1.5 Free Coffee

Focus: experimental probability, simulation

Warm Up

1. The theoretical probability of winning a prize in a lottery is 1 in 5. Write this as a fraction and a percent.	**2.** The weather report says there is a 70% chance of snow. Write the probability of it snowing as a decimal and a fraction.
3. You roll 2 dice. Circle the probability of rolling a sum of 7. Impossible Not Likely Likely Very Likely Certain	**4.** Explain your answer to #3. _____ _____ _____ _____
5. What is the theoretical probability of rolling a 5 with 2 dice? Write your answer as a fraction and a percent.	**6.** If you flip a coin 10 times, what is the theoretical probability of flipping heads? Write your answer as a fraction and a decimal.
7. Flip a coin 10 times. What is the experimental probability of flipping heads? Write your answer as a fraction and a decimal.	**8.** What is the difference between theoretical and experimental probability? _____ _____ _____ _____

It's On the Cup

1. A coffee shop promotion offers prizes in specially marked cups. The chance of winning is 1 in 9.

   Buy a coffee. Win a prize!

   Chapter 1

   a) In your own words, explain the meaning of "The chance of winning is 1 in 9."

   _____

   _____

   b) List 2 words that mean the same as "chance."

   _____   _____

   c) What experiment that you completed recently has the same theoretical probability as getting a winning cup?

   _____

   _____

2. **a)** How can you **simulate** the coffee cup promotion without actually using coffee cups? To simulate means to model with an experiment. Describe or draw what you will do.

   _____

   _____

   _____

   _____

   b) If you run this simulation 100 times, how many "winners" should you get? _____

   c) Explain how you determined your answer to part b).

   _____

   _____

   _____

d) Test your hypothesis. Do the simulation *exactly* 100 times. Tally the results below.

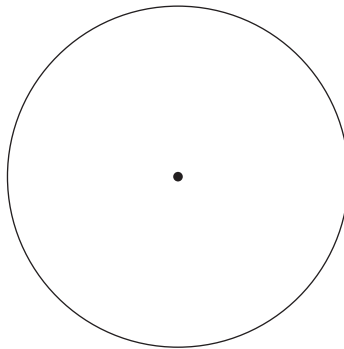|	
Winner	
Non-Winner	

e) Write your winning results 3 ways.

As a percent of the total: _____

As a fraction of the total: _____

As a decimal: _____

f) Some people like to show data like this on a graph. Use a circle graph to display your results.

g) Did your experiment match the theoretical probability of the promotion?

1 in 9
Chances
of Winning

YES _____ NO _____

h) If not, explain why.

_____

_____

_____

- Another way to run this kind of simulation is to use a device that generates random numbers.
- A **random number generator** is a tool that picks numbers so that each number has an equal probability of coming up on each try.
- A graphing calculator can be set up to work as a random number generator. It can then model the previous experiment.

Go to pages 1–2 to write the definition for **random number generator** in your own words.

Chapter

1

Tech Tip: Using the Random Number Generator in a TI-83/84 Graphing Calculator

1. Press **MATH**. Scroll right so that PRB is highlighted.

2. Press **5** to select **5:randInt(**.
The command **randInt(** tells the calculator to generate random integers.

```
randInt(
```

3. Type **1,9)**.
Make sure there are no spaces between the characters.
This tells the calculator to select numbers between 1 and 9.

4. Press **ENTER**. An integer from 1 to 9 will be displayed.
Continue pressing **ENTER** to generate more random integers.

```
randInt(1,9)
              2
              3
              4
```

---

3. a) Select a target number from 1 to 9 for this

experiment. _____

Every time the random generator comes up with that number, you are a winner.

b) Use a random number generator to select exactly 100 numbers ranging from 1 to 9. Tally the results below.

Winner	
Non-Winner	

c) How many times did the number you selected in

part a) appear? _____

d) State your winning percent. _____

e) Explain your results in terms of simulating winning a prize from the coffee promotion.

_____

_____

4. a) Repeat the experiment another 100 times. Tally the results below.

Winner	
Non-Winner	

b) Add these results to you totals from #3b).

How many times did the number you selected in #3a)

appear? _____

c) State your winning percent. _____

d) Is your result closer to the theoretical probability you

calculated in #2b)? YES _____ NO _____

e) Explain your answer to part b). _____

_____

5. a) Collect the number of winning simulations in #4b) from everyone in your class.

Number of Winning Simulations for Each Member of the Class

Total Number of Winners in the Class = _____

b) What is the total number of random numbers generated by the class? _____

c) Calculate the class's winning percent.

☑ Check Your Understanding

1. According to the theoretical probability of the promotion, how many winning results should your class have had?

2. Explain why your individual results and the whole class's results may have differed.

_____

_____

_____

Buy a coffee. Win a prize!

3. Is the coffee shop's ad accurate? Explain.

_____

_____