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Sunset Park High School Instructional Team

Unit Template

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| Grade: 9  *Forbes-Gray*  Subject: Probability/Statistics  Title: State Lotteries: Who wins? Who Loses? | |
| **Unit Topic and Length:** | |
| **Common Core Learning Standards to focus on\* (other standards may be addressed additionally):**  **Probability & Statistics Standards:**  ***S.ID.5, 6a, 6b, 6c*** Summarize, represent, and interpret data on two categorical and quantitative variables. *Linear focus, discuss general principle*  ***S.ID.4*** Summarize, represent, and interpret data on a single count or measurement variable.  ***S.IC.1, 2*** Understand and evaluate random processes underlying statistical experiments.  ***S.IC.3, 4, 5, 6*** Make inferences and justify conclusions from sample surveys, experiments and observational studies.  ***S.CP.1, 2, 3, 4, 5*** Understand independence and conditional probability and use them to interpret data. *Link to data from simulations or experiments*  ***S.CP.6, 7, (+) 8, (+) 9*** Use the rules of probability to compute probabilities of compound events in a uniform probability model.  ***(+) S.MD.6, 7*** Use probability to evaluate outcomes of decisions. *Include more complex situations*  ***(+) S.MD.1, 2, 3, 4*** Calculate expected values and use them to solve problems.  ***(+) S.MD. 5a, 5b*** Use probability to evaluate outcomes of decisions..  **Reading Informational Text 1:** Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.  **Reading Informational Text Standard 10:** Read and comprehend complex literary and informational texts independently and proficiently.  **Writing Standard 1:** Write arguments to support claims in an analysis of topics of texts, using valid reasoning and relevant and sufficient evidence. Explore and inquire into areas of interest to form an argument.  a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s),  distinguish the claim(s) from alternate or opposing claims, and create an organization that  logically sequences claim(s), counterclaims, reasons, and evidence.  b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant  evidence for each while pointing out the strengths and limitations of both in a manner  that anticipates the audience’s knowledge level, concerns, values, and possible biases.  c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the  text, create cohesion, and clarify the relationships between claim(s) and reasons,  between reasons and evidence, and between claim(s) and counterclaims.  d. Establish and maintain a formal style and objective tone while attending to the norms and  conventions of the discipline in which they are writing.  e. Provide a concluding statement or section that follows from and supports the argument  presented.  **Speaking and Listening Standard 1:** Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building in others’ ideas and expressing their own clearly and persuasively.  **Language Standard 6:** Acquire and use accurately a range of general academic and domain specific words and phrases sufficient for reading, writing and listening at the college and career readiness level. | |
| Big Ideas and Enduring Understandings:   * Lotteries vary state by state although some games are multi-state. * State lotteries generate money for the state like education. * The lottery is not a private enterprise. * There chance of winning the lottery are small, but can be calculated. * What did happen in the past is often different from what we predict of the lottery in the future. * Each lottery has a prize structure related to probability. * Certain subsets of people are recruited to play the lottery. * The lottery is random but there are ways to beat the system. * Some lotteries are easier to win then others. * The lottery is just a game, which a student could create. | **Essential Questions for the unit, questions should come form yearlong essential questions:**   * How does the lottery differ from state to state? * Where does the money from the lottery go? * Who owns the lottery? * How likely is it that someone will win? What will they win? * Can someone cheat the lottery? * Who plays the lottery, why? * What different design set-ups exist for the lottery? Could I create one? |
| General class texts, materials, and resources to support text complexity: | **leveled texts , materials and resources to support text complexity:**  **(matching topically and/or thematically to general texts and materials)**  **Level 1**  **Sample Surveys on the Lottery**  **Lottery Advertisements**  **Scientific Notation Review – Khan Academy**  **Level 2**  **State lottery Websites (NY, NJ, CT, PA, MD)**  **Game Websites (Power Ball, Mega Millions…)**  **Graphing Calculators**  **News Articles on Lottery Revenue, Comparing to Other Gambling**  **Weebly – Directed research Website**  **Level 3**  **Tax Structures- IRS Website**  **Articles on Winners, Future?; Ticket purchasing Times; Random vs Selected numbers**  **Random number generator – random.org/integers** |
| **Content:**   * Odds of winning – graph, table, paragraph * Prize structure- probability, pay off, Levels * Sample space * Single Event/Multi-event probability * Dependent/Independent Probability * Conditional/Compound Probability * Advertising Bias * Revenue Analysis * Analyzing results- Table, Graph, Pi Charts * Writing/Speaking Conclusions * Speech Writing * Symposium Participation * Percent Error * Scientific Notation * Calculator Skills | **Skills:**   * Read/interpret tables, bar graphs, and pi charts. * Calculate single event, compound event, independent, dependent and conditional probability. * Make a decision based on a calculated probability. * Distinguish theoretical and experimental probability. * Determine a sample space for a lottery game. * Identify key elements of a lottery game design. * Compare and contrast state lottery games, prize structures, revenues, and chance of winning. * Examine lottery advertisements for bias and motive. * Convert fractions/decimals/percents to describe probability and revenue. * Conduct and survey about the lottery. Analyze the results and write conclusions. * Justify calculations, decisions and conclusions verbally and in writing. * Develop and execute a speech for the state lottery symposium. * Actively listen, critique and expand on classmates state lottery presentations. * Determine the percent difference between theoretical and experimental probability. * Understand very small numbers on a calculator. Express with scientific notation |
| **Vocabulary/Key Terms (regents, academic vocabulary, domain specific terms and phrases):**   * Lottery, Gambling, Chance, Fair, Statistic, Probability, Sample Space, Theoretical/Experimental/Conditional/Independent/Dependent/Compound/Simple/Single Event/Multiple-Event Probability; want/desire; Prediction, Results, Compare, Order, Decide, Analyze, Determine, Conclude, Distinguish, Bias, Targeted Audience, Revenue, Percent, Decimal, Fraction, Funding, Private, Governmental, Successful, Win, Lose/Loss, Prize Structure, Multi-State, Generate, Self-Selected, Computer Generated, Cost, Estimated Gain, Percent Error, Pay Off | |
| **Strategies**   * **Graph Analysis- Checklist, Key Words;** * **Sentence Starters;** * **Word Webs/Word Sort** * **Word Banks;** * **Probability /Percent Error Formulas;** * **Translating Probability Values into Sentences;** * **Calculator Tricks- Scientific Notation, Fraction/Decimal/Percent, Probability;** * **Tree Diagrams/Lists;** * **Venn Diagram;** * **Cause/Effect Sheet;** * **Pass the Paper/Numbered Heads Together** * **3,2,1 Reflection** * **Two Truths and a Lie** * **Word Wall – Vocabulary Review/Representation** * **Learning Ambassadors/Gallery Walk** * **Speech Outline/Checklist;** * **Graphic Organizer for Symposium Notes** | |
| **Assessment evidence and activities**  Initial Assessment: Lottery Conversation – What do you know? How can you explain it? How can you represent it? | |
| |  |  | | --- | --- | | **Formative assessments, may include DYO depending on unit structure and goals:**  Internet/Survey Research Project (50 points)   * 2 State Lottery Games (NY & \_\_\_\_\_)- chances of winning, prize structure, cost of ticket * 3 Representations- Table, Graph, Ad- observation, Opinion/Analysis, Conclusions * Fun facts about Revenue, Winners, Lucky Numbers, Legality, Etc. * Lottery Survey – Collect Data, represent data, Analyze data, draw conclusion   Winning/Losing- Analyzing the Probability of Winning State Lotteries (multi-day assignments- 10 points each)   * Whole class work on NY Powerball – Sample space, multiple event probability, Conditional probability, Independent/dependent Probability, Theoretical * Calculator Skills – Scientific Notation * Theoretical vs Experimental probability- what will happen? vs What is really happening?,, Powerball website, Percent Error * Group Work- Probability of your state’s lottery, including sample space * Enrichment\* Create your own game   Prize Structure- What do you win and when? (25 points)   * Estimated Pay Off, * Compare/Contrast different States * Enrichment\* Create your own Prize structure   Revenue Analysis: Where does the money go? Who is contributing the money? (50 points)   * Looking at NY data as a class * Vocabulary discussion * Farness/Ethics * Reading Lottery related articles * Debate on if the lottery should exist * Personal position pape | **Skills assessed in each formative assessment – what are we assessing at different points in the unit?**     * Navigation a website * Reading Comprehension * Synthesizing information * Rephrasing * Writing an opinion * Drawing a conclusion * Identifying Key Information * Interpreting Graphs, Tables, Advertisements * Identifying Bias * Sample space, * Multiple event probability, * Conditional probability, * Independent/dependent Probability * Theoretical vs Experimental Probability * Analyzing unusual results * Translating values to sentences, * Calculator Skills * Scientific notation * Applying guided practice to group/Individual Work * Enrichment\* Modeling a game based on an old game, but adding your own elements      * Analyzing/Reading/Interpreting Tables * Substituting into an equation * Interpreting Equation Output verbally and in writing * Determining the Larger Value * Drawing Conclusions based on results * Analyzing data: graphs, tables, text * Building, connecting, applying vocabulary * Understanding and evaluating Fairness * Participating in a debate – summary paragraph * Enrichment\* Writing a position paper – including revision, technology skills | | |
| |  |  | | --- | --- | | **Final Performance Task and Benchmarks to Reach Final Task, including but not limited to DYO tasks:**  State Lottery Symposium (100 points)   * Gathering relevant findings for presentation * Choosing pieces of work * Speech Writing * Revision of speech and visuals * Creating a poster * Speech Execution * Audience Participation * Final Reflection | **rubric/how each benchmark and final task is graded:**   * Self-evaluation of work (10 points) * Organization/Presentation- speech, poster, writing (10 points) * Developing a thesis/main goal/message (5 points) * Writing a speech (20 points) * Revising a speech/Visuals (10 points) * Speaking /listening skills (20 points) * Note taking, Questioning skills (20 points) * Synthesis – forward thinking, application (5 points) | | |
| **Learning Plan & Activities (relative timeline):**  *Plan out days per unit looking at marking period endings and reasonable timeline for material and work backwards here. The learning plan is not intended to be a lesson plan but to help plan the progression of skills and matching skills, strategies, and standards throughout a complete unit.*  *Keep in mind: opportunities for student self-reflection, evidence and work collected and assessed, and areas that may be difficult for students and possible support strategies to assist students etc.*  *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*  **Day 1/Lesson 1**  Focus Questions: How do we determine our baseline knowledge of state lottery systems?  Skill focus: Creating a web, Connecting Ideas, Verbal/Written communication, Reading/Listening Comprehension, Analyzing visual/auditory images  Standard(s):  Possible Activities to reach goal: Group discussion (initial assessment) on the lottery, Video about the lottery, Examining images related to the lottery, Analysis questions,  Strategy used to teach skill(s): Word wall, Web, Sentence Starters, Annotated Video watching, Checklist for viewing/Looking, Speaking/Listening Protocols  Daily outcome/assessments: Lottery Vocabulary/Video/Image Activity Sheet  **Day 2-4/Lesson 2-4 - Expand out with research**  Focus Questions: How do we research about the state lotteries with the internet and through surveys?  Skill focus: Writing survey questions/answers, Representing surveys in tables, Analyzing survey Results Navigation a website, Reading Comprehension, Synthesizing information, Rephrasing, Writing an opinion, Drawing a conclusion, Identifying Key Information, Interpreting Graphs, Tables, Advertisements, Identifying Bias  Standard(s):  Possible Activities to reach goal: Survey Homework, Internet Scavenger Hunt, 3 representation, Guided Research  Strategy used to teach skill(s): Weebly,; Sample survey (website); Teacher modeling- graphic organizers, internet skills; T-chart for representations;  Daily outcome/assessments: Survey results/analysis, Scavenger hunt sheet, 3 representation T-table, Independent research notes/write up  **Day 5-7/Lesson 5-7**  Focus Questions: How do we analyze the probability of Powerball?  Skill focus: Sample space, Multiple event probability, Conditional probability, Independent/dependent Probability, Theoretical vs. Experimental Probability, Analyzing unusual results, Translating values to sentences, Calculator Skills, Scientific notation, Applying guided practice to group/Individual Work, Enrichment\* Modeling a game based on an old game, but adding your own elements  Standard(s):  Possible Activities to reach goal: Calculator skills (Scientific notation)/Probability Intro; NY Probability Analysis; Other state Analysis; Compare/Contrast State Lotteries  Strategy used to teach skill(s): Venn Diagram, Guided Demonstration; hand-on learning with calculators; Regent’s practice problems  Daily outcome/assessments: Probability Intro/Scientific Notation/Calculator Station 3,2,1 reflection; NY Probability Analysis/ Other state Probability Analysis;  **Day 8-9/Lesson 8-9**  Focus Questions: How do we analyze the money surrounding the lottery?  Skill focus: Analyzing data: graphs, tables, text; Building, connecting, applying vocabulary; Understanding and evaluating Fairness; Participating in a debate- summary paragraph; Enrichment\* Writing a position paper – including revision, technology skills  Standard(s):  Possible Activities to reach goal: NY Revenue/Funding analysis, Other state revenue/funding analysis; Debate; Position Paper  Strategy used to teach skill(s): Guided Practice; Scaffolded research; guided questions; group/individual work; debate protocol; position paper small group instruction/outline/revision opportunity  Daily outcome/assessments: NY & Other state Revenue/Funding analysis, Debate- speech, notes, final decision; Position Paper/Paragraph  **Day 10-13/Lesson 10-13**  Focus Questions: How do we prepare for and execute our State Lottery Comparison Symposium?  Skill focus: Self-evaluation of work; Organization/Presentation- speech, poster, writing,; Developing a thesis/main goal/message; Writing a speech; Revising a speech/Visuals; Speaking /listening skills; Note taking, Questioning skills; Synthesis – forward thinking, application  Standard(s):  Possible Activities to reach goal: Guided Instruction, Workshop time- organization, revision, poster creation, Speech writing; Speech/audience expectation/practice; Symposium with invited guests  Strategy used to teach skill(s): Rubric/Checklist, Revision protocols- individual/group, Graphic Organizer for Audience participation; Posted audience speech norms/expectations; Strict time limits on symposiums/Gallery Walk/Learning Ambassadors, Sentence starters  Daily outcome/assessments: Speech, Presentation Poster, Checklist/Rubric, Audience Graphic Organizer, Final Reflection | |
| **Teacher Focus Area/Reflective Planning**  ***use this area to incorporate specific areas of focus based on professional development including inquiry team that maps to a specific ccls. this might be based on teacher growth in addition to assessment of student needs in prior units.*** | |