

**Math 9: Statistics and Probability
Backward Lesson Plan**

Name: Kelsey Wilkinson, Emma Plummer, Allison McQueen

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Pathway: Math 9 **Strand:** Statistics and Probability

Stage 1 – Identify Desired Results

Established Goal(s)

General Outcome: Establish number sense, spatial sense, logical thinking and mathematics as a human endeavour.

Specific Outcome:

SP9.1 Demonstrate understanding of the effect of:

- bias
- use of language
- ethics
- cost
- time and timing
- privacy
- cultural sensitivity, population or sample on data collection. **[C, PS, R, T]**

Achievement Indicators:

a. Analyze given case studies of data collection, including data pertaining to First Nations and Métis peoples, and identify potential problems related to bias, use of language, ethics, cost, time and timing, privacy, or cultural sensitivity. **[IA]**

Prior Knowledge:

- Statistics and probability strand 1-9.
- Students will know the different modes of displaying data and can interpret them.
- Students know how to make different graphs to represent data (such as bar charts, dot plots, pie charts).
- Students have an understanding of mean, median, mode and central tendency.
- Students will have an understanding of how to calculate average.

Adaptive Dimensions:

- Depending on level of prerequisite knowledge, instructions may need to be adjusted.
- Adapt as necessary to various physical and intellectual disabilities.
- If certain students need extra time, allow them extra time without consequence.
- Encourage working in groups to promote open and shared learning (based on their table).
- If students are having difficulties, do not be afraid to sit down with them and work through their difficulties.

<p>Materials:</p> <ul style="list-style-type: none"> • Sampling Rectangles Adapted Activity • Random Rectangles Sheet • Right, Wrong and Questions Chart (with space for two responses to each question) • Videos cued on SMARTBoard • Random Number Generator cued on SMARTBoard. • Have a few random and subjective samples completed beforehand to supplement student data (if the number of students is small) 	<p>Essential Question(s):</p> <ul style="list-style-type: none"> • [EQ1] What affects the accuracy of data? <i>Expected Responses: personal bias, size of sample, randomness of sample,</i> • [EQ2] How can we ensure that a sample is truly random? <i>Expected Responses: it has no overlapping qualities, selected in an impartial manner, etc.</i> • [EQ3] Does sample size reduce the bias we see in data? <i>Expected Responses: if the data is chosen subjectively it is hard to see what an increased sample size will do, larger sample sizes give you more opinions and worldviews,</i> • [EQ4] Does the sample affect how society perceives data? <i>Expected Responses: Yes it can because for example a sample of 450 may sound like a lot of people when in reality, there could be a population of 100,000 (there will be many different answers based on world view).</i>
<p>Knowledge <i>Students will know...</i></p> <ul style="list-style-type: none"> • What a random sample consists of. [EQ1, EQ3] • How the type of sample, size of sample and bias affect how society views the statistical data. [EQ4] • Different ways to graphically represent statistical data. 	<p>Skills <i>Students will be able to...</i></p> <ul style="list-style-type: none"> • Collect random and subjective data. • Identify random and subjective samples. • Make conjectures regarding bias within statistics. • Discuss the effects of sample size of data.

Stage 2—Determine Acceptable Evidence	
<p>Performance Task(s)</p> <ul style="list-style-type: none"> • [PT1] Observations of participation in Sampling rectangles activity. • [PT2] Using visual assessment and visual clues to ensure that students are on task and are understanding during discussions and sampling rectangles activity. 	<p>Other Evidence</p> <ul style="list-style-type: none"> • [OE1] “Observations and Questions I Still Have” chart from the pair shares (completed in set and closure-similar to a KWL chart). This will allow the teacher to see students understanding and discoveries and to help them plan for their next lesson. • [OE2] Homework Slip
Stage 3—Learning Plan	
<p>Before:</p> <ul style="list-style-type: none"> • Show students one case study of statistics to peak students interests about different forms of data collection and how they depict different images of the situation. • Hand out “observation” chart before showing the three examples of statistics. • Have students fill out the chart by themselves, and then pair share their observations and questions to get their discussion skills going and to place emphasis on discussion. <p>During:</p> <ul style="list-style-type: none"> • Students will work on the sampling activity individually or in table groups and go through the questions handed out. Students must know that each of them have to have data. • The teacher will rotate around the students/pair groups. • When students get to the average question in their worksheets, help them recall how to find the average. • Refer to teacher notes for questions to ask during instruction and expected responses. <p>After:</p> <ul style="list-style-type: none"> • Students will revisit the one example of statistics given in the before. • Make sure the class has enough time to revisit observation chart. In the pairs they will look at their previous inferences made and put what they know/think based on the sample activity they just did. • After discussing it in their pairs, there will be a class discussion [EQ1-4] Students will hand in their observations and questions chart. • Refer to Teacher Notes for questions to discuss after the activity and expected responses. Writing and presenting more open questions, so teachers do not feel tempted to ask leading or closed questions to fill quiet space. • Make sure students hand in observation chart. 	

- Homework Slip (to get students thinking about statistics outside of math class): Bring one example of statistics you see in everyday media to class tomorrow.

Random Rectangles—Activity Sheet
Taken from NCTM Data and Probability Navigation

1. Look at the rectangles on the activity sheet. Each small square represents an area of one. Select five (5) rectangles that you think would give a good representation (that is, a representative or typical group) of all the rectangles on the sheet.
 - a. Record the numbers of the rectangles that you chose and give their corresponding areas.
 - b. Compute and record the mean area for the five (5) rectangles that you selected.

Number of Rectangle: Area:

1. _____

2. _____

3. _____

4. _____

5. _____

Mean area: _____

2. Generate five (5) random numbers between 1 and 100 by using a random number generator. If a number repeats, discard it, and generate another one to replace it.
 - a. Use these random numbers to locate the five rectangles that have the corresponding numbers on the sheet, and record their areas.
 - b. Compute and record the mean areas of the five rectangles.

Number of Rectangle: Area:

1. _____

2. _____

3. _____

4. _____

5. _____

Mean area: _____

3. Report to the class the mean for the areas of the rectangles that you chose and that were chosen randomly. Compile the class results together on the Smart Board to create representation of the mean areas of the chosen rectangles and a representation of the mean areas of the random rectangles. Compare the two representations. What do you observe?

4. Repeat the process of question 2 to find five (5) more random rectangles. Compute the mean of the 10 randomly selected rectangles.

Number of Rectangle: Area:

1.	_____	_____
2.	_____	_____
3.	_____	_____
4.	_____	_____
5.	_____	_____
6.	_____	_____
7.	_____	_____
8.	_____	_____
9.	_____	_____
10.	_____	_____

Mean area: _____

5. How does this compare to the previously determined mean of five random rectangles?

5. Collect everyone's results and create a new representation. What do you observe?