# 5E Lesson Plan Template

|  |  |
| --- | --- |
| Teacher |  |
| Subject area/course/grade level | Math / 4th Grade |
| Standards (State and ISTE Standards for Students) | MA19.4.G.A Draw and identify lines and angles, and identify shapes by properties of their lines and angles. MA19.4.27 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines, and identify these in two-dimensional figures.MA19.4.28 Identify two-dimensional figures based on the presence or absence of parallel or perpendicular lines or the presence or absence of angles of a specified size.MA19.4.28a Describe right triangles as a category, and identify right triangles.MA19.4.29 Define 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.MA19.4.29a Identify line-symmetric figures and draw lines of symmetry.1. Empowered Learner Students leverage technology to take an active role in choosing, achieving, and demonstrating competency in their learning goals, as informed by the learning sciences. Students: a. articulate and set personal learning goals, develop strategies leveraging technology to achieve them, and reflect on the learning process itself to improve learning outcomes. b. build networks and customize their learning environments to support the learning process. c. use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways. d. understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies. 2. Digital Citizen Students recognize the rights, responsibilities, and opportunities of living, learning, and working in an interconnected digital world, and they act and model in ways that are safe, legal, and ethical. Students: a. cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world. b. engage in positive, safe, legal, and ethical behavior when using technology, including social interactions online or when using networked devices. c. demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property. d. manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation online.3. Knowledge Constructor Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts, and make meaningful learning experiences for themselves and others. Students: a. plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.b. evaluate the accuracy, perspective, credibility, and relevance of information, media, data, or other resources. c. curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.d. build knowledge by actively exploring real-world issues and problems, developing ideas and theories, and pursuing answers and solutions.4. Innovative DesignerStudents use a variety of technologies within a design process to identify and solve problems by creating new, useful, or imaginative solutions. Students:a. know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts, or solving authentic problems.b. select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.c develop, test, and refine prototypes as part of a cyclical design process. d. exhibit a tolerance for ambiguity, perseverance, and the capacity to work with open-ended problems.5. Computational ThinkerStudents develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions. Students:a. Formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models, and algorithmic thinking when exploring and finding solutions.b. collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.c break problems into component parts, extract key information and develop descriptive models to understand complex systems or facilitate problem-solving.d. understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.6. Creative Communicator Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats, and digital media appropriate to their goals. Students: a. choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication. b. create original works or responsibly repurpose or remix digital resources into new creations. c. communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models, or simulations. d. publish or present content that customizes the message and medium for their intended audiences.7. Global Collaborator Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally. Students: a. use digital tools to connect with learners from a variety of backgrounds and cultures, engaging with them in ways that broaden mutual understanding and learning. b. use collaborative technologies to work with others, including peers, experts or community members, to examine issues and problems from multiple viewpoints. c. contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal. d. explore local and global issues and use collaborative technologies to work with others to investigate solutions. |
| Objectives | * Students will be able to identify lines of symmetry in 2D shapes, and real-world objects.
* Students will be able to draw and identify lines of symmetry on given shapes.
* Students will be able to create and identify symmetrical designs.
* Students will be able to explain the concept of line symmetry using appropriate vocabulary
 |
| Differentiation Strategies: How will the lesson address the various learning styles of the students and the needs of those with special needs? | * **For struggling learners:** Provide shapes with clearly visible lines of symmetry. Offer one-on-one instruction and additional examples.
* **For intermediate learners:** Challenge them to create lines of symmetry in shapes.
* **For advanced learners:** Challenge them to create more complex symmetrical designs or explore rotational symmetry. Have them research symmetrical patterns in nature or architecture
 |

## The 5 Es

| E | Description |
| --- | --- |
| Engagement | Activity 1* The teacher will build off the student’s prior knowledge of shapes by introducing 2D shapes of different sizes. Students will first be provided with several manipulative shapes to hold. Some shapes’ will have equal sides. Some shapes will have sides that are unequal in size.
* Students will be asked the open-ended question: "Look at these shapes. Can you find ways to group them based on their appearance or any special properties you notice?"
* Student will be prompted to go to the website:
* <https://apps.mathlearningcenter.org/pattern-shapes/>
* Students will place several shapes they are familiar with on the pattern board and asked again, “Can you find ways to group them based on their appearance or any special properties you notice?"
* Students can then use the drag-and-drop features of the pattern board to create their own categories. They can choose to group by the number of sides, curved vs. straight edges, or size.

Activity 2* Students will be directed to go to a Google slides show:
* <https://docs.google.com/presentation/d/1QNcELpWMkTWAsTg-aFJNE5s_6gqTJLeSGbU1fntrUrU/edit?usp=sharing>
* [YOU ROCK Symmetry! - Google Slides](https://docs.google.com/presentation/d/1fWIZSl9PbkuWNLRWQaVJIfJEF1s2CDeZY_0e2HWucZQ/edit?slide=id.g3486fe5821f_1_488#slide=id.g3486fe5821f_1_488)
* Students are presented with half of a shape and asked to predict what the complete object might look like. They will use their memory and prior understanding of how objects are typically shaped.
* The teacher will ask: "What do you think the other half of this looks like? Can you imagine it in your mind? What makes you think that?"
* Students will use Sketchpad to draw the complete shape.
* The teacher will facilitate a discussion by asking: Do the two sides look the same? Would the two halves line up perfectly if you could fold this object in the middle? Have you seen other real-life objects with this 'matching'
 |
| Engagement Assessment | Activity: "Symmetrical or Not?"* The teacher will present students with 8 shapes on the last slide of the slide show. The teacher will then ask students to identify the symmetrical ones and why.

<https://docs.google.com/presentation/d/1T8Ur-8s_dpNs9fJqnfWPdBWYfzVrwRIOWJ-QDj1OZ88/edit?usp=sharing> |
| Exploration | The teacher will place students into small groups of four. Students will be asked to identify lines of symmetry in each other’s shapes. The teacher will ask students, "Look at your partner's design. Can you identify the line of symmetry? Are there any other lines of symmetry? What strategies did you and your partner use to create symmetrical designs?"Activity 1: Mirror Mirror* The teacher will use online geoboards to allow students to mirror shapes and explore symmetry.
* The teacher will place students into groups and ask students to go to the following website from clever messages: <https://www.interactive-maths.com/reflection-symmetry-in-triangles-ggb.html>
* [Reflection Symmetry in Quadrilaterals (GGB)](https://www.interactive-maths.com/reflection-symmetry-in-quadrilaterals-ggb.html)

The teacher will ask students to manipulate and mirror quadrilaterals and triangles using the above website. * The teacher will ask students the following higher-order questions:
1. Imagine you could 'fold' your original shape and its reflection along the mirror line. What would happen? Why does that tell us it's symmetrical?
2. If you moved the mirror line to a different spot on your original shape, would you still be able to create a mirror image? Why or why not?
3. Can you think of a shape that looks the same even if you flip it in more than one way and still have more than one line of symmetry? What are some examples?
4. Look at the original shape and its reflection. What properties are the *same*? What properties are *different*?

Activity 2* Students will be placed in partner pairs.
* While the teacher will use the classroom View Sonic board, students will be directed to the following website: <https://www.topmarks.co.uk/symmetry/symmetry-sorting>
* The objective is to validate students’ understanding of symmetry.
* Each student will discuss with their partner if each object is symmetrical or asymmetrical before choosing an answer in the game.
* For each shape, the teacher will ask:
1. How can we test if this shape has a line of symmetry?
2. How can we test if this shape has rotational symmetry?
3. Why did your group put this object in the 'both' category?
4. Did we disagree on any of the items? What did you and your partner disagree on?
 |
| Explanation | * The teacher will address students' misconceptions about folding pictures of objects vertically and matching different objects to identify symmetry.
* The teacher will encourage students to understand that symmetry means a shape can be folded along a line so that both halves match up exactly. The line can go up and down, side to side, or even diagonally. Using the example of a circle or snowflake, which has many lines of symmetry, will help students understand the shape can fold on more than one line to reveal symmetry.
* The teacher will encourage students to remember that for an object to have symmetry, the object’s half must be a mirror image or a reflection of the original half.

Vocabulary Review:* **Symmetry:** When a shape or design can be divided into two identical halves that are mirror images of each other.
* **Line of Symmetry:** The imaginary line that divides a shape into two matching halves.

Students will be directed to open the Nearpod: <https://app.nearpod.com/?pin=P2AXW>* To encourage increased comprehension and analysis of symmetry, during the Nearpod, the teacher will ask the following higher-order questions:
* Can you think of something in your community that has symmetry? Why do you think symmetry might be important in nature? (Think about animals, plants, buildings, stop signs.)
* **Comprehension:** If a shape has more than one line of symmetry, what does that tell you about the shape? How are those lines of symmetry related to each other?
* **Application:** Look at the tile on the classroom floor and ceiling. Why might you want to use symmetrical shapes in your design? What kind of feeling might a symmetrical pattern create?
* **Creation:** Can you think of a shape with exactly three symmetry lines? What would it look like? How about exactly five lines of symmetry? What would it look like?
 |
| Elaboration | Group assignmentStudents will create a brochure identifying symmetry in real-life objects. The teacher will place students in groups of five, and they will bring pictures of real-life objects to create a Canva brochure online.Objective: To bolster students’ understanding of symmetry, students will connect symmetry to real-life objects.**Instructions**:1. Create five categories of symmetry.
2. Find pictures of the objects for each category.
3. Using the technology app Canva, create a brochure of symmetry in real-life objects.
4. Brochures should be clear, labeled, and show lines of symmetry.

Technology Used:Individual Project* Students will be asked to create an abstract art design using the symmetrical art website Weave Silk or choose a similar art app where they can create a design showing symmetry.
* Students must download their picture and label the line of symmetry in the picture. How many lines of symmetry can the students identify?
* Students will then create a Canva presentation on symmetry.

Technology:Canva:**Instructions**:1. Create a symmetrical art design on an art app like weavesilk.com or a moart.com.
2. Download the art piece and place it in a Canva presentation.
3. Create at least 3 slides on Symmetry.
4. Slide 1 – this should consist of the student’s title slide
5. Slide 2 – This should consist of the student's artwork. The artwork should label the lines of symmetry.
6. Slide 3 – This slide should consist of pictures of symmetrical shapes and a short 3-5 sentence paragraph explaining line symmetry. The paragraph should be free of errors, use vocabulary discussed during the lesson, and refer to real – life examples of line symmetrical objects.

Example: |
| Evaluation |

|  |
| --- |
| **Line Symmetry Canva Technology Project**Rubric - 4th Grade |
| **Criteria** | **5 Points** | **4 Points** | **3 Points** | **2 Points** | **1 Point** |
| **Title Slide** | Professionally designed title slide with student name, project title, and creative symmetry-related background or graphic | Title slide includes most required elements with some visual appeal | Basic title slide with student name and project title | Incomplete title slide missing key information | Minimal effort on title slide |
| **Artwork Slide** | Detailed, original artwork with multiple, clearly labeled lines of symmetry using precise mathematical terminology | Original artwork with some lines of symmetry labeled accurately | The artwork shows a basic understanding of symmetry with partial labeling | Artwork lacks clear symmetry or minimal labeling | No discernible symmetry in the artwork |
| **Symmetry Explanation Slide** | Comprehensive 3-5 sentence paragraph explaining line symmetry with advanced vocabulary, multiple real-life examples, and zero grammatical errors | Well-written paragraph with most technical vocabulary and minimal grammatical errors | Basic explanation of symmetry with some errors or limited examples | Minimal explanation with significant grammatical errors | Incomplete or incorrect explanation |
| **Technical Presentation** | Visually engaging slides with consistent formatting, appropriate font, and professional design | Slides are neat and mostly consistent with minor formatting issues | Basic slide design with some formatting inconsistencies | Poorly formatted slides with distracting elements | Minimal effort in slide design |
| **Mathematical Accuracy** | Demonstrates deep understanding of line symmetry with complex explanations and multiple examples | Shows clear understanding of symmetry concepts with minor misconceptions | Basic understanding of symmetry with some errors | Limited understanding of symmetry | No evident understanding of symmetry |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

Total Possible Points: 25* 22-25 Points: (Excellent A)
* 18-21 Points: (Proficient B)
* 14-17 Points: (Developing C)
* 10-13 Points: (Emerging D)
* 0-9 Points: (Beginning F)

**Symmetry Brochure Rubric**

|  |
| --- |
|  |
| **Criteria** | **5 Points** | **4 Points** | **3 Points** | **2 Points** | **1 Point** |
| **Mathematical Symmetry Accuracy** (Does the brochure show categories of line symmetry?) | Perfectly demonstrates symmetry concepts with precise line/rotational symmetry in design | Clearly shows symmetry with minor technical errors | Demonstrates basic symmetry understanding with some inconsistencies | Limited symmetry representation with multiple errors | No recognizable symmetry in the project |
| **Visual Design** (Is the brochure creatively designed? Did it use appealing colors and shapes? Did it have a catchy title?) | Professionally created visual representation with detailed symmetrical drawings | Neat, clear visual design with good symmetry | Acceptable visual design with some clarity | Unclear visual design with minimal effort | Poorly constructed visual representation |
| **Mathematical Vocabulary**(Was proper vocabulary used in the brochure? Did it make sense?) | Uses advanced symmetry vocabulary correctly and confidently | Uses most symmetry terms accurately | Uses some mathematical symmetry terms | Limited mathematical language | No mathematical vocabulary used |
| **Presentation Delivery** (Did the brochure make the reader want to know more about shapes and symmetry? Did it present new information on symmetry?) | Confident, engaging delivery with excellent eye contact and projection | Clear delivery with good presentation skills | Adequate presentation with some hesitation | Difficult to understand presentation | Minimal or no presentation effort |

Total Possible Points: 25* 22-25 Points: (Excellent A)
* 18-21 Points: (Proficient B)
* 14-17 Points: (Developing C)
* 10-13 Points: (Emerging D)
* 0-9 Points: (Beginning F)
 |