Problem 1 – Exploring the Fundamental Counting Principle

Page 1.3 shows a method to determine the total number of different cakes.

- Explain the method that was used in your own terms.

- What is another method of drawing the segments that will lead to the same count?

- What multiplication sentence can represent this problem?

Read the scenario on page 1.5. Use segments to help solve the problem.

- What method of drawing segments did you use?

- How many outfits does Jess have to choose from?

- What multiplication sentence can represent this problem?

- Tiana is choosing an entrée and a side dish for her dinner. There are **m** entrée choices and **n** side dish choices. Write a formula to find how many different dinners Tiana can choose from.

Try These:

1. An ice cream parlor has 31 flavors of ice cream. If you would like to have a different two scoop cone every day, how many days can you continue to do so? (Assume the two scoops must be different and a strawberry/vanilla is different from a vanilla/strawberry?

2. A license plate consists of 3 digits, followed by 2 letters. How many different license plates exist?

Problem 2 – Exploring Permutations

Investigate a trip between two cities where the number of possible cities changes on pages 2.2 – 2.5.

It is important to know that a trip from Albany to Baltimore is not the same as a trip from Baltimore to Albany. Use the answers from those pages to fill in the first four rows of the chart below. The first one is done for you.

Number of Cities	Number of Paths
2	2
3	
4	
5	
6	
7	

- What pattern do you notice?

- Predict what the number of paths will be for 6 and 7 cities.

- What formula do you think can be used to find the number of trips between 2 cities if there are *n* cities?

- How is this similar and different from Problem 1?

On page 2.6, use the **nPr** command to confirm the number of paths for 6 and 7 cities.

Try These:

1. There are 9 players who are arranged in a batting order for a softball game. How many different batting orders are there?

2. In a senior class, 6 people are running for office. If you are electing a president, vice president and secretary, how many different slates of officers are there?

3. Sixteen runners are in a cross-country race. In how many different ways can they place 1^{st}, 2^{nd}, and 3^{rd}?

Problem 3 – Exploring Combinations

In Question 2 on the previous page, 3 officers were chosen from a slate of 6 people. Instead of choosing a slate of officers, choose a committee of three. Page 3.1 shows two columns of officer slates that would each be considered the same committee.

- How many slates describe one committee?
- Predict how many slates would describe the committee of people d, e, and f.
- In Column C, list the slates that would describe the committee of people d, e, and f.
- Determine the number of committees formed from 6 people. How does this number relate to the number of slates of officers?

Use the diagrams in Problem 2 to find the number of trips that can be taken if Albany to Baltimore is the same trip as Baltimore to Albany.

- How does the number of trips compare to the number of paths?
- What formula do you think can be used to determine the number of trips for *n* cities?

Number of Cities	Number of Trips
2	2
3	
4	
5	
6	
7	

- Predict the number of trips will be for 6 and 7 cities.

On page 3.4, use the **nCr** command to confirm the number of trips for 6 and 7 cities.

Try These:

1. There are 12 players on a basketball team. How many starting line-ups can be made using 5 players, assuming that the position they play does not matter?
2. How many 5-card hands can be dealt from a standard deck of 52 cards?
3. How many committees can be made from the U.S. Senate if the committee must have 3 Republicans and 3 Democrats (There are 42 Republicans, 57 Democrats and 1 Independent)?