

Just in Time Quick Check
Standard of Learning 7.PS.1
Strand: Probability and Statistics

Standard of Learning 7.PS.1

The student will use statistical investigation to determine the probability of an event and investigate and describe the difference between the experimental and theoretical probability.

Students will demonstrate the following Knowledge and Skills:

- a) Determine the theoretical probability of an event.
- b) Given the results of a statistical investigation, determine the experimental probability of an event.
- c) Describe changes in the experimental probability as the number of trials increases.
- d) Investigate and describe the difference between the probability of an event found through experiment or simulation versus the theoretical probability of that same event.

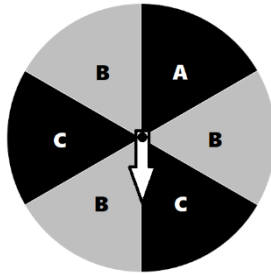
Just in Time Quick Check

Just in Time Quick Check Teacher Notes

Supporting and Prerequisite SOL: 6.PS.1

Just in Time Quick Check 7.PS.1

1. Find the theoretical probability that the spinner below lands on the letter B. Write your answer as a fraction in simplest form.



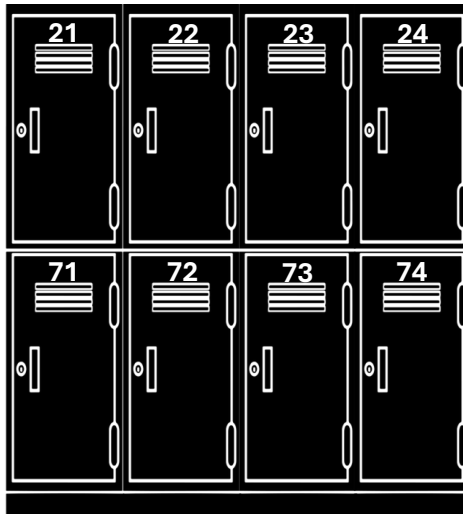
2. The sides of a fair number cube are labeled 1, 2, 3, 4, 5, and 6. What is the theoretical probability that the number cube will land with the number 5 facing up?

3. Max has eight circular chips that are all the same size and shape in a bag.



Max reaches into the bag and removes one circular chip. What is the theoretical probability that the circular chip has a star on it? Write your answer as a fraction, decimal, and percent.

4. A school principal wants to place a gift card inside one randomly selected 7th grade student's locker from those shown. What is the theoretical probability of the student's locker having a number that is a multiple of 3?



5. Tamara rolled a fair number cube with sides labeled 1, 2, 3, 4, 5, and 6. The table shows the results of rolling the fair number cube 20 times.

Tamara's Results

Number Landing Face Up	Frequency
1	4
2	4
3	2
4	3
5	2
6	5

Determine the experimental probability that the number landing face up is a five.

6. A bag contained one red, one blue, and one green ball. Each ball in the bag is the same size and shape. Mr. Smith selected a ball from the bag without looking, recorded the color, and returned the ball to the bag. He did this four times, and the results were red, green, blue, green. Determine the experimental probability of Mr. Smith selecting a red ball from the bag.
7. A bag of equally sized marbles contains 6 green marbles, 8 blue marbles, and 10 red marbles. Amber reached in the bag, picked a marble without looking, recorded its color, and returned the marble to the bag. Her data are recorded in the table.

Amber's Results

Color Marble	Number of times drawn
Green	22
Blue	16
Red	10

Based on these results, which color marble has an experimental probability equal to its theoretical probability? Explain your reasoning.

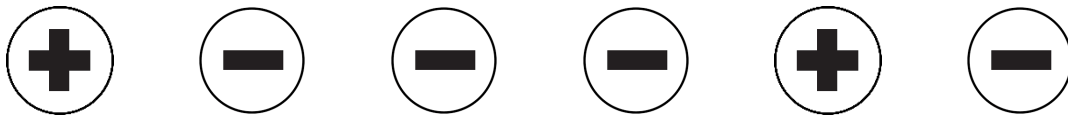
8. Miguel rolled a fair number cube. The results of 24 rolls are shown.

Results of 24 Rolls

Number Landing Face Up	Frequency
1	8
2	4
3	2
4	3
5	4
6	3

Miguel will roll the fair number cube an additional 1,000 times. Should he expect the experimental probability of the fair number landing with a 1 facing up to increase or decrease? Explain your thinking.

9. John found a fair coin with a positive sign on one side and a negative sign on the other. He flipped the fair coin 6 times, and the results are shown.

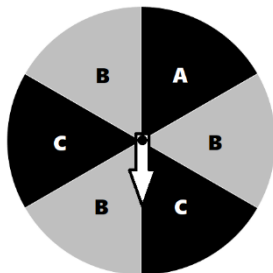


If the coin is flipped an additional 100 times, John should expect the experimental probability of the coin landing with a positive sign face up to get closer to _____%. Explain your thinking.

7.PS.1 Just in Time Quick Check Teacher Notes

Common Errors/Misconceptions and their Possible Indications

1. Find the theoretical probability that the spinner below lands on the letter B. Write your answer as a fraction in simplest form.



A common error students may make is assuming if there are three letters on the spinner, each has the same probability of $\frac{1}{3}$. This may indicate that students need to develop a more conceptual understanding of theoretical probability being the ratio of number of possible favorable outcomes to the total number of possible outcomes. Provide students with situations where the number of favorable outcomes is not the same for each event.

2. The sides of a fair number cube are labeled 1, 2, 3, 4, 5, and 6. What is the theoretical probability that the number cube will land with the number 5 facing up?

A common error some students may make is to use the desired outcome as part of the probability, naming the probability of landing on a 5 as $\frac{5}{6}$. This error may indicate that students do not understand the sample space of a fair number cube. It may be helpful to have students write or draw all the outcomes in the sample space and circle the favorable outcomes. In the example above, students would write the numbers 1, 2, 3, 4, 5, 6 and would circle the 5. This would provide students with a visual that there is one favorable outcome out of six, or $\frac{1}{6}$.

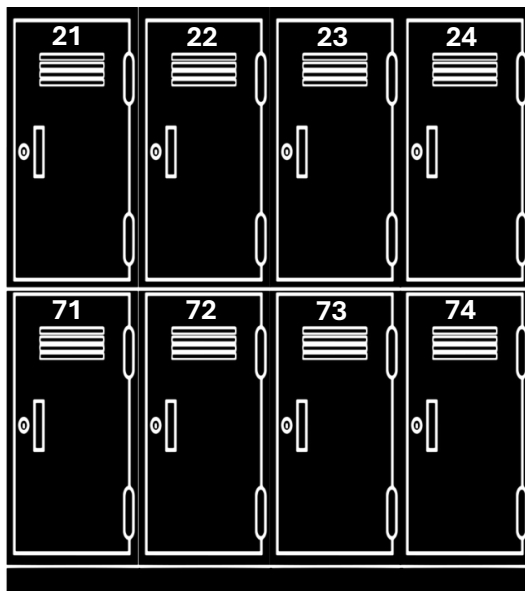
3. Max has eight circular chips that are all the same size and shape in a bag.



Max reaches into the bag and removes one circular chip. What is the theoretical probability that the circular chip has a star on it? Write your answer as a fraction, decimal, and percent.

A common error students may make is to correctly name the probability in fraction form but not give the correct decimal and/or percent equivalencies. These students may need more experience connecting fractions to decimals and percents. Providing a visual (e.g., anchor chart, vocabulary card, math journal entry, Frayer model) may be beneficial to help students see how fractions, decimals, and percents are connected.

4. A school principal wants to place a gift card inside one randomly selected 7th grade student's locker from those shown. What is the theoretical probability of the student's locker having a number that is a multiple of 3?



A common error students may make is to think that numbers that end in 3 are multiples of 3, listing the probability as $\frac{2}{8}$ or $\frac{1}{4}$. This error might indicate a need to review mathematical vocabulary learned in previous grades. Refer to the Grade 4 and Grade 5 Instructional Guides for ideas to review vocabulary such as factors, multiples, prime, composite, even and odd.

5. Tamara rolled a fair number cube with sides labeled 1, 2, 3, 4, 5, and 6. The table shows the results of rolling the fair number cube 20 times.

Tamara's Results

Number Landing Face Up	Frequency
1	4
2	4
3	2
4	3
5	2
6	5

Determine the experimental probability that the number landing face up is a five.

A common error students may make is to calculate the experimental probability using the total number of possible outcomes instead of the number of trials in the experiment resulting in an incorrect answer of $\frac{2}{6}$ or $\frac{1}{3}$. This may indicate a need to develop a conceptual understanding of theoretical and experimental probabilities. Provide students with more experiences calculating both experimental and theoretical probabilities from the same context.

6. A bag contained one red, one blue, and one green ball. Each ball in the bag is the same size and shape. Mr. Smith selected a ball from the bag without looking, recorded the color, and returned the ball to the bag. He did this four times, and the results were red, green, blue, green. Determine the experimental probability of Mr. Smith selecting a red ball from the bag.

A common error students may make is to incorrectly list the theoretical probability of $\frac{1}{3}$ instead of the experimental probability. This may indicate students need more experience calculating and comparing theoretical and experimental probabilities. Providing students with a visual (e.g., anchor chart, vocabulary card, math journal entry) may be beneficial to help cement the differences between theoretical and experimental probabilities.

7. A bag of equally sized marbles contains 6 green marbles, 8 blue marbles, and 10 red marbles. Amber reached in the bag, picked a marble without looking, recorded its color, and returned the marble to the bag. Her data are recorded in the table.

Amber's Results

Color Marble	Number of times drawn
Green	22
Blue	16
Red	10

Based on these results, which color marble has an experimental probability equal to its theoretical probability? Explain your reasoning.

A common error students may make is to choose red because they see there are 10 red marbles in the bag and a red marble was drawn 10 times in the experiment. This error may indicate that students do not understand the difference between theoretical and experimental probability. Providing students with a visual (e.g., anchor chart, vocabulary cards, math journal entry) that highlights the differences between theoretical and experimental probability may be helpful.

Another common error students may make is not recognizing that the two ratios of $\frac{8}{24}$ and $\frac{16}{48}$ are equivalent. This may indicate that students need more experience with equivalent ratios. Refer to the Grade 6 Instructional Guide for ideas.

8. Miguel rolled a fair number cube. The results of 24 rolls are shown.

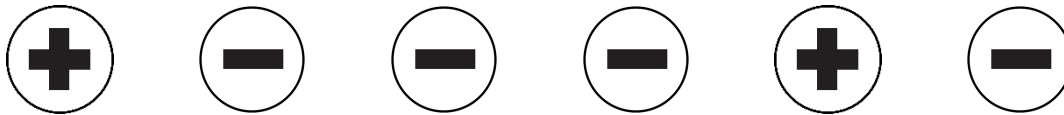
Results of 24 Rolls

Number Landing Face Up	Frequency
1	8
2	4
3	2
4	3
5	4
6	3

Miguel will roll the fair number cube an additional 1,000 times. Should he expect the experimental probability of the fair number landing with a 1 facing up to increase or decrease? Explain your thinking.

A common misconception that students may have is the belief that experimental probability remains constant. Another common misconception that students may have is that experimental probability always increases because they know that the number of times the favorable outcome occurs will increase. (For example, out of 24 rolls, Miguel rolled a one 8 times. If he increases this to 1,000 trials, he will roll a one much more than 8 times.) These misconceptions may indicate that students do not have a conceptual understanding of experimental probability, making it difficult to understand that the experimental probability could increase or decrease as the number of trials increases, and that the experimental probability should become close to the theoretical probability as the number of trials increases. Students may benefit from acting out experiments and documenting the experimental probability several times to see how the experimental probability changes as the number of trials increase.

9. John found a fair coin with a positive sign on one side and a negative sign on the other. He flipped the fair coin 6 times, and the results are shown.



If the coin is flipped an additional 100 times, John should expect the experimental probability of the coin landing with a positive sign face up to get closer to _____%. Explain your thinking.

A common error students may make is to give an answer of $33\frac{1}{3}\%$ which is the experimental probability of flipping a positive sign for the six coin flips. This may indicate that students do not understand that experimental probability approaches the theoretical probability as the number of trials increases. Students may benefit from conducting experiments while recording both the theoretical and experimental probabilities.