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| DATE: 4/06/10 | **SUBJECT**: Math | **TOPIC**: Menu Combinations | **GRADE:** 3rd  |
| **HOW MUCH TIME DO YOU EXPECT THE LESSON TO TAKE?** |
| (1) 45 minute session  |
| **OBJECTIVE(S):** |
| **1.** Students will devise a strategy to discover how many different combinations of meals they could order with $3.00. |
| **BIG IDEA:** |
| **Combinations describe the possible arrangements of a particular group of objects in which the order of the objects does not matter.** |
| **IDENTIFY THE PA STANDARD(S) YOUR LESSON ADDRESSES:** |
| **2.1.3.E.** Count, compare and make change using a collection of coins and one-dollar bills.**2.1.3.G.** Use concrete objects to count, order and group.**2.2.3.A.** Apply addition and subtraction in everyday situations using concrete objects.**2.2.3.B.** Solve single- and double-digit addition and subtraction problems with regrouping in vertical form.**2.4.3.A.** Make, check and verify predictions about the quantity, size and shape of objects and groups of objects.**2.5.3.A.** Use appropriate problem-solving strategies (e.g., guess and check, working backwards). **2.5.3.C.** Select and use an appropriate method, materials and strategy to solve problems, including mental mathematics, paper and pencil and concrete objects.**2.7.3.A.** Predict and measure the likelihood of events and recognize that the results of an experiment may not match predicted outcomes.**2.7.3.C.** List or graph the possible results of an experiment. |
| **MATERIALS/RESOURCES/TOOLS:** |
| **1.** SMART Board with prepared Notebook lesson sequence (task, list, prediction table, tree diagram) **2.** Task Sheets (20)**3.** Eat’n Park Menus (20)**4.** Scrap Paper**5.** Money**6.** Calculators (20)**7.** Smile Eat’n Park Cookies (22) |
| **GROUPING:** |
| * Whole group instruction will be used to introduce the task
* Students will work individually to begin devising a strategy to solve the problem
* Students will work in partners to compare and revise strategies and answers
* Whole group discussion will be used to go over the students’ strategies and outcomes
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| **LESSON OPENING:** |
| * **Introduction/Launch:**
	1. Teacher will engage the students by saying “I have another math challenge for you all! Since you all did so well with the cookie division task, this is going to be even trickier!”
	2. Teacher will pass out the task sheets.
	3. Teacher will read and explain: “You are going to Eatn’ Park! You have $3.00 to spend. You want to order one food item, either breakfast, lunch, or dinner, and one drink.”
	4. Meanwhile teacher will pass out the Eatn’ Park menus.
	5. Teacher will continue explaining: “I want you to come up with a strategy to figuring out all the different combination of meals you could order.”
	6. Teacher will ask a student to explain what a combination is to his/her peers.
	7. Teacher will pass out calculators, money, and scrap paper to each student.
	8. Teacher will ask the students to first look at the menu and predict how many different combinations they can order with their $3.00 and write their prediction on their task sheet.
	9. Teacher will list each student’s prediction on the SMART board for later use.
	10. Teacher will tell the students to use any and all of the materials provided or to ask for additional materials that could help them solve the problem.
	11. Teacher will ask if students have any questions about the task.
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| **DURING THE LESSON:** |
| * **Teaching/Learning & Monitoring:**
	1. For the first part of the lesson, students will work individually.
	2. Teacher will begin working her way around the room to observe the work of the students.
	3. To get students started, teacher will ask,
* Where do you think you should start to solve this problem?
* What are some different techniques you could try?
* How can you use the material in front of you to help you get started?

(These questions can be quietly reflected upon by students or they may share their answers and ideas with the class)* 1. As students begin to get started, teacher will start to work one on one with students.
	2. Teacher will ask each student to explain what their strategy is.
	3. Teacher will remind students to be showing all their work so they can prove the amount of different combinations they could order.
	4. For the students who are struggling, teacher will ask if there is anything they could do to make the task easier for them? (referring to ruling out menu items they do not have enough money for)
	5. For the students who are progressing, teacher will ask what they could do so that they did not need either a calculator or the money to count (referring to rounding)
	6. As individual students are making progress and valuable realizations, teacher will ask those students to share their ideas, strategies or observations to the class. This may be:
* Some menu items can be crossed out because you do not have enough money to get the food item and a drink
* You can round to even dollar numbers to make it easier
* Calculators and fake money really isn’t even necessary to solving the problem
* You could create a list of the combinations
* You could create a chart of the combinations
* You could create a tree diagram to discover the combinations
	1. If there are some students who are struggling, becoming frustrated, or getting off task, teacher will work more closely with them. She will provide extra scaffolding by hinting towards the tree diagram and chart strategies.
	2. For students who are at a complete standstill, teacher may model one or two different combinations so students can see the strategy.
	3. Teacher may also refer to the Smiley cookies to provide some extrinsic motivation for students who may be getting restless, frustrated or off task.
	4. Once students have all made the realization that they do not need to calculators or money (either by their own discovery or by a classmate explaining) teacher will collect these materials to be sure students are not distracted with them and are now focused on devising a strategy and answer for the different combinations.
	5. If there are students who have solved the problem immediately, teacher will ask extension questions such as: how many combinations could you order with $4.00 and/or what are the different combinations of dinners and sides you could order.
	6. Once students have worked individually for some time and the teacher believes they are advancing, she will allow students to work with a partner.
	7. Teacher will ask students to share their strategy and answer so far with each other.
	8. Teacher will tell students to pick a way they think is working the best and work together to come up with a final answer and soon we will share our answers.
	9. Teacher will now continue to work with partners using assessing and advancing questions to challenge students.
	10. Teacher will ask the students:
* What discoveries are you making? (groups of objects can be ordered in different ways to create different combinations, different strategies may be used to solve the same question)
* What mathematical ideas, practices are you using (predicting, rounding, adding, subtracting, multiplying, listing, tree-diagram or creating a chart)
* Does the order of our combination matter in this task? (no)
* Can you think of a situation where order of a combination does matter?
	1. For students who have been extremely successful with the task, teacher will ask the students:
* Combine your money and discover what different items you could order
* Are we repeating items here in our combination? What happens when we do repeat items?
* Can you think of different circumstances where you use combinations with or without repeating items?
* Can you think of circumstances where the order of the items matter?
	1. Teacher will monitor progress of the students and warn when there is 3 minutes left to work on the problem.
	2. When there is a minute left, teacher will tell students to finalize their answer and make sure all their work is shown.
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| **END OF THE LESSON:** |
| * **Conclusion/Closure:**
	1. Teacher will ask the students to SLANT.
	2. Once students are brought back to attention, teacher will ask each set of partners to share their amount of combinations they came up with.
	3. Teacher will list all the different answers on the SMART board next to the prediction list.
	4. As students are telling their answers, teacher will ask what strategy they used allowing students to explain to their classmates.
	5. Teacher will ask students if they agree or disagree with their classmates’ strategies and/or answers giving an opportunity for discussion and/or defending of answers and strategies.
	6. Now referring to the prediction list created during the introduction of the lesson, teacher will then ask whose answer came close to their predicted answer.
	7. Teacher and class will compare and discuss all the different answers.
	8. Teacher will then show students (if it has not yet been discovered) the correct list and tree diagram she created prior to giving the lesson.
	9. Now as a whole group question, teacher will ask the students if the order mattered in our task?
	10. Teacher will then ask if the students can think of an example where order does matter in a combination.
	11. Teacher will explain this is actually a Permutation, and give examples such as order in a race or the combination to a safe.
	12. Finally, teacher will write the numbers in the tree diagram on the SMART board scaffolding towards the easy way to solve this task.
	13. Teacher will ask students if anyone knows what computation we could have simply of used to figure out this task in a matter of seconds. (referring to multiplication)
	14. Teacher will demonstrate this making sure students fully understand this idea. Teacher can use different ideas and numbers to practice this idea.
	15. Teacher will ask the students what they learned today scaffolding and leading a discussion among the class until students reiterate the big idea:
* ***Combinations describe the possible arrangements of a particular group of objects in which the order of the objects does not matter.***
	1. Teacher will ask the class if they can think of other situations where combinations are used. (lotteries,
	2. Teacher will collect the students’ task sheets and scrap paper and (if appropriate) comment on how proud she is of her class yet again.
	3. Teacher will handout Smiley cookies to the students if they behaved well and participated in the activity appropriately and successfully.
* **Assessment:**
1. Teacher will use formative informal assessment by observing the students’ participation during the first part of the task. Students should be answering and asking helpful questions; determining what information is needed to solve the problem; using CUCRC to solve problem; and using trial and error to devise a strategy independently.
2. Teacher will then continue to assess their understanding by observing their interaction, discussion and participation while they are working in partners.
3. Teacher will formally assess whether learning goals were met by reviewing each students’ task sheet. Students should have devised a strategy by either listing, creating a table, or making a tree diagram to find the possible combination of meals they could order with $3.00 (32).
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