1. Teaching objective(s):

   • Mississippi Framework - Data Analysis & Probability

     5. Organize and interpret data. Analyze data to make predictions.
        d. Determine probabilities through experimentation, simulation, or calculation. (Note: Make and test conjectures and predictions by calculating the probability of an event.) (DOK 2)

   • Common Core

     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 ½ indicates an event that is neither unlikely nor likely.

     • The students will learn the likelihood of an event occurring and basic probability.

2. Instructional Activities

   o TTW have the students define probability, unlikely, and likely in their own words.
   o TSW share their ideas by placing them on the white board.
   o TTW then read *A Very Improbable Story* to introduce the lesson.
   o TSW listen carefully to the story.
   o After the story is over, TTW allow the students to change their definitions on the board if they had a change of mind.
   o TTW begin the lesson modeling the definitions with marbles, like in the story, so that the students can get a visual idea.
   o TTW take 25 white marbles, 25 yellow marbles, 25 blue marbles, and 25 green marbles and place them in a bag.
   o TTW ask the students “What is the probability that I will pick a green marble?”
TTW demonstrate the first pick. TTW show them that since there are 25 green marbles and a total of 100 marbles, the chance of picking a green marble will be 25 out of 100 or 1 out of 4.

TTW ask, “What is the probability of picking a white marble?”

TTW ask a student to come up and pull a marble to see if they will pick a white and state the probability of picking a white marble.

TTW let the students know that the definition of probability is

\[ P = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}} \]

TTW place a few practice problems from the Buckle down book (page 181) on the Promethean board and guide the students through these problems.

- Tanya has a box full of marbles: 13 are blue, 9 are purple, and 20 are red. She pulls one marble out of the box without looking. What is the probability of pulling each color out of the box?
  - P (blue) \( \frac{13}{42} \)
  - P (purple) \( \frac{3}{14} \)
  - P (red) \( \frac{10}{21} \)

- If a number cube numbered 1 through 6 is rolled once, what is the probability of the number 4 facing upward? \( \frac{1}{6} \)
- If a number cube numbered 1 through 6 is rolled once, what is the probability of an even number facing upward? \( \frac{1}{2} \) or 50%

After clarification has been established TTW assign three more problems (Buckle Down page 187; numbers 1, 2, & 4) for independent practice. Once the problems have been worked TTW pull names to show their work on the board.

1. Andrea has a bag of 20 marbles: 4 blue, 5 yellow, 3 red, and 8 white. She took one marble from the bag and then replaced it. She took a total of 50 marbles from the bag and recorded her results in the table.

<table>
<thead>
<tr>
<th>Color</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>12</td>
</tr>
<tr>
<td>Yellow</td>
<td>14</td>
</tr>
<tr>
<td>Red</td>
<td>8</td>
</tr>
<tr>
<td>White</td>
<td>16</td>
</tr>
</tbody>
</table>

What was Andrea’s experimental probability of taking a blue marble? \( \frac{6}{25} \)

2. Bill has a hat collection: 4 blue, 6 red, and 7 white. If Bill selects a hat from his collection at random, what is the probability that the hat will be white? \( \frac{7}{17} \)

3. Eric put 2 green marbles, 5 red marbles, 5 yellow marbles, and 8 blue marbles into a box. If Eric randomly takes one marble from
the box, what is the probability of him choosing a red marble?  
\[ \frac{1}{4} \]

- TSW work the problems on the board and explain their work.
- TTW then take out decks of cards in another aid to help with probability.
- In groups of 2, TSW explore the cards.
- TSW answer these questions:
  - How many cards total are in the deck? 52
  - How many suites (TTW define suite)? 4
  - How many cards in each suite? 13
  - What colors do you notice? RED and BLACK
- TTW ask, “What is the likelihood that I will pull a queen? What is the likelihood that I will draw a red or black card? What is the likelihood that I will draw a green king?"
- TSW will either answer likely or unlikely.
- TTW ask,
  - “What is the likelihood that the moon will come out tonight? LIKELY
  - What is the likelihood that I will get a million dollars in the next thirty minutes? UNLIKELY
  - What is the likelihood that I will flip a coin and get heads? LIKELY
- TTW pull names and have random students answer these questions on the likelihood of events.
- TTW will make sure that there is understanding of this concept.
- TTW have students get into groups of 3 or 4. TTW pass out the M&Ms worksheet.
- TTW pass out small bags of M&Ms to each individual in the groups and instruct the students NOT TO EAT the candy. TSW read the directions and begin to work.
- TTW walk around and assist with the students that are struggling.
- TSW work until the end of class.

3. Materials and Resources
- Promethean board
- Computer for the promethean board
- Pencil
- Paper
- Coins
- Marbles
- Small bags of M&Ms for each student
- Probability worksheet using M&Ms
- Textbook – Prentice Hall Mathematics Course 2
- Buckle Down Mississippi Mathematics Level 7
- A Very Improbable Story
References


4. Assessment

For this lesson, I would use the M&Ms worksheet as a type of assessment. This will get the students involved and enjoy being assessed instead of taking the standard paper and pencil test. I found this template online and just revised it so that it would fit my lesson.
M&M Probability Activity

Materials:
- Bag of Plain M&Ms
- Pencil

Procedure:
- Open bag of Plain M&Ms and record counts in table below.
  - (When this is complete, you may eat them.)
- Answer questions that follow.
- Please give your answers in the form of a fraction, decimal, and percent.
- Complete the chart with your answers to questions 1 - 7.

<table>
<thead>
<tr>
<th>Color</th>
<th>Plain M&amp;Ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td></td>
</tr>
<tr>
<td>Red</td>
<td></td>
</tr>
<tr>
<td>Yellow</td>
<td></td>
</tr>
<tr>
<td>Brown</td>
<td></td>
</tr>
<tr>
<td>Green</td>
<td></td>
</tr>
<tr>
<td>Orange</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>

1. What is the probability of getting a red M&M?
2. What is the probability of getting a blue M&M?
3. What is the probability of getting a yellow M&M?
4. What is the probability of getting an orange M&M?
5. What is the probability of getting a brown M&M?
6. What is the probability of getting a green M&M?
7. What is the probability of getting a green M&M or a brown M&M?
8. If you put all your M&Ms back into one bag and select one from the bag without looking, what color is it most likely to be? What color is it least likely to be?
<table>
<thead>
<tr>
<th>Problem #</th>
<th>Fraction</th>
<th>Decimal</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3</td>
<td></td>
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<td></td>
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<td></td>
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<td></td>
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<tr>
<td>7</td>
<td></td>
<td></td>
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</table>
Sample Key: Answers will vary. Both tables are worth 84 points (3 points per cell). Question number 8 is worth 16 points. Since this is a two-part question, the first question is worth 8 points and the second question is worth 8 points. This assessment is worth 100 points.

M&M Probability Activity Key

Materials:

□ Bag of Plain M&Ms

Procedure:

□ Open bag of Plain M&Ms and record counts in table below.
   ○ (When this is complete, you may eat them.)
□ Answer questions that follow.
□ Please give your answers in the form of a fraction, decimal, and percent.
□ Complete the chart with your answers to questions 1 - 7.

<table>
<thead>
<tr>
<th>Color</th>
<th>Plain M&amp;Ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>14</td>
</tr>
<tr>
<td>Red</td>
<td>18</td>
</tr>
<tr>
<td>Yellow</td>
<td>12</td>
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<tr>
<td>Brown</td>
<td>10</td>
</tr>
<tr>
<td>Green</td>
<td>12</td>
</tr>
<tr>
<td>Orange</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
</tr>
</tbody>
</table>
1. What is the probability of getting a red M&M?
2. What is the probability of getting a blue M&M?
3. What is the probability of getting a yellow M&M?
4. What is the probability of getting an orange M&M?
5. What is the probability of getting a brown M&M?
6. What is the probability of getting a green M&M?
7. What is the probability of getting a green M&M or a brown M&M?
8. If you put all your M&Ms back into one bag and select one from the bag without looking, what color is it most likely to be? **Red**
   What color is it least likely to be? **Orange**

<table>
<thead>
<tr>
<th>Problem #</th>
<th>Fraction</th>
<th>Decimal</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>18/72 = ¼</td>
<td>0.25</td>
<td>25%</td>
</tr>
<tr>
<td>2</td>
<td>14/72 = 7/36</td>
<td>0.19</td>
<td>19%</td>
</tr>
<tr>
<td>3</td>
<td>12/72 = 1/6</td>
<td>0.17</td>
<td>17%</td>
</tr>
<tr>
<td>4</td>
<td>6/72 = 1/12</td>
<td>0.083</td>
<td>8%</td>
</tr>
<tr>
<td>5</td>
<td>10/72 = 5/36</td>
<td>0.139</td>
<td>14%</td>
</tr>
<tr>
<td>6</td>
<td>12/72 = 1/6</td>
<td>0.17</td>
<td>17%</td>
</tr>
<tr>
<td>7</td>
<td>22/72 = 11/36</td>
<td>0.306</td>
<td>30.6%</td>
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</table>