Mad Minute Averages

Name Date

Mon.	Mon.	Mon.	Mon.
Tues.	Tues.	Tues.	Tues.
Wed.	Wed.	Wed.	Wed.
Thurs.	Thurs.	Thurs.	Thurs.
Fri.	Fri.	Fri.	Fri.

Mon.	Mon.	Mon.	Mon.
Tues.	Tues.	Tues.	Tues.
Wed.	Wed.	Wed.	Wed.
Thurs.	Thurs.	Thurs.	Thurs.
Fri.	Fri.	Fri.	Fri.

Mon.	Tues.	Wed.	Thurs.	Fri.
Mon.	Tues.	Wed.	Thurs.	Fri.

Week	Average	Parent Signature	Week	Average	Parent Signature
one			six		
two			seven		
three			eight		
four			nine		
five			ten		

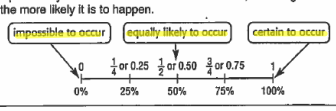
11-1

NAME _____ DATE _____ PERIOD ____

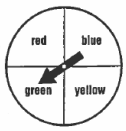
Study Guide and Intervention

Theoretical Probability

When tossing a coin, there are two possible **outcomes**, heads and tails. Suppose you are looking for heads. If the coin lands on heads, this would be a favorable outcome or **event**. The chance that some event will happen (in this case, getting heads) is called **theoretical probability**. You can use a ratio to find probability. The probability of an event is a number from 0 to 1, including 0 and 1. The closer a probability is to 1, the more likely it is to happen.



EXAMPLE 1 **There are four equally likely outcomes on the spinner. Find the probability of spinning green or blue.**



$$P(\text{green or blue}) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$$

$$= \frac{2}{4} \text{ or } \frac{1}{2}$$

The probability of landing on green or blue is $\frac{1}{2}$, 0.50, or 50%.

Lesson 11–1

Complementary events are two events in which either one or the other must happen, but both cannot happen at the same time. The sum of the probabilities of complementary events is 1.

EXAMPLE 2 **There is a 25% chance that Sam will win a prize. What is the probability that Sam will not win a prize?**

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

$0.25 + P(\text{not win}) = 1$ Replace $P(\text{win})$ with 0.25.

$-0.25 \quad = -0.25$ Subtract 0.25 from each side.

$P(\text{not win}) = 0.75$

So, the probability that Sam won't win a prize is 0.75, 75%, or $\frac{3}{4}$.

EXERCISES

1. There is a 90% chance that it will rain. What is the probability that it will not rain?

One pen is chosen without looking from a bag that has 3 blue pens, 6 red, and 3 green. Find the probability of each event. Write each answer as a fraction, a decimal, and a percent.

2. $P(\text{green})$ 3. $P(\text{blue or red})$ 4. $P(\text{yellow})$

NAME _____ DATE _____ PERIOD ____

11-1

Practice: Word Problems

Theoretical Probability

Write each answer as a fraction, a decimal, and a percent.

PARTY For Exercises 1 and 2, the spinner shown is spun once. The spinner shows the prizes a person can win at a party.

1. What is the probability that a person will spin a cap? a whistle? a cap or yo-yo?	2. What is the probability that a person will spin a stuffed animal? Explain. What is the probability that a person will win a prize?
3. **WEATHER** The weather report says there is an 85% chance it will be very hot tomorrow. Should you get ready to use the air conditioner? Explain.	4. **EATING HABITS** 7% of Americans are vegetarians. If you ask a random person whether he or she is a vegetarian, what is the probability that the person is *not* a vegetarian? Explain.
5. **SCHOOL** Theresa is taking a multiple-choice test and does not know an answer. She can guess answer A, B, C, D, or E. What is the probability that Theresa will guess correctly? incorrectly?	6. **NUMBER CUBE** You roll a number cube. How likely is it that you will roll a number less than 1? less than 7? Explain.
7. **FOOD** Mrs. Phillips has 10 identical cans without labels. She knows that she had 1 can of peas, 5 cans of corn, 1 can of carrots, and 3 cans of beets. She opens one can. What is the probability it is carrots? corn or beets?	8. In Exercise 7, how likely is it Mrs. Phillips will open a can of corn? a can of peas? Explain.

Lesson 11–1

NAME _____ DATE _____ PERIOD ____

11-2

Study Guide and Intervention

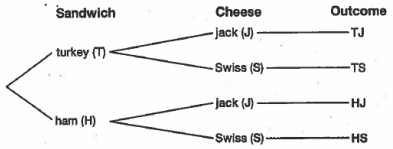
Outcomes

The set of all possible outcomes is called the **sample space.**

A **tree diagram** is a diagram used to show the total number of possible outcomes. It can be used to show the sample space. When you make a tree diagram, you have an organized list of outcomes. When you know the number of outcomes, you can easily find the probability that an event will occur.

EXAMPLE 1 **How many sandwiches are possible from a choice of turkey or ham with jack cheese or Swiss cheese?**

Draw a tree diagram.



There are four possible sandwiches.

EXAMPLE 2 **Use the tree diagram from Example 1. Find the probability of choosing a ham with jack cheese sandwich.**

The outcome column of the tree diagram shows there is one possible outcome for ham with jack cheese. There are 4 possible outcomes. So, $P(\text{ham, jack}) = \frac{1}{4}$, 0.25, or 25%.

EXERCISES

Draw a tree diagram to show the sample space for each situation. Then tell how many outcomes are possible and find the probability.

1. buy a can or a bottle of grape or orange soda
   Find P(bottle, grape).

2. toss a coin and roll a number cube
   Find P(4, tails).

3. wear jeans or shorts with a blue, white, black, or red T-shirt. Find P(jeans, white T-shirt).

NAME _____ DATE _____ PERIOD ____

11-2

Practice: Word Problems

Outcomes

1. **OUTINGS** Olivia and Candace are deciding between Italian or Chinese food and then whether to go to a movie, walk in the park, or go for a bike ride. Draw a tree diagram to show the sample space. How many choices do they have?	2. **PETS** Terence is going to get a parrot. He can choose among a yellow, green, or multi-colored female or male parrot. Draw a tree diagram showing all the ways Terence can choose. What is the probability he will choose a yellow female?
3. **CAKE** Julia is ordering a birthday cake. She can have a circular or rectangular chocolate or vanilla cake with chocolate, vanilla, or maple frosting. Draw a tree diagram showing all the possible ways Julia can order her cake. How many options does she have?	4. **GAMES** Todd plays a game in which you toss a coin and roll a number cube. Draw a tree diagram to find all possible outcomes. What is P(heads, odd number)?
5. **SCHOOL** Melissa can choose two classes. Her choices are wood shop, painting, chorus, and auto shop. List all the ways two classes can be chosen.	6. **SHOPPING** Kaya has enough allowance to purchase two new baseball caps from the five he likes. How many ways can he choose?

NAME _____ DATE _____ PERIOD ____

11-3

Study Guide and Intervention

Making Predictions

A **survey** is a method of collecting information. The group being surveyed is the **population**. To save time and money, part of the group, called a **sample**, is surveyed.

A good sample is:
- selected at **random**, or without preference,
- representative of the population, and
- large enough to provide accurate data.

EXAMPLE 1 **Every sixth student who walked into the school was asked how he or she got to school. Determine whether the sample is a good sample.**

This sample is good because it is random (every sixth student), representative of the population (students coming to school), and large enough to provide accurate information.

EXAMPLES

School Transportation	
Method	Students
walk	10
ride bike	10
ride bus	15
get ride	5

2 **Using the information from Example 1, what is the probability that a student at the school rode a bike to school?**

$$P(\text{ride bike}) = \frac{\text{number of students that rode a bike}}{\text{number of students surveyed}}$$

$$= \frac{10}{40} \text{ or } \frac{1}{4} \text{ So, } P(\text{ride bike}) = \frac{1}{4}, 0.25, \text{ or } 25\%.$$

3 **There are 360 students at the school. Predict how many bike to school.**

Write a proportion. Let s = number of students who will ride a bike.

$$\frac{10}{40} = \frac{s}{360}$$

You can solve the proportion to find that of the 360 students, 90 will ride a bike to school.

EXERCISES

Determine whether the following sample is a good sample. Explain.

1. 300 people at the opera were surveyed to find their favorite type of music.

SCHOOL Use the following information and the table shown. Every tenth student entering the school was asked which one of the four subjects was his or her favorite.

Favorite Subject	
Subject	Students
Language Arts	10
Math	10
Science	15
Social Studies	5

2. Find the probability that any student attending school prefers science.

3. There are 400 students at the school. Predict how many students would prefer science.

Lesson 11-3

NAME _____ DATE _____ PERIOD ____

11-3 Practice: Word Problems

Making Predictions

MOVIES For Exercises 1–3, use the table of results of Jeremy's survey of favorite kinds of movies.

Favorite Movie Type	Number of People
Drama	12
Foreign	3
Comedy	20
Action	15

SLEEP For Exercises 4–7, use the table of results of the Better Sleep Council's survey of Americans to find the most important factors for good sleep.

Most Important Factors for Good Sleep	
Good Mattress	32
Daily Exercise	20
Good Pillows	8
Healthy Diet	11
Other Factors	29

1. **MOVIES** How many people did Jeremy use for his sample?

2. If Jeremy were to ask any person to name his or her favorite type of movie, what is the probability that it would be comedy?

3. If Jeremy were to survey 250 people, how many would you predict would name comedy?

4. **SLEEP** Predict how many people out of 400 would say that a good mattress is the most important factor.

5. What is the probability that any person chosen at random would not say that a healthy diet is the most important factor?

6. Suppose 250 people were chosen at random. Predict the number of people that would say good pillows are the most important factor.

7. What is the probability that any person chosen at random would say that daily exercise is the most important factor for a good night sleep?

8. **ICE CREAM** Claudia went to an ice cream shop to conduct a survey. She asked every tenth person who entered the shop to name his or her favorite dessert. Did Claudia select a good sample? Explain.

Lesson 11-3

NAME _____ DATE _____ PERIOD ____

11-4 Study Guide and Intervention

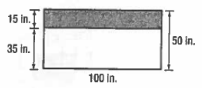
Probability and Area

Probability can be expressed as the ratio of areas.

The probability of landing in a specific region of a target is the ratio of the area of the specific region to the area of the target.

$$P(\text{specific region}) = \frac{\text{area of specific region}}{\text{area of the target}}$$

EXAMPLE 1 **Find the probability that a randomly thrown dart will land in the shaded region of the dartboard. Assume it is equally likely for a dart to land anywhere in the rectangle.**



$$P(\text{shaded region}) = \frac{\text{area of shaded region}}{\text{area of the target}}$$

Area of shaded region

$\ell \times w = 15 \times 100$

$= 1{,}500$ sq in.

Area of dartboard

$\ell \times w = 50 \times 100$

$= 5{,}000$ sq in.

$P(\text{shaded region}) = \frac{1{,}500}{5{,}000}$ or $\frac{3}{10}$

So, the probability that a randomly thrown dart will land in the shaded region is $\frac{3}{10}$, 0.30, or 30%.

EXAMPLE 2 **Predict how many times a dart will land in the shaded area above if 30 darts are randomly thrown.**

Write a proportion that compares the number of darts landing in the shaded region to the number of darts thrown. Let n = the number of darts landing in the shaded region.

$\frac{n}{30} = \frac{3}{10}$ ← darts landing in the shaded region / ← darts thrown

$n \times 10 = 30 \times 3$ Write the cross products.

$10n = 90$ Multiply.

$\frac{10n}{10} = \frac{90}{10}$ Divide each side by 10.

$n = 9$ So, if 30 darts are randomly thrown, 9 darts will land in the shaded region.

EXERCISES

Use the dartboard from Example 1.

1. What is the probability that a randomly thrown dart will land in the region that is not shaded?

2. Predict the number of darts that will land in the region that is not shaded if 40 darts are randomly thrown.

NAME _____ DATE _____ PERIOD ____

11-4

Practice: Word Problems

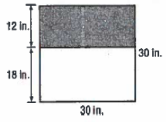
Probability and Area

GAMES For Exercises 1–5, use the following information and the game boards below.

Game Board 1 is for a beanbag toss game in which you are blindfolded and toss a beanbag at the board. The game board shows a bird's head with eyes, beak, and a hole for a mouth. Game Board 2 is for a dart game in which you randomly throw a dart at the board.

Game Board 1

Game Board 2



1. Refer to Game Board 1. The shaded region represents the mouth hole. Dawn will randomly throw a beanbag at the board. What is the probability that the beanbag will go into the mouth hole? What is the probability that the beanbag will not go into the mouth hole?	**2.** Use your answer from Exercise 1. Predict how many beanbags will go into the mouth hole if Dawn throws 20 beanbags. Explain.
3. Use your answer from Exercise 1. Predict how many beanbags will not go into the mouth hole if Dawn throws 40 beanbags.	**4.** Refer to Game Board 2. Pam will randomly throw a dart at the dartboard. What is the probability that her dart will land in the shaded region? Explain.
5. Use your answer from Exercise 4. Predict the number of darts that will land in the shaded area if Pam randomly throws 60 darts.	**6. SKYDIVING** A skydiver is dropped from a plane above a field that is 35 yards by 16 yards. In the center is a region of sand that is 7 yards by 7 yards. What is the probability that the skydiver will land in the sandy region?

NAME _____ DATE _____ PERIOD ____

11-5

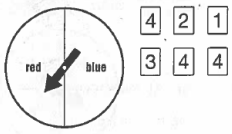
Study Guide and Intervention

Probability of Independent Events

Lesson 11–5

If the outcome of one event does not affect the outcome of a second event, the two events are **independent events**. The probability of two independent events is found by multiplying the probability of the first event by the probability of the second event.

EXAMPLE 1 **A spinner is spun and a number card is chosen at random. What is the probability that red is spun and a 4 is chosen?**



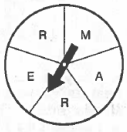
$P(\text{red}) = \frac{1}{2}$, $P(4) = \frac{3}{6}$ or $\frac{1}{2}$

$P(\text{red and } 4) = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

So, the probability is $\frac{1}{4}$, 0.25, or 25%.

EXERCISES

A spinner is spun and a number card is chosen at random. Find the probability of each event.



1. P(M and 3)
2. P(R and 3)
3. P(consonant and odd)
4. P(consonant and 3)
5. P(vowel and less than 7)
6. P(vowel and even)

A coin is tossed and a number cube is rolled. Find the probability of each event.

7. P(tails and even)
8. P(heads and less than 4)
9. P(heads and greater than 2)

NAME _____ DATE _____ PERIOD ____

11-5

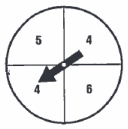
Practice: Word Problems

Probability of Independent Events

Lesson 11-5

GAMES For Exercises 1–3, use the spinner and the letter cards and the following information.

Brad is playing a game with his little sister in which you spin the spinner and randomly choose a letter card. The spinner tells how many words you must name that begin with the letter on the letter card you choose.



1. What is the probability of spinning an even number and choosing a vowel?	2. What is the probability of spinning an even number and a consonant? Explain.
3. Find P(even and M). What are the possible numbers of words beginning with M that Brad or his sister will have to name?	4. **WEATHER** The probability of snow on Monday is 0.2. The probability of snow on Tuesday is 0.4. What is the probability that it will snow on both days?
5. **GAMES** Stephen is playing a game with two coins. In order to score points, both coins must land on heads or both must land on tails. What is the probability that Stephen will score points on one toss?	6. **FOOD** A bakery sells muffins and beverages. The beverages are coffee, tea, orange juice, and milk. There are five kinds of muffins. If a customer chose a beverage and a muffin at random, what is the probability the customer would choose a milk and a blueberry muffin?