1. Analyzing Student Learning
   a. Identify the specific standards/objectives from the lesson plans measured by the assessment chosen for analysis.

   [ Standards: ]

   7.SP.5. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.

   7.SP.6. Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.

   7.SP.8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

   7.SP.8.a Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.

   7.SP.8.b Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event.

   7.SP.8.c Design and use a simulation to generate frequencies for compound events. For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?

   Objectives:
   o Students will define simple and compound events.
   o Students will construct a tree diagram to represent all outcomes of a compound event.
   o Students will create a sample space to list all possible outcomes based upon a tree diagram.
   o Students will formulate events with a probability of 0, ½, and 1 based upon a given situation.
   o Students will compare and contrast theoretical and experimental probability.
   o Students will design a simulation for a given situation.

   b. Provide the evaluation criteria you are using to analyze the student learning.
[ Prior to the end of the period students’ were expected to complete at least three stations completely and fully. For each station they could potentially earn up to five points, adding up to a maximum of fifteen points. If they completed more than three stations they could earn up to two additional points depending on the number of additional questions they answered and how much of it was completed correctly. Therefore the highest score they could potentially score on this assessment was a seventeen out of fifteen.

For each question answered I was looking for entirely correct answers. The questions they were being asked generally only had one correct answer, otherwise their answer had to be correct provided they developed a situation that would be a viable solution. If students were missing a portion of a problem or answered it incorrectly they lost points accordingly. ]

c. Provide a graphic (table or chart) or narrative summary of student learning for your whole class. Be sure to summarize student learning for all evaluation criteria described above.

[ Since students were only required to answer a minimum of three of the six stations the following statistics on their learning is solely based upon the students who actually completed the station being mentioned.

The majority of students who answered station one correctly answered the question, where they were asked to define simple and compound events. There were three students who answered this question that mis-read the word they were defining as they provided the definition for sample space not simple event. A couple of students had difficulty giving an example of a simple event as they linked it to flipping a coin, which would be valid, however they went on to say that such an event would be flipping heads, tails, heads, and heads on four tosses. This would be incorrect as a correct answer would be simply flipping a coin once and having it land on heads. The students had no difficulties providing an example of a compound event as many of them used examples from the ice cream tree diagram discussed a few days earlier in class.

Station two proved to be a little challenging for four of the students who completed this particular station. They found it challenging as it asked them to draw a tree diagram for two coins and a spinner. The station provided visuals and this may have been the point of confusion as it showed a coin with heads showing and a coin with tails. From what I gathered it appeared that students either felt the coins were only one sided or they didn’t realize they needed a new column to show the second coin. The remaining students who completed this station did a nice job writing a valid key and clearly showing all of their branches on their tree diagram.

Station number three was one of the few stations that all students, except one, who attempted it, got it correct. This station asked students to make a sample space from the tree diagram shown. They then had to find the probability of a simple event occurring. The one student who received points off on this question wrote out the sample space correctly however did not understand the meaning of “P(Curtain C).” She showed all pertinent work needed to find the probability but then wrote that it equaled something having nothing to do with the question.

Station four asked students to determine events that would have a probability of zero, one-half, and one based upon a given bag of marbles. About half of the students who attempted this question answered it incorrectly. The majority of these incorrect answers were incorrect either because they just rewrote the probability of that chance, for example they wrote P(0), or they wrote events that would not have resulted in the given probabilities.

Very few students answered station five. Only one student attempted to use a drawing to demonstrate the difference between theoretical and experimental probability while the other students used narration. The answers provided were vague and rarely included an example of each type of probability. The information that was provided was accurate according to the definitions of theoretical and experimental probabilities.

About one-third of the class completed station number six. This station when completed included very few details. The majority of the answers provided only included the type of tool
students would use as their simulation. Only two students actually explained how to use the tool they chose to determine the probability of the event occurring.]

d. Use evidence found in the 3 student work samples and the whole class summary to analyze the patterns of learning for the whole class and differences for groups or individual learners relative to

- conceptual understanding
- procedural fluency
- reasoning/problem solving skills

Consider what students understand and do well, and where they continue to struggle (e.g., preconceptions, common errors, common struggles, confusions, and/or need for greater challenge).

[The three student work samples that I chose focus on three students with different levels of ability in math. Student #1 is a high achieving student with an average in the nineties, Student #2 is an average math student with an overall average in the high seventies/low eighties who has a learning disability in math, and Student #3 is a lower achieving math student with a speech language impairment and an average in the high sixties.

All three students completed station #3, as did the majority of the class. They all proved to show their conceptual understanding and procedural fluency in creating a sample space as they showed all twelve options possible for the door and curtain combinations. The majority of the class also answered the question about the probability of getting curtain C correctly as well. One of the students who answered this incorrectly was Student #3. This student said that the probability was “carnival.” I am not sure where she found this probability. This is one question that I could have included a greater challenge in for my students as this seemed to be written at a low level for them. In the future I could always not give them the tree diagram to create the sample space for and instead tell them there are three doors and four curtains and have them write the sample space from there and answer the probability question. This would then make them create a tree diagram themselves or visualize it in their minds before answering the question.

As far as station #1 is concerned a common error that I noticed throughout the class as a whole, which can be seen in Student #3’s assessment, is in regards to the definition of simple event. Many students wrote down the definition for sample space for this question in place of simple event. This seems to be either a misunderstanding of the vocabulary words or I know many of them actually looked back in their notes for assistance on this one, and therefore they must have seen a vocabulary word that started with “s” and thought this must be it.

The majority of the class seemed to struggle with creating a tree diagram. During class I only ever had them creating tree diagrams that contained two or more entirely different items (for example: ice cream, toppings, and sprinkles, or bread, meat, and cheese). In station #2 I gave them two coins and a spinner and many students struggled with creating this tree diagram. During the period I was talking with Student #1 and she along with others had the misconception that the two coins would be the same. Due to her misconception, I had to question her about the relationship between the two coins and have her compare it in her mind to our ice cream example so that she would be able to problem solve and realize the two coins have no dependency on one another as her original tree diagram had shown. Once her and the others realized this they were able to successfully use their knowledge of tree diagrams to complete it correctly. Student #2 successfully created the tree diagram; however hers is a little hard to read as her branches are very close together. Whereas, Student #3, my struggling student, had some difficulty in creating the tree diagram as he only accounted for one coin in
his, not two. He seemed to have the same misconception that my high achieving students had, however I happened to be there to correct their misconceptions whereas I was not there when he made his. All students who completed this station had a strong understanding of the importance of a key as they all included an accurate key for their tree diagram. Creating this tree diagram was designed to assess the student’s procedural fluency of creating a tree diagram as there is only one way to create one.

Station #4 seemed to be very challenging for students. I sort of expected this though because it was not something I directly covered in class, however a similar exercise was included in a warm-up one morning. Very few students answered this question correctly; Student #1 was one of them. The remaining students struggled with the idea of creating events with the given probabilities. This exercise, for those who successfully solved it, showed true problem solving skills as they had to customize events given a bag of marbles that would result in the given probabilities. This question did not have only one correct answer as there are multiple combinations that could have resulted in any one of those probabilities. Additionally to reach this answer, students had to work backwards from what they are used to.

Station #5 asked students to explain the difference between theoretical and experimental probability. This assesses student’s conceptual understanding of the two terms as they need to have a strong understanding of what each of them is in order to differentiate between the two. The few students who answered this station basically gave the definition of each without using anything else to explain their differences. Due to this response I feel that I should have challenged them more on this station by asking them to give an example of each in order to differentiate between the two. This way they would be required to provide examples and show their conceptual understanding and problem solving skills instead of showing they conceptually understand the definition because that was all that was shown in their responses to this station.

Station #6 seemed to be challenging for students, as few of them actually answered the question. Out of my three focus students only Student #1 answered this question, the others did not even attempt it. From listening to the groups who did successfully complete this question they understood that their model, or simulation, required something that can be broken into four equal chances. The primary answers I received on this question included four cards in a deck of cards or four coins. Although students gave me their tool very few, including Student #1 included an explanation of how they would perform this simulation in order to determine the probability. However by them choosing an appropriate tool they show me that they understand the concepts behind such a model and are able to apply their knowledge through problem solving to create a simulation which does in this case have a probability of one out of four.

2. Feedback to Guide Further Learning

Refer to specific evidence of submitted feedback to support your explanations.

a. In what form did you submit your evidence of feedback for the 3 focus students? (Delete choices that do not apply.)
   - Written directly on work samples
   - Explain how feedback provided to the three focus students addresses their individual strengths and needs relative to the standards/objectives measured.

[I provided very little feedback to Student #1 as she is one of my high achieving students and all of the questions she answered were correct. Additionally, she went above and beyond the requirements required of her prior the end of class as she answered five of the six stations. The little bit of feedback I did provide to her was on station #5 where she said “experimental is when you experiment to get the probability. Theoretical is when you estimate the outcomes of probability.” In her response I circled the word “estimate” and asked her how do we estimate? This was intended to make her go a little further in her explanation as I know she is capable of...]

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explaining this concept further than she has shown. I also wrote a comment saying “good” on station #6 where she says to use four coins for her simulation. My feedback to her in this case showed her that I knew she had met the objective and standard which says she is able to design a simulation. For her correct answers I placed check marks in the station boxes showing I saw her understanding of the concepts covered including: tree diagrams, compound events, sample spaces, probabilities of zero, one-half, and one, experimental vs. theoretical and simulations.

Student #2 required very little feedback as well, partially because I allowed her along with a few other students the opportunity to continue working on the stations during resource room with the special education teacher a few periods later that day. One comment I did make on her paper basically finished her thought. When she was defining experimental probability on station #5 she said “actual” so I finished it saying “happens when experimenting.” I finished her thought on this because she was right, it is what actually happens but I wanted her to realize that it is what actually happens when you perform the situation. I felt that this comment would allow her to think about that and see that it generates more of an understanding of the concept than just “actual.” I placed check marks on station #2 and #3 on her paper as she showed she met the standards and objectives associated with tree diagrams and sample spaces.

Student #3 was also given additional time in resource room to work on his assessment with the special education teacher. He was one student who defined sample space in station #1 instead of simple event, therefore I wrote a comment explaining what he had defined so he could learn that there is a difference between the two. For his simple event example, he included too many outcomes so I crossed out his and reduced his outcomes to just heads to explain to him that this represents just one outcome. He demonstrated a strong understanding of compound event’s definition and an example so I placed a check mark next to these responses showing him he was accurate. In station #2 he forgot to include a second column for the second coin, so because he had a large gap in between the two columns he did have I included the second column required for him. I then wrote a little note at the bottom explaining to him he needs to have a new column for each situation and then he is to branch off of that. I did this detailed type of feedback because he is one of my struggling students and I felt that by including the visual of what it is supposed to look like it might help him with a similar problem in the future. This is the student who had written “carnival” for the second question on station #3. From his answer I knew he had no idea what “P(Curtain C)” represents so I wrote the question out for him asking “how many times do we pick curtain c?” I hope that by asking him this question he realizes what the notation P(an event) means so that he can successfully answer the question the next time he is assessed on the concept. I also circled the combinations in the sample space that he wrote out to show him how to find the answer to this question. The final station Student #3 answered was station #4 and he basically rewrote the probabilities. After marking these wrong I wrote him another question asking what events would get you these probabilities as he showed no understanding of the standard being assessed in this question.

c. How will you support students to apply the feedback to guide improvement, either within the learning segment or at a later time?

[My students are allowed to re-do any graded assignment for a higher grade. Therefore one way my students can apply my feedback is by reading it and then using it to guide their correction on their own or they are more than welcome to stay after school, come in before school or come for extra help during their lunch or study hall to receive further assistance with the material. At this time I would be more than willing to sit down with them and help them correct their misconceptions. After they reach an understanding of the material by developing a correct response they will be required to write a few sentences describing where they went wrong and how it needed to be corrected. This way they show me they understand the concept not only because they now have the correct answer but they also demonstrate their understanding by...]}
explaining why that is the correct answer. This explanation will demonstrate a deeper understanding than simply correctly answering the question.

Additionally, at a later time I would include some of these smaller concepts in a homework assignment or quiz to give the students additional practice of these concepts prior to the summative assessment. This will give them further opportunities to increase their conceptual understanding and show me whether or not they have met the objectives and standards so I know whether or not the material needs to be retaught or just reinforced more within the unit’s future lessons.

As far as the vocabulary is concerned I will continue to include using such definitions throughout all lessons giving them ample opportunities to use and provide examples of the vocabulary definitions learned. Prior to this assessment taking place, the students learned a lot of new material and vocabulary in three days. I did not expect them to fully understand everything at once and expect that it will take them some time and practice before they have full understandings of all the concepts covered.

3. Evidence of Language Understanding and Use

You may provide evidence of language use with your video clip(s) from Task 2 AND/OR through the student work samples analyzed in Task 3.

Refer to examples from the clip(s) (with time stamps) and/or student work samples as evidence.

- Explain the extent to which your students were able to use language (targeted function, vocabulary, and additional identified demands) to develop content understandings.

[ My chosen language function was to predict. Students can be seen using the language function in the video clip 1 from time 00:00 to 1:10, which shows the beginning minutes of lesson two on compound events. In the video clip students are asked to predict the number of ways they can order their ice cream sundae given three flavors of ice cream, two toppings, and two colors of sprinkles. Unknowingly, students were predicting how many branches would essentially be in their tree diagram and how many listings would be listed in their sample space prior to doing any work. This prediction was an educated guess on their part. Each of the students who offered up a prediction were asked to provide a valid reasoning behind their prediction, as it was not to be a random number they pulled out of their head.

Throughout the entire learning segment students were exposed to vocabulary terms which were new to them, as the entire idea of probability was a new concept for them to be learning. Within the unit of probability there are numerous vocabulary terms that students need to become familiar with. In particular, students needed to learn what a simple and compound event are, what proper notation is for each of these, what a sample space or tree diagram is, what the difference is between theoretical and experimental probability is and most importantly what probability means. These vocabulary words are used again and again throughout every lesson in this learning segment. I made it a point to always stress the vocabulary words to students time and time again as they came up in class. Each day students would receive a note packet and there would be an area for vocabulary. It would be in this section that we would define the new vocabulary words used and learned as well as provide a valid example for students to look back on in order to help them remember the definition. In their assessment on day four of the learning segment students were asked to define a couple primary vocabulary words that had been learned the previous days as well as provide examples. This exercise was intended to make them look back in their notes for assistance if they could not remember what the word meant exactly. Additionally, all of their assessments were designed in such ways that they would need to know the vocabulary in order to answer all questions correctly.
By giving my students ample opportunities to learn the vocabulary and use the language function of predict, I am expanding their opportunities to develop conceptual understanding of the material presented. I never forcefully include the vocabulary in the lessons, it just seems to fit allowing students to develop their understanding of it over time.

4. Using Assessment to Inform Instruction

a. Based on your analysis of student learning presented in prompts 1c–d, describe next steps for instruction

- for the whole class
- for the 3 focus students and other individuals/groups with specific needs

Consider the variety of learners in your class who may require different strategies/support (e.g., students with IEPs, English language learners, struggling readers, underperforming students or those with gaps in academic knowledge, and/or gifted students needing greater support or challenge).

Since many of the students got at least one thing wrong in their assessment and everyone has a place where they can improve. I will devote half of the next class period to reviewing the problems presented. I will divide the class into groups based on what was answered correctly and incorrectly, essentially creating groups that complement each other. Students will then be given about twenty minutes to compare answers and share how they arrived at correct answers. I will encourage students to use this time to help each other make corrections. While they are doing this I will walk around the room helping students who need the extra one on one time. I feel this will be a good opportunity for students of all ability levels because the higher achieving students will be able to assist the students who are having difficulty which will increase their conceptual understanding of the material as they are now being asked to explain their understanding of it to their peers. After the twenty minutes is up I will bring the class back together and allow them to ask me any questions they would like us to cover as a class. For each question asked, I will ask other students to offer up how they answered the question so it is not me just telling them what they should have done. I will be sure that during this time we cover the tree diagram station as many students had misconceptions with this station.

Once all questions are answered I will give out an exit slip for students to complete. There will be three versions of the exit slip: one for the high achieving students, one for average students, and one for low achieving students. The students will not know that the exit slips are different and that they are aimed for their ability level. However this will show me where all of my students stand after this exercise as all exit slips will be similar to the station on tree diagrams, the only difference will be in their challenge level.

b. Explain how these next steps follow from your analysis of student learning. Support your explanation with principles from research and/or theory.

During my analysis of student learning I realized that my students had misconceptions at several different places in the stations. Therefore I will be using peer collaboration for them to work through the problems they face. This is a beneficial tactic for students to use as they sometimes can learn better from their peers than from the teacher. Since I had already covered all of this material with the students I decided it would be beneficial for everyone if the students had the chance to be the teacher for their peers. This allows students who already understand the concept to deepen their understanding while explaining it to someone who struggles with the concept.
Then I decided to re-evaluate my students on a station that the majority of the class answered but answered incorrectly making minor errors due to misconceptions. It is my hope that they used the time I gave them wisely to work through how to solve this problem. Although I did make it a point to go over it after their collaboration to clear up any misunderstandings they still have. I re-evaluated them on this standard using differentiation based upon the ability they showed during the first assessment. For example, students who showed a strong understanding will be given an exit slip with multiple columns and a compound event probability to find; whereas students who struggled with the first or did not answer it at all will be given a tree diagram to draw that only includes two columns and a simple event probability question. The average students will receive an exit slip that combines both the high achieving and low achieving student’s exit slips. My idea behind differentiating this assessment is that I will be able to challenge my high achieving students while trying to make my low achieving students feel successful. The standard only states that students need to find compound probabilities using organized lists, they never mentioned how big the list needs to be. ]