Probability Area

Hemlatta Engineer & David (SungJin) Suh

Title of activity: Probability Area Model Activity Companion

Math topic: Probability & Data

Curriculum Competency:

- Apply multiple mental math strategies to solve problems
- Develop, demonstrate, and apply mathematical ideas through diagram and inquiry.
- Use problem solving strategies: trial and error, act it out, drawing diagrams.

Content Objective:

- Theoretical probability with two independent events.
- Experimental probability with two independent events.
- Students will develop a probability area model and use it to find probabilities of events.

Grade levels: Annual Family Math & Science Day (Children & parents visit station)

Resource:https://static1.squarespace.com/static/54905286e4b050812345644c/t/583c7eced482e9bbbef4db21/1480359649091/StarburstLessonPDF.pdf

Required Materials (per group):

- 9 different colored blocks (3 blocks for each color)
- 4 Plastic cups/containers
- 2 White boards & markers
- Masking tape

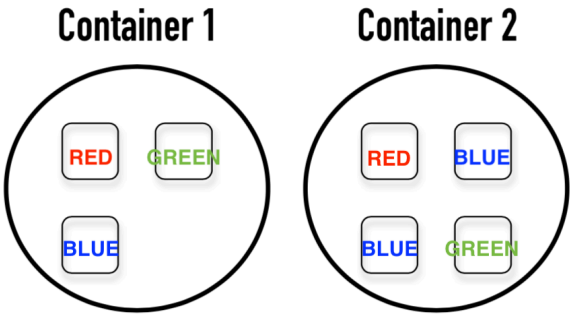
Description:

"Probability Area Model" is a great activity for students to develop finding all possible outcomes in total, given that there are three (or even more to make it challenging) different colored blocks – red, blue, and green - separated in two cups; each cup contains at least two blocks of any color. Students choose blocks randomly and then put them into each cup. They place blocks on the corresponding places and finish filling out the table. Once students find all possible combinations, they will be asked to find a probability, such as "given that there are x possible outcomes, what is the probability of getting one red block from Cup 1 and one blue block from Cup 2?".

Tips for Teacher:

Teachers give a brief demonstration at the beginning, so that students can easily understand and follow the instructions to complete probability area model. Then, students will be provided with the marked cups and blocks, and work with others to complete the probability area model. Since the model can be solved in various ways, teachers are encouraged to familiarize themselves with different ways of solving it.

Sample



		Cup 2			
		Red (R)	Blue (B)	Blue (B)	Green (G)
Cup 1	Red (R)	RR	RB	RB	RG
	Green (G)	GR	GB	GB	GG
	Blue (B)	BR	BB	BB	BG

- $\Pr[RR] = \frac{1}{12}$
- $\Pr[BB] = \frac{2}{12} = \frac{1}{6}$
- $\Pr[GB] = \frac{2}{12} = \frac{1}{6}$
- $\Pr[BG] = \frac{1}{12}$

(Extensions)

- $\Pr[RO] = \frac{0}{12} = 0$, given that there is no orange block in Cup 2.
- What is the probability of getting at least one blue?
- What is the probability of getting no reds?
- How could you change this scenario to ensure that you always get a green?
- Is reasonable to assume that blue is the least popular color based on the results of this model?
- (To make it more challenging for students, put more blocks with additional colors in each cup so that there are more outcomes to deal with)