

## **PREFACE**

*“Study the science of art. Study the art of science.”*

*Leonardo Da Vinci*

STEAM is an educational discipline that aims to spark an interest and lifelong love of the arts and sciences in children from an early age. Science, Technology, Engineering, the Arts and Math are similar fields of study in that they all involve creative processes and none uses just one method for inquiry and investigation. Teaching relevant, in-demand skills that will prepare students to become innovators in an ever-evolving world is paramount, not only for the future of the students themselves but for the future of the world.

STEAM empowers teachers to employ project-based learning that crosses each of the five disciplines and fosters an inclusive learning environment in which all students are able to engage and contribute. As opposed to traditional models of teaching, educators using the STEAM framework bring the disciplines together, leveraging the synergy between the modeling process and math and science content, for example, in order to blur the boundaries between modeling techniques and scientific/mathematical thinking. Through this holistic approach, students are able to exercise both sides of their brain at once.

An important part of this educational approach is that students who are taught under a STEAM framework are not just taught the subject matter but they are taught how to learn, how to ask questions, how to experiment and how to create.

The goal of this guide is to provide instructional tools in line with the National Curriculum of Pakistan, and it will be useful for teachers of students in all grades. It presents a teaching approach that encourages the active participation and involvement of students in the learning process, with an appropriate balance between thinking and hands-on activities. Sometimes students will be engaged in discussion, and if teachers use questioning effectively, it can improve their students' thinking and communication skills.

To make the guide user-friendly, simple step by step instructions are provided.

A total number of periods is also suggested for each unit, but the amount of time needed to complete each unit or activity may vary according to its degree of difficulty and the abilities and skills of the students. Teachers can adjust the times to suit their particular needs and context. Advanced preparation and clear instructions by teachers will help to minimize classroom management problems.

All materials suggested for the activities should be easily available at low/no cost: alternative materials can be substituted if necessary.

## HOW TO USE THIS GUIDE

Following the simple guidelines can help you get most out of these lesson plans. However, as all teachers know, in order to deliver the best lessons, you should be thoroughly familiar with the subject matter before you plan your lessons.

1. Always read the lesson plans thoroughly before the class to maximize confidence and command over your teaching. It will also enable you to modify in advance the plans to suit the needs of your particular students.
2. Collect and test all the materials listed in the plan before the lesson in order to obtain the required results. This will also minimize classroom management problems.
3. Instead of giving your input directly, introduce the key vocabulary using the glossary or dictionary. Involve the students in exploring the meanings of the key vocabulary using the glossary and if any meaning is not there, ask them to look up the meanings in a dictionary. You can also prepare flash cards for the new terms and display them on the walls. Before starting your lesson, ask the students to read these words aloud and share their meanings. This will help your students improve the pronunciation of the new scientific terms and their fluency in using these terms in discussion of the topics.
4. Before any activity, give clear instructions about what, how, and why they are going to do it.
5. Each additional worksheet has been coded according to the following criteria.

**STE. 3. 1. 4**

Subject

Grade

Term

Number

6. The concept of STEAM education is new for everyone. If a child takes longer time than you had anticipated, adjust accordingly. Always be appreciative of the work done in class.

We hope that this guide will prove useful in making the learning and teaching something to be looked forward to and enjoyed by teachers and students alike.

**IQRA ZAHID**

DEPARTMENT OF ACADEMICS

THE NEXT SCHOOL


# THE NEXT SCHOOL

## DAILY LESSON PLAN

Class: 3

Term 2

Lesson 1 and 2

<b>Project:</b> Algorithms and programming: <b>Build a star war games</b>		<b>Duration</b>
		70 min
<b>Learning Objectives: At the end of the lesson, students will be able to</b> <ul style="list-style-type: none"> <li>• Create an animated, interactive game using sequence and events.</li> <li>• Identify actions that correlate to input events.</li> </ul>		
<b>Teaching Objectives: Teacher will</b> <ul style="list-style-type: none"> <li>• Help them to recognize regular programming practices in games so that when they play games at home, they can see common computer science principles being used.</li> <li>• Make sense of problems and persevere in solving them.</li> </ul>		
<b>Skills involved:</b> Thinking skills · Problem Solving · Communication · Self-management		
<b>Resources required:</b> Computer or Laptop <a href="https://www.youtube.com/watch?v=icVRxFr39AU&amp;list=PL2DhNKNdmOtqBgWyF5kmy2oPh0U-Zfv2G">https://www.youtube.com/watch?v=icVRxFr39AU&amp;list=PL2DhNKNdmOtqBgWyF5kmy2oPh0U-Zfv2G</a>		
<b>Instructions:</b> <b>Warm up:</b> In a class discussion, ask the students what their favorite video game is (you might need to remind the students to only use games that are classroom appropriate). Ask the students what their favorite part of the game is. Most of the time, students will respond with some kind of event. When you recognize a student response that describes an event, ask the student to describe it further. Once the student is done describing their fun, take a minute to relate it back to the definition of an event. <b>Event: An action that causes something to happen.</b> Ask the students to try and relate some of their favorite parts of video games and how they can be described as events. Have them pair-share and discuss the differences between their events and their partner's. <b>Activity: Build a Star Wars Game</b> <a href="https://studio.code.org/s/coursed-2021/lessons/7/levels/2">https://studio.code.org/s/coursed-2021/lessons/7/levels/2</a> <b>Step 1:</b> Show them the introductory video ( <a href="https://youtu.be/hS1xTfibanA">https://youtu.be/hS1xTfibanA</a> ) <b>Step 2:</b> Hold down the buttons or the arrow keys on your keyboard to trigger the move events. <b>Step 3:</b> Use your skill building to solve the puzzles. <b>Step 4:</b> At the end of the activity there is a free play. Ask the student to make your own game and share it with your friends. <b>Note: Answer key will be attached in the resources for your reference</b>		
		
<b>Evaluation/Reflection:</b>		

Signature of the teacher

Signature of the Head/Coordinator

# THE NEXT SCHOOL

## DAILY LESSON PLAN

Class: 3

Term 2

Lesson 3 and 4

<b>Project:</b> Demonstrate the effects of static electricity: <b>Separate Pepper from Salt</b>	<b>Duration</b> 70 min
<b>Learning Objectives: At the end of the lesson, students will be able to</b> <ul style="list-style-type: none"> <li>Recognize and define the terms attract and repel as they relate to static electricity.</li> <li>Explain what happens when neutral, positively charged.</li> </ul>	
<b>Teaching Objectives: Teacher will</b> <ul style="list-style-type: none"> <li>Describe technologies associated with static electricity.</li> <li>Help the children participate in collaborative conversations about the topic</li> <li>Explain the transfer of electrons between two objects.</li> </ul>	
<b>Skills involved:</b> Thinking skills · Problem Solving · Observation skills · Self-management	
<b>Resources required:</b> ·Lego Building Blocks 1 Teaspoon salt,1 Teaspoon pepper, Plastic comb, Dish cloth, Printable Magic Comb worksheet <a href="https://www.youtube.com/watch?v=EzmJ5j6StCO">https://www.youtube.com/watch?v=EzmJ5j6StCO</a>	
<b>Instructions:</b> <b>Warm up: Ask the student if there was a way we could separate salt and pepper again?</b> Take different answers from them. <b>Say:</b> We rub the plastic comb on our hair for about 10 seconds and then hold the center to our salt and pepper mixture. As if by magic, a few particles will jump from the paper up to the comb! Now explain to them what static electricity is and take a print out for every student in the class. <b>Activity:</b> <b>Step 1:</b> Put some salt and pepper in a small dish. Stir it together. <b>Step 2:</b> Give a plastic comb a static charge by running it through their hair. <b>Step 3:</b> Hold the statically charged comb over the dish, and the comb will attract the pepper causing it to jump up out of the dish! If you hold the comb too close, the salt will jump up too, so it might take a little practice for just the right “magic” effect! <b>Note:</b> Ask the children to record their observations and findings on their worksheet.	
<b>Evaluation/Reflection:</b>	



Signature of the teacher

Signature of the Head/Coordinator


# THE NEXT SCHOOL

## DAILY LESSON PLAN

Class: 3

Term 2

Lesson 5 and 6

<b>Project:</b> Explore the layers of the earth: <b>Earth layer activity with Legos</b>		<b>Duration</b>
		70 min
<b>Learning Objectives: At the end of the lesson, students will be able to</b> <ul style="list-style-type: none"> <li>• Differentiate between the characteristics of earth's structural layer</li> <li>• Outline the boundaries among the earth's layers</li> </ul>		
<b>Teaching Objectives: Teacher will</b> <ul style="list-style-type: none"> <li>• Outline the characteristics of each of Earth's layer</li> <li>• Enable the students to acquire the knowledge about the topic</li> </ul>		
<b>Skills involved:</b> Thinking skills · Problem Solving · Communication · Self-management		
<b>Resources required:</b> Lego Building Blocks		
<b>Instructions:</b> <b>Warm up:</b> Begin by asking students to imagine that they were going to use a shovel to dig deeper and deeper into the Earth. What do they think they would encounter along the way? Have them share their ideas and discuss these as a class. <b>Say:</b> The earth can be divided into three main layers: the core, the mantle, and the crust. Each of these layers can be further divided into two parts: the inner and outer core, the upper and lower mantle, and the continental and oceanic crust. <b>Now Open the image and ask them to build the following layers!</b> <b>Activity:</b> <b>Step 1: The crust:</b> Talk about how all living things live on the crust. It's a thin but hard layer that covers the super-hot core, made of the ocean basins and Continental plates. <b>Step 2: The Mantle:</b> Now ask them to build the layer of the mantle under the crust about silicate rocks rich in magnesium and iron. <b>Step 3: The Core:</b> At the center of the Earth is the core, which has two parts. The solid, inner core is made of iron. It is surrounded by a liquid, outer core composed of a nickel-iron alloy. <b>Challenge: Now it's your turn to build a slice of the earth or whatever design comes to mind!</b>		
		
<b>Evaluation/Reflection:</b>		

Signature of the teacher

Signature of the Head/Coordinator



# THE NEXT SCHOOL

## DAILY LESSON PLAN

Class: 3

Term 2

Lesson 7 and 8

<b>Project:</b> Determine how to earthquake-proof their designs are by testing them on an earthquake simulator pan of Jell-O: <b>Testing model structures</b>	<b>Duration</b> 70 min
<b>Learning Objectives: At the end of the lesson, students will be able to</b> <ul style="list-style-type: none"> <li>Learn what causes earthquakes and how engineers use this knowledge to design more 'earthquake-proof' structures.</li> <li>Design, build, and test their model buildings and then determine how earthquake-proof their designs.</li> </ul>	
<b>Teaching Objectives: Teacher will</b> <ul style="list-style-type: none"> <li>incorporate geology, geography and natural disaster management into STEAM Education</li> <li>Compare a model structure with what it represents.</li> </ul>	
<b>Skills involved:</b> Thinking skills · Problem Solving · Communication · Self-management	
<b>Resources required:</b> 30 toothpicks, 30 miniature marshmallows, square baking dishes, 2 boxes of jelly	
<p><b>Instructions:</b></p> <p><b>Warm up: Show students' parts of the following video of the ground moving during an earthquake (see minute 5:45):</b> <a href="https://www.youtube.com/watch?v=ZMXuFm1opJM">https://www.youtube.com/watch?v=ZMXuFm1opJM</a>.</p> <p>Ask students to share their observations and the questions they have. Tell them about why earthquakes occur and the reason behind it.</p> <p><b>Before the Activity</b> Prepare the Jelly the night before the activity so that it is fully set when students begin the activity. Pour the Jelly into eight 21.5 cm (8½-inch) square pans to be shared by students, or in one large pan for the entire class to share.</p> <p><b>Step 1:</b> For this engineering design challenge, students are limited to using only mini marshmallows and toothpicks to build their model structures. Ask them to build the sketch of any structure on paper.</p> <p><b>Step 2:</b> Once the students have drawn and labelled their sketches, distribute 30 toothpicks and 30 marshmallows to each student or team, and have them build their first model prototype.</p> <p><b>Step 3:</b> Shake the pan back and forth in a shearing motion to simulate an earthquake.</p> <p><b>Step 4:</b> After the earthquake is over, have students make a quick sketch of their model building before removing it from the pan of Jell-O.</p> <p><b>Step 5:</b> Now that students have gone through their first design, build, and test cycle, show students the following photographs of different earthquake-proof buildings:</p>	



[https://www.frontiersin.org/files/Articles/272020/fbuil-03-00049-HTML/image\\_m/fbuil-03-00049-g005.jpg](https://www.frontiersin.org/files/Articles/272020/fbuil-03-00049-HTML/image_m/fbuil-03-00049-g005.jpg)

**Evaluation/Reflection:**

\_\_\_\_\_  
Signature of the teacher

\_\_\_\_\_  
Signature of the Head/Coordinator