Name _____ Date _____ Class _____

LESSON 11-5

Practice A

Making Predictions

Make a prediction based on an experimental probability. The first one is done for you.

1. A bowler knocks down at least 6 pins 70% of the time. Out of 200 rolls, how many can the bowler predict will knock down at least 6 pins?

   140

2. A tennis player hits a serve that cannot be returned 45% of the time. Out of 300 serves, how many can the tennis player predict will not be returned?

   _____

3. West Palm Beach, Florida, gets rain about 16% of the time. On how many days out of 400 can residents of West Palm Beach predict they will see rain?

   _____

4. Rob notices that 55% of the people leaving the supermarket choose plastic bags instead of paper bags. Out of 600 people, how many can Rob predict will carry plastic bags?

   _____

Make a prediction based on a theoretical probability. The first one is done for you.

5. Martin flips a fair coin 64 times. How many times can he expect the coin to come up tails?

   32

6. A spinner has five equal sections labeled 1–5. In 60 spins, how often can you expect to spin a 3?

   _____

7. Harriet rolls a number cube 39 times. How many times can she expect to roll 3 or 4?

   _____

8. A bag contains 6 red and 10 black marbles. You pick out a marble, record its color, and return it to the bag. If you do this 200 times, how many times can you expect to pick a black marble?

   _____

Solve each problem.

9. The Arno family is planning a 14-day April vacation. The location they've chosen has 10 rainy days in April. The Arnos would like at least 7 days without rain. Should they keep their current plans? Explain.

   _____

   _____

10. Advertisements for the train claim it is on-time 90% of the time. The bus has a record of being on-time 56 out of 64 days. Which form of transportation provides more reliable service? Explain.

    _____

    _____

LESSON 11-5

Practice B

Name _____ Date _____ Class _____

Making Predictions

Make a prediction based on an experimental probability.

1. A baseball player reaches base 35% of the time. How many times can he expect to reach base in 850 at-bats?

_____

2. Fredericka can make 65% of her shots from the free-throw line. If she shoots 75 times, how many shots can she expect to go in?

_____

3. In 1951, Odessa, Texas had temperatures of at least 95° F 11% of the time. During that year, how many days could residents predict would have highs of at least 95° F?

_____

4. A survey shows that 67% of peanut butter lovers prefer chunky-style. Out of 850 people surveyed, how many can be predicted to say they prefer chunky-style peanut butter?

_____

Make a prediction based on a theoretical probability.

5. Gil rolls a number cube 78 times. How many times can he expect to roll an odd number greater than 1?

_____

6. Jenna flips two pennies 105 times. How many times can she expect both coins to come up heads?

_____

7. A shoebox holds same-size disks. There are 5 red, 6 white, and 7 blue disks. You pick out a disk, record its color, and return it to the box. If you repeat this process 250 times, how many times can you expect to pick either a red or white disk?

_____

8. Ron draws 16 cards from a standard deck of 52. The deck is made up of equal numbers of four suits—clubs, diamonds, hearts, and spades. How many of the cards drawn can Ron expect to be spades?

_____

Solve each problem.

9. During February and March, Jack is spending 7 days in the Yukon to check on endangered species. The region has snowfall that blocks roads 20 days during these months. Can Jack expect to be able to get around at least 5 of the days? Explain.

_____

10. ABC Airlines has had delays on 18 of 126 recent flights. DEF Airlines has had delays 13% of the time. Which airline would you expect to provide more reliable service? Why?

_____

LESSON 11-5

Practice C

Name _____ Date _____ Class _____

Making Predictions

Make a prediction based on an experimental probability.

1. A hockey goalie blocks 89% of shots at the goal. How many shots can the goalie predict she or he will block in 758 tries?

_____

2. Going door to door, Lil has educated 93% of the people in her town about recycling. If she has the same rate of success for 5,400 houses, how many people will she reach?

_____

3. Annette, Alaska, gets about 30% as much rain as Barrow, Alaska, which gets rain 4% of the time. In a year (365 days), how many days can residents of Annette expect it to rain?

_____

4. A football player forces at least 1 turnover in 27.5% of the games he plays in. If the player appears in 57 games, in how many can he predict he will force a turnover?

_____

Make a prediction based on a theoretical probability.

5. A bag has 7 blue marbles, 3 red, 4 green, and 8 white. You pick a marble, record its color, and return it. If you repeat this process 665 times, how many times can you expect to pick a blue or green marble?

_____

6. A bag holds nine $1 bills, seven $5 bills, and two $10 bills. You pick a bill, record the denomination, and return it. In 438 repetitions, how many times can you expect to pick $5?

_____

7. Shari rolls a pair of number cubes, numbered 1 to 6, 64 times. How many times can she expect to roll an odd number?

_____

8. A spinner has 12 equal sections—5 red, 4 green, and the rest black. In 921 spins, how many times can you expect to spin black?

_____

Solve each problem.

9. Airline 1 loses passengers' luggage 4.1% of the time, Airline 2 loses luggage 4 times in 95. Which airline has a better record? Explain.

_____

_____

10. Ted plans a 21-day skiing vacation in December through February. The area he is considering is open 46 days during this period. Ted would like at least 14 days of skiing. Will this area meet his needs? Explain.

_____

Name _____ Date _____ Class_____

Making Predictions

Solve the problems.

1. The Hirsch family is planning a three-week trip to the rainforest this August. This area experiences humidity levels of 90% or more 70% of the time in August. How many days in the rainforest can the family expect to have humidity levels below 90%?

   Solution:

   The rainforest has humidity levels of 90% or more for 70% of the days in August, but levels less than 90% for the rest of the time.

   100% – 70% = 30%, or 0.3

   The trip will last 3 weeks, or 21 days. To find how many days can be expected to have humidity levels less than 90%, multiply 0.3 by the number of days.

   $0.3 \cdot 21 = 6.3$

   The Hirsch family can expect about 6 days to have humidity levels over 90%.

2. The school picnic, which is a one-day event, has been scheduled for April this year. The area routinely gets rain for 53% of the days in April. About how many rainy days can the organizers expect in April?

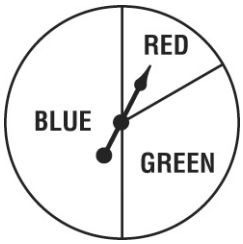
   Convert the percent into a decimal.
   53% = _____

   To estimate the number of rainy days in April, multiply the decimal _____ by the number of days in April: _____.

   _____ × _____ = _____

   The organizers can expect about _____ rainy days in April.

The blue space on the spinner equals half the area. Of the remaining area, two thirds are green. Use the spinner to answer questions 3–5. Circle the letter of the correct answer.



3. How many spins out of 80 are likely to be blue?
   A 30
   B 40
   C 50

4. How many spins out of 80 are likely to be green?
   A about 8
   B about 13
   C about 25

5. How many spins out of 650 are likely to be either red or green?
   A 325
   B about 290
   C about 246

Name _____ Date _____ Class_____

Making Predictions

Predictions are guesses about what will happen. There are two methods of predicting.

1: Using past evidence When playing darts you hit the bull's eye 5 times in 10 tries. Use this evidence to predict how many bull's eyes you would hit in 50 tries. First, set up an equation relating the *number of bull's eyes hit* to the *number of tries*:

$$\frac{\text{number of bull's eyes}}{\text{number of tries}} = \frac{5}{10}$$

Since you know the number of future tries (50), you can use this proportion: $\frac{5}{10} : \frac{x}{50}$

$$\frac{5}{10} = \frac{x}{50}$$

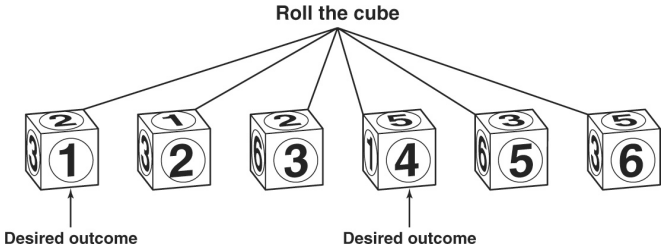
Solve the **proportion**: $10x = 250$

$$x = 25$$

You expect to make 25 bull's eyes in 50 tries.

2: Creating an "outcome" tree You are rolling a number cube. You want to know how many times in 21 tries you can expect to roll a 1 or 4.

There are a total of 6 **outcomes**. Of these, <u>*two*</u> outcomes (1 and 4) are desirable. So: $\frac{2}{6} = \frac{x}{21}$



You cross-multiply, which gives you: $42 = 6x$

$$x = 7$$

You expect to roll 7 1's or 4's in 21 rolls.

1. How many bull's eyes can you predict you will make in 70 tries? _____
2. How many times you can expect to roll a 1 or 4 in 150 tries? _____
3. You throw a ball through a hoop once in 8 tries. How many balls can you predict you will throw the hoop in 56 tries?

   _____
4. You flip a fair coin 16 times. How many times can you expect the coin to come up tails? _____
5. You hit a ball 90% of the time. Predict how many times you will hit the ball in 200 tries. _____

LESSON 11-5

Challenge

Name _____ Date _____ Class_____

Conditional Probability

A special class of predictions involve **conditional probability**. This is a relationship between two events such that one depends on another. The notation for conditional probability is P(A|B). This is read as *the probability of A given B.* The equation for conditional probability is:

$$P(A/B) = \frac{P(A \cap B)}{P(B)}, \text{ where } \cap \text{ means "and"}$$

Suppose, for example, that black and red checkers are placed in a bag. You pull out two checkers without replacing either. The probability of drawing a red checker and then a black checker is 25%. The probability of picking a red checker on the first draw is 42%. What is the probability of picking a black checker on the second draw, given that the first checker drawn was red? To solve, you use the equation:

$$P(\text{black/red}) = \frac{P(black \cap red)}{P(red)} = \frac{0.25}{0.42} = \sim 0.60$$

So you can predict that you will draw a black checker after drawing a red checker about 60% of the time.

Use the equation to predict the conditional probability in each of the examples.

1. A different number of black and red checkers are placed in the bag. Now when you draw a red checker followed by a black checker, $P(\text{red} \cap \text{black})$ is 0.32 and $P(red)$ is 0.46. What is $P(\text{black/red})$?

   _____

2. The probability that a college freshman signs up for computer lab and computer programming is 0.49. That probability that a freshman signs up for computer lab is 0.89. What is the probability of a freshman signing up for computer programming given that the freshman has signed up for computer lab?

   _____

3. The probability that today is Monday and that one or more employees phones in sick 0.06. For a store open Monday to Friday, what is the probability that one or more employees phones in sick given that today is Monday? Explain.

   _____

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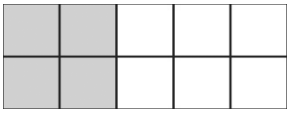
Use Models

Predicting is guessing about a future result.

You can use **experimental probability** to make a prediction.

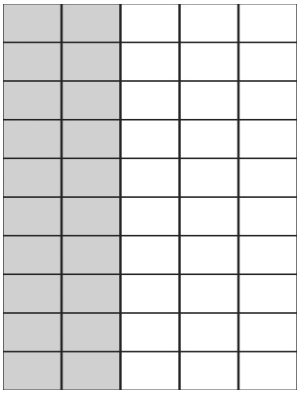
Pat is able to flip a game disk into a cup 4 times in 10 tries. Out of 50 tries, how many flips can Pat predict she will make?



Model Pat's successful flips: $\frac{4}{10}$

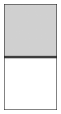
$\frac{4}{10} \times 50 = \frac{200}{10} = 20$

<u>*Pat can predict she will make 20 flips out of 50.*</u>



√ You can use **theoretical probability** to make a prediction.

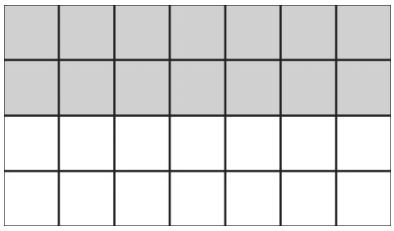
Al flips a coin 28 times. How many times can he expect to flip heads?



$P(\text{heads}) = \frac{1}{2}$:

$\frac{1}{2} \times 28 = \frac{28}{2} = 14$:

<u>*Al can expect to flip heads 14 times out of 28.*</u>



1. The experimental probability that Will can throw a football through a hoop is 60%. How many throws out of 15 can Will predict he will make?

   _____

2. Li rolls a game cube 24 times. How many times can she expect to roll 1?

   _____

3. The theoretical probability of rolling a 1 or 2 is $\frac{1}{3}$. How many rolls in 15 can you expect to be a 1 or 2?

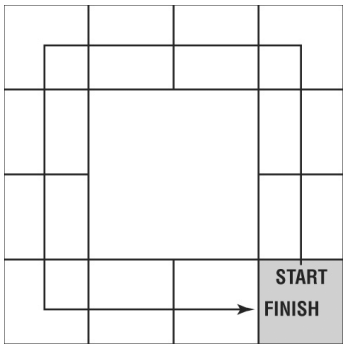
   _____

LESSON 11-5

Puzzles, Twisters & Teasers

So Predictable!

Copy the game board onto a sheet of cardboard or sturdy paper. Players use different colored game disks as space markers. Move is determined by rolling two number cubes and flipping a coin. The winner is the first person to land exactly on "FINISH" by moving forward.



1. **The coin determines the direction of the move. (Heads means "move forward," tails means "moves backward".)**
2. **The sum of the two number cubes determines the number of spaces to move. Use the chart below to determine the number of spaces to move. (Round to the nearest whole number as needed.)**

A roll with a sum of…	**… Means you should move the number of…**
2	Times in 8 rolls that you expect to roll a sum of 3 or less in this game
3	Free throws out of 15 you predict a basketball player with an experimental probability of 30% will make
4	Times in 4 flips that you expect 2 coins flipped both to show heads
5	Times you expect a batter who reaches first base 47% of the time to reach first base in 9 at-bats
6	Times in 10 rolls that you expect to roll a sum of 11 in this game
7	Strikes in 40 rolls that you expect from a bowler with a 4% experimental probability of rolling a strike
8	Times in 13 spins that you expect a spinner with six equal sectors marked 1–6 to land on an even number <6
9	Times in 55 tries you can expect a bean bag to go through a hole if the thrower has a 2% experimental probability of making this shot
10	Times in 12 rolls that you expect to roll a sum of 4, 5, or 6 with two number cubes
11	Goals in 35 tries that you expect of a soccer player with a 16% experimental probability of making a goal
12	Times in 18 spins that you expect a spinner with six equal sectors marked 1–6 to land on 1