

Lesson Plan: Investigating Dragon Flight Speeds Using Normal Distribution

Objective: Students will apply the principles of normal distribution to analyze the flight speeds of dragons in the mythical land of Draconia. They will test hypotheses about these speeds and explore the implications of their findings on the realm's transportation and economy.

Grade Level: IB Diploma Programme Mathematics Applications and Interpretation SL (AI SL 4.9).

Duration: 60 minutes

Warm-up Activity (5 minutes)

- Inquiry Question: How can statistics help us understand phenomena in both real and mythical worlds?
- Activity: A quick brainstorm on the importance of statistical methods in interpreting data from diverse sources, setting the stage for today's activity.

Introduction to the Scenario (10 minutes)

- Presentation: Share the background of Draconia and the concerns about dragon flight speeds. Introduce the objective of using statistical analysis to investigate these reports.
- Objective: Explain that the class will act as Dracometrics Masters, using normal distribution to analyze the situation.

Hypothesis Setting (5 minutes)

- Group Discussion: Guide students to formulate the null and alternative hypotheses about the dragons' flight speeds.
- Interactive Engagement: Utilize questioning to ensure students understand the hypothesis-testing framework.

Data Collection Simulation (10 minutes)

- Simulation Activity: Students simulate the collection of dragon flight speeds, either through a provided dataset or a simple random number generation model mimicking normal distribution.
- Data Recording: Students note down their simulated speeds for analysis.

Statistical Analysis (15 minutes)

- Calculations: Using the normal distribution $N(200, 120^2)$, students calculate probabilities and z-scores for observed speeds, particularly those significantly lower than the mean.

- Software Utilization: Employ calculators or software to facilitate complex calculations, reinforcing the practical skills of statistical analysis.

Decision Making (10 minutes)

- Critical Thinking: Based on their analysis, students discuss in groups whether the evidence supports the hypothesis that dragons are flying slower than usual.
- Consideration: Emphasize the importance of considering natural variability in their decision-making process.

Group Presentations and Reflection (5 minutes)

- Presentation: Groups share their findings, including their decision on the hypothesis and the reasoning behind it.
- Reflection: Discuss the potential real-world implications if dragons are flying slower and how this analysis mirrors challenges in real-life statistical studies.

Extension and Homework (Optional)

- Investigation Questions: Assign questions that encourage deeper exploration into factors affecting dragon flight speeds, the impact of standard deviation on the distribution curve, and the broader implications of the study.
- Practical Applications: Students can explore additional problems from the provided PDF on normal distribution to solidify their understanding.

Materials Needed:

- Computers or calculators with statistical functions
- Access to a dataset or random number generator
- Whiteboard and markers for group presentations

Assessment:

- Formative Assessment: Participation in discussions and simulation activities.
- Summative Assessment: Accuracy and thoroughness of the statistical analysis and the rationale presented in group conclusions.