EXPLORATIONS

Activity 10

Collect All Ten to Win!

Students will simulate a contest that requires the participants to collect 10 different tokens found in the bottom of specially marked cereal boxes. They will determine the average number of cereal boxes a person must buy in order to "collect all 10!"

Concept

- Probability

Skills

- Collecting and organizing data
- Averaging
- Calculator skills: MATH, **rand** (generating random numbers)

Materials

- Student Activity sheets (page 52)
- TI-73 calculators

Activity

Ask the students:

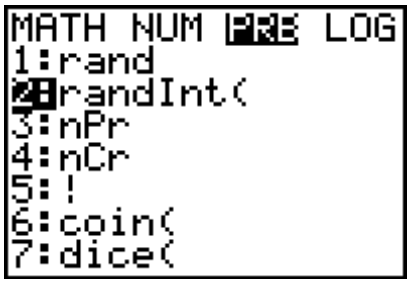
- *Have you ever tried to collect a set of cards or toys from a fast food restaurant, cereal box, or gum package?*
- *How long did it take you to collect all of the set?*
- *How much of the product did you have to buy before you collected the entire set?*

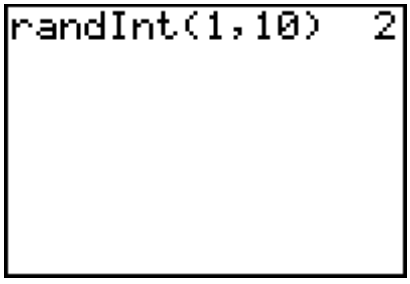
Tell them that today they will be simulating a contest from a popular cereal company that requires you to collect 10 pieces in order to win a free box of cereal. Each piece has an equally likely chance of being in the box. Ask the students:

- *How many boxes of cereal do you think we will have to buy in order to collect all ten pieces? (Have them write down this prediction on the top of their Student Activity sheet.)*
- *What is the least number of boxes we will have to buy?*
- *How likely is it that we will get all 10 pieces by just buying 10 boxes?*

Use the random integer generator on the calculator to simulate the game pieces in boxes of cereal.

***Note**: Remember that you must seed the calculators before generating random numbers for the first time. See page 42 for instructions.*





1. Start on the Home screen. Press [MATH] and [▸] to move to **PRB**.
2. Select **2:randInt(** and press [ENTER] to paste to the Home screen.
3. Enter **1, 10)** since there are 10 game pieces we are trying to collect.

   The calculator will now randomly select numbers between 1 and 10 each time you press [ENTER].

Discuss with the students what the random integer generator represents:

- Each time they press [ENTER], it represents buying a box of cereal.
- The number they get when they press [ENTER] represents the game piece they are getting from that box of cereal.
- They will need to continue pressing [ENTER] and generating random numbers until each number (1 through 10) has appeared at least once.

Students may begin generating the random numbers and recording their data on the Student Activity sheet as they go. Here is a sample of a Student Activity sheet:

Game Piece	Number of Pieces Acquired
1	II
2	I
3	I
4	II
5	IIIII
6	II
7	I
8	II
9	I
10	I

Total number of boxes the student had to buy: 18 boxes.

Wrap-Up

Once everyone has completed the simulation, compare class data. Ask:

- *Did everyone have to purchase the same number of boxes? Why or why not?*
- *Who got all ten game pieces by buying just ten boxes?*
- *Who thinks they had to buy the greatest number of boxes?*

Find the class average of the number of boxes each person had to "buy." Ask the students:

- *What does the class average mean in terms of collecting all ten pieces?*
- *How will this affect your shopping in the future?*

Have students complete the remaining questions on the Student Activity sheet.

Assessment

Suppose a sticker machine offers six different designs. How many stickers will you have to purchase from the machine in order to collect all six designs?

Extension

- Most contests do not give each game piece an equally likely chance. For instance, if the soft drink company Dr. Blue requires contestants to collect game pieces from their soda cans to spell DR BLUE, they may distribute thousands of D's, R's, B's, L's and E's but only a few U's. Students can design a simulation to represent this scenario by using the random integer function again and assigning numbers 1-5 to D, 6-10 to R, 11-15 to B, 16 -20 for L, and 21-25 for E. But only 26 for U. This means that the only time you get the letter U is when 26 comes up on the calculator.

Student Activity

Name _____

Date _____

Activity 10

Collect All Ten to Win

*Record the results of your calculator simulation of the contest below. Place a tally mark inside the **Frequency** column each time you get a game piece.*

Before you begin, record your prediction:

I predict I will need to buy _____ boxes to collect all ten pieces.

Game Piece	Frequency of getting game piece
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

1. I had to "buy" _____ boxes to collect all 10 pieces.

2. Class average: _____ game pieces.

3. If our class average represents the average number of boxes a person will need to buy to win, how much money will that person be spending in order to collect all ten pieces to win the coupon? (Each box of cereal costs $3.99.)

_____

_____

4. Do you think this contest is worth playing for the coupon? What prize would make it worth playing?

_____

_____