair Divisions with Unequal Shares (Found in Projects and Papers at the end of Chapter 3)</li></ul> |
| 2 | 3.2 - The Divider-Chooser Method | |
| 3 | 3.3 - The Lone-Divider Method | |
| 3 | 3.4 - The Lone-Chooser Method | |
| 5 | 3.5 - The Method of Sealed Bids | |
| 5 | 3.6 - The Method of Markers | |

**ESSENTIAL QUESTIONS:** 1. What are the elements of a fair division game? 2. What are the requirements for a fair-division method? 3. How do we apply different fair-division methods to various situations?

**ESSENTIAL SKILLS:** 1. Students will apply the basic skill of game theory in order to share things fairly using cooperation, reason, and logic.

Total Days: 20 days

**UNIT 1: Social Choice**

## Chapter 4: The Mathematics of Apportionment - Making the Rounds

| Total Number of Days | Section | Assessments |
|---|---|---|
| 5 | 4.1 - Apportionment Problems and Apportionment Methods | • Do Now |
| 3 | 4.2 - Hamilton's Method | • DEJ/CEA |
| 3 | 4.3 - Jefferson's Method | • Homework |
| 4 | 4.4 - Adam's and Webster's Methods | • Tests/Quizzes |
| 2 | 4.5 - The Huntington-Hill Method | • MathLab |
| 5 | 4.6 - The Quota Role and Apportionment Paradoxes | • Project: Apportionment Methods and the 2000 Presidential Election (Page 135) and The First Apportionment of the House of Representatives (Page 136) |

**ESSENTIAL QUESTIONS:** 1. What is an apportionment problem? 2. What are the elements common to all apportionment problems? 3. What is an apportionment method? 4. What are the 4 classic apportionment methods? 5. How is the apportionment method used in government? 6. What are the flaws and paradoxes of the various apportionment methods?

**ESSENTIAL SKILLS:** Students will utilize their previous knowledge on the mathematics of voting to understand the parallelism between voting and apportionment.

Total Days: 22 days

# End of Semester One

## UNIT 2: GROWTH

## Chapter 9: The Mathematics of Getting Around

| Total Number of Days | Section | Assessments |
|---|---|---|
| 3 | 9.1 - Sequences and Population Sequences | <ul><li>Do Now</li><li>DEJ/CEA</li><li>Homework</li><li>Tests/Quizzes</li><li>MathLab</li><li>Projects: Choose a project from page 291 from Project and Papers</li></ul> |
| 5 | 9.2 - The Linear Growth Model | |
| 5 | 9.3 - The Exponential Growth Model | |
| 5 | 9.4 - The Logistic-Growth Model | |

**ESSENTIAL QUESTIONS:** 1. How does the concept of various types of sequences play a role in modeling population growth? 2.How are linear growth, exponential growth, and logistic growth models used to model populations?

**ESSENTIAL SKILLS:** Students utilize their previous knowledge of linear and exponential functions.

**Total Number of Days:** 18 days

**UNIT 2: GROWTH**

**Chapter 10: Financial Mathematics**

| Total Number of Days | Section | Assessments |
|---|---|---|
| 2 | 10.1 - Percentages | ● Do Now |
| 2 | 10.2 - Simple Interest | ● DEJ/CEA<br>● Homework |
| 5 | 10.3 - Compound Interest | ● Tests/Quizzes<br>● MathLab |
| 3 | 10.4 - Consumer Debt | ● Project: A Future Home Buyer's Must-Do Project (page 321) |

**ESSENTIAL QUESTIONS:** What is the meaning, use, and abuse of percentages in financial mathematics? What role does simple and compound interests play in your finances? How does consumer debt affect our economy?

**ESSENTIAL SKILLS:** Students will apply their skills on number sense and utilize their previous knowledge on linear/exponential functions from Algebra 1.

**Total Number of Days:** 12 days

**UNIT 3: STATISTICS**

| **Chapter 14: Censuses, Surveys, Polls, and Studies** | | |
|---|---|---|
| **Total Number of Days** | **Section** | **Assessments** |
| 5 | 14.1 - Enumeration | • Do Now |
| 7 | 14.2 - Measurement | • DEJ/CEA<br>• Homework<br>• Tests/Quizzes |
| 5 | 14.3 - Cause and Effect | • MathLab<br>• Project: Choose a project from page 445 from Project and Papers |

**ESSENTIAL QUESTIONS:** 1.How is enumeration used? 2.How are measurement questions used to collect data? 3. Why are cause and effect the most difficult types of data collection?

**ESSENTIAL SKILLS:** Students will expand their knowledge on data collection and its results based on their previous knowledge in Algebra 1.

**Total Number of Days:**  17 days

**UNIT 3: STATISTICS**

| **Chapter 15: Graphs, Charts, and Numbers** | | |
|---|---|---|
| **Total Number of Days** | **Section** | **Assessments** |
| 5 | 15.1 - Graphs and Charts | <ul><li>Do Now</li><li>DEJ/CEA</li><li>Homework</li><li>Tests/Quizzes</li><li>MathLab</li><li>Projects:Lies, Damn Lies, and Statistics and Data in Your Daily Life (page 477)</li></ul> |
| 3 | 15.2 - Means, Medians, and Percentiles | |
| 2 | 15.3 - Ranges and Standard Deviations | |

**ESSENTIAL QUESTIONS:** 1. What are the standard graphical tools for describing data? 2.How do you choose the best graphical tool to represent your data set? 3.What are the numerical summaries for a data set? 4.What are the measures of spread for a data set?

**ESSENTIAL SKILLS:** Students will build on their previous knowledge of statistics from Algebra 1.

**Total Number of Days:** 10 days

## Review

## End of Semester Two

**UNIT 3: STATISTICS**

| **Chapter 16: Probabilities, Odds, and Expectations** |
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| Total Number of Days | Section | Assessments |
| --- | --- | --- |
| 3 | 16.1 - Sample Spaces and Events | - Do Now |
| 5 | 16.2 - The Multiplication Rule, Permutations, and Combinations | - DEJ/CEA |
| 5 | 16.3 - Probabilities and Odds | - Homework |
| 2 | 16.4 - Expectations | - Tests/Quizzes |
| 5 | 16.5 - Measuring Risk | - MathLab |
|  |  | - Project: A History of Gambling |

**ESSENTIAL QUESTIONS:** 1. What are the building blocks for computing probabilities? 2.How do we apply key mathematical tools for probability calculations? 3. How do we calculate probabilities and odds? 4. What is the relationship between risk and reward? 5.How do we use expectations as a tool for measuring risk?

**ESSENTIAL SKILLS:** Students will apply their previous knowledge about probabilities

| **Total Number of Days:** 20 days |
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