Warm Up

Write each fraction in simplest form.

1. $\frac{15}{21}$ $\frac{5}{7}$

2. $\frac{48}{64}$ $\frac{3}{4}$

3. $\frac{9}{81}$ $\frac{1}{9}$

4. $\frac{30}{45}$ $\frac{2}{3}$

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Probability Song

Essential ?

How can you describe the likelihood of an event?

Standard

MCC7.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.

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Vocabulary

experiment
trial
outcome
event
probability
simple event
compound event
complement

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Probability

An activity involving chance, such as rolling a cube, is called an **experiment.** Each repetition or observation of an experiment is a **trial**, and each result is an **outcome**. A set of one or more outcomes is an **event**. For example, rolling a 5 (one outcome) can be an event, or rolling an even number (more than one outcome) can be an event.

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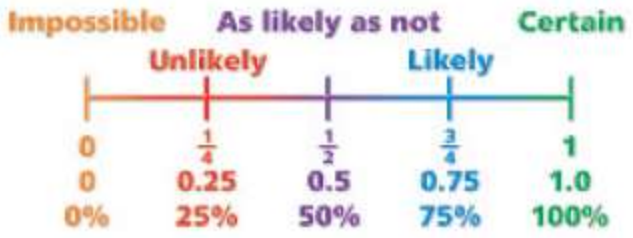
Probability

The **probability** of an event, written *P*(event), is the measure of how likely an event is to occur. A **simple event** has a single outcome. A **compound event** is two or more simple events. Probability is a measure between 0 and 1, as shown on the number line. You can write probability as a fraction, a decimal, or a percent.



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A. The **Braves** will win the World Series.

B. The next baby born in **Columbus** will be a girl.

C. You will watch television some time today.

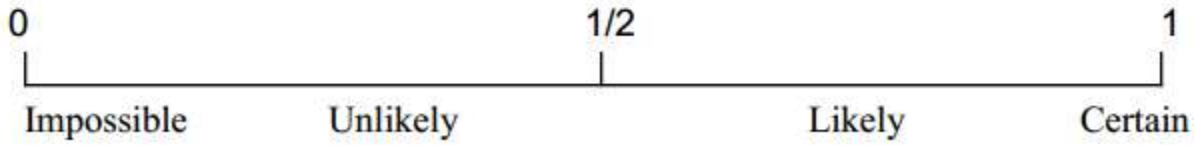
D. It will snow in your area during the month of August.

E. You will read at least four books this month.

F. It will be sunny tomorrow.

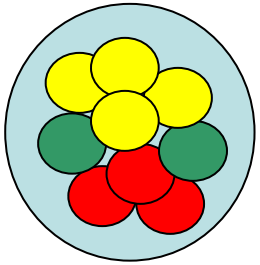
G. **You will make an A in math this 9 weeks**.

Walk-on Probability Line

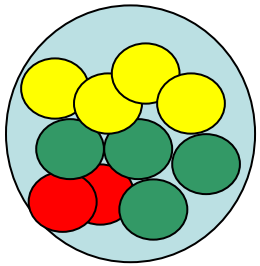


Probability

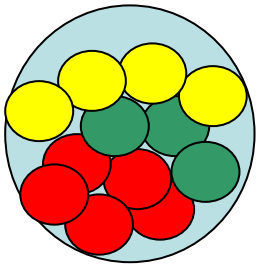
Fun with Probability!



Gum Ball Machine #1



Gum Ball Machine #2



Gum Ball Machine #3

How probable is it to pull a red gum ball out of machine number 1?

How probable is it to pull a green gum ball out of machine number 2?

How probable is it to pull out a yellow gum ball out of machine number 3?

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Additional Example 1A: Determining the Likelihood of an Event

Determine whether each event is impossible, unlikely, as likely as not, likely, or certain.

rolling an odd number on a number cube

There are 6 possible outcomes:

Odd	*Not* Odd
1, 3, 5	2, 4, 6

Half of the outcomes are odd.

Rolling an odd number is as likely as not.

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Additional Example 1B: Determining the Likelihood of an Event

Determine whether each event is impossible, unlikely, as likely as not, likely, or certain.

rolling a number less than 2 on a number cube

There are 6 possible outcomes:

Less than 2	*2 or more*
1	2, 3, 4, 5, 6

Only one outcome is less than 2.

Rolling a number less than 2 is unlikely.

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When a number cube is rolled once, the possible numbers that could show face up are _____.

Each time you roll the cube, a number lands face up. This is called an *event*. Below is a list of 9 different events.

Work with a partner to order the events from those least likely to happen to the ones that are most likely to happen when you roll the number cube one time.

Use the space next to each event to write any notes that might help you order them.

Rolling a number less than 7 _____

Rolling an 8 _____

Rolling a 1, 2, or 3 _____

Rolling a 5 _____

Rolling a number other than 6 _____

Rolling an even number _____

Rolling a number greater than 5 _____

Rolling an odd number _____

Rolling a prime number _____

The order I wrote the events in is:

_____

_____

_____

REFLECT

1a. How did you sort the events?

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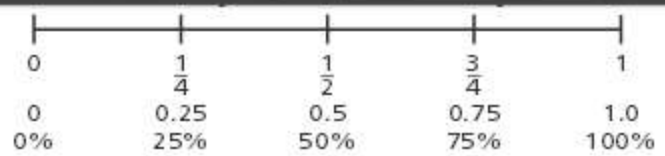

MCC7.SP.5

2 EXAMPLE Describing Events

Determine whether each event is impossible, unlikely, as likely as not, likely, or certain. Then, tell whether the probability is 0, close to 0, $\frac{1}{2}$, close to 1, or 1.

A You flip a coin. The coin lands heads up.

B You roll two number cubes and the sum of the numbers is 10.

C A bowl contains 14 red marbles and 3 green marbles. You pick a red marble.

D A spinner has 10 equal sections marked 1 through 10. You spin and land on a number greater than 0.

TRY THIS!

Describe each event as impossible, unlikely, as likely as not, likely, or certain. Tell whether the probability is 0, close to 0, $\frac{1}{2}$, close to 1, or 1.

2a. A hat contains pieces of paper marked with the numbers 1 through 16. You pick an even number.

2b. A spinner has 6 equal sections marked 1 through 6. You spin and land on 0.

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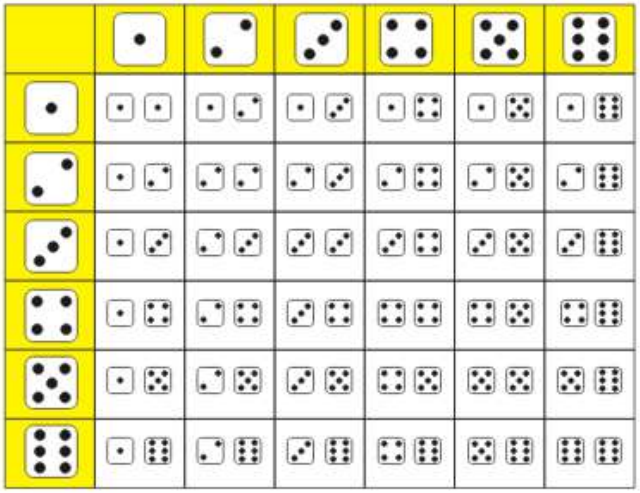
Exploring Probability Using Sample Space



The probability matrix displays all of the possible outcomes when rolling a pair of dice. Answer all of the questions below using the probability matrix.

Example:

What is the probability of rolling a sum of 3?

$$P(\text{sum of } 3) = \frac{2}{36} = \frac{1}{18} = 0.0\overline{5} \approx 0.06$$

Out of the 36 possible outcomes, two of them have a sum of 3. 2 out of 36 can be reduced to 1/18.

Directions: Express the probability of each event happening when rolling a pair of dice. Express your answer as a fraction and a decimal.

1) P(sum of 7)

2) P(sum of 2)

3) P(sum of 11)

4) P(sum of 3)

5) P(sum of 10)

6) P(sum of 9)

7) P(sum of 8)

8) P(sum of 5)

9) P(sum of 1)

10) P(sum of 4)

11) P(sum of 6)

12) P(sum of 12)

Probability

When a number cube is rolled, either a 5 will be rolled or it will not. Rolling a 5 and not rolling a 5 are examples of *complementary events*. The **complement** of an event is the set of all outcomes that are *not* the event.

Because it is certain that either an event or its complement will occur when an activity is performed, the sum of the probabilities is 1.

$$P(\text{event}) + P(\text{complement}) = 1$$

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Additional Example 2: Using Complements

A bag contains circular chips that are the same size and weight. There are 8 purple, 4 pink, 8 white, and 2 blue chips in the bag. The probability of drawing a pink chip is $\frac{2}{11}$. What is the probability of not drawing a pink chip?

$P(\text{event}) + P(\text{complement}) = 1$

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Additional Example 2 Continued

$P(\text{event}) + P(\text{complement}) = 1$

$P(\text{pink}) + P(\text{not pink}) = 1$

$\frac{2}{11} + P(\text{not pink}) = 1$ *Substitute $\frac{2}{11}$ for P(pink).*

$-\frac{2}{11} \quad = -\frac{2}{11}$ *Subtract $\frac{2}{11}$ from both sides.*

$P(\text{not pink}) = \frac{9}{11}$ *Simplify*

The probability of not drawing a pink chip is $\frac{9}{11}$.

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Check It Out: Example 2

A bag contains circular buttons that are the same size and weight. There are 7 maroon buttons, 3 sky buttons, 5 white buttons, and 5 lavender buttons in the bag. The probability of drawing a sky button is $\frac{3}{20}$. What is the probability of not drawing a sky button?

$P(\text{event}) + P(\text{complement}) = 1$

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Check It Out: Example 2 Continued

$P(\text{event}) + P(\text{complement}) = 1$

$P(\text{sky}) + P(\text{not sky}) = 1$

$\frac{3}{20} + P(\text{not sky}) = 1$ *Substitute $\frac{3}{20}$ for P(sky).*

$-\frac{3}{20} \quad = -\frac{3}{20}$ *Subtract $\frac{3}{20}$ from both sides.*

$P(\text{not sky}) = \frac{17}{20}$ *Simplify*

The probability of not drawing a sky button is $\frac{17}{20}$.

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3 EXAMPLE Using the Complement of an Event

In a standard deck of cards, the probability of choosing a card at random and getting an ace is $\frac{1}{13}$. What is the probability of not getting an ace?

$P(\text{event}) + P(\text{complement}) =$ _____

$P(\text{ace}) + P($_____$) = 1$

$\frac{\square}{\square} + P($_____$) = 1$

$P(\text{not getting an ace}) = 1 - \frac{\square}{\square}$

$= \frac{\square}{\square}$

TRY THIS!

3a. A jar contains balls marked with the numbers 1 through 8. The probability that you pick a number at random and get a 5 is $\frac{1}{8}$. What is the probability of not picking a 5?

_____

3b. You roll a number cube. The probability that you roll an even number is $\frac{1}{2}$. What is the probability you will roll an odd number?

_____

REFLECT

3c. Why do the probability of an event and the probability of its complement add up to 1?

_____

_____

_____

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Additional Example 3: *School Application*

Mandy's science teacher almost always introduces a new chapter by conducting an experiment. Mandy's class finished a chapter on Friday. Should Mandy expect the teacher to conduct an experiment next week? Explain.

Since the class just finished a chapter, they will be starting a new chapter. It is likely the teacher will conduct an experiment.

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Check It Out: Example 3

After completing a unit chapter, Alice's keyboarding class usually begins the next class day with a time trial exercise, practicing the previously learned skills. It is Wednesday and a unit chapter was completed the previous day. Will the class start with a time trial exercise?

If the teacher keeps to her planned schedule, it is likely the class will start with a time trial.

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Class work/Homework

- Complete practice pages.

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