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.

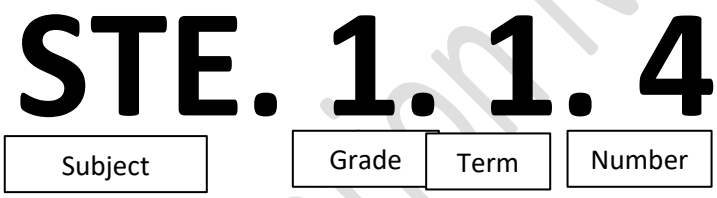
A total number of periods is also suggested for each unit, but the amount of time needed to complete each unit or activity may vary according to its degree of difficulty and the abilities and skills of the students. Teachers can adjust the times to suit their particular needs and context. Advanced preparation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



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: 1 Term 2 Week 1 & 2

Project: Concept of 2D and 3D shapes by using gumdrops: 2D and 3D Modeling	**Duration**
	80 min

Learning Objectives: At the end of the lesson, students will be able to

- Identify the difference between 2D and 3D Models.
- Identify how different structures relate to each other.

Teaching Objectives: Teacher will

- Identify several factors that engineers consider when designing a bridge
- Show them different structures of bridges through media

Skills involved:

Thinking skills · Problem Solving · Communication · Self-management

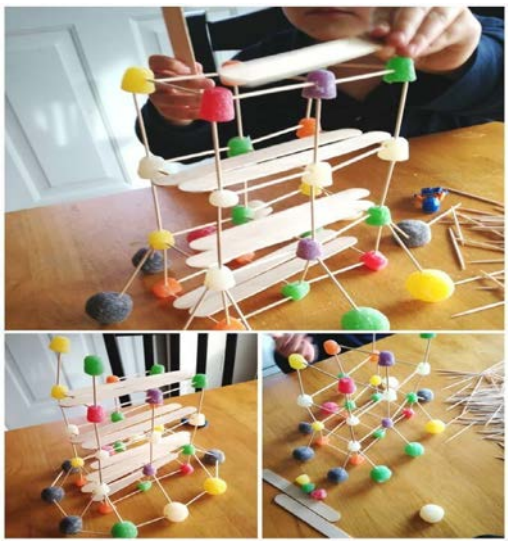
Resources required:

·Gumdrops, toothpicks, Lego minifigures, popsicle sticks
https://www.youtube.com/watch?v=1xIT_D8sLpk

Instructions:

Warm up: Gather the students and talk about the shapes we saw, how many gumdrops and toothpicks we would need, and how bridges work.

Note: *Before we began the bridge building activity, try to explore the gumdrops and toothpicks with students and ask them to build some shapes on their own. (1st class)*



Step1: Set out a number of toothpicks and gumdrops, and let students have a go at working out what makes a great bridge design. Make sure to test the stability of your bridge too.

Step2: Help the LEGO men (only characters) get across the bridge and also add Popsicle sticks to all the bridge building activities.

Step 3: Ask the students to plan a rescue mission for the LEGO man, so work on building bridges and ladders to rescue them by making 2 levels of bridge.

Step 4: The bridge building activities can take on their own! let students add in a bit of creativity too

Evaluation/Reflection:

_____ _____

Signature of the teacher Signature of the Head/Coordinator

THE NEXT SCHOOL

DAILY LESSON PLAN

Class: 1 Term 2 Week 3 & 4

Project: Build a car with help of building blocks: **Lego Car**	**Duration**
	40 min

Learning Objectives: At the end of the lesson, students will be able to

- Do the addition because students can really see what's happening.
- Do the counts and figure out the sums

Teaching Objectives: Teacher will

- Use laminated LEGO addition mats so that the students can use a wipe off marker and do the activity over and over.
- Make the clear concept of addition by demonstration using objects.

Skills involved:

Thinking skills · Problem Solving · Communication · Self-management

Resources required:

·Lego Building Blocks ·Printed Challenge Cards

https://www.youtube.com/watch?v=y_mMbQWUZyc

Instructions:

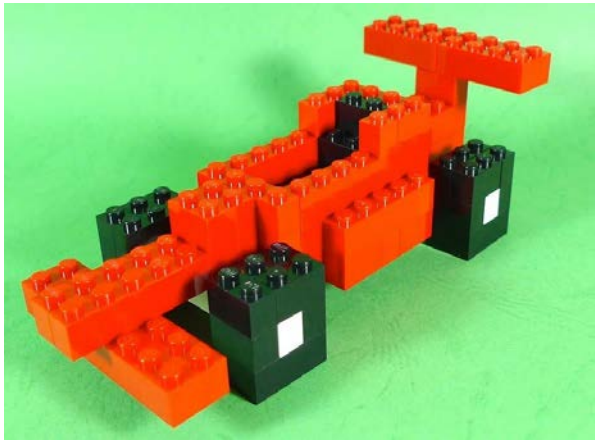
Warm up: Tell the students that there are many options and ways to build a LEGO car, but the basic principles behind their construction remains the same (show them how to build a basic car). Think and imagine your own!

Say: Try to build your dream car by using building blocks.

Gather your LEGO materials

Step 1: Find a safe, clear space to build the car. A table or desk near a bright lighting source is a good place to build a LEGO car. You want to find a space that's big enough for you to spread out your pieces

Step 2: Spread your LEGO pieces neatly in front of you. Organize the pieces by size and shape, so it is easier to pick the pieces you need.



Step 3: Build the base by using different base bricks

Step 4: Build the front hood. You'll need 2 2x2 square bricks and two 2x2 clear angular bricks.

Step 5: Build the windshield section. This piece will sit directly behind the hood you just built. You will need 2 2x4 bricks and a 2x4 LEGO windshield piece.

Step 6: Build the cab. You will need 1 2x4 rectangular brick, 2 1x2 rectangular bricks, and a 1x2 LEGO steering wheel piece.

Place your car on a flat, smooth surface.

You are done!

Evaluation/Reflection:

_____ _____

Signature of the teacher Signature of the Head/Coordinator

THE NEXT SCHOOL

DAILY LESSON PLAN

Class: 1 Term 2 Week 5 & 6

Project: Exploring how three basic colors can combine together to make any other color: **Walking Rainbow**	**Duration** 40 min

Learning Objectives: At the end of the lesson, students will be able to

- Define the primary colors and how mixture of colors creates secondary colors
- Describe colors of the rainbow

Teaching Objectives: Teacher will

- Explaining how rainbows form and the colors found within them
- Enable the students to acquire the knowledge about the topic

Skills involved:

Thinking skills · Problem Solving · Communication · Self-management

Resources required:

· 6 transparent cups, Paper towel roll, gel food coloring, Water, 3 plastic spoons

https://www.youtube.com/watch?v=Jfn-80RbZRg

Instructions:

Warm up: Gather the students and discuss the color theory: the paper towels pull color from the base red, blue, and yellow primary color cups, the resulting mixture creates the secondary colors of green, purple, and orange, completing the rainbow.

Also tell them how Capillary action works on plants by pulling water from the soil and up into their leaves to keep watered.

Step 1: Collect Your Materials used 6 clear plastic cup, regular food-grade food coloring, you can use watercolors, or other food dyes if you have them and a container of clear water so you can fill your cups
several different stirrings stick.

Step 2: Take 3 cups and fill them with water

Step 3: Once the cups are about three-quarters full add several drops of food coloring, try to use the same amount of food coloring in all the cups. Now add red, blue and yellow coloring to the cups.

Step 4: Place Cups in a Circle
(You will now have 3 cups full of colored water and 3 empty cups)

Step 5: Place the Paper Towels

Step 6: Roll the paper towels into tube-like pieces and put one end in a full cup and the other end in an empty cup.

The capillary action will start happening right away.

Evaluation/Reflection:

_____ _____

Signature of the teacher Signature of the Head/Coordinator

THE NEXT SCHOOL

DAILY LESSON PLAN

Class: 1 Term 2 Week 7 & 8

Project: Introduction to simple machines and how machines are useful: **Lego Duplo Paint Machine**	**Duration** 40 min

Learning Objectives: At the end of the lesson, students will be able to

- Identify powered and simple machines
- Usage of the machines in practical life

Teaching Objectives: Teacher will

- Tell how they can improve the paint machine
- Discuss what happens when you spin the paint machine fast? slow?
- Introduce a simple machine and how they work.

Skills involved:
Thinking skills · Problem Solving · Communication · Self-management

Resources required:
Duplo turntable brick,2×2 Duplo bricks,2×8 Duplo plate,4×8 Duplo plate, Paintbrush, Tempera paint, Paint tray, large sheets of white paper, blue sticky tack

Instructions:

Warm up: Ask the students to recall studying about rainbows and working with colors and that today they are working with machines. ask the children if they can tell the names of simple machines.

Take different answers from the students and encourage them.

Say: Now ask them to think how different types of paints will react with the **machine**? Let's try it!

Building Instructions:

Step1: Use Duplo bricks, plates and turntable brick to build a paint machine. Make sure it is the correct height to fit the paintbrush!

Step2: Use the blue sticky tack to attach the paintbrush to the bottom of the 2×8 Duplo plate and to keep the paint machine upright by sticking some to the bottom of the 4×8 Duplo plate.

How to use the Paint Machine:

Step1: Dip the paintbrush in the paint, attach the paintbrush to the paint machine.

Step2: Place the paint machine on top of a large sheet of white paper and spin it around to paint circles on the paper.

Step3: Experiment with using the paint machine with different paint colors, building and painting with the paint machine at different heights and spinning the machine fast and slow.

Evaluation/Reflection:

_____ _____

Signature of the teacher Signature of the Head/Coordinator