



Cumberland County Schools

Objective 4.02 – Combinations

Lesson Title: Combinations
Curriculum Area: Mathematics
Grade: Third Grade
Time: 60 minutes

I. PLAN

A. NCSCS Goal 4:

The learner will understand and use data and simple probability concepts.

B. NCSCS Objective:

4.02 - Determine the number of permutations and combinations of up to three items.

C. CCS Task Analysis:

TLW: Define and distinguish between permutations and **combinations**.

TLW: Make combinations of up to three given objects.

D. CCS Pacing Guide:

Quarter: Third

Week(s): 7-9

E. Lesson Background:

Strand: Data Analysis and Probability

Marzano Level: Applying

F. Materials:

- *The Sundae Scoop*, by Stuart J. Murphy
- Transparency of Attachment A
- Student math journal
- Attachment B – enough copies so student teams have 6 names
- Unifix cubes
- Construction paper and crayons
- Ice cream cones – Attachment C

G. Prerequisite Skills:

- Ability to sequence items and organize information

H. Essential Question(s):

- How can organizing information in a chart format (diagram) assist in determining the number of combinations of a collection of objects?

I. IMPLEMENT

A. Anticipatory Set:

The teacher will read the story, *The Sundae Scoop*, to the students, being sure to stop and draw the students' attention to the diagrams within the story. The teacher will point out to the students that the diagrams in the story are examples of combinations.

B. Teacher Input:

“We just finished reading a book where the characters solved a combination problem. The students had to find out how many different combinations of sundaes to serve at the school picnic. Today we are going to learn to solve problems that involve combinations. “First, we will review the vocabulary we need to know.” The teacher will write the vocabulary word listed below on the board or overhead for the students to copy into their math journals. As the teacher writes, she/he will read the word aloud to the students. The students will write the term and definition as the teacher writes it. (Adding these terms to a word wall would further enhance the learning.)

- **combination** – a collection of objects in which order does not matter

Rehearsal:

Students will work in pairs. Student A will say the vocabulary word and tell the definition, then Student B will say the vocabulary word and tell the definition.

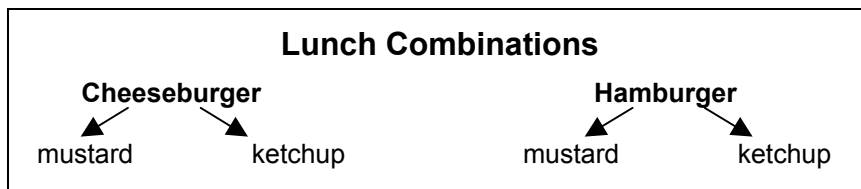
Teacher Input: Overhead (Attachment A)

“Let’s begin by looking at combinations. Remember that our definition states that a combination is a collection of objects in which order does not matter. In the book, the children were coming up with different combinations of sundaes. Let’s review the process that the characters in our book used to decide how many different combinations of sundaes to have at the school picnic” On an overhead, the teacher will use a transparency of Attachment A to repeat and explain the process of deciding what kinds of sundaes will be offered at the school picnic. The teacher will cover up the transparency so the students only see the portion that is being discussed.

Rehearsal: Math Journal

Students will work in pairs to create a diagram like the one discussed above. The teacher will tell the students to create a diagram showing the possible combinations that could be created at a restaurant. The teacher will first tell the students to create a chart showing hamburgers or cheeseburgers. Next, the students will be directed to find the possible combinations if mustard or ketchup is added to the burger.

After the students complete the diagram, ask the girls what choices they have for lunch (cheeseburger, hamburger). The boys will celebrate the girls for the correct answer. Next, ask the boys what can be added to their hamburger (mustard, ketchup). The girls will celebrate the boys for the correct answer. Lastly, have the girls tell how many possible combinations there are for the menu (4).



Teacher Input:

“You did a great job creating a diagram showing the four lunch combinations. So far, all of our examples have been about food. Let’s look at another example.” The teacher will call six students up to the front to use in the demonstration. He/she will tell the students that a photographer is coming to take pictures of these six students and that the photographer wants the students to be in pairs. The teacher will arrange the students in groups of two and reiterate the point that with combinations order does not matter (taking a picture of Sam and Tina is the same as taking a picture of Tina and Sam). The teacher will write the names of the students on the board to show that the photographer will have to take three pictures; therefore, with this scenario there will be three combinations.

Rehearsal: Attachment B and Math Journal

The teacher will group students in teams of six and will give each team a set of six name cards. He/she will say, “Boys and girls, pretend you are at an amusement park and are about to ride the roller coaster. The roller coaster has seats that hold two people. Arrange the index cards so that each person has a partner. How many seats will these six friends need to all ride the roller coaster? Work through the problem, discuss as a team, and then write the answer in your math journal. After the answer, include an explanation of how your team came up with the answer.”

Teacher Input:

The teacher will review the problem with the class. Using the six cards from one of the groups, he/she will go through the process of arranging the cards and will reiterate that it doesn't matter the order of the people within the groups (*Mike and Charles* is the same as *Charles and Mike*). "Boys and girls, there will need to be three seats so that all six of the children get to ride the roller coaster."

C. Guided Practice: Math Journal and RallyCoach

The teacher will write the following words on the board: *peanut butter sandwich, ham sandwich, apple* and *banana*. The students will work in pairs to create possible combinations, using the diagram introduced earlier in the lesson. Student A will create the first diagram and Student B will check, coach as needed, and celebrate. Student B will create the second diagram and Student A will check, coach as needed, and celebrate. Both students will agree on the number of lunch combinations (4) and write the answer in their math journal.

D. Closure: Math Journal

The teacher will ask the students the following question: "In how many ways can Michael, Amber, Matthew, Kyle, Victoria, and Katherine stand in line if each person needs a partner?" The teacher will write the names on the board or overhead as a reference for the students. Before the students begin, the teacher will direct them to show their work by writing out the possible combinations and then giving the numeric answer.

E. Independent Practice - Differentiated Assignment:**Advanced Learners:**

Students will reread *The Sundae Scoop*. After reading the story, each student will write a story involving combinations (i.e., "The Day I Decorated Cookies")

Proficient Learners: Construction Paper and Crayons

Students will create two different menu options that offer 4 possible combinations. The menu must be set up in a diagram format along with illustrations and at least two sentences describing the choices.

Strategic Learners: Attachment C, Construction Paper, and Crayons

The students will create four possible combinations, using ice cream cones. The students will color the cones to represent the flavors and toppings. The ice cream cones will be glued to construction paper, and a diagram showing the possible combinations will also be drawn on the construction paper.

Intensive Learners: Unifix Cubes and Math Journal

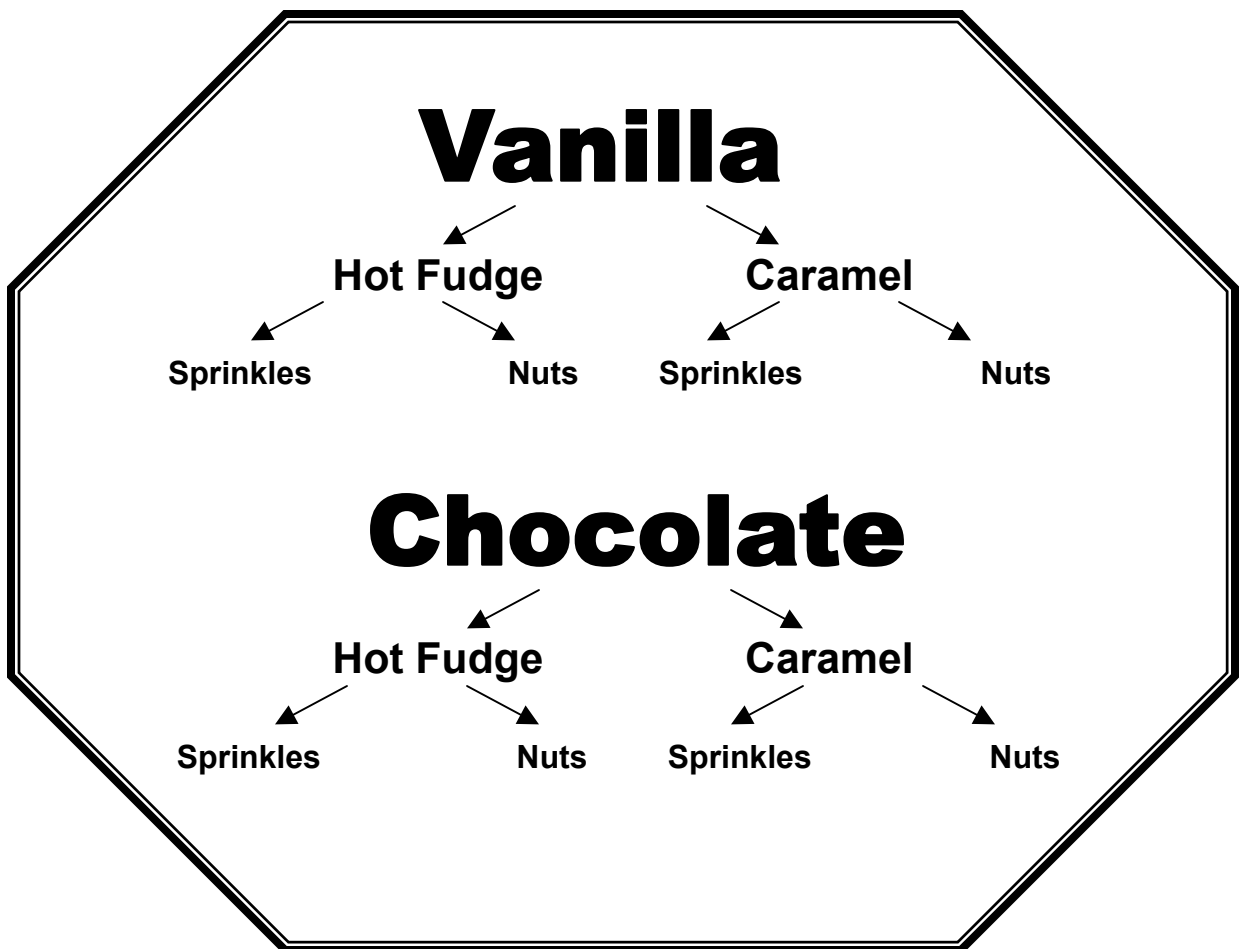
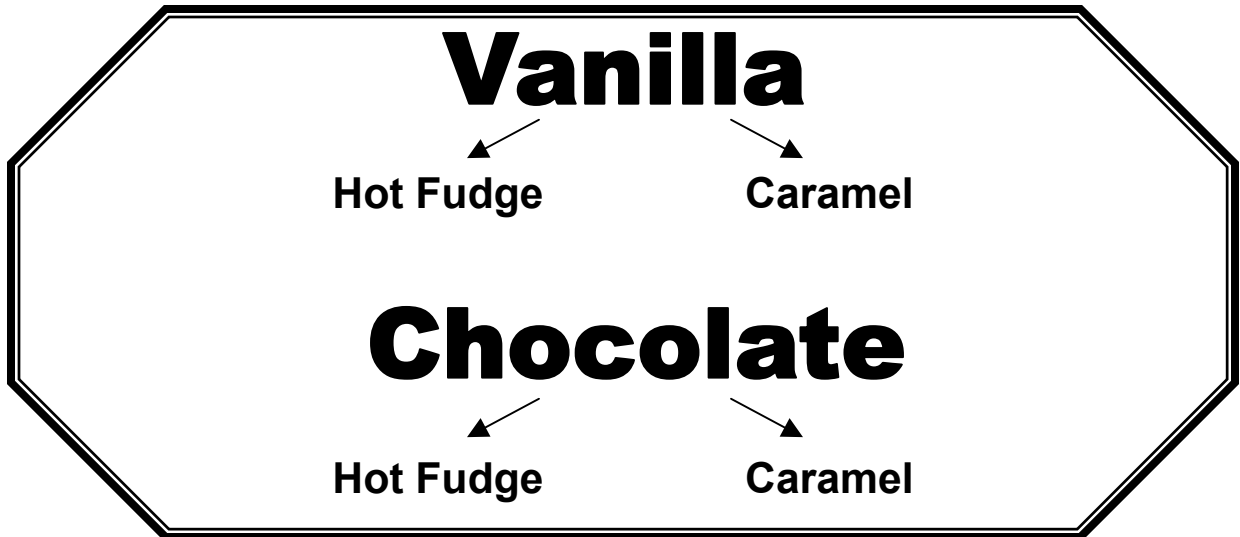
The students will be given six different colored unifix cubes. The students will arrange the cubes into the three possible combinations and record the findings in their math journal. The students will create the diagram of possible combinations by drawing in the math journal.

II. ASSESS:**A. Products:****B. Diagnostic (see background):****C. Pre-Assessment:****D. Post Assessment (EOG format plus 2 open-ended):****IV: RESOURCES:****A. Websites:**

- <http://illuminations.nctm.org/ActivityDetail.aspx?ID=3>

B. Materials:**C. Professional Development Opportunities:**

Sundae Combinations



Name Cards

Attachment B

Mike	Charles
Baylee	Kyle
Casey	Morgan

Mary	Hayleigh
Hannah	Kim
Todd	Angie

Heath	Kirk
Cindy	Sylvia
Mason	Tyler

Ice Cream Cones

