

Objective

Determining Compound Probability

Warm-Up



Sam has six crayons. The crayons are blue, red, green, purple, brown, and yellow. He chooses one crayon at random.

1. What is the probability that the crayon Sam chooses will be red or purple?
2. What is the complementary event?
3. What is the probability of the complementary event?

GETTING STARTED

And Or What?!

What's the difference between the words and and or? You've been using them your whole life, so you can imagine that you are pretty sure of the difference. However, these words have a very specific meaning in mathematics, and it is important to understand the difference.

For each situation, identify how many of your classmates are in each category.

1. Cat owners vs. dog owners
 - a. Cat owners
 - b. Dog owners
 - c. Cat or dog owners
 - d. Cat and dog owners
2. Even birth dates vs. odd birth dates
 - a. Even birthdays
 - b. Odd birthdays
 - c. Even or odd birthdays
 - d. Even and odd birthdays
3. Athletes vs. musicians
 - a. Athletes
 - b. Musicians
 - c. Athletes or musicians
 - d. Athletes and musicians

What is the difference between and and or?

4. If you know the answers to parts (a) and (b) from Questions 1–3, can you determine the answers to the other two situations? Explain why or why not.
 - a. part (c)?
 - b. part (d)?

You can calculate the probability of multiple events, say events A and B. Sometimes, you will want to know the probability of A or B occurring. Other times, you will want to know the probability of A and B occurring.



Garden Plain Pet Shelter has the following animals available for adoption. You will complete a probability model and use it to determine the probability that the next pet chosen at random is a dog or a cat.


Pets	Number Available
cat	4
dog	7
snake	1
rabbit	3
bird	5

- How many pets are available for adoption?
- Complete the probability model for adopting a pet from Garden Plain Pet Shelter.


Outcome	Cat	Dog	Snake	Rabbit	Bird
Probability					

- Is the model a uniform or a non-uniform probability model? Explain your reasoning.
- What is the probability the next pet adopted is:
 - a dog?
 - a snake?
 - a cat?
- Determine the probability that the next pet adopted is a dog or a cat.
 - How many of the pets are dogs or cats?
 - How many total pets are there?
 - What is the probability the next pet adopted is a dog or a cat?


Examples of students' methods to solve Question 5 are shown.

Tenisha 


I added the number of cats and dogs and got a total of 11. $4 + 7 = 11$
That's 11 pets out of 20.
 $\frac{\text{desired}}{\text{total}} = \frac{11}{20}$

Jermaine 


Don't want 9 out of 20.
So what's left is 11 out of 20.

Drew 

CATS $\frac{4}{20}$
DOGS $+\frac{7}{20}$
 $\frac{11}{20}$

Daryl 

$\frac{2}{3}$
Cats and dogs
That's 2 animals listed out of 5

Mark 

Probability of a cat $\frac{4}{20}$ or $\frac{1}{5}$
Probability of a dog $\frac{7}{20}$
 $\frac{1}{5} + \frac{7}{20} = \frac{8}{25}$

6. Analyze each student's responses to the question.

a. Describe the strategy Jermaine used.

b. Describe the strategy Drew used.

c. What is the difference between Tenisha's work and Drew's work?

d. Explain to both Daryl and Mark why their methods are incorrect for determining the probability that the next pet adopted will be a cat or dog.

A compound event combines two or more events, using the word "and" or the word "or."

Determining the probability of a compound event with the word "and" is different from a compound event with "or."

The difference is that a compound event with the word "and" means that you are determining the probability that both events occur.

When determining a compound event with “or,” you are determining the probability that one, or the other, or both outcomes occur.

7. What is the probability that the next pet adopted is a 4-legged animal?

a. What events make up “the next pet adopted being a 4-legged animal”?

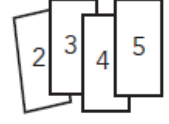
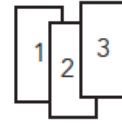
b. For how many events are you determining the probability? How do you know?

c. Rewrite Question 7 using the events you wrote in part (a).

d. Determine the probability that the next pet adopted is a 4-legged animal. Show how you determined your answer.



The cards shown were placed face down in two piles so that they could be randomly chosen.



1. If one card is randomly chosen from each pile, determine the probability of randomly choosing a matching pair.
 - a. What are the possible outcomes for randomly choosing one card from each pile? Make sure you show your work by either creating an organized list or constructing a tree diagram.

 - b. How many possible outcomes are there?

 - c. What events make up randomly choosing a matching pair?

 - d. Rewrite Question 1 using the events you wrote in part (c).

 - e. Determine the probability of randomly choosing a pair.

2. Determine the probability of randomly choosing two cards that sum to 5. Show your work.

3. The class is asked to determine the probability of randomly choosing 2 odd cards. Lucy says, "The probability of drawing 2 odd cards is 4 out of 7 because there are 7 cards and 4 of them are odd." Do you agree with Lucy's statement? If not, explain to Lucy why her reasoning is not correct.

4. Write a problem using the number cards for which Lucy's answer would be correct.

5. What outcomes make up the event of "choosing 2 odd cards" given one card is chosen from each pile?

6. Determine the probability of randomly choosing 2 odd cards.

7. Determine the probability of selecting one card from each pile where the first card is a 2 and the second card is odd.

a. List the event(s) for determining the probability.

b. List the outcome(s) for the event(s).

c. Determine the probability of selecting one card from each pile where the first card is a 2 and the second card is odd.

8. Determine the probability that the first card is a 2 or the second card is odd.

a. List the event(s) for determining the probability.

b. Determine the outcome(s) for the event(s).

c. How many outcomes are listed? Are any of the outcomes listed in both events?

d. How many unique outcomes are there for the two events?

e. Determine the probability that the first card is a 2 or the second card is odd.

f. Why would you not count all of the outcomes when calculating the probability?

9. Explain the difference between the events in Questions 7 and 8.



LESSON 11.3
Pet Shop Probability



Objective **Determining Compound Probability**

Practice

1. Porter is pulling colored tiles out of a bag to use for an art project. The table shows the number of tiles of each color that are in the bag. Porter selects tiles from her bag.

a. How many tiles are in her bag?

b. Complete the probability model for pulling tiles from the bag.

Outcome	Blue	Yellow	Pink	Green	Purple
Probability					

Color	Number of Tiles
Blue	10
Yellow	12
Pink	6
Green	3
Purple	9

c. What is the probability that Porter pulls a green or purple tile?

d. What is the probability that Porter pulls a pink, green, or purple tile?

e. What is the probability that Porter pulls a pink and purple tile in one draw?