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| **Synopsis of high-quality task:**  This is a grade 4 math task which involves students exploring and identifying lines of symmetry. In this task, students will design a plan for a tiling a floor which has at least one line of symmetry.  **Anticipated student time spent on task:** 45 minutes  **Student task structure(s):** Individual, partner or group work |
| [**Math Content Standards and Practices:**](http://www.doe.mass.edu/frameworks/math/2017-06.pdf)  **4.G.A.3** Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.  **SMP 1** Make sense of problems and persevere in solving them.  **SMP 5** Use appropriate tools strategically.  **SMP 6** Attend to precision. |
| **Prior Knowledge:**  **3.G.A.1** Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g. quadrilaterals). Compare and classify shapes by their sides and angles (right angle/non-right angle). Recognize rhombuses, rectangles, squares, and trapezoids as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.  **3.G.A.2** Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. |
| **Connections to the real-world:**  Students may design a floor tile for a treehouse etc. |
| **Mastery Goals:**  **Learning Objective:**   * Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.   **Language Objective:**   * Students will read a situational problem and will interpret constraints. * Students will write a reflection about the task, explaining their thinking. |
| **Teacher instructions**  **Instructional Tips/Strategies/Suggestions:**  The task requires a student to demonstrate understanding of the concepts of 2-dimensional shapes and their attributes.   1. Students must be able to use the characteristics, properties, and relationships of 2-dimensional geometric shapes in order to examine, compare, and analyze attributes of geometric figures. 2. Students must determine whether shapes have no lines of symmetry or at least one line of symmetry. 3. Students must analyze 2-dimensional shapes and their properties and attributes to determine which shapes can and which shapes will not fit together without any gaps.   **Accommodations:**   * Pattern blocks for kinesthetic learners * Paper shapes to fold, to test for symmetry   **Technology/Manipulatives:**   * Pattern Blocks (physical or virtual manipulatives) * Paper shapes, to fold   **Extension:**   * Students can challenge themselves by creating a symmetrical floor pattern using multiple shapes and multiple lines of symmetry. * Students can investigate and classify shapes which will and will not “tessellate”. |

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| **Instructional Materials/Resources/Tools:**   * Student Handout * Pattern blocks, plastic or foam * Tablets, with access to virtual pattern blocks   **Solution:**   * Solutions will vary; Floor plans must include at least one line of symmetry |
| **Accessibility and Supports:**  Allow students to use physical or virtual manipulatives for the task  Project sample tessellations and identify lines of symmetry  Give a floor plan template with a pre-drawn line over which students can reflect pattern blocks.  **Potential sentence starters:**   * Sam and Harper will be satisfied with my design because… * My design will work as a floor because … * My floor design has \_\_\_ line(s) of symmetry.   **Key Vocabulary:** line of symmetry, line symmetric, tile, grout |

**SYMMETRICAL TILES TASK**

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

Sam and Harper have recently built a treehouse in their backyard. The last step, before it is complete, is to add the tile floor. Your job is to help them in designing the tile floor for their treehouse. To share the space equally, their plan is to draw a line of symmetry across the middle of the floor.

**Step 1**: At the store, Sam and Harper view their tile options. Can you identify some of the shapes below that they saw?

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**Step 2**: Find at least one line of symmetry and draw it on each shape.

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**Step 3**: In the floor plan below, build a design, using two or more of the shapes above. Your floor should have at least one line of symmetry. The shapes and grout lines must all be symmetrical against the line of symmetry that you identify. Completely fill the floor with tiles!

**Step 4:** Will your design work for the treehouse floor? How do you know that Sam and Harper will be satisfied with your design? Are your tiles symmetrical or just the shape? Would this work as a floor?

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| **Sample Student Work:**  photo of student work, showing a pattern using 2 hexagons, 2 rhombuses and 8 trapezoids. the shape has at least one line of symmetry. |