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| **Synopsis of high-quality task:**  In this task students will prepare a school cafeteria for a school dance to submit to a school party planning team. Given the measurement of the space and other needs for setting up for the dance (drink tables, picture booth, ticket booth…), students will complete floor designs for their proposal.  **Anticipated student time spent on task:** 2 lesson periods  **Student task structure(s):** Individual work/partner work/group work |
| [**Math Content Standards and Practices:**](http://www.doe.mass.edu/frameworks/math/2017-06.pdf)  **4.MD.A.3** Apply the area and perimeter formulas for rectangles in real world and mathematical problems.  **4.NBT.B.5** Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.  **4.OA.A.2** Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.  **SMP1** Make sense of problems and persevere in solving them.  **SMP2** Reason abstractly and quantitatively.  **SMP3** Construct viable arguments and critique the reasoning of others.  **SMP4** Model with mathematics.  **SMP5** Use appropriate tools strategically. |
| **Prior Knowledge:**  **3.MD.C.5.a** A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area.  **3.MD.C.5.b** A plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units.  **3.MD.C.7.a** Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.  **3.MC.C.7.b** Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.  **3.MD.D.8** Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.  **3.OA.A.4** Determine the unknown whole number in a multiplication or division equation relating three whole numbers. |
| **Connections to the real-world:**   * Planning a school dance * Debating to a group of people why your idea should be chosen |
| **Mastery Goals:**  **Learning Objective:**   * Students will be able to express area and perimeter in different ways in a real life, relevant application. * Students will be able to use their understanding of area and perimeter to be able to find different lengths and widths for each part of the dance to optimize the best size of each part of the dance. * Students will be able to use mathematical reasoning to explain why their set-up is the best for the dance.   **Language Objective:**   * Students will be able to discuss and explain with their peers why their example is the most efficient and practical representation or strategy to answer the task’s question. |
| **Teacher instructions**  **Instructional Tips/Strategies/Suggestions:**  **Lesson 1**   * Pose the question to students “What makes a school dance successful?” Allow 8-10 students to answer. * Tell students today they will be designing a set-up for their own school dance and introduce the task to the students reading only up to the end of the different areas that they have to include. * Ask students what they notice about the measurements of the parts of the dance. * Read the remainder of the task to students. * Ask students why it would be important to have multiple designs for the dance to choose from. Discuss how when planning in the real world different options are presented and the committee or team chooses which one would be the most efficient based off of the explanation of the creator. * Have students begin to complete the task.   + For students who are higher level allow them to work independent on this task with or without graph paper.   + Allow students who are working below grade level or who struggle with the concept of area and perimeter to work with a partner but explain that they each have to have their own design.   **Lesson 2**   * Set up each student’s poster around the room. * Go around the room and allow each student 1-2 minutes to explain why they believe their design is the best for the dance using mathematical reasoning. |
| **Instructional Materials/Resources/Tools:**  Include:   * Student directions for completing the task * A materials list and/or materials management * Safety information if applicable * Any handouts, links, books, videos, materials, etc. that is needed for the student to complete the task * Scoring rubric – Focus on including the standards-content and practices for performance criteria. Less focus should be on presentation style, design, etc. unless it is tied directly to an ELA standard.   **Materials:**   * Student copy of the task * Paper/pencils * Grid paper * Grid paper of poster size * Anchor charts to solve for an unknown length(s) when given an area and perimeter * Reference sheet with formulas for area and perimeter (for students who have the accommodation) * Student worksheet provided at the end of task |
| **Accessibility and Supports:**  **Potential sentence starters:**  “I chose the location of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to be here because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.”  “My length for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ was \_\_\_\_\_\_\_\_\_\_\_\_\_ and my width was \_\_\_\_\_\_\_\_\_\_\_\_\_\_.”  “I got my measurements by using the equation \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.”  “The side lengths for the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are the best choice because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.”  **Key academic vocabulary:** Perimeter, Area, Length, Width, Multiply, Variable |

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| **Rubric**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Category** | **Exceeds Expectations** | **Meets Expectations** | **Partially Meets Expectations** | **Does not meet expectations** | | **Mathematical Concepts** | Shows a complete understanding of the mathematical concepts and addresses all components using clear and effective strategies. | Shows a nearly complete understanding of mathematical concepts and addresses almost all of the components using clear and effective strategies, but there may be minor errors. | Shows some understanding of the mathematical concepts and addresses some of the components using strategies. | Shows limited or not understanding of the problem and uses inaccurate strategies to complete the task. | | **Explanation** | Student can clearly and effectively explain their reasoning for the area and perimeter of each part of the dance while using mathematical vocabulary and representation that relates to the real word problem and to expressing their ideas. | Student can clearly and effectively explain their reasoning for how they determined the area and perimeter of each part of the dance and appropriately uses mathematical vocabulary and representation that relates to the real world problem. | Student can provide an explanation, but may need prompting questions from the teacher to guide them. The student shows some use of appropriate mathematical vocabulary and representation. | Student provides little to no explanation of their reasoning and uses little to no mathematical vocabulary to show their knowledge as it relates to the real world problem. | | **Accuracy** | Students work is thorough and reveals no errors. | Students work in thorough and reveals little errors. | Most work is shown and may be revealing some errors. | Little work is shown and/or contains several inaccuracies. | | **Perseverance** | Student solves for different solutions that could be the area and perimeter for each part to provide the best set-up for the dance. | Student attempts to find different solutions for the area and perimeter for some parts of the dance to provide the best set-up for the dance. | Students requires prompting to think about how to find different solutions for the area and perimeter, but once is given the prompting finds solutions for some parts. | Even after prompting the student does not continue to find different solutions for area and perimeter for the different part of the dance. | |

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

DANCE OFF

You are running to be in charge of planning a school dance for the whole 4th grade and have been given the cafeteria as the location of the dance. The cafeteria measures 42 by 30 feet. In order to make this dance a success you have to ensure that you plan out the set-up of the cafeteria carefully to allow space for the following:

* A DJ Booth with an area of 70 square feet
* 3 food tables each with a perimeter of 18 feet
* 2 soda tables each with a perimeter of 14 feet
* 4 rectangular tables for students to sit at that each have an area of 24 square feet
* A rectangular dance floor that has a perimeter of 90 feet.
* Picture Booth that is 10 feet wide and has an area of 60 square feet.
* A ticket booth with an area of 30 square feet.

**Remember that you need to allow room around the picture booth, food tables, and soda tables to give room for students to stand while waiting for their turn and for the staff running it to stand.**

What will your design look like? Can you support your reasoning?

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| **Sample Student Work**  Student solution for the "School Dance" task showing layout for the dance on graph paper |