**Subject area/course**: Mathematics/Statistics

**Grade level/band**: 10-12

**Task source**: Summit Public Schools; Author: Joanna Hefty

**Casino Night**

**TEACHER'S GUIDE**

1. **Task overview**:

Students investigate casino games and create their own game to pitch to Caesar's Palace Casino.

1. **Aligned standards:**
2. **Primary Common Core State Standards**

CCSS.Math.Practice.SMP1Make sense of problems and persevere in solving them.

CCSS.Math.Practice.SMP2Reason abstractly and quantitatively.

CCSS.Math.Practice.SMP3 Construct viable arguments and critique the reasoning of others.

CCSS.Math.Practice.SMP.5Use appropriate tools strategically.

CCSS.Math.Practice.SMP.6Attend to precision.

[CCSS.MATH.Content.HSS.ID.A.3](http://www.corestandards.org/Math/Content/HSS/ID/A/3/) Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

[CCSS.MATH.CONTENT.HSS.CP.A.1](http://www.corestandards.org/Math/Content/HSS/CP/A/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").

[CCSS.MATH.CONTENT.HSS.CP.A.3](http://www.corestandards.org/Math/Content/HSS/CP/A/3/) Understand the conditional probability of *A* given *B* as *P*(*A* 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*.

[CCSS.MATH.CONTENT.HSS.CP.B.6](http://www.corestandards.org/Math/Content/HSS/CP/B/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.

[CCSS.MATH.CONTENT.HSS.CP.B.8](http://www.corestandards.org/Math/Content/HSS/CP/B/8/) Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B|A) = P(B)P(A|B), and interpret the answer in terms of the model.

[CCSS.MATH.CONTENT.HSS.MD.A.2](http://www.corestandards.org/Math/Content/HSS/MD/A/2/) Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.

[CCSS.MATH.CONTENT.HSS.MD.A.3](http://www.corestandards.org/Math/Content/HSS/MD/A/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.

[CCSS.MATH.Content.HSS.MD.B.5.A](http://www.corestandards.org/Math/Content/HSS/MD/B/5/a/) Find the expected payoff for a game of chance.

1. **Critical abilities**

Communication in Many Forms**:** Use oral and written communication skills to learn, evaluate, and express ideas for a range of tasks, purposes, and audiences. Develop and strengthen writing as needed by planning, revising, editing, and rewriting while considering the audience.

Experimentation and Evaluation**:** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. Evaluate hypotheses, data, analysis, and conclusions, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

Interpersonal Interaction and Collaboration:Develop a range of interpersonal skills, including the ability to work with others, to participate effectively in a range of conversations and collaborations.

Modeling, Design, and Problem Solving**:** Use quantitative reasoning to solve problems arising in everyday life, society, and the workplace, e.g., to plan a school event or analyze a problem in the community, to solve a design problem or to examine relationships among quantities of interest. Plan solution pathways, monitoring and evaluating progress and changing course if necessary, and find relevant external resources, such as experimental and modeling tools, to solve problems. Interpret and evaluate results in the context of the situation and improve the model or design as needed.

1. **Time/schedule requirements:**

This task will take approximately 2 weeks.

1. **Materials/resources:**

Students will need access to the Internet for brief research. They will also need access to computers and video equipment to film their commercials. If these materials are not accessible, teachers may create alternative guidelines for the commercial component of the task; for example, students may present a live version of a commercial or give a “pitch.” You will also need card decks and dice for the Casino Lab activity (Item A).

Documents required:

* Item A. Casino Lab
* Item B. Casino Night Commercial

1. **Prior knowledge:**

None listed.

1. **Connection to curriculum:**

None listed.

1. **Teacher instructions:**

Steps:

1. Group Casino Task – Probability Analysis

See attached document *Casino Lab* (Item A).

1. Instruction Manual Rough Draft
2. Peer Review of Manual and Game
3. Video Commercial (see Item B) and Final Draft of Instruction Manual
4. **Student support:**

None listed.

1. **Extensions or variations:**

None listed.

1. **Scoring:**

Student work can be scored using the Summit Public Schools Casino Night rubric.