

Name _____

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Chapter 10 Probability and Statistics

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Parent Signature _____ Date _____

Student Signature _____ Date _____

Teacher Signature _____ Date _____

Name _____ Class Period _____

Evaluation of Notes


Criteria	10 – Unsatisfactory	20 – Satisfactory	25 – Good	30 – Excellent	Score
Set-up and Neatness	<ul style="list-style-type: none"> • No name • Paper appears to have been scrunched, put through a blender, or used as a napkin 	<ul style="list-style-type: none"> • Name • Handwriting is hard to read. 	<ul style="list-style-type: none"> • Name and class period • Some extra notes added 	<ul style="list-style-type: none"> • Name and class period • Many extra notes added 	_____
Completion of practice	<ul style="list-style-type: none"> • One or more sections are blank 	<ul style="list-style-type: none"> • Some practice is not complete • Not all work is shown 	<ul style="list-style-type: none"> • All practice is complete • Some work not shown 	<ul style="list-style-type: none"> • All practice complete • All work shown 	_____
Text marking	<ul style="list-style-type: none"> • None of the notes are highlighted or underlined 	<ul style="list-style-type: none"> • One or more sections are missing highlighting or underlining 	<ul style="list-style-type: none"> • Each section contains highlighting or underlining. 	<ul style="list-style-type: none"> • Every key point is highlighted or underlined and it is done so neatly. 	_____
Completed on time or within one day of being absent? +10 points!					_____
Total Score					_____

Evaluation of Homework

Criteria	0 – Unsatisfactory	30 – Satisfactory	40 – Good	50 – Excellent	Score
Set-up and Neatness	<ul style="list-style-type: none"> • No name • Paper appears to have been scrunched, put through a blender, or used as a napkin 	<ul style="list-style-type: none"> • Name • Handwriting is hard to read. 	<ul style="list-style-type: none"> • Name and class period • Some answers are boxed 	<ul style="list-style-type: none"> • Name and class period • All answers are boxed 	_____
Completion of practice	<ul style="list-style-type: none"> • The homework is not done or attempted. 	<ul style="list-style-type: none"> • Some problems are not done. • Not all work is shown 	<ul style="list-style-type: none"> • All practice is complete • Some work not shown 	<ul style="list-style-type: none"> • All practice complete • All work shown 	_____
Total Score					_____

Chapter 10	Probability and Statistics
MAFS.7.SP.3.7	Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.
Essential Question	In an experiment how can you determine possible results? <i>In this lesson I am determining what are the possible outcomes of experiments.</i>

10.1 Outcomes and Events

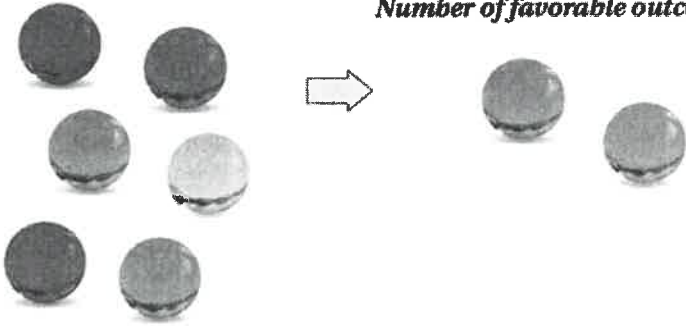
 **Key Ideas**


Outcomes and Events

An **experiment** is an investigation or a procedure that has varying results. The possible results of an experiment are called **outcomes**. A collection of one or more outcomes is an **event**. The outcomes of a specific event are called **favorable outcomes**.

For example, randomly selecting a marble from a group of marbles is an experiment. Each marble in the group is an outcome. Selecting a green marble from the group is an event.

Possible outcomes *Event: Choosing a green marble*
Number of favorable outcomes: 2

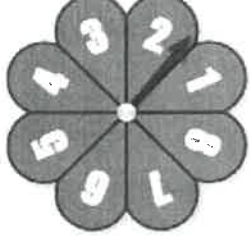


 **Vocabulary and Concept Check**

- VOCABULARY** Is rolling an even number on a number cube an *outcome* or an *event*? Explain.
- WRITING** Describe how an outcome and a favorable outcome are different.

You spin the spinner shown.

- How many possible results are there?
- Of the possible results, in how many ways can you spin an even number? an odd number?



**Homework
10.1 Practice A
#1-6**

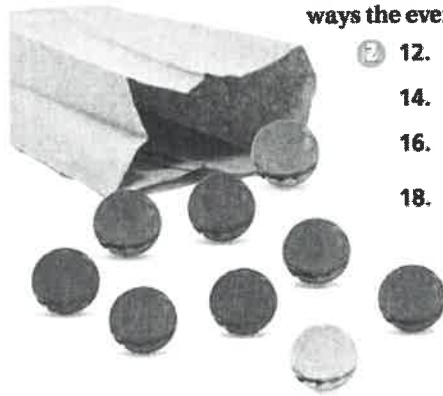
5. TILES What are the possible outcomes of randomly choosing one of the tiles shown?



You randomly choose one of the tiles shown above. Find the favorable outcomes of the event.

- 6. Choosing a 6
- 7. Choosing an odd number
- 8. Choosing a number greater than 5
- 9. Choosing an odd number less than 5
- 10. Choosing a number less than 3
- 11. Choosing a number divisible by 3

**Homework
10.1 Practice A
#7-10**



You randomly choose one marble from the bag. (a) Find the number of ways the event can occur. (b) Find the favorable outcomes of the event.

- 12. Choosing blue
- 13. Choosing green
- 14. Choosing purple
- 15. Choosing yellow
- 16. Choosing *not* red
- 17. Choosing *not* blue
- 18. **ERROR ANALYSIS** Describe and correct the error in finding the number of ways that choosing *not* purple can occur.

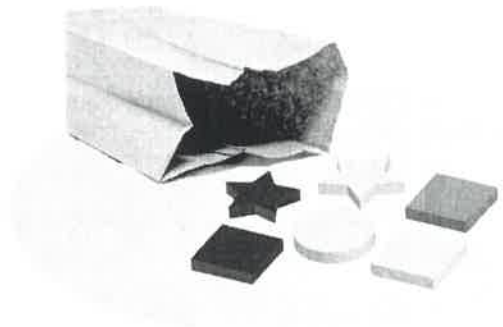


purple	<i>not</i> purple
purple	red, blue, green, yellow

Choosing *not* purple can occur in 4 ways.

You randomly choose one shape from the bag. (a) Find the number of ways the event can occur. (b) Find the favorable outcomes of the event.

- 19. Choosing a square
- 20. Choosing a circle
- 21. *Not* choosing a star



10.1 Practice A

You randomly choose one of the tiles shown below. Find the favorable outcomes of the event.



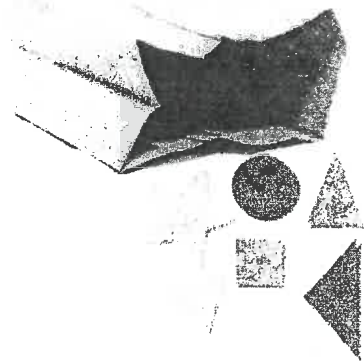
1. Choosing a 4
2. Choosing an even number
3. Choosing a number less than 2
4. Choosing an odd number greater than 6
5. Choosing a number divisible by 2
6. Choosing a number greater than 10

You randomly choose one shape from the bag.

(a) Find the number of ways the event can occur.

(b) Find the favorable outcomes of the event.

7. Choosing a triangle
8. Choosing a star
9. Choosing *not* a square
10. Choosing *not* a circle
11. A beverage cooler contains bottles of orange juice and apple juice. There are 44 bottles in the cooler.
 - a. You are equally likely to randomly choose a bottle of orange juice or a bottle of apple juice from the cooler. How many of the bottles are apple juice?
 - b. Two of the bottles of orange juice are replaced with apple juice. How many ways can you randomly choose a bottle of apple juice from the cooler?
12. Three girls and four boys made the final round of the spelling bee.
 - a. How many ways can you randomly choose a girl to be the first contestant?
 - b. Given that part (a) occurred, how many ways can you randomly choose a girl to be the second contestant?



MAFS.7.SP.3.5 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 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.

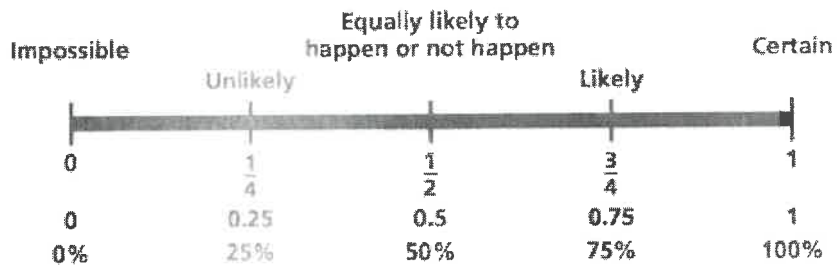
Essential Question How can you describe the likelihood of an event?
In this lesson I am using what I know about events and outcomes to determine how likely it is an outcome may happen.

10.2 Probability

 **Key Idea**

Probability

The **probability** of an event is a number that measures the likelihood that the event will occur. Probabilities are between 0 and 1, including 0 and 1. The diagram relates likelihoods (above the diagram) and probabilities (below the diagram).




 **Key Idea**

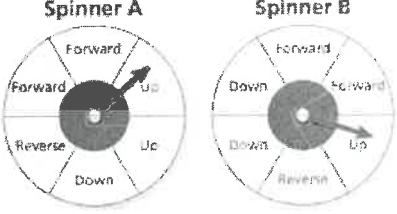

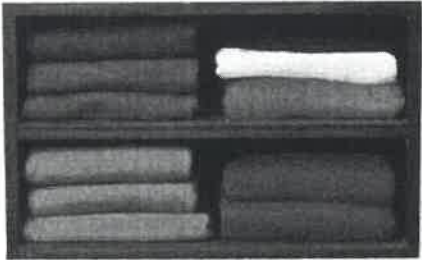

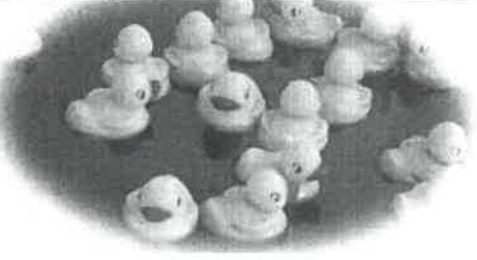
Finding the Probability of an Event

When all possible outcomes are equally likely, the probability of an event is the ratio of the number of favorable outcomes to the number of possible outcomes. The probability of an event is written as $P(\text{event})$.

$$P(\text{event}) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$$

 **Vocabulary and Concept Check**

- VOCABULARY** Explain how to find the probability of an event.
- REASONING** Can the probability of an event be 1.5? Explain.
- OPEN-ENDED** Give a real-life example of an event that is impossible. Give a real-life example of an event that is certain.

<p>Homework 10.2 Practice A #1-3</p>	<p>You are playing a game using the spinners shown.</p> <p>4. You want to move down. On which spinner are you more likely to spin "Down"? Explain.</p> <p>5. You want to move forward. Which spinner would you spin? Explain.</p>	
<p>Homework 10.2 Practice A #4-6</p>	<p>Describe the likelihood of the event given its probability.</p> <p>6. Your soccer team wins $\frac{3}{4}$ of the time.</p> <p>7. There is a 0% chance that you will grow 12 more feet.</p> <p>8. The probability that the sun rises tomorrow is 1.</p> <p>9. It rains on $\frac{1}{5}$ of the days in July.</p>	
	<p>10. VIOLIN You have a 50% chance of playing the correct note on a violin. Describe the likelihood of playing the correct note.</p>	
<p>Homework 10.2 Practice A #7-10</p>		<p>You randomly choose one shirt from the shelves. Find the probability of the event.</p> <p>11. Choosing a red shirt</p> <p>12. Choosing a green shirt</p> <p>13. <i>Not</i> choosing a white shirt</p> <p>14. <i>Not</i> choosing a black shirt</p> <p>15. Choosing an orange shirt</p>
	<p>16. ERROR ANALYSIS Describe and correct the error in finding the probability of <i>not</i> choosing a blue shirt from the shelves above.</p>	
<p>Homework 10.2 Practice A #11</p>	<p>17. CONTEST The rules of a contest say that there is a 5% chance of winning a prize. Four hundred people enter the contest. Predict how many people will win a prize.</p>	
<p>Homework 10.2 Practice A #12</p>	<p>18. RUBBER DUCKS At a carnival, the probability that you choose a winning rubber duck from 25 ducks is 0.24.</p> <p>a. How many are <i>not</i> winning ducks?</p> <p>b. Describe the likelihood of <i>not</i> choosing a winning duck.</p>	

**Homework
10.2 Practice A
#13**



19. DODECAHEDRON A dodecahedron has twelve sides numbered 1 through 12. Find the probability and describe the likelihood of each event.

- a. Rolling a number less than 9
- b. Rolling a multiple of 3
- c. Rolling a number greater than 6

A Punnett square is a grid used to show possible gene combinations for the offspring of two parents. In the Punnett square shown, a boy is represented by XY. A girl is represented by XX.

20. Complete the Punnett square.

21. Explain why the probability of two parents having a boy or having a girl is equally likely.

		Mother's Genes	
		X	X
Father's Genes	X	XX	
	Y		

The local weather report stated there is a $\frac{2}{3}$ chance of rain on Friday. How likely is it to rain?

- A. certain
- B. likely
- C. unlikely
- D. impossible

The weather report stated there is a $\frac{2}{3}$ chance of rain on Friday, but it is more likely to rain on Saturday than on Friday.

What is a possible probability of rain on Saturday as a percentage?

The local weather report states that there is more than a $\frac{2}{3}$ chance of rain for Saturday.

What is the likelihood that it will rain on Saturday?

- A It is certain to rain on Saturday.
- B It is likely to rain on Saturday.
- C It is neither likely nor unlikely to rain on Saturday.
- D It is impossible that it will rain on Saturday.

A bag contains 3 red marbles and 6 blue marbles.

What is the probability of randomly selecting a red marble from the bag?

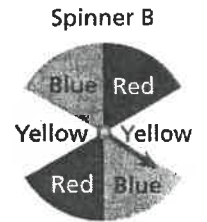
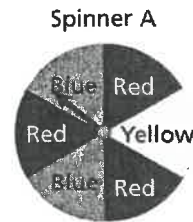
Select all situations that describe a probability of $\frac{1}{6}$ of drawing a red marble out of the bag.

- 1 red, 6 yellow, 6 green, 6 blue, 6 white
- 3 red, 4 yellow, 4 green, 4 blue, 3 white
- 4 red, 5 yellow, 5 green, 4 blue, 6 white
- 6 red, 6 yellow, 6 green, 6 blue, 6 white
- 6 red, 4 yellow, 8 green, 6 blue, 12 white

10.2 Practice A

You are playing a game using the spinners shown.

1. You want to spin red. Which spinner should you spin? Explain.
2. You want to spin yellow. Which spinner should you spin? Explain.
3. You want to spin blue. Does it matter which spinner you spin? Explain.






Describe the likelihood of the event given its probability.

4. The probability that it will snow today is zero.
5. You make a free throw 70% of the time.
6. Your band marches in $\frac{1}{6}$ of the parades.

You randomly choose one song from a collection of 4 country songs, 2 jazz songs, 3 rock songs, and 1 pop song. Find the probability of the event.

7. Choosing a jazz song
8. Choosing a pop song
9. *Not* choosing a country song
10. Choosing a blues song
11. Your football team has a 75% chance of winning a game. Your team is scheduled to play 16 games. Estimate how many games your team will win.
12. In a classroom, the probability that the teacher chooses a boy from 20 students is 0.45.
 - a. How many students are *not* boys?
 - b. Describe the likelihood of *not* choosing a boy.
13. A box contains ten slips of paper numbered 1 through 10. Find the probability and describe the likelihood of each event.
 - a. Choosing a number greater than 2
 - b. Choosing a number that is a multiple of 2
 - c. Choosing a number that is less than 10

MAFS.7.SP.3.6	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. For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times
Essential Question	How can you use relative frequencies to find probabilities? <i>In this lesson I will learn how to find experimental and theoretical probabilities of events so I can describe or predict outcomes.</i>
10.3 Experimental and Theoretical Probability	<p>When you conduct an experiment, the relative frequency of an event is the fraction or percent of the time that the event occurs.</p> $\text{relative frequency} = \frac{\text{number of times the event occurs}}{\text{total number of times you conduct the experiment}}$
	<p> Key Idea</p> <p>Experimental Probability Probability that is based on repeated trials of an experiment is called experimental probability.</p> $P(\text{event}) = \frac{\text{number of times the event occurs}}{\text{total number of trials}}$
	<p> Key Idea</p> <p>Theoretical Probability When all possible outcomes are equally likely, the theoretical probability of an event is the ratio of the number of favorable outcomes to the number of possible outcomes.</p> $P(\text{event}) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$
	<p> Vocabulary and Concept Check</p> <ol style="list-style-type: none"> VOCABULARY Describe how to find the experimental probability of an event. REASONING You flip a coin 10 times and find the experimental probability of flipping tails to be 0.7. Does this seem reasonable? Explain. VOCABULARY An event has a theoretical probability of 0.5. What does this mean? OPEN-ENDED Describe an event that has a theoretical probability of $\frac{1}{4}$. LOGIC A pollster surveys randomly selected individuals about an upcoming election. Do you think the pollster will use experimental probability or theoretical probability to make predictions? Explain.

Use the bar graph to find the relative frequency of the event.

6. Spinning a 6

7. Spinning an even number

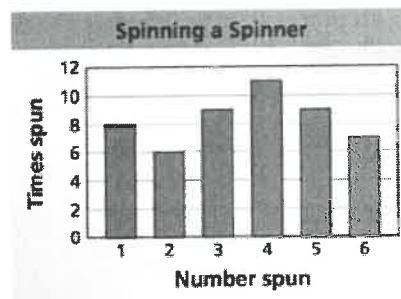
Use the bar graph to find the experimental probability of the event.

8. Spinning a number less than 3

9. Not spinning a 1

10. Spinning a 1 or a 3

11. Spinning a 7



12. **EGGS** You check 20 cartons of eggs. Three of the cartons have at least one cracked egg. What is the experimental probability that a carton of eggs has at least one cracked egg?

13. **BOARD GAME** There are 105 lettered tiles in a board game. You choose the tiles shown. How many of the 105 tiles would you expect to be vowels?



14. **CARDS** You have a package of 20 assorted thank-you cards. You pick the four cards shown. How many of the 20 cards would you expect to have flowers on them?



Use the spinner to find the theoretical probability of the event.

15. Spinning red

16. Spinning a 1

17. Spinning an odd number

18. Spinning a multiple of 2

19. Spinning a number less than 7

20. Spinning a 9

21. **LETTERS** Each letter of the alphabet is printed on an index card. What is the theoretical probability of randomly choosing any letter except Z?

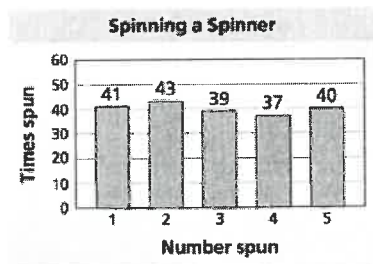
22. GAME SHOW On a game show, a contestant randomly chooses a chip from a bag that contains numbers and strikes. The theoretical probability of choosing a strike is $\frac{3}{10}$. The bag contains 9 strikes. How many chips are in the bag?

23. MUSIC The theoretical probability that a pop song plays on your MP3 player is 0.45. There are 80 songs on your MP3 player. How many of the songs are pop songs?

24. MODELING There are 16 females and 20 males in a class.

- What is the theoretical probability that a randomly chosen student is female?
- One week later, there are 45 students in the class. The theoretical probability that a randomly chosen student is a female is the same as last week. How many males joined the class?

The bar graph shows the results of spinning the spinner 200 times. Compare the theoretical and experimental probabilities of the event.



25. Spinning a 4

26. Spinning a 3

27. Spinning a number greater than 4

28. Should you use *theoretical* or *experimental* probability to predict the number of times you will spin a 3 in 10,000 spins?



You spin the spinner once. Find the theoretical probability of the event.

29. Spinning a 5

30. Spinning an odd number

You throw two sticks 15 times and record the results. Use the table to find the experimental probability of the event.

Outcome	Frequency
2 blue	4
2 pink	3
1 blue, 1 pink	8

31. Tossing 2 blue

32. Tossing 1 blue and 1 pink

33. *Not* tossing all blue

A chocolate company selects 50 random packages to check their weight. It finds that 2 packages have an incorrect weight.

How many packages out of 2000 should the company predict have an incorrect weight?

A chocolate company produces 2 types of chocolate: type A and type B. The company selects 25 random packages of each type to check their weight and finds that one package of type A has an incorrect weight and 3 packages of type B have an incorrect weight.

How many packages should the company predict have an incorrect weight when it checks 2000 of each type?

A company plans to ship 2000 packages of chocolate. The company randomly selects 100 packages and finds that five packages have an incorrect weight.

Based on this data, how many packages out of the 2000 should be predicted to have an incorrect weight?

A spinner is divided into equal parts 1 – 5. George spun the spinner 300 times. A table of outcomes is shown.

Part	Times Spun
1	42
2	66
3	63
4	72
5	57

Based on the table, what is an estimated probability of the spinner landing on an even number?

A spinner is divided into blue, green, and red parts. George spins the spinner 300 times. A table of outcomes is shown.

Part	Times Spun
Blue	91
Green	107
Red	102

Based on this data, what is the estimated probability of the spinner landing on red?

A bag contains 4 red, 4 blue, 4 green, and 4 yellow marbles. A marble is randomly pulled from the bag and replaced seven times. The table shows the outcome of the experiment.

Trial	Outcome
1	Yellow
2	Blue
3	Yellow
4	Red
5	Blue
6	Yellow
7	Yellow

Which marble color's observed frequency is closest to its expected frequency?

- A red
- B blue
- C green
- D yellow

Tony has a bucket filled with green, blue, yellow, and red markers. He removes 3 markers from the bucket, with replacement.

Select all the outcomes that are possible.

- All of the markers removed are the same color.
- Only 1 marker of each color is removed.
- There are equal numbers of green and blue markers removed.
- There are equal numbers of red and yellow markers removed.
- There are only 2 colors of markers removed, and they were removed an equal number of times.

10.3

Practice A

You have two sticks. Each stick has one blue side and one pink side. You throw the sticks 10 times and record the results. Use the table to find the experimental probability of the event.

Outcome	Frequency
2 blue	1
2 pink	3
1 blue, 1 pink	6



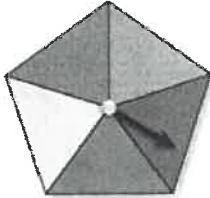

1. Tossing 2 pink
2. Tossing 1 blue and 1 pink
3. *Not* tossing all pink
4. You check 15 bananas. Six of the bananas are bruised.
 - a. What is the experimental probability that a banana is bruised?
 - b. What is the experimental probability that a banana is *not* bruised?
5. Sixteen students have cell phones. Five of the cell phones have touch screens.
 - a. What is the experimental probability that a student's cell phone has a touch screen?
 - b. Out of 144 students' cell phones, how many would you expect to have touch screens?

You flip a coin twice. You repeat this process 12 times. The table gives the results.

Outcome	Frequency
2 Heads	2
1 Head, 1 Tail	7
2 Tails	3

6. Use the first table to find the experimental probability of each outcome.
7. Based upon experimental probability, which outcome is most likely?
8. The second table gives the possible outcomes of flipping a coin twice. Each of these outcomes is equally likely. What is the theoretical probability of flipping 1 tail?
9. Compare your answers to Exercises 7 and 8.

1st Flip	2nd Flip
Head	Head
Head	Tail
Tail	Head
Tail	Tail

MAFS.7.SP.3.8	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.
Essential Question	How can you find the number of possible outcomes of one or more events? <i>In this lesson I will learn how to find the probability of compound events so I can predict outcomes.</i>
10.4 Compound Events	<p>The set of all possible outcomes of one or more events is called the sample space.</p> <p>You can use tables and tree diagrams to find the sample space of two or more events.</p>
	<p>Another way to find the total number of possible outcomes is to use the Fundamental Counting Principle.</p>
	<p> Key Idea</p> <p>Fundamental Counting Principle An event M has m possible outcomes. An event N has n possible outcomes. The total number of outcomes of event M followed by event N is $m \times n$.</p>
	<p>A compound event consists of two or more events. As with a single event, the probability of a compound event is the ratio of the number of favorable outcomes to the number of possible outcomes.</p>
	<p> Vocabulary and Concept Check</p> <ol style="list-style-type: none"> VOCABULARY What is the sample space of an event? How can you find the sample space of two or more events? WRITING Explain how to use the Fundamental Counting Principle. WRITING Describe two ways to find the total number of possible outcomes of spinning the spinner and rolling the number cube. OPEN-ENDED Give a real-life example of a compound event. <div style="display: flex; justify-content: space-around; align-items: center;">   </div>
<p>Homework 10.3 ext. Practice #1-6</p>	<p>5. COMBINATIONS The lock is numbered from 0 to 49. Each combination uses three numbers in a right, left, right pattern. Find the total number of possible combinations for the lock.</p>

**Homework
10.4 Practice A
#1-2**

Use a tree diagram to find the sample space and the total number of possible outcomes.

6.

Birthday Party	
Event	Miniature golf, Laser tag, Roller skating
Time	1:00 P.M.–3:00 P.M., 6:00 P.M.–8:00 P.M.

7.

New School Mascot	
Type	Lion, Bear, Hawk, Dragon
Style	Realistic, Cartoon

**Homework
10.4 Practice A
#3-4**

Use the Fundamental Counting Principle to find the total number of possible outcomes.

8.

Beverage	
Size	Small, Medium, Large
Flavor	Root beer, Cola, Diet cola, Iced tea, Lemonade, Water, Coffee

9.

MP3 Player	
Memory	2 GB, 4 GB, 8 GB, 16 GB
Color	Silver, Green, Blue, Pink, Black

10.

Clown	
Suit	Dots, Stripes, Checkers board
Wig	One color, Multicolor
Talent	Balloon animals, Juggling, Unicycle, Magic

11.

Meal	
Appetizer	Nachos, Soup, Spinach dip, Salad, Fruit
Entrée	Chicken, Beef, Spaghetti, Fish
Dessert	Cake, Cookies, Ice cream

12. **NOTE CARDS** A store sells three types of note cards. There are three sizes of each type. Show two ways to find the total number of note cards the store sells.

**Homework
10.4 Practice A
#5**

13. **ERROR ANALYSIS** A true-false quiz has five questions. Describe and correct the error in using the Fundamental Counting Principle to find the total number of ways that you can answer the quiz.



$$2 + 2 + 2 + 2 + 2 = 10$$

You can answer the quiz in 10 different ways.



14. **CHOOSE TOOLS** You randomly choose one of the marbles. Without replacing the first marble, you choose a second marble.

- a. Name two ways you can find the total number of possible outcomes.
- b. Find the total number of possible outcomes.

You spin the spinner and flip a coin. Find the probability of the compound event.

15. Spinning a 1 and flipping heads
16. Spinning an even number and flipping heads
17. Spinning a number less than 3 and flipping tails
18. Spinning a 6 and flipping tails
19. *Not* spinning a 5 and flipping heads
20. Spinning a prime number and *not* flipping heads



You spin the spinner, flip a coin, then spin the spinner again. Find the probability of the compound event.



21. Spinning blue, flipping heads, then spinning a 1
22. Spinning an odd number, flipping heads, then spinning yellow
23. Spinning an even number, flipping tails, then spinning an odd number
24. *Not* spinning red, flipping tails, then *not* spinning an even number

25. **TAKING A TEST** You randomly guess the answers to two questions on a multiple-choice test. Each question has three choices: A, B, and C.

- a. What is the probability that you guess the correct answers to both questions?
- b. Suppose you can eliminate one of the choices for each question. How does this change the probability that your guesses are correct?

26. You have 160 songs on your MP3 player. The probability of randomly choosing a rock song is 30%. How many of the songs on your MP3 player are *not* rock songs?

27. Your bike lock has 4 digits numbered 0 to 9. Find the total number of possible combinations for the lock.

10.4 Practice A

Use a tree diagram to find the sample space and the total number of possible outcomes.

1.

Pet	
Animal	Hamster, Guinea Pig, Snake
Name	Lucky, Shadow, Smokey, Max

2.

Ice Cream	
Cone	Waffle, Sugar
Flavor	Chocolate, Vanilla, Strawberry

Use the Fundamental Counting Principle to find the total number of possible outcomes.





3.




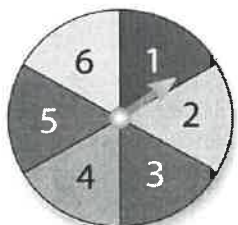
Pizza	
Size	Small, Medium, Large
Crust	Thin, Thick, Regular

4.

Car	
Transmission	Automatic, Manual
Doors	2-door, 4-door
Color	Red, Blue, Black, White

5. You are taking a true-false test that has 10 questions. Assuming you answer every question, in how many different ways can the test be completed?
6. A game system allows players to design a personal picture. Each picture is designed by choosing from male or female, 8 face shapes, 48 eyes, 12 noses, 24 mouths, and 82 hair styles. How many different pictures are possible?

MAFS.7.SP.3.8	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.
Essential Question	What is the difference between dependent and independent events? <i>In this lesson I will learn how to find the probability of dependent and independent events.</i>
<p>10.5 Independent and Dependent Events</p>	<p> Key Idea</p> <p>Probability of Independent Events</p> <p>Words The probability of two or more independent events is the product of the probabilities of the events.</p> <p>Symbols $P(A \text{ and } B) = P(A) \cdot P(B)$ $P(A \text{ and } B \text{ and } C) = P(A) \cdot P(B) \cdot P(C)$</p> <p>Compound events may be <i>independent events</i> or <i>dependent events</i>. Events are independent events if the occurrence of one event <i>does not</i> affect the likelihood that the other event(s) will occur.</p>
	<p> Key Idea</p> <p>Probability of Dependent Events</p> <p>Words The probability of two dependent events <i>A</i> and <i>B</i> is the probability of <i>A</i> times the probability of <i>B</i> after <i>A</i> occurs.</p> <p>Symbols $P(A \text{ and } B) = P(A) \cdot P(B \text{ after } A)$</p> <p>Events are dependent events if the occurrence of one event <i>does</i> affect the likelihood that the other event(s) will occur.</p>
	<p> Vocabulary and Concept Check</p> <p>1. DIFFERENT WORDS, SAME QUESTION You randomly choose one of the chips. Without replacing the first chip, you choose a second chip. Which question is different? Find “both” answers.</p>  <p>What is the probability of choosing a 1 and then a blue chip? _____</p> <p>What is the probability of choosing a 1 and then an even number? _____</p> <p>What is the probability of choosing a green chip and then a chip that is <i>not</i> red? _____</p> <p>What is the probability of choosing a number less than 2 and then an even number? _____</p> <p>2. WRITING How do you find the probability of two events <i>A</i> and <i>B</i> when <i>A</i> and <i>B</i> are independent? dependent?</p>
<p>Homework 10.5 Practice A #1-2</p>	<p>Tell whether the events are <i>independent</i> or <i>dependent</i>. Explain.</p> <p>3. You roll a 4 on a number cube. Then you roll an even number on a different number cube.</p> <p>4. You randomly draw a lane number for a 100-meter race. Then your friend randomly draws a lane number for the same race.</p>

<p>Homework 10.5 Practice A #3-4</p>	<p>You spin the spinner and flip a coin. Find the probability of the compound event.</p> <ol style="list-style-type: none"> Spinning a 3 and flipping heads Spinning an even number and flipping tails Spinning a number greater than 1 and flipping tails Not spinning a 2 and flipping heads 
<p>Homework 10.5 Practice A #5-6</p>	<p>You randomly choose one of the tiles. Without replacing the first tile, you choose a second tile. Find the probability of the compound event.</p>  <ol style="list-style-type: none"> Choosing a 5 and then a 6 Choosing an odd number and then a 20 Choosing a number less than 7 and then a multiple of 4 Choosing two even numbers
	<p>13. ERROR ANALYSIS Describe and correct the error in finding the probability.</p>  <div style="border: 1px solid gray; padding: 5px; margin-left: 20px;"> <p>X You randomly choose one of the marbles. Without replacing the first marble, you choose a second marble. What is the probability of choosing red and then green?</p> $P(\text{red and green}) = \frac{1}{4} \cdot \frac{1}{4} = \frac{1}{16}$ </div>
	<p>A game has a deck of cards with 10 red cards, 4 blue cards, and 2 yellow cards. You randomly choose two cards. Find the probability of choosing the given cards.</p> <ol style="list-style-type: none"> two red cards a blue card and a yellow card
	<p>You spin the spinner twice. Find the probability of the event.</p> <ol style="list-style-type: none"> Spinning a 3 then a 4 Spinning a 2 then a number greater than 2 Describe the likelihood of spinning an odd number then an even number. 
	<p>19. Your drawer contains 6 black socks and 8 white socks. You randomly choose two socks. What is the probability that both socks are black?</p>

A **simulation** is an experiment that is designed to reproduce the conditions of a situation or process. Simulations allow you to study situations that are impractical to create in real life.

Tony has a bucket filled with 10 green, 3 blue, 1 red, and 7 yellow tennis balls. He removes 4 tennis balls from the bucket, without replacement.

Which of the following outcomes could represent this selection?

- A. All of the tennis balls are blue.
- B. There is 1 tennis ball of each color.
- C. There are exactly 3 green tennis balls.
- D. There are more red tennis balls removed than other colors.
- E. The number of red tennis balls is the same as the number of blue tennis balls.

A bucket contains 5 green tennis balls and 2 yellow tennis balls. Tony removes 2 tennis balls, with replacement, from the bucket shown.



What is the probability that Tony will choose a yellow tennis ball and then a green tennis ball?

A bucket contains 5 green tennis balls, 2 yellow tennis balls, and 6 red tennis balls. Tony removes 3 tennis balls, with replacement, from the bucket shown.



What is the probability that the first tennis ball is yellow, the second tennis ball is green, and the third tennis ball is red?

A bucket contains 5 green tennis balls, 2 yellow tennis balls, 6 red tennis balls, and 8 blue tennis balls. Tony removes 3 tennis balls, without replacement, from the bucket shown.



What is the probability that Tony removes 1 yellow, 1 green, and 2 blue tennis balls?

10.5

Practice A

Tell whether the events are *independent* or *dependent*. Explain.

1. You spin a spinner twice.

First Spin: You spin a 2.

Second Spin: You spin an odd number.

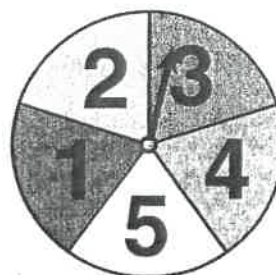
2. Your committee is voting on the leadership team.

First Vote: You vote for a president.

Second Vote: You vote for a vice president.

You spin the spinner and flip a coin. Find the probability of the compound event.

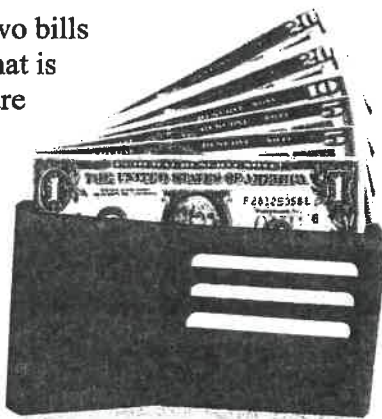
3. Spinning an odd number and flipping heads
4. *Not* spinning a 5 and flipping tails



You randomly choose one of the tiles. Without replacing the first tile, you choose a second tile. Find the probability of the compound event.





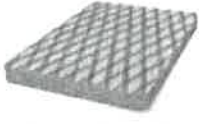


5. Choosing a 6 and then a prime number
6. Choosing two odd numbers
7. You randomly pull two bills from your wallet. What is the probability they are both \$20?



You roll a number cube twice. Find the probability of the compound event.

8. Rolling two numbers whose sum is 2
9. Rolling an even number and then an odd number

<p>MAFS.7.SP.1.1</p> <p>MAFS.7.SP.1.2</p>	<p>Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.</p> <p>Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.</p>
<p>Essential Question</p>	<p>How can you determine whether a sample accurately represents a population? <i>In this lesson I will learn what makes a sample an accurate representation of a population.</i></p>
<p>10.6 Samples and Populations</p>	<p>A population is an entire group of people or objects. A sample is a part of the population. You can use a sample to make an <i>inference</i>, or conclusion, about a population.</p>
	<p>An unbiased sample is representative of a population. It is selected at random and is large enough to provide accurate data.</p> <p>A biased sample is not representative of a population. One or more parts of the population are favored over others.</p>
	<p> Vocabulary and Concept Check</p> <ol style="list-style-type: none"> VOCABULARY Why would you survey a sample instead of a population? CRITICAL THINKING What should you consider when conducting a survey?
<p>Homework 10.6 Practice A #1-2</p>	<p>Identify the population and the sample.</p> <p>3. Residents of New Jersey  Residents of Ocean County </p> <p>4.   4 cards All cards in a deck</p>
	<p>Determine whether the sample is <i>biased</i> or <i>unbiased</i>. Explain.</p> <p>5. You want to estimate the number of students in your school who play a musical instrument. You survey the first 15 students who arrive at a band class.</p>
	<p>6. You want to estimate the number of books students in your school read over the summer. You survey every fourth student who enters the school.</p>
	<p>7. You want to estimate the number of people in a town who think that a park needs to be remodeled. You survey every 10th person who enters the park.</p>

Determine whether the conclusion is valid. Explain.

8. You want to determine the number of students in your school who have visited a science museum. You survey 50 students at random. Twenty have visited a science museum, and thirty have not. So, you conclude that 40% of the students in your school have visited a science museum.
9. You want to know how the residents of your town feel about building a new baseball stadium. You randomly survey 100 people who enter the current stadium. Eighty support building a new stadium, and twenty do not. So, you conclude that 80% of the residents of your town support building a new baseball stadium.

**Homework
10.6 Practice A
#4-6**

Which sample is better for making a prediction? Explain.

10. **Predict the number of students in a school who like gym class.**

Sample A | A random sample of 8 students from the yearbook

Sample B | A random sample of 80 students from the yearbook

11. **Predict the number of defective pencils produced per day.**

Sample A | A random sample of 500 pencils from 20 machines

Sample B | A random sample of 500 pencils from 1 machine

12. **FOOD** You ask 125 randomly chosen students to name their favorite food. There are 1500 students in the school. Predict the number of students in the school whose favorite food is pizza.

Favorite Food

Pizza	58
Hamburger	36
Pasta	14
Other	17

**Homework
10.6 Practice A
#6-8**

Determine whether you would survey the population or a sample. Explain.

13. You want to know the average height of seventh graders in the United States.
14. You want to know the favorite types of music of students in your homeroom.
15. You want to know the number of students in your state who have summer jobs.

Theater Ticket Sales	
Adults	Students
522	210

Adults	Students
522	210

16. **THEATER** You survey 72 randomly chosen students about whether they are going to attend the school play. Twelve say yes. Predict the number of students who attend the school.

A middle school has

- 220 students in grade 6;
- 170 students in grade 7; and
- 100 students in grade 8.

The media specialist wants to know which books are the most popular among the students in her school. Since she cannot ask all the students, she will survey a group of them.

Which sample can best help the media specialist draw conclusions about the preferences of all the students in the school?

- A. 45 sixth graders, 35 seventh graders, 20 eighth graders
- B. 20 sixth graders, 35 seventh graders, 45 eighth graders
- C. 45 sixth graders, 45 seventh graders, 45 eighth graders
- D. 20 sixth graders, 20 seventh graders, 20 eighth graders

A company has three sales departments (local, regional, and national) at each of several locations across the United States. Each local sales department has 120 employees. The company wants to survey its employees to determine the most effective sales method.

Which sample should the company use to arrive at the most reliable conclusion?

- (A) 24 employees from one sales department at one location
- (B) 24 employees from one sales department at each location
- (C) 24 employees from each sales department at one location
- (D) 24 employees from each sales department at each location

10.6 Practice A

Identify the population and the sample.

1. All students in a school
30 students in the school
2. 75 strawberries in the field
All the strawberries in the field
3. You want to know the number of students in your school who read some of the newspaper at least once a week. You survey 30 random students that you meet in the hallway between classes.
 - a. What is the population of your survey?
 - b. What is the sample of your survey?
 - c. Is the sample biased or unbiased? Explain.

Which sample is better for making a prediction? Explain.

4.

Predict the number of residents in St. Lucie County who own a home.	
Sample A	A random sample of 100 residents in the county
Sample B	A random sample of 100 residents in the city of Fort Pierce
5.

Predict the number of people at a beach who are wearing sunscreen.	
Sample A	A random sample of 50 people at the beach
Sample B	A random sample of 5 people at the beach


Determine whether you would survey the population or a sample. Explain.

6. You want to know the average weight of the members of your family.
7. You want to know the number of grocery stores in Florida that carry your favorite cereal.
8. A survey asked 60 randomly chosen students if they eat school lunch. Forty said yes. There were 560 school lunches sold today. Predict the number of students who attend the school.

MAFS.7.SP.2.3	Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.
MAFS.7.SP.2.4	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.

Essential Question How can you compare data sets that represent two populations?
In this lesson I will learn how to compare data sets using measures of center and variation.

**10.7
Comparing
Populations**

 **Vocabulary and Concept Check**

- REASONING** When comparing two populations, when should you use the mean and the MAD? the median and the IQR?
- WRITING** Two data sets have similar variabilities. Suppose the measures of center of the data sets differ by 4 times the measure of variation. Describe the visual overlap of the data.

**Homework
10.7 Practice A
#1**

3. SNAKES The tables show the lengths of two types of snakes at an animal store.

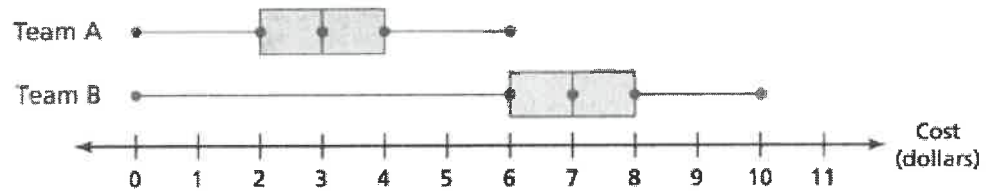
Garter Snake Lengths (inches)					
26	30	22	15	21	24
28	32	24	25	18	35

Water Snake Lengths (inches)					
34	25	24	35	40	32
41	27	37	32	21	30

- Find the mean, median, mode, range, interquartile range, and mean absolute deviation for each data set.
- Compare the data sets.

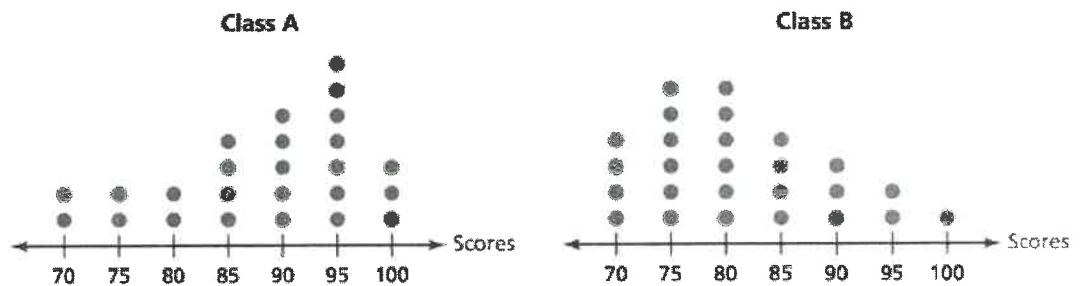
**Homework
10.7 Practice A
#2**

4. HOCKEY The double box-and-whisker plot shows the goals scored per game by two hockey teams during a 20-game season.



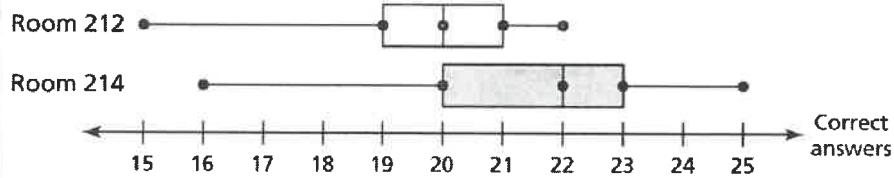
- Compare the populations using measures of center and variation.
- Express the difference in the measures of center as a multiple of the measure of variation.

5. TEST SCORES The dot plots show the test scores for two classes taught by the same teacher.



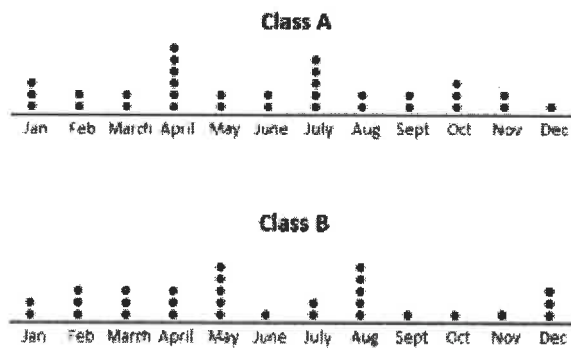
- Compare the populations using measures of center and variation.
- Express the difference in the measures of center as a multiple of each measure of variation.

6. The double box-and-whisker plot shows the numbers of correct answers on a test for each student in Room 212 and Room 214.



- Compare the populations using measures of center and variation.
- Express the difference in the measures of center as a multiple of each measure of variation.

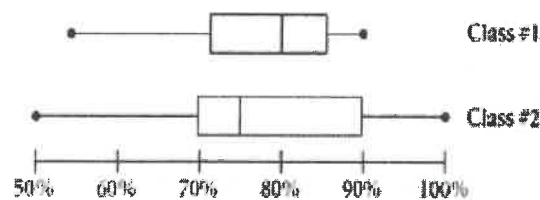
Dot plots for the birthdays of the students in two classes are shown.



Which measure do both classes have in common?

- mean
- median
- mode
- interquartile range

Box plots for chapter 6 test scores of two classes are shown.



What is the difference in the mean between the two sets of data?

10.7

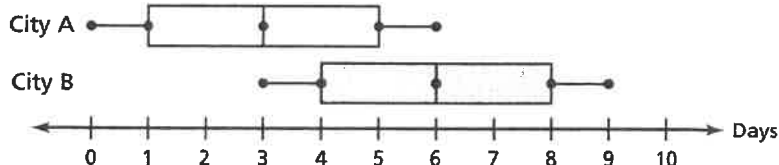
Practice A

1. The tables show the ages of the players on two basketball teams.

Varsity Team Ages					
18	16	17	16	18	17
19	18	18	18	18	17

Junior Varsity Team Ages					
16	17	15	16	17	15
18	14	17	16	17	17

- Find the mean, median, mode, range, interquartile range, and mean absolute deviation for each data set.
 - Compare the data sets.
 - When comparing the two populations using measures of center and variance, would you use the mean and the MAD, or the median and the IQR? Explain.
 - Express the difference in the measures of center as a multiple of the measure of variation.
2. The double box-and-whisker plot shows the number of inches of snow per week in two cities in a 16-week period.



- Compare the populations using measures of center and variation.
- Express the difference in the measures of center as a multiple of the measure of variation.

**Chapter
10**

Take Home Quiz #1

For use after Section 10.5

You randomly choose one of the tiles shown. Find the number of ways the event can occur.

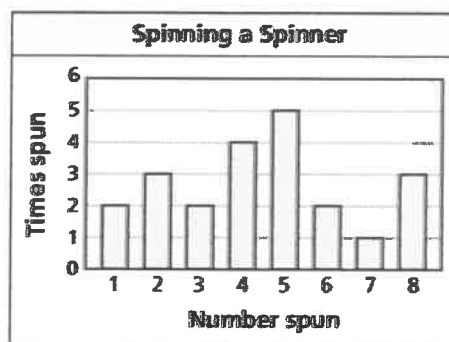


1. Choosing an even number
2. Choosing a number divisible by 6
3. Choosing a number greater than 7

You randomly choose a marble from a jar. The jar contains 4 red marbles, 10 blue marbles, 7 green marbles, and 6 yellow marbles. Find the probability of the event.

4. Choosing a green marble
5. *Not* choosing a blue marble
6. Choosing a yellow marble

Use the bar graph to find the experimental probability of the event.



7. Spinning a 3
8. Spinning a multiple of 4
9. Spinning a 5 or 7
10. Spinning a number greater than 3

Use the Fundamental Counting Principle to find the total number of possible outcomes.

11.

Milkshake	
Size	Small, Medium, Large
Flavor	Vanilla, Chocolate, Strawberry, Mocha, Caramel

12.

Movies	
Genre	Comedy, Drama, Action, Thriller, Adventure, Science Fiction
Place	Theater, Home

13. There are 64 cookies in a jar. The probability of randomly choosing an oatmeal cookie from the jar is 37.5%. How many of the cookies are *not* oatmeal cookies?
14. You roll a number cube and flip a coin. Find the probability of rolling a 3 and flipping tails.

Answers

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____

**Chapter
10**

Take Home Quiz #2
For use after Section 10.7

Determine whether the sample is *biased* or *unbiased*. Explain.

Answers

1. You want to estimate the number of students in your grade who choose math as their favorite subject. You survey 10 of your close friends.
2. You want to estimate the number of people in a town in favor of a proposed curfew law. You survey every fifth person who enters a post office.
3. Which sample is better for making a prediction? Explain.

1. _____

2. _____

Predict the percentage of English-speaking people in the world	
Sample A	A random sample of 100,000 people from the U.S.
Sample B	A random sample of 100,000 people all across the world

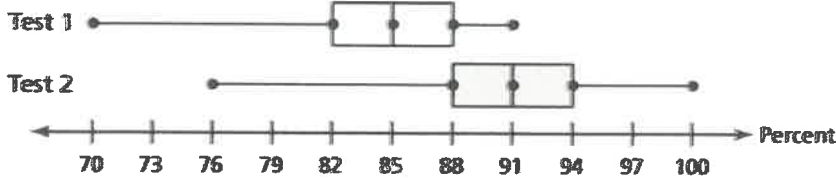
4. You want to know how the residents of your town feel about a Laundromat going out of business. You survey 100 people who enter the Laundromat. Ninety are disappointed about the closing, and ten are not. So, you conclude that 90% of the residents of your town are disappointed about the Laundromat going out of business. Determine whether the conclusion is valid. Explain.
5. Of the 40 randomly chosen students surveyed, 27 are involved in extracurricular activities at school. There are 680 students in the school. Predict the number of students in the school who are involved in extracurricular activities.
6. The double box-and-whisker plot shows the scores of two tests.

3. _____

4. See left.

5. _____

6. a. See left.
 b. _____



- a. Compare the populations using measures of center and variation.
- b. Express the difference in the measures of center as a multiple of the measure of variation.

**Chapter
10**

Ms. Abadie's Test Review

You randomly choose one marble from the jar.
Find the theoretical probability of the event.

1. Choosing a blue marble
2. Choosing a green marble
3. *Not* choosing a red marble



6 blue
4 red
2 green

You toss two dimes 24 times and record the results. Use the table to find the experimental probability of the event.

4. Tossing two tails
5. Tossing one head and one tail
6. *Not* tossing two heads
7. Tossing all heads or all tails

Outcome	Frequency
head and head	4
head and tail	15
tail and tail	5

8. A factory produces 90 pairs of designer jeans. An inspector randomly chooses 6 pairs of jeans and discovers that 1 of the pairs of jeans is defective.
 - a. What is the experimental probability that a pair of jeans inspected will be defective?
 - b. How many of the 90 pairs of jeans would you expect to be defective?

Use the Fundamental Counting Principle to find the total number of possible outcomes.

9.

Shirts	
Style	Short-Sleeved, Long-Sleeved, Sweatshirt
Size	Small, Medium, Large, Extra Large

10.

Sports	
Location	Gym, Park, Beach
Activity	Volleyball, Soccer, Frisbee, Flag-Football, Running, Bike Riding

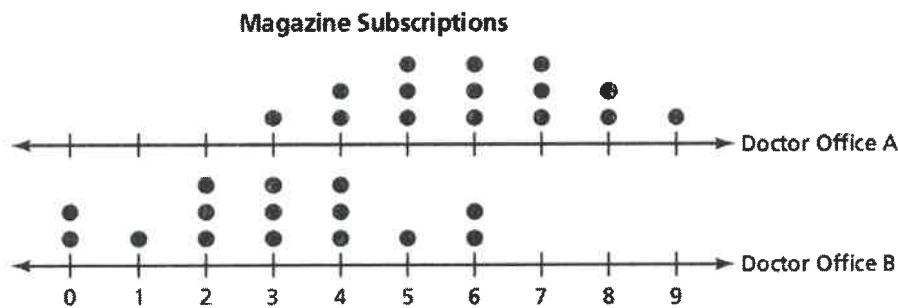
You roll a number cube twice. Find the probability of the event.

11. Rolling a 4 then an even number
12. Rolling a 3 then a 3
13. Rolling a number less than 1 and then a number less than 2

**Chapter
10**

14. The cooler contains 10 grape juice bottles and 15 cranberry juice bottles. You randomly choose two bottles. What is the probability that both bottles are cranberry juice?
15. You flip a coin and you roll a number cube. What is the probability that you flip heads and roll a number less than 3?
16. Which sample is better for making a prediction? Explain.
 Sample A: A random sample of 10 customers leaving a store
 Sample B: A random sample of 100 customers leaving a store
17. You want to know the number of students in your school that have a January birthday. You survey the students in your math class. Three students have a January birthday, and 32 do not. So, you conclude that about 8.6% of the students in your school have a January birthday. Determine whether the conclusion is valid. Explain.

18. The double dot plot shows the numbers of magazine subscriptions of two doctor's offices for the past 15 years.



- a. Compare the populations using measures of center and variation.
- b. Express the difference in the measures of center as a multiple of each measure of variation.