

## Looking Behind the Numbers: Lunch Specials

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### CSOs:

- **MA.8.5.1** Use appropriate technology to solve application problems involving combinations and permutations.
- **AS 4.2** Determine the number of ways events can occur and the associated probabilities.
- **10.5.2** Find the probability of simple events using the rules of probability.
- **10.5.3** Predict the outcomes of simple events using the rules of probability.

### Objectives:

- Make tree diagrams to determine the number of possible combinations.
- Interpret and compare tree diagrams.
- Introduce the fundamental counting principle.

### Materials:

- Mathscape, Looking Behind the Numbers (8<sup>th</sup> grade curriculum)
- Unfinished Tree Diagram worksheet
- Large sheet of construction paper (for making tree diagrams in groups)
- Copies of pages 28, 29, and 43 from student manuals

### Vocabulary:

- combination
- tree diagram
- Fundamental Counting Principle

### Set:

- Ask students to name two types of soup and three types of sandwiches and then list all possible combinations of choosing one soup and one sandwich. Once the students have listed the combinations, explain that tree diagrams are another way to find the possible combinations. Illustrate a tree diagram using the soup and sandwich example.

### Procedure:

1. Discuss the advertisement on page 28. Hand out copies of unfinished tree diagram worksheet for students to complete.
2. Discuss the advertisement claim using the following questions:
  - a. How many different combinations are there?
  - b. Is the advertising claim true? Explain your reasoning.
  - c. How would you rewrite the claim to make it true?
  - d. How would you change the menu to make the original claim true?
3. Have students complete activity and answer questions 1-4.
4. Students will find the number of combinations for each restaurant on page 29.
5. After completing the table, lead a discussion to help students discover the Fundamental Counting Principle.
6. Have students create dinner menus following the guidelines on page 29.
7. Group discussion of results and sharing of projects.

### Assignment:

Looking Behind the Numbers, lesson 10 Homework

### Accommodations:

- Be available to assist special education students who have difficulty reading or in a larger class, group students so that stronger readers can read aloud.

### Related Websites:

- Prime Phone Numbers  
[www.actionmath.com/Probability01.html](http://www.actionmath.com/Probability01.html)
- Meal or No Meal?  
<http://www.addictinggames.com/mealornomeal.html>
- Illuminations: Mathematics and Football  
<http://illuminations.nctm.org/LessonDetail.aspx?id=U85>

### Assessment

This lesson was informally assessed by a class discussion. More formally, the lesson was assessed according to student responses to the activity questions and the menus they created.

### Performance Descriptors (MA.PD.8.5)

#### ■ Distinguished

The student demonstrates exceptional and exemplary performance with distinctive and sophisticated application of knowledge and skills that exceeds the standard in probability. The student justifies problem-solving methods with valid and convincing evidence.

#### ■ Above Mastery

The student demonstrates competent and proficient performance and shows a thorough and effective application of knowledge and skills that exceeds the standard in probability. The student correctly predicts the probability of simple and compound events. The student communicates problem-solving methods with sound reasoning.

#### ■ Mastery

The student demonstrates fundamental course or grade level knowledge and skills by showing consistent and accurate academic performance that meets the standard in probability. The student displays, analyzes and solves application problems involving combinations, permutations, and games of chance to determine probability and make predictions. The student, given the results of experiments, calculates the experimental and theoretical probabilities of simple and compound events.

#### ■ Partial Mastery

The student demonstrates basic but inconsistent performance of fundamental knowledge and skills characterized by errors and/or omissions in probability. Performance needs further development. The student predicts and reports probable outcomes of simple probability experiments. The student analyzes problem situations involving games of chance but is inconsistent.

#### ■ Novice

The student demonstrates substantial need for the development of fundamental knowledge and skills, characterized by fragmented and incomplete performance in probability. Performance needs considerable development. The student records and displays data involving games of chance and may predict and/ or calculate probable outcomes of a simple experiment as compared to the actual outcomes. Skill development is needed for the student to calculate combinations and permutations in application problems.

(Performance descriptors were adapted from the West Virginia Content Standards)