

Sample Spaces and Likelihood

- S 7.6(A)** Represent sample spaces for simple and compound events using lists and tree diagrams.
- R 7.6(H)** Solve problems using qualitative and quantitative predictions and comparisons from simple experiments.

Understand the TEKS

The sample space of a simple or compound event can help you find the probability of a specific outcome. The probability is written as the number of **favorable outcomes**, or the outcomes that you are looking for, divided by the total number of possible outcomes.

$$\text{Probability} = \frac{\text{favorable outcomes}}{\text{total number of outcomes}}$$

You can use an organized list or tree diagram to find the total number of possible outcomes and the number of favorable outcomes.

A greater probability indicates a greater likelihood that an event will happen. For example, if the probability of someone winning a game is $\frac{5}{6}$, or 5 out of 6, then winning is likely. If the probability is $\frac{1}{6}$, or 1 out of 6, it is not likely the person will win.

A class competition requires students to first flip a coin, which can land on heads (H) or tails (T), and then roll a 6-sided number cube. If the coin lands on heads and the roll of the number cube is less than 5, the student wins. If there are 24 students in the class, how many students would you expect to win?

Step 1 Find the sample space using an organized list.

Complete the table to show all of the possible outcomes. H1 indicates a flip of heads and rolling a 1. T2 indicates a flip of tails and rolling a 2, etc.

Heads	H1	H2	H3	_____	_____	_____
Tails	T1	T2	_____	_____	_____	_____

There are a total of _____ possible outcomes.

Step 2 Find the probability of winning.

There are _____ outcomes that include heads and a roll less than 5: H1, H2, H3, and H4.

So the probability of winning is _____.

Step 3 Make a prediction.

To find the number of students likely to win, multiply the probability by the total number of students.

$$\text{_____} \times 24 = \text{_____}$$

The probability of winning is _____, so _____ out of 24 students are likely to win.



Did You Know?

OPERATIONS Finding the fraction of a number is equal to the fraction times the number. Remember that “of” is often used to describe multiplication. So, $\frac{1}{4}$ of 20 is equal to $\frac{1}{4}(20) = 5$.



★ Practice

DIRECTIONS Read and answer each question carefully.

- 1 The school is providing box lunches for a field trip. Each box contains a sandwich, fruit, and drink, from the following options.

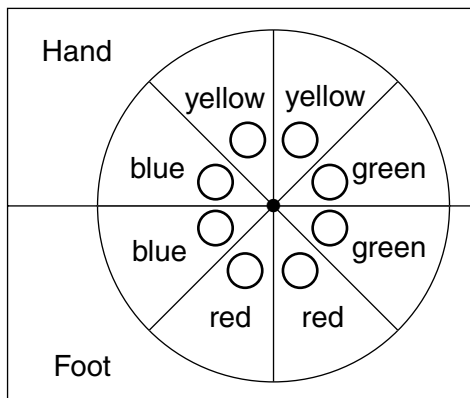
Sandwich	Fruit	Drink
Turkey	Pineapple	Milk
Ham	Oranges	Water
Veggie		Juice

If Juan chooses a box at random, what is the probability that he will get a ham sandwich, an orange, and water?

- (A) $\frac{1}{3}$
- (B) $\frac{1}{8}$
- (C) $\frac{1}{15}$
- (D) $\frac{1}{18}$

- 2 The spinner for a game tells you to put a hand or foot onto 1 of 4 different color dots: blue (B), red (R), yellow (Y), or green (G). Imagine the spinner is spun 40 times. Choose the color(s) you would predict you would touch with a hand or foot 5 times.

Fill in **FOUR** correct answers.



- 3 Gina has a sock drawer that has 4 solid blue socks, 2 striped socks, and 2 dotted socks. If she picks a solid blue sock without looking, how likely is she to pick another solid blue sock?

- (A) Equally likely, because the sample space has not changed
- (B) Less likely, because there are fewer blue socks in the drawer
- (C) More likely, because there are fewer blue socks in the drawer
- (D) Equally likely, because striped and dotted socks can also be blue

- 4 Students in Ms. Martin’s class get bonus points in a game by pulling a random marble from a bag.



The marbles are numbered 1 to 4. Each student reaches into the bag twice, putting the marble back the first time, and then adds the value of the 2 marbles to get the number of bonus points. What is the probability the student will get 3 or 5 bonus points?

- (A) $\frac{3}{8}$
- (B) $\frac{3}{16}$
- (C) $\frac{1}{4}$
- (D) $\frac{1}{8}$

- 5 Ana, Delia, and Megan write stories for a competition.

If they each win 1 of the top 3 places, what is the probability that neither Ana nor Megan will win 3rd place?

- (A) $\frac{1}{6}$ (C) $\frac{2}{3}$
 (B) $\frac{1}{3}$ (D) 1

- 6 Adam is having his teeth cleaned. The tooth polish will be flavored peppermint, spearmint, cherry, or orange, and they are randomly chosen. The last 3 times he went to the dentist, the polish was cherry flavored.

What is the chance he will **NOT** get cherry this time?

- (A) $\frac{1}{4}$
 (B) $\frac{2}{3}$
 (C) $\frac{3}{4}$
 (D) 1

- 7 Maria has made a playlist for her afternoon run. The playlist has 2 songs by the Alphas, 1 song by the Battles, and 2 songs by the Charmers.

If the songs play randomly as she runs, how likely is it that the Battles will play first?

- (A) Not likely; there is a $\frac{1}{5}$ chance of a Battles song playing
 (B) Not likely; there is double the chance that the other songs will play
 (C) Very likely; there are only 5 songs to choose from
 (D) Very likely; there is a $\frac{1}{2}$ chance of a Battles song playing

- 8 Suppose you have two coins and two 6-sided number cubes.

Circle the correct answer from each drop-down menu to complete the statement.

It is more likely for two

coins to land on heads
 number cubes to roll the
 same number

because the

$\frac{1}{6}$
 $\frac{1}{4}$
 $\frac{1}{2}$

probability of getting 2 heads is

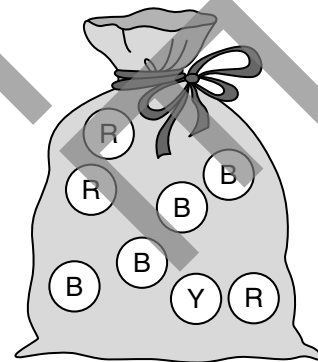
and

the probability of rolling the same number

twice is

$\frac{1}{36}$
 $\frac{1}{6}$
 $\frac{1}{3}$

- 9 200 customers are participating in a grocery store contest, using the bag shown. Each customer will draw 1 marble from the bag and then replace the marble. If customers choose a yellow marble, they win a prize.



How many customers would you predict will win a prize?

Write your answer in the box.