Curriculum Sample Template

Max. 8 Pages

Grade Level	7th	**Content Area**	Math
Course Title (grades 9-12 Only)			
Expected Prior Knowledge *The knowledge/skills mastered earlier in the year foundational to the mastery of the required Standard in the current sample.*	Familiarity with population and the idea behind a sample set. How to find the arithmetic mean. How to conduct surveys and read data within charts.		
Alignment to Program of Instruction *Briefly outline methods of instruction found in this sequence of lessons that align to the Program of Instruction described in A.3.*	Using sampling to make inferences about a population while understanding mean and variance are tied directly to the 7th grade Core Knowledge sequence. In addition, statistics and probability are cornerstones of STEM teaching and instruction will be blended with the aid of online videos. Kagan cooperative group strategies (i.e. individual whiteboards, centers, gallery walks) are used and each lesson includes Marzano high yield strategies (i.e. objective driven vocabulary)		
Standard Number and Description *List the Number* and the full description for the Required Standard or Science Performance Objective listed in section A.6.*	7.SP.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sample survey data. Gauge how far off the estimate or prediction might be.*		
Materials/Resources Needed	Mimeo board Students will need access to the internet for blended learning lessons. Whiteboards.		

* ***Standard Number****: For English Language Arts (Reading and Writing), use Grade, Strand, Standard (e.g., 3.RI.2). For K-8 Math, use Grade, Domain, Standard (e.g., 6.EE.7). For HS Math, use Conceptual Category-Domain, Standard (e.g., A-REI.6). For Science, use Grade, Strand, Concept, PO (e.g., 4.1.3.1).*

Lesson (add as needed)	**Instructional Strategies**	**Student Activities**

1	**Objective**: Students will ("SW") Understand that random sampling is a practical method for measuring characteristics of a population **Key Points:** • Define the population of concern • Specifying a sampling frame. • Specifying a sampling method (i.e. Systematic, Snowball, Random) • Determining the sample size **Activation of Prior Knowledge**: Teacher will ("TW") call upon three students to estimate how many people live in the United States **Introduction to New Material ("INM")/Modeling**: TW introduce key points and provide sampling questions on the Mimeo board. Teacher will use a "think out loud" exercise to introduce the merits and advantages of sampling **Guided Practice:** SW participate in a centers exercise. TW set up each center with a different example of a large population. SW work in homogenous groups, changing from center to center, creating samples that fit the population. TW ask multiple checks for understanding ("CFUs"; call on non-volunteer to restate instructions, ask students to define key points in their own definitions, ask student to reteach their neighbor) to ensure sufficient progress. **Independent Practice**: TW provide students with multiple choice questions about random sampling. **Assessment**: TW put an exit ticket question on the Mimeo board. SW turn in the exit ticket on the way out of class.	SW open their interactive notebooks to a new page and write the objectives and key points on top. SW highlight new vocabulary, write the definitions from their math glossary, and rewrite the definitions in their own words. SW quietly estimate how many people live in the United States. SW open their interactive notebooks and write down teacher examples and any questions left unanswered. SW work quietly in homogenous groups. SW quietly change from center to center, creating samples that fit the population, and ask clarifying questions when necessary. SW complete the independent practice section about random sampling and ask clarifying questions when necessary SW complete the assessment exit ticket
2	**Objective**: SW Draw inferences about a population based on sample data **Key Points:** • Mean average is the arithmetic mean • Median is the middle number in a sample • Range is the difference between the largest and smallest values **Activation of Prior Knowledge**: TW ask students to read aloud the key points from the last lesson about sampling. **INM/Modeling**: TW introduce the key points. TW choose two students from the class, have them stand up on the board. TW think out loud while making inferences about the students.	SW open their interactive notebooks to a new page and write the objective and key points. SW look up any unknown vocabulary in their math glossary, write the definitions, and rewrite the definitions in their own words. SW actively listen while their classmates read the key points form last time. SW actively listen while the teacher engages in the think aloud activity.

	Guided Practice: TW pass out whiteboards for the whiteboard activity. TW present multiple charts on the Mimeo board and each student will write an inference on their whiteboard. TW take the time to scan each student's whiteboard and make corrections and clarifications when necessary. TW ask multiple CFU's (call on non-volunteer to restate instructions, ask students to define key points in their own definitions, ask student to reteach their neighbor) to students to engage and clarify key points. **Independent Practice**: TW present each students with a chart (plot diagram, histogram, etc) SW make one inference they believe to be correct and one inference they believe to be incorrect. SW justify their answers with short paragraph answers. **Assessment**: TW provide students with 5 short excerpts about a population with corresponding graphs. SW answer multiple choice questions and justify their answers by writing why they chose each answer in the margin of the paper.	SW engage in the whiteboard activity, answer all teacher questions, and make inferences about the presented population. SW participate in the independent practice activity and justify answers while referencing the key points. SW complete the assessment activity and justify the answers using key points.
3	**Objective:** Analyze variation in a population from multiple samples of data. **Key Points** • Variance is a measure of how far a set of numbers is spread out **Activation of Prior Knowledge:** TW use a think out loud activity to review making an inference about a population. TW also think out loud about an incorrect inference and note how two conclusions can often be far apart even if supported by data. **Blended Learning**: https://www.khanacademy.org/math/probability/descriptive-statistics/variance_std_deviation/v/sample-variance **INM/Modeling:** TW introduce the key points and show examples of data sets on the Mimeo board. TW explain situations with wide variance and situations with limited variance. **Guided Practice:** TW set up a "gallery walk" around the classroom. SW walk around each gallery location, filling in their data sheets, and analyzing the variance in each sample. TW follow students around, present multiple CFU's (call on non-volunteer to restate instructions, ask students to define key points in their own definitions, ask student to reteach their neighbor), and monitor behavior. **Independent Practice**: TW pass out short answer questions about	SW write the objectives in their interactive notebook. SW write key points and find the definitions of unknown words in their math glossary. SW rewrite the unknown vocabulary in their unknown words. SW pay close attention during the activation of prior knowledge. SW ask clarifying questions and participate when called upon. SW watch the Khan Academy video and write all examples. SW prepare clarifying questions to be addressed during class. SW follow along with all examples write examples in their interactive notebooks. SW participate in the gallery walk activity, carefully analyzing the variance within the data and answering all checks for understanding. SW complete the independent practice activity.

	variance. SW analyze the data and answer each question. **Assessment:** SW collect their own data from an experiment to be completed during class time. Once all data is collected, SW create charts and analyze the variance within their data. SW write a one paragraph critiquing the result. (5 points, must score at least 4 for mastery)	SW conduct their own experiment within class and collect data. SW critique their work and take note of the variance within their sample.
4	TW instruct students to complete the summative assessment.	SW complete the summative assessment.

Summative Assessment Items: *Attach here.* For each summative assessment item, include an answer key or scoring rubric describing how points are to be awarded.

***Two points each. Round all decimals to the nearest hundredth.**

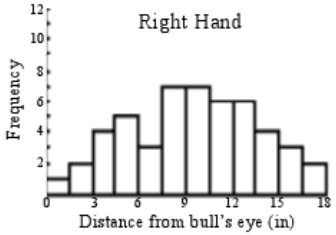
1. Which sampling method leaves the most room for sampling error; systematic, simple random, or snowball? Why?
2. What is the process of multistage cluster sampling?
3. Describe one scenario of systematic sampling.

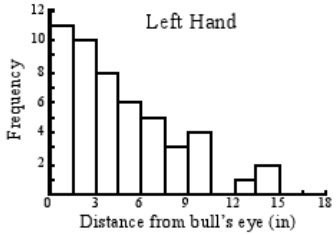
4. Two students are trying out for the basketball team, Roger and Michael. Only one spot on the team is open and the coach must decide which player is more likely to help the team win games. The coach runs a one minute shooting test 3 times to see which students scores the most baskets. Below are the results of the shooting tests. Based on the data below, which player is most likely to score more points during a game? Why and how did you come up with your answer?

Player Name	Test 1 Baskets Made	Test 2 Baskets Made	Test 3 Baskets Made
Roger	15	17	14
Michael	21	9	8

5. Using the above data, would it be more appropriate for the coach to select the more talented player based on mean score or median score?

6. Pierre has never thrown darts before. He wanted to keep track of how often he hit the bull's eye so that he can best be prepared to compete against his friends. If darts are usually thrown from approximately 8 feet away, which hand should he use?





Hugo wanted to know how many cars drive by his house each night. He cannot stay up all night counting cars because he has school in the morning so he decides to test a sample. Over the course of 1 week, Huge measure how many cars drive by his house between 7pm and 8pm. Use the data table below to answer question 1-3.

Day of the week	# of cars that drove past
Mon	7
Tues	9
Wed	7
Thurs	10
Fri	23
Sat	21
Sun	2

7. If Hugo had only observed cars driving past his house from Monday to Thursday, what would be a reasonable guess for the number of cars that would drive by on Friday?
8. Describe one scenario that can explain the large variance between Thursday and Friday.
9. Explain the variance between Sunday and Monday in a hypothetical scenario.

Answer Key

1. Snowball. In snowball method, once you have contacted a sample, you ask for suggestions of participants who are similar opening the door to bias and sample error because you are trusting unverified sources.

2. First draw sample of areas. Initially large areas selected then progressively smaller areas within larger area are sampled. Eventually end up with sample of households and use method of selecting individuals from these selected households.

3. Open the phonebook, pick one name, and choose every 11th name following your initial choice. The system is every 11 is your sample.

4. Roger averaged a higher score. 13.67/12.67 respectively.

5. Mean score, even though the median score is also favored to Roger.

6. According to the histogram, Pierre should use his right hand.

7. Approximately 8 cars would be a reasonable guess if the average from Monday – Thursday was 8.25.

8. Perhaps Hugo lives near a large concert venue that had a show on Friday. Or based on the Saturday data, perhaps Hugo lives near a popular restaurant or movie theater that had increased traffic due to the weekend.

9. Perhaps Hugo also lives near a neighborhood and most people are quietly in their homes at 8pm on a Sunday.

Total: _____/18; Grading Scale: 0-13=Incomplete; 14=C; 15-16=B; 17-18=A. 80%=Mastery.