### **Focus Questions**

### **Background**

The student book is organized around three to five investigations, each of which contain three to five problems and a Mathematical Reflection that students explore during class.

In the Teacher Guide the Goals for each unit include two to four big concepts with an elaboration of the essential understandings for each.

In the Teacher Guide, a Focus Question is provided for each problem in an investigation. The Focus Question collapses the mathematical understandings and strategies embedded in the problem into one overarching question. The teacher can use the Focus Question to guide his/her instructional decisions throughout his/her planning, teaching, and reflections on student understanding.

### Description

The Goals of the unit describe the mathematics content developed in the unit. The Focus Questions provide a story line for the mathematical development of an investigation. The set of Mathematical Reflections in the student book provide a story line for the mathematical development of the unit. The following contain all of the Goals, Focus Questions and Mathematical Reflections for each unit in CMP3.

### **Purpose**

These stories can serve as an overview of the unit and as a guide for planning, teaching and assessing.

The Goals, Mathematical Reflections, and Focus Questions can be laminated and used a bookmark for the Teacher.

## 7-6 What Do You Expect

Unit Goals, Focus Questions, and Mathematical Reflections

#### **Unit Goals**

### Experimental and Theoretical Probabilities Understand experimental and theoretical probabilities

- Recognize that probabilities are useful for predicting what will happen over the long run
- For an event described in everyday language, identify the outcomes in a sample space that compose the event
- Interpret experimental and theoretical probabilities and the relationship between them and recognize that experimental probabilities are better estimates of theoretical probabilities when they are based on larger numbers
- Distinguish between outcomes that are equally likely or not equally likely by collecting data and analyzing experimental probabilities
- Realize that the probability of simple events is a ratio of favorable outcomes to all outcomes in the sample space
- Recognize that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring
- Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability
- Determine the fairness of a game

# **Reasoning With Probability** Explore and develop probability models by identifying possible outcomes and analyze probabilities to solve problems

- Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events
- Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process
- Represent sample spaces for simple and compound events and find probabilities using organized lists, tables, tree diagrams, area models, and simulation
- Realize that, just as with simple events, the probability of a compound event is a ratio of favorable outcomes to all outcomes in the sample space
- Design and use a simulation to generate frequencies for simple and compound events
- Analyze situations that involve two or more stages (or actions) called *compound events*
- Use area models to analyze the theoretical probabilities for two-stage outcomes
- Analyze situations that involve binomial outcomes

- Use probability to calculate the long-term average of a game of chance
- Determine the expected value of a probability situation
- Use probability and expected value to make a decision

### **Focus Questions and Mathematical Reflections**

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	Why is it called the		outcomes be determined both	You can use an area model or a			
			experimentally and theoretically? Why	simulation to determine the probability			
2. In an experiment, are 30 trials Will they get the same probabilities? or why not? of a situation that involves two actions. a. Pick one of the situation in Question 1.							
as good as 500 trials to predict Explain. 2. Describe a situation in which it is difficult Explain how each of these is used. Describe a series of three actions, each with							
the chances of a result?  b. Two people analyze a situation to find the  or impossible to find the theoretical 3. Describe how you would calculate the  two equally likely outcomes. Make a list of all							
Explain/ theoretical probability of an outcome. Will probabilities of the outcomes. expected value for a probability the possible outcomes.	Explain/			expected value for a probability			
3. What does it mean for results to they get the same probabilities? Explain. 3. Explain what it means of a probability situation. b. Write a question about your situation that can							
be equally likely?  c. One person uses an experiment to estimate situation to be fair.  4. Expected value is sometimes called be answered by your list.	be equally likely?	c. One person uses an experiment to estimate	situation to be fair.	<ol> <li>Expected value is sometimes called</li> </ol>	be answered by your list.		

the probability of an outcome. Another	4. Describe some of the strategies for	the longer-term average. Explain why	3. As you increase the number of actions for a
person analyzes the situation to find the	determining the theoretical probabilities	this makes sense.	binomial situation, what happens to the total
theoretical probability of the outcome. Will	for situations in this unit. Give an		number of possible outcomes? For example,
they get the same probabilities? Explain.	example of a situation for each of the		suppose you increase the number of times a
3. What does it mean for a game to be fair?	strategies.		coin is tossed. What happens to the total
4. What is a sample space, and how can it be			number of outcomes?
represented?			