Course: *Algebra II Functions* **Unit #7:** *Statistics & Probability*	**Year of Implementation:** 2024-2025

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Stage One - Desired Results

Link(s) to New Jersey Student Learning Standards for this course:
{provide all applicable links to standards here}
https://www.state.nj.us/education/cccs/2020/

- **Unit Standards:** *(keep each of the following headings in place)*
  - ***Content Standards***

    Making Inferences and Justifying Conclusions S-IC: 1, 2, 3, 4, 5, 6
    Understand and evaluate random processes underlying statistical experiments.
    Make inferences and justify conclusions from sample surveys, experiments, and observational studies.

    Conditional Probability and the Rules of Probability S-CP:1, 2, 3, 6, 7, 9
    Understand independence and conditional probability and use them to interpret data.
    Use the rules of probability to compute probabilities of compound events in a uniform probability model.

    Interpreting Categorical and Quantitative Data S.ID.A: 3, 4, B 5
    Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
    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.
    Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.
  - ***21st Century Life & Career Standards***
    - All curriculum writers/revisionists need to include standards that apply to “Career Readiness, Life Literacies, and Key Skills”. This should include a brief description of the standard and the standard number. Document only those standards and practices that apply to each unit. Use the following link to assist you [see pages of 31-36; 41-42; 53-56 for specific standard #’s and strands]

https://www.state.nj.us/education/cccs/2020/2020%20NJSLS-CLKS.pdf

- 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3)
- 9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8)
- 9.4.12.IML.4: Assess and critique the appropriateness and impact of existing data visualizations for an intended audience (e.g., S-ID.B.6b, HS-LS2-4).
- 9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).

- ***Interdisciplinary Content Standards***
  - SL.11-12.1. Initiate and participate effectively in a range of collaborative discussions (one-on- one, in groups, and teacher-led) with peers on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
  - SL.11-12.4 Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
  - L.11-12.6. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

- ***NJ Statutes:*** NJ State law mandates the inclusion of the following topics in lesson design and instruction as aligned to elementary and secondary curriculum.

  Amistad Law: N.J.S.A. 18A 52:16A-88 Every board of education shall incorporate the information regarding the contributions of African-Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.

  Holocaust Law: N.J.S.A. 18A:35-28 Every board of education shall include instruction on the Holocaust and genocides in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction

shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.

LGBT and Disabilities Law: N.J.S.A. 18A:35-4.35 A board of education shall include instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district's implementation of the New Jersey Student Learning Standards (N.J.S.A.18A:35-4.36) A board of education shall have policies and procedures in place pertaining to the selection of instructional materials to implement the requirements of N.J.S.A. 18A:35-4.35.

Diversity and Inclusion (N.J.S.A. 18A:35-4.36a) A board of education shall incorporate instruction on diversity and inclusion in an appropriate place in the curriculum of students in grades kindergarten through 12 as part of the district's implementation of the New Jersey Student Learning Standards.

Asian American and Pacific Islanders (AAPI) P.L.2021, c.410 Ensures that the contributions, history, and heritage of Asian Americans and Pacific Islanders (AAPI) are included in the New Jersey Student Learning Standards (NJSLS) for Social Studies in kindergarten through Grade 12 (P.L.2021, c.416)

For additional information, see

NJ Amistad Curriculum: ***https://www.nj.gov/education/amistad/about/***

Diversity and Inclusion: ***https://www.nj.gov/education/standards/dei/index.shtml***

- *(Sample Activities/ Lessons):* ***https://www.nj.gov/education/standards/dei/samples/index.shtml***

Asian American and Pacific Islanders:

- ***Asian American and Pacific Islander Heritage and History in the U.S.***
  A Teacher's Guide from EDSITEment offering a collection of lessons and resources for K-12 social studies, literature and arts classrooms that center around the experiences, achievements and perspectives of Asian Americans and Pacific Islanders across U.S. history.

Transfer Goal: Students will be able to independently use their learning to make predictions and decisions on real world events.

As aligned with LRHSD Long Term Learning Goal(s): https://www.lrhsd.org/Page/6163

Problem-Solving: apply and transfer autonomously and collaboratively mathematical concepts and problem- solving techniques to unfamiliar, varied and real-world situations

Habits of Mind: approach new situations with curiosity, persistence, resourcefulness, and confidence; take risks, monitor their progress, accept and learn from setbacks, make adjustments, and reflect on their performance

Enduring Understandings	*Essential Questions*
Students will understand that. . . EU 1 evidence based predictions can be made using computational methods. *EU 2* data modeling provides deeper meaning.	How well can we predict the outcomes of future events? How can univariate data be collected, described, and visualized?
Knowledge ***Students will know . . .*** *EU 1* ● the counting principle, a tree diagram, combinations and permutations can be used to determine the outcomes of an event. (S-CP B9) ● the definition of probability. (S-IC) ● the difference between theoretical and experimental probability and when to apply one or the other. (S-IC, S-CP)	***Skills*** ***Students will be able to. . .*** *EU 1* ● apply the counting principle. (S-CP B9) ● demonstrate a tree diagram. (S-CP B9) ● distinguish between a permutation or combination and apply the correct formula. (S-CP B9) ● calculate the likelihood that an event will occur when outcomes are equally likely or an experiment is performed. (S-IC)

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- outcomes of the occurrence of one event may or may not have an effect on the occurrence of another event. (S-CP)
- critical vocabulary is necessary to communicate and understand mathematics in the real world. (S-MD)

EU 2

- distribution of data sets can differ. (S-ID A 3,4,5)
- measures of center and spread vary in different data sets. (S-ID.A.4)

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- calculate a compound event. (S-IC, S-CP)
- determine the union and intersection of two events. (S-CP)
- determine if an event is independent or dependent based on given information. (S-CP)
- demonstrate the correct usage and application of critical vocabulary. (S-MD)

EU 2

- interpret and compare data distributions using shape, center (median and mean) and spread (interquartile range and standard deviation) through the use of technology and using the empirical rule. (S-ID A 3,4,5)

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Learning Plan: **Suggested Learning Activities to Include Differentiated Instruction and Interdisciplinary Connections: Each learning activity listed must be accompanied by a learning goal of A= Acquiring basic knowledge and skills, M= Making meaning and/or a T= Transfer.** *{place A, M and/or T along with the applicable EU number in parentheses after each statement} All knowledge and skills must be addressed in this section with a corresponding lesson/activity which teaches each concept. The following color codes are used to notate activities that correspond with interdisciplinary connections and 21st Century Life & Career Connections (which involves Technology Literacy): Red = Interdisciplinary Connection; Purple = 21st Century Life & Career Connection*

- Activity #1 – Tree Diagram – Counting Principle (A, EU 1)
- Activity #2 – TI-nspire: Permutations: (M, EU 1) https://education.ti.com/en/activity/detail?id=8B18D5F4F1464B1B8070A1908F387CE4
- Activity #3 – TI-nspire: Permutations and Combinations: (M, EU 1) https://education.ti.com/en/activity/detail?id=FCF58410D4734EEF8D95B8AA6B7DD26B
- Activity #4 – " Clue" (T, EU 1)
- Activity #5 – "Coin Toss" (M, EU 1)
- Activity #6 - Students play matchups and rounds of "rock-paper-scissors" (RPS) in a best-of-five game series organized in a tournament bracket format. They note wins, losses, and ties in order to compare experimental probability to theoretical probability, and then solve probability problems. (M, T EU 1)
- Activity #7 – Powerpoint: Independent and Dependent Events (A, EU 1)
- Activity #8 - Probability Review Game: (A, EU 1) http://www.crctlessons.com/probability-game.html
- Activity #9- Desmos Human Stopwatch (A, M EU 2) https://teacher.desmos.com/activitybuilder/custom/59de914bdfeb6e0c086d4b34?collections=featured-collections%2C5da8a6474d5c010a4455b470
- Activity #10- Intro to Statistics - Detecting Parkinson's Disease (A, M, T EU 2) https://teacher.desmos.com/activitybuilder/custom/5f612f148ce2162b1789e06d?collections=6115836cfc86266607c72ed9%2C5f899fc08b6b260afaa3eac2
- Activity #11- Slow Reveal Graphs: All that and a bag of chips (T, EU 2) All that and a bag of chips https://slowrevealgraphs.com/2022/03/18/how-many-calories-do-people-really-eat-at-chipotle/

Suggested Sequence of Learning Activities:

- Discussion on different types of games found at a carnival. An introduction to the performance task (A, EU 1)
- Apply the counting principle and demonstrate a tree diagram. (M, EU 1)
- Activity #1 – Tree diagram – Counting Principle (A, EU 1)
- Define and apply a permutation.(A, M, EU 1)
- Activity #2 – TI-nspire (M, EU 1)

- Define and apply a combination.(A, M, EU 1)
- Activity #3 – TI-nspire (M, EU 1)
- Activity #4 – Clue (T, EU 1)
- Compare and contrast theoretical probability and experimental probability. (A, EU 1)
- Activity #5 – “Coin Toss” (M, EU 1)
- Activity #6 – “Rock, Paper, Scissors” (M, T EU 1)
- Apply area formulas to determine geometric probability.(A, EU 1)
- Determine the probability of compound events.(A, EU 1)
- Determine the probability of independent/dependent events.(A, EU 1)
- Activity #7 – Powerpoint(A, EU 1)
- Activity #8 – Review game (A, EU 1)
- Activity #9- “Human Stopwatch” (A, M EU 2)
- Define shape, center (median and mean) and spread (interquartile range and standard deviation) through the use of technology and using the empirical rule (A, EU 2)
- Activity #10 “Intro to Statistics - Detecting Parkinson's Disease” (A, M, T EU 2)
- Activity #11 “All that and a bag of chips” (T, EU 2)

Critical Vocabulary:

Combination	Complement	Compound event
Conditional probability	Counting principle	Data Distribution
Dependent event	Empirical Rule	Event
Experimental probability	Geometric probability	Independent event
Intersection	Interquartile Range	Mean
Median	Odds	Probability
Sample space	Standard Deviation	Theoretical probability
Tree diagram	Union	

Pacing Guide

{This chart will be identical in all of the units for this course.}

Unit #	*Title of Unit*	*Approximate # of teaching days*
1	Unit 1 Quadratic Functions	30
2	Unit 2 Polynomial Functions	18
3	Unit 3 Exponential & Logarithmic Functions	18
4	Unit 4 Radical Functions	18
5	Unit 5 Rational Functions	18
6	Unit 6 Functions	14
7	Unit 7 Statistics & Probability	18

Instructional Materials

TInSpire Calculator
DESMOS online graphing calculator and activities
Khan Academy
Kuta Infinite Software

Accommodations

Special Education: The curriculum will be modified as per the Individualized Education Plan (IEP). Students will be accommodated based on specific accommodations listed in the IEP.

Students with 504 Plans: Students will be accommodated based on specific accommodations listed in the 504 Plan.

English Language Learners: Students will be accommodated based on individual need and in consultation with the ELL teacher.

Students at Risk of School Failure: Students will be accommodated based on individual need and provided various structural supports through their school.

Gifted and Talented Students: Students will be challenged to enhance their knowledge and skills through acceleration and additional independent research on the subject matter.