IN2STEAM Lesson Plan

1. Unit title	**Geometric Robot**
Teacher & School	**Başak Didin / Basiskele Doga Schools, Turkey**
2. Target group	1st and 2nd Grades
3. Duration	2 class hours (30 min. + 30 min.)
4. STEAM Skills/ 21st Century Skills	Critical Thinking Problem Solving Creative Thinking Media Literacy Interpersonal skills 
5. Expected learning outcomes	At the end of this unit, students will be able to: M.2.2.1. Classify the geometric shapes according to the number of edges and vertices. a) Similar or different sides of triangle, square, rectangle, circle and circle are explained. b) Studies on whether a given geometric shape resembles other geometric figures are included. M.2.2.1.2. Create structures by using models and stencils, drawing the structures they create. a) Students learn how to work with one type of shape models first and then move on to use a variety of shape models. b) Drawing studies can be done on dotted paper with the shapes obtained by using the surfaces of the objects. c) Students are made aware of the ornaments on the works of art belonging to different civilizations. M.2.2.1.3. Recognise and distinguish a cube, square prism, rectangular prism, triangular prism, cylinder and sphere on models. a) Objects are introduced formally without mentioning their geometric properties. b) Objects from everyday life will be used (ping-pong ball, milk box, bottle, etc.). M.2.2.1.4. Realise that the formal properties of geometric bodies and shapes do not change when their direction, position or size are altered. a) Emphasis is placed on the shapes, objects and their properties introduced at the class level. b) Interactive studies with appropriate information and communication technologies can be included. c) Three-dimensional dynamic geometry software can be used.
6. Subjects and topics covered	Subjects: Mathematics, Arts Titles: Geometric Robot

7. Methodologies	Design Thinking
8. Integration of ART	Figurative Arts: the parts of the robot are created by using geometric shapes.
9. Learning Environment	Classroom
10. Required resources	Materials: -Triangular prism -Square prism -Quadrangular -Cube -Cylinder -Sphere -Adhesive -Craft paper -Play eye
11. Prior knowledge **a. teacher** **b. students**	To implement this unit, the teacher will need to have a good understanding of Design Thinking methodology. It will be useful to refresh the information about geometric objects in general. In order to attend and contribute to this course, students will already have a basic knowledge of geometric objects.
12. Detailed description of the step-by-step sequences of the unit, incl. specific activities to support the learning experience	Introduction Explain that you will discover the geometric objects we need to use in order to invent a robot. Using their creative thinking skills, they will create a new robot. Students will collaborate in groups of 2 or 3 during this activity and eventually share their findings with the class. STEP 1: Explore Repeat the general knowledge about geometric bodies, reminding them of the information previously acquired. Then ask each group to imagine a robot. Ask questions such as “What geometric objects are in the shape of this robot?”, “What geometric objects does this robot have?”. STEP 2: Interpret Show some examples of robot images. Ask them to investigate and interpret the general shape properties of the robot and describe which geometric objects they resemble. For example; Ask why the eyes of a human-like robot look like spheres, or why their legs look like cylinders. STEP 3: Create an Idea Talk about the properties of geometric shapes. Ask students to share their thoughts on their background information. Have them think about how to design the geometric robot, what geometric shapes they can use in its parts, and how to build this robot.

	Let the students start with a brainstorming session and explain whatever happens. The mindmap on the subject is a valid contribution. Ask them to develop and refine the contributions that they find more interesting. Ask them to choose a suggestion on how to close the brainstorming session and to develop it further. STEP 4: Prototype Ask students to draw the proposal developed from the brainstorming session, using the robot pictures that were previously distributed as models. Ask students to present the finished drawings to the whole class and explain what they hope to achieve. Students who do not present are encouraged to provide positive reinforcement (for example, "I like your opinion!") or to give constructive feedback (eg "Have you thought about making the robot's arms with a plastic cylinder?"). By creating a positive and supportive atmosphere, students will be encouraged to exchange ideas from each other. This is an important aspect of the ideation process. Ask students to start working on a prototype, that is, to transform the drawings into concrete objects. The prototype doesn't need to be functional at this stage, it just needs to physically represent the idea. It is not always possible to ask students to create a prototype of their drawing (for example, if their ideas are too complex, too abstract, etc.). To ensure that everyone has the opportunity to actively participate in this step, the teacher can provide each group with the following instructions from the materials specified under "Required resources" above.; 1) Select the materials required for your robot in our drawing. 2) Understand thoroughly how, where and how to use these materials. 3) Draw the instructions, starting from the foundation of your robot. 4) Assemble your robot in collaboration with adhesives. 5) Add visuality with handcrafted papers after completing the combination of the basic parts of your robot. 6) Complete your design by considering the similarities of your robot with our drawing and the abstract thinking of your dreams. STEP 5: Test Ask students to test their prototypes, potential bugs and weaknesses, and address any that may come up. Ask them to write down what they like best and least about their prototype (i.e. what they should have on if they go from prototype to a fully functional solution). Explain that the analysis of the prototype is part of the early production date part where many bugs can be fixed. It can be seen as part of the test. Explain that, in order to create interest, the presentation is as important as the prototype itself. They need to use colours and other tools to create an interesting image. Depending on usability and age, there may be an activity that will include multimedia support.
13. Gender-inclusive strategies and activities planned	This activity is intended to be gender neutral. Do not refer to gender stereotypes when explaining how people use robots (for example, a female cleaning robot, a female cooking robot, a male robot that repairs cars, etc.). Make sure that boys and girls are evenly distributed among the groups so that the final results are not categorised as "boy" and "girl" prototypes. When

	observing group work, make sure that each group member contributes equally (this is also a personality aspect, gender may or may not play a role).
14. Assessment & Evaluation	In Steps 1 and 2 above, ask research questions to check for clarity. At the end of Step 3, each group will submit a written proposal that can be formally evaluated against various standards (e.g. language skills, understanding of the subject, etc.). Step 4 will provide concrete results, such as a drawing and a 3D object. Steps 5 and 6 will provide tangible results. When students present the prototype to each other, you can ask them to vote by category (for example, best looking design, best functioning robot, etc.). For each category, you can give each student three stickers or three sticky notes; They can then add one, two or three stickers to a prototype of their choice, or distribute the stickers to two or three prototypes as they wish. You can also ask students to write a brief justification for their vote on the post-it note. An important aspect of the assessment will be observation throughout the unit. In particular, it will be important to keep students on task and engage; offer support when you feel stuck. If an issue has certain problematic aspects that continue to arise, make a note of reviewing them in a follow-up lesson.
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