EUREKA MATH™ TIPS FOR PARENTS

KEY CONCEPT OVERVIEW

In this topic, students start to distinguish between theoretical probability and estimated probability as they conduct their own experiments. Students also learn about the importance of **simulations** and when to use them. After creating their own simulations, students use the data to calculate estimated probabilities. The final lesson of the topic encourages students to use probability to make decisions.

You can expect to see homework that asks your child to do the following:

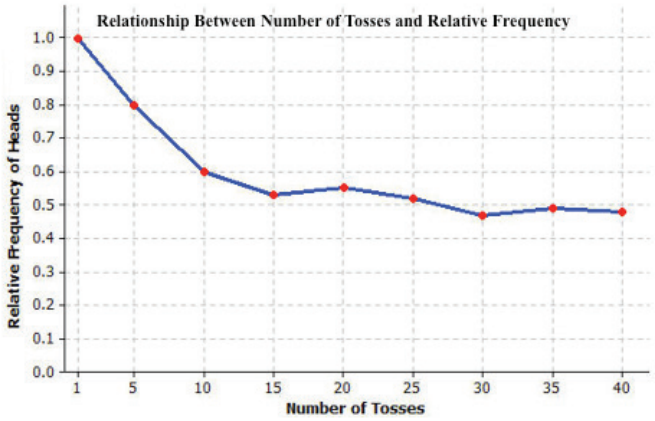
- Make predictions about the outcomes of experiments.
- Conduct an experiment to collect data, and then use the data to calculate estimated probabilities.
- Use the results from an experiment to make decisions.
- Calculate theoretical probability and compare this with the outcomes from a simulation.
- Create simulations that can be used to conduct experiments.

SAMPLE PROBLEMS *(From Lessons 8 and 10)*

1a. Beth tosses a coin 40 times and records her results. The **relative frequency** of the coin landing on heads changes as the number of tosses increases. Complete the following table for the 40 coin tosses.

Number of Tosses	Total Number of Heads	Relative Frequency of Heads (to the nearest hundredth)
1	1	1.00
5	4	0.80
10	6	0.60
15	8	0.53
20	11	0.55
25	13	0.52
30	14	0.47
35	17	0.49
40	19	0.48

1b. Use the relative frequency of heads from the table to complete the graph below for totals of 1, 5, 10, 15, 20, 25, 30, 35, and 40 tosses.



1c. As the number of tosses increases, what do you notice about the change in the relative frequency of heads appearing?

On the graph, you can see that the relative frequency changes less as the number of tosses increases. The line drawn to connect the points seems to level off around a relative frequency of 0.5.

SAMPLE PROBLEMS *(continued)*

2. Estimate the probability that a family with three children will have only one girl. Use the following outcomes of 50 trials of tossing a fair coin three times per trial. Use *H* to represent a boy birth and *T* to represent a girl birth.

HHT	HTH	HHH	TTH	THT	THT	HTT	HHH	TTH	HHH
HHT	TTT	HHT	TTH	HHH	HTH	THH	TTT	THT	THT
THT	HHH	THH	HTT	HTH	TTT	HTT	HHH	TTH	THT
THH	HHT	TTT	TTH	HTT	THH	HTT	HTH	TTT	HHH
HTH	HTH	THT	TTH	TTT	HHT	HHT	THT	TTT	HTT

I went through the list and counted the total number of times that HHT, HTH, or THH appear and divided that total by 50. The estimated probability is $\frac{16}{50}$, or 0.32.

Additional sample problems with detailed answer steps are found in the *Eureka Math Homework Helpers* books. Learn more at GreatMinds.org.

HOW YOU CAN HELP AT HOME

You can help at home in many ways. Here are some tips to help you get started.

- Challenge your child to determine and compare the theoretical and estimated probabilities of various events. For example, the theoretical probability of rolling a number less than 3 on a number cube is $\frac{2}{6}$, or $\frac{1}{3}$, because a number cube has 2 numbers less than 3 (1 and 2) and 6 possible outcomes. Ask your child to roll a number cube 10 times, record the results of each roll, and calculate the estimated probability. Is it close to the theoretical probability? Next, have your child roll the number cube 30 times. Does the estimated probability change?
- Discuss possible simulations for different events. For example, when generating outcomes for birth months, using a 6-sided number cube does not work because it provides only 6 possible outcomes. Instead, simulations that may work include labeling 12 note cards (or scraps of paper) with 1 birth month per card and then drawing the cards from a bag, using a 12-sided number cube, or using a spinner with 12 equally sized sections.

TERMS

Relative frequency: A fraction, decimal, or percent that represents how often a specific outcome has occurred. To calculate the relative frequency, divide the target outcome by the total number of outcomes. For example, a team won 9 out of 15 games last season, so its relative frequency of winning was $\frac{9}{15}$, 0.6, or 60%.

Simulation: The use of tools such as coins, number cubes (dice), or cards to generate outcomes that represent real outcomes. For example, to simulate randomly choosing a day of the week, you could write each day of the week on a separate card, place all seven cards in a bag, and choose one.