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Grade Level: 8

Content Area: Probability and Predictions

PA Standard(s) addressed: Math Standards - 2.2.8.A, 2.4.8.B, 2.5.8.A, 2.5.8.B, 2.5.8.C, 2.5.8.D, 2.7.8.A

Reading, Writing, Speaking and Listening Standards - 1.1.8.G, 1.4.8.B, 1.5.8.B

NCTM Standard(s) addressed: Data Analysis and Probability - In grades 6-8 all students should understand and apply basic concepts of probability. Other standards also addressed are Problem Solving, Reasoning and Proof, Communication, Connections, and Representation.

Problem Name: Ice Cream Challenge

Problem:

The students in Mr. Fudge's class won the 8th grade math contest, and each student received a three-scoop ice cream cone. Mr. Fudge purchased four flavors of ice cream. Each student in the class made a cone with three different flavors. All possible flavor arrangements were made in the class. Each of the students had one of the different cones. If it took each student ninety seconds to decide and make their cone, how many minutes did it take for the class to complete the task?

Directions:

For full credit, you **must** do the following:

1. Show all calculations for every step of the problem, even if you used mental math or your calculator.
2. Write a **complete** explanation of each step of the problem and why you chose to do that procedure.

Problem Solution(s):

4 types of ice cream taken in three scoops on a cone = $4 \times 3 \times 2 = 24$ choices of cones

Time to create = 24 choices \times 90 seconds = 2160 seconds

Time in minutes to create = 2160 seconds / 60 seconds = 36 minutes

To obtain the highest scores, students must include work and an explanation of why each step was carried out. The explanation should include how the number of cones was determined, the relationship between the number of possible cone arrangements and the number of students (they are equal), and the relationship to the amount of time in minutes to complete the task.

Specific Rubric:

5. Advanced Understanding:

The student will give the correct answer (36 minutes) with accurate procedure and calculations. The student will show all arrangements of the three- scoop cones and/or show the calculations to reach the total number of arrangements, how they arrived at 24 students, the time it took to complete the task and the conversion from seconds to minutes. A rationale (why?) for all steps should be explained.

4. Satisfactory Understanding:

The student will give the correct answer (36 minutes). The calculations or explanations are accurate but may be missing some minor steps.

3. Almost Satisfactory Understanding:

- A. The student will give the correct answer without showing all calculations.
OR
- B. The student will give the correct answer without writing all explanations.
OR
- C. The student gave an incorrect answer with correct procedures and explanations. The incorrect answer is the result of one computational error.

2. Partial Understanding:

- A. The student gave the correct answer with limited explanation and calculations.
OR
- B. The student gave an incorrect answer with correct procedures and explanations. The incorrect answer is the result of more than one computational error.

1. Minimal Understanding:

- A. The student gives the correct answer with very little or no explanation or calculations.
OR
- B. The student gives an incorrect answer but shows some of the procedure, which indicates some knowledge of mathematical process necessary to solve the problem.

0. No Understanding:

- A. Student did not attempt the problem.
OR
- B. Student did not give the correct answer but attempted with incorrect procedures.