

Math ACCESS Lesson

Title:

Counting Principle (Multiplication Principle)

Grade level/course:

6th -7th grade

Time Frame:

Content Objectives:

- Identify all possible outcomes for a given setting
- Determine the number of outcomes for a given setting

Language Objectives:

- Use comparative and superlative adjectives correctly – compare.
- Use terms
 - Pattern
 - Total
 - possible
 - generalize
 - condiments
- Use content vocabulary appropriately and accurately.
 - Tree diagram
 - Outcomes

Higher Order Thinking:

- Generate generalization from a pattern
- Estimate
- Consider all possibilities
- Justify the result of an added condition

Materials:

- Cut outs of outfits (see handout)
- Subway menu (see handout)

Initiation:

1. Ask students to identify the different ingredients for a subway sandwich
2. Ask students to estimate the total possible sandwiches that can be created from the ingredients.

Procedures:

1. Explain that the class will work on simpler problems before returning to the Subway problem – students will determine how many outfits can be created from 3 pairs of pants, two shirts, and two pairs of shoes.
2. Explain that each group will receive a cut out of each clothing item. They are to record the different outfits that can be created, e.g. light pants, orange shirt, boots.
3. Divide class into groups and distribute cutouts.
4. Monitor progress. When groups start finishing, transition into discussion.
5. Have volunteers share outfits and record on board.
6. Ask groups to share their respective total different combinations.
7. Discuss that there is a method to get all the outfits – a tree diagram.
8. Demonstrate but leave the tree incomplete. Have students complete it.
9. Monitor work to verify completion and accuracy.
10. Complete tree on board. Explain the different outcomes and the number of outcomes.
11. Explain that the food network has a recipe for grilled cheese and jelly (the volunteers on the show loved it!). Provide students the following options to make this sandwich.
 - a. Wheat, rye, or white
 - b. Cheddar or American
 - c. Grape or strawberry
12. Have the students generate a tree diagram, identify the different combinations, and the number of outcomes.
13. Add Swiss cheese and apricot jelly and have them redo the tree diagram.
14. Discuss the problem that occurs (tree gets too big).
15. Have students look at the first grilled cheese tree diagram and in groups have them attempt to determine a short cut for determining the total number of outcomes.
16. Discuss as a class ($\# \text{ breads} \times \# \text{ cheese} \times \# \text{ jellies}$) and explain this is the Counting Principle.
17. Have them use the CP to determine total possible sandwiches with the extra cheese and jelly.
18. Have groups compare and contrast the tree diagram method with the CP.
19. Discuss as a class.

Closure:

1. Have students use the Counting Principle to determine how many sandwiches are possible at Subway.
2. Have students consider how this changes if the sandwich can be heated – assume heating makes it a different sandwich.
 - a. Ask the class about heating the sandwich and assume this is a different sandwich.
 - b. Have students write quietly how this will change the total number of sandwiches and to justify their answers.
 - c. Discuss.

Student Work Products:

- Tree diagram for outfits and for grilled cheese and jelly sandwiches.
- Practice quiz.

Assessment:

- Pop quiz.

Differentiation:

- Collaboration with individual support from teacher.
- Individual work to monitor progress.
- Formative quiz to assess progress and understanding.



The menu board is divided into several sections:

- Enjoy Made the way you want it!**: Features a large image of a sandwich and a list of options.
- Sandwiches**: Lists various sandwich options with prices, such as the 6" Submarine Sandwich (£2.99) and the 12" Submarine Sandwich (£5.99).
- Breakfast**: Lists breakfast items like the Bacon & Egg Sandwich (£2.99) and the Bacon & Cheese Sandwich (£2.99).
- Seafood & Vegetarian**: Lists items like the Grilled Salmon Sandwich (£4.99) and the Grilled Chicken Sandwich (£4.99).
- Want it toasted?**: Lists items like the Grilled Cheese Sandwich (£2.99) and the Grilled Cheese & Ham Sandwich (£3.99).
- Kids' Pak**: Lists items like the Kids' Pak Sandwich (£2.50) and the Kids' Pak Sandwich (£2.50).
- Any Footlong Just £4**: A promotional offer for a footlong sandwich for £4.