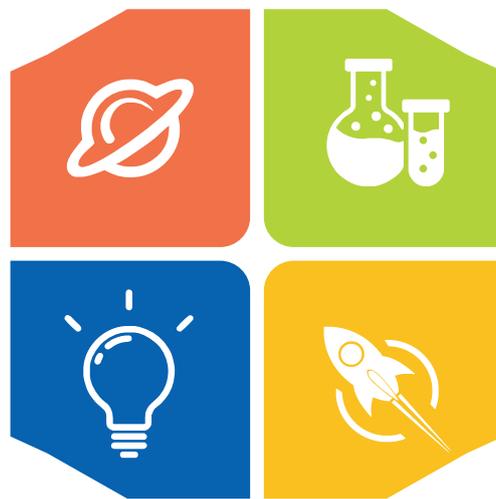


# STEM Activity Program

(Age - 5 yrs. and above)



**Engage - Create - Innovate - Inspire**

## **Box of Science**

Share your activity pictures or activity notes with us  
and get a digital certificate for completion of this program



# Foreword

by team Box of Science



This guidebook on STEM activities is designed for kids. We have tried to provide interesting activities which kids can perform at home. Even parents can join them.

Our team expects kids to engage themselves in fun learning activities that will boost their curiosity. Such hands-on engagements are helpful in cognitive developments of a child. They also help in improving curiosity and imagination. We want to inspire little geniuses and provide them with a confidence that they can create something.

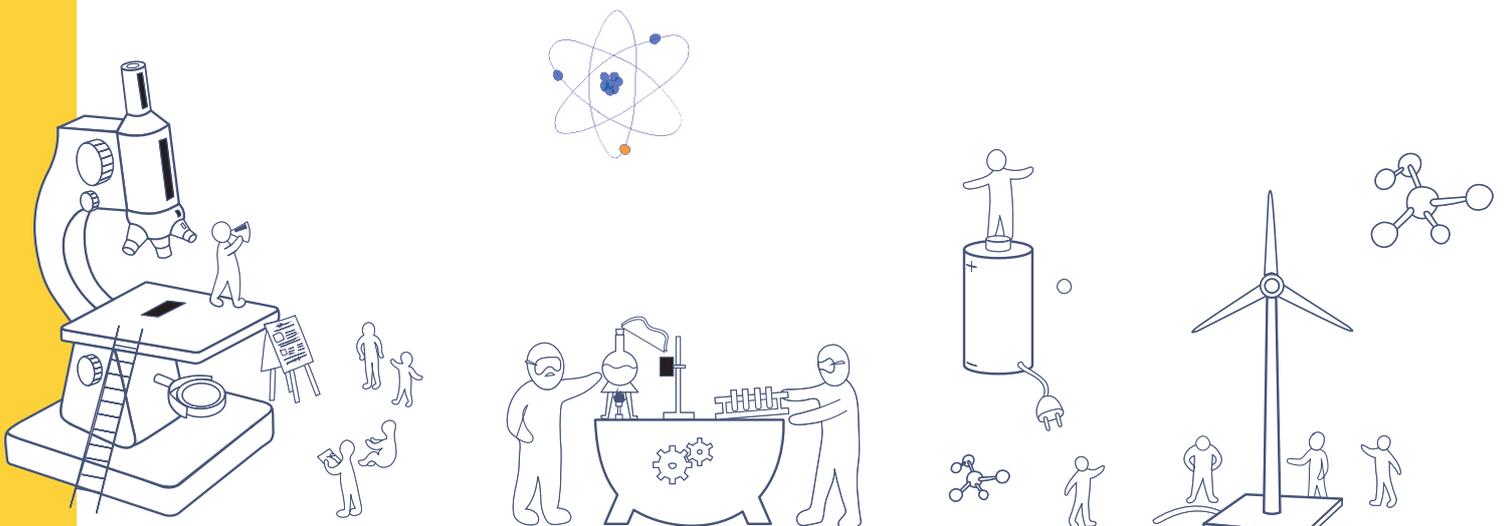
In India, the COVID 19 situation is at brink of becoming colossal pandemic. It is everyone's responsibility now to follow instructions given by experts and authorities. As every dark cloud has silver lining, the situation gave ample time for kids to enhance their skills. Hence we have decided to launch this initiative.

At 'Box of Science', we will be developing interesting STEM activity manuals like this for kids and teachers. We have tried to select activities which can be done at home, with available materials. It is not advised to go out in search of the materials if they are not available. These activities are also helpful in understanding scientific concepts in detail.

Enjoy 'Learning by Doing' with us. Stay safe - stay at home.

Share pictures and activity notes with us and get a digital certificate from us for participation in STEM program. Send images on [reply@boxofscience.com](mailto:reply@boxofscience.com) with name of child and address.

**Also 3 selected entries will get 'My Science Lab' Kit delivered to their addresses in the month of June 2020.**





# Indoor model of Planetary System



## Objectives:

To understand relative sizes of planets and the Sun  
Knowing interplanetary distances, vastness of the space  
Understanding different units for large scale distances

## Procedure:

1. Refer the chart given below
2. The 6th column represents relative sizes of different planets and the Sun.
3. Draw circular planets of the given diameters on plain paper. The scale is in millimeters. Cut these planets, name and color them.
3. Once the system is ready, check the 4th column.
4. Arrange planets (starting from the Sun) in an order. Keep them at given distance (As mentioned in 4th column) the scale here is in centimeters.
5. Once your solar system is ready, write a report on the activity. Do share your observations and photos of your solar system with us.

## Key concepts: (Units for astronomical distances)

1. A.U. (Astronomical Unit): 1 AU = Distance between our Earth and the Sun  
= 150,000,000 (rounded off value)
2. Light year: Distance covered by light ray in given year. It can be measured like 1 light second, 1 light day and so on... Speed of light 3,00,000 km/sec

Planet	Distance From Sun (AU)	Distance to Planet (km)	Scale Distance From Sun (cm)	Actual Diameter (km)	Model Diameter (mm)
Sun (a star)	0			1,391,980	139
Mercury	0.39	58,000,000	3.9	4,880	0.5
Venus	0.72	108,000,000	7.9	12,100	1.2
Earth	1.00	150,000,000	10	12,800	1.3
Mars	1.52	228,000,000	15.2	6,800	0.7
Jupiter	5.20	778,000,000	52.0	142,000	14.3
Saturn	9.54	1,430,000,000	95.4	120,000	12.0
Uranus	19.2	2,870,000,000	192	51,800	5.2
Neptune	30.1	4,500,000,000	301	49,500	4.8
Pluto	39.4	5,900,000,000	394	2,300	0.2



# Kitchen Chemistry

## Chemicals in our houses



### Objectives:

To understand about different chemicals that we use in our daily lives  
Knowing about soluble insoluble chemicals  
Understanding food chemistry

### Procedure:

#### Solubility tests:

Things required - Salt, sugar, baking soda, ground nuts, any of the pulses etc.

Take a small cup of water, and try mixing collected entities in water. Make a note of soluble and insoluble materials. Do share you observations with us.

#### Useful chemicals in our daily lives:

Things required - Writing pad, A4 size paper or notebook, pen/pencil

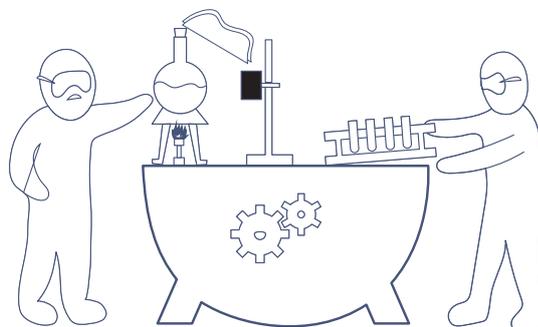
Make a list of chemicals that are being used in daily lives. e.g. chemicals in your toothpaste, chemicals in soap, shampoo etc. read ingredients on these products and write them down.

#### What and Why?

Check over internet for other applications of these chemicals. For example sorbitol is a chemical used in our toothpastes. Find out about this chemical. Let the kids understand the importance of extensive research in the field of Chemistry.,

#### Food chemistry:

Make a separate list of ingredients that are edible. Parental guidance is expected here. Let the kids know about harmful and edible entities. List out different spices, sweet and sour chemicals (food items). Ingredients in chocolates, biscuits, energy drinks etc.





# Capillarity Effect

Maintenance free watering system



## Objectives:

Knowing surface properties of liquids, capillarity, water flow, gravity  
Understanding how plants transports the water

## Procedure:

### Activity 1- Wick motor

Materials - A cup full of water, cotton wick

Procedure - Keep the wick at the edge of the cup and immersed in water. Wait for 1-2 minutes. The wick will soak water and once saturated, will transport it drop by drop outside the cup. Find out how? Also share picture of your wick motor.

### Activity 2: Color mixer

Materials: cotton handkerchief or any cloth, food color (if unavailable use haldi), 2 cups with water.

Procedure: Keep one cup at slightly higher level than the other. Add food color or a pinch of haldi in one cup. Let the other colorless. Soak cloth in tap water. Put one end of the cloth in colored water while other end in colorless water. Keep this arrangement for few minutes. Observe what happens...and take picture..share with us... Note down your results.

Visit this link for video assistance:

<https://www.youtube.com/watch?v=hZ-44n2OtCg>

### Activity 3: Plant watering mechanism

Materials: woolen or thick cotton thread, Empty pet bottle, screwdriver

#### Procedure:

Make a hole in the lid of the bottle. Fill this bottle with water.

Keep it near the plant vase at a height.

Insert thick thread through the hole into water.

The other end should be kept at lower heights near plant root.

Water will flow slowly due to height difference and plant soil will be moist for a longer period of time. You don't have to water it every day.



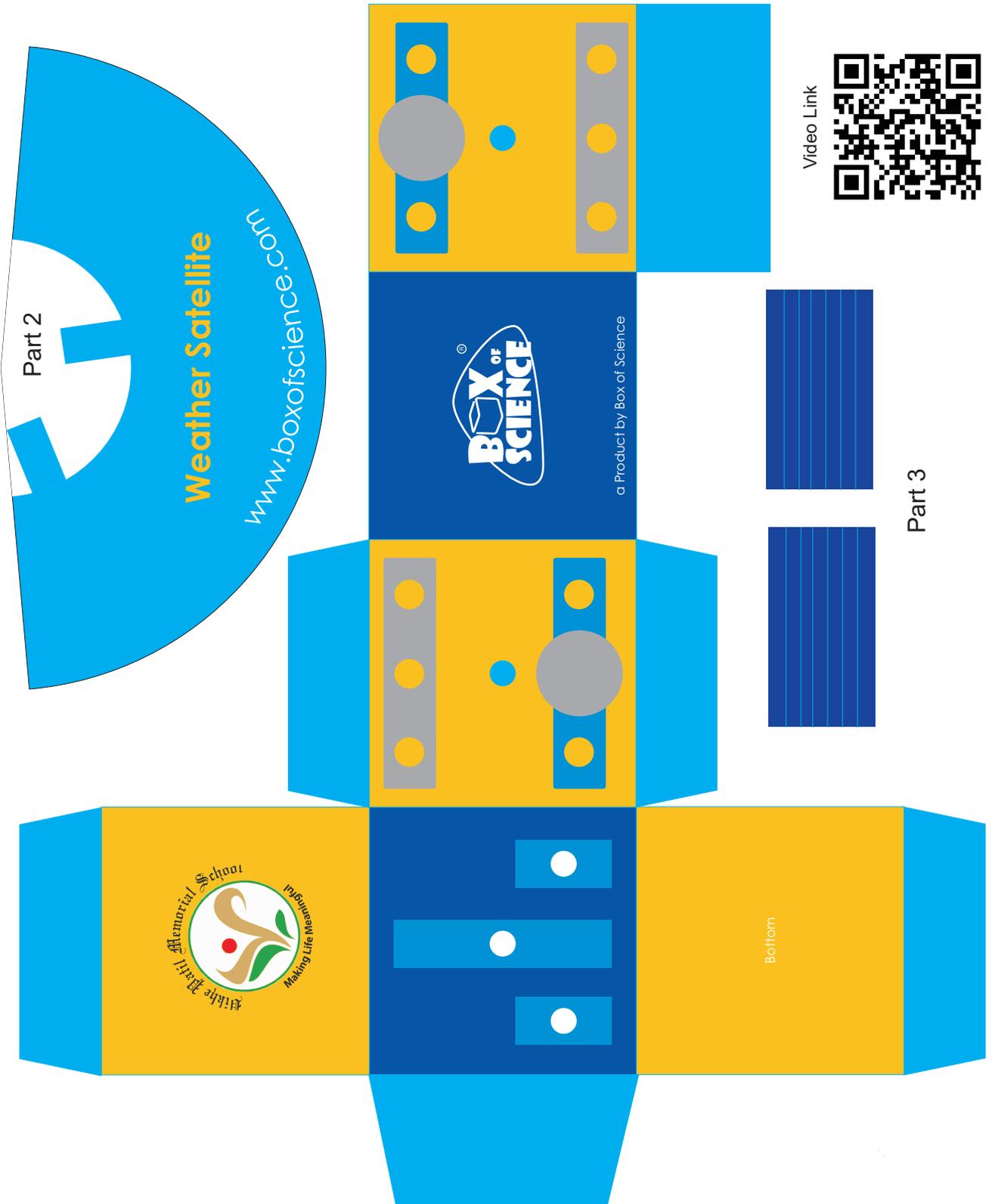
Video Link





# 3D model of Satellite

Applications of space technology



### Instructions:

1. Take a print or draw shape like above.
2. Cut out the paper in the given shape. Paste it on cardsheet. Make a box out of it.
3. Make a cone from the 'Part 2' template. This cone will serve as a stand for your satellite
4. Cut out 'Part 3'. They represent solar panels. Attach them with tooth picks or any other sticks to the central box.
5. Your satellite model is ready. Share picture and write a note on applications of satellites.



# Atoms, molecules

World of tiny particles



## Objectives:

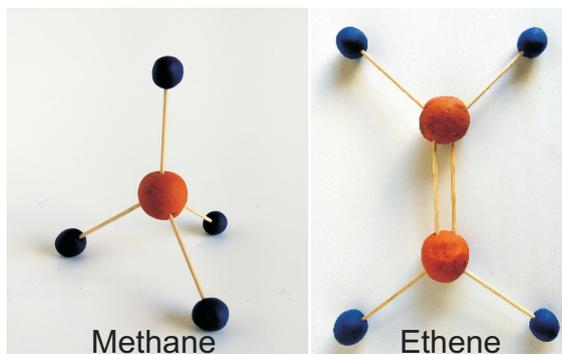
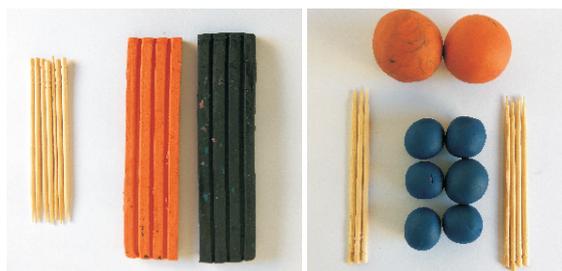
Knowing about atoms and molecules  
Solid, liquid and gases  
Molecular structures and types

## Materials:

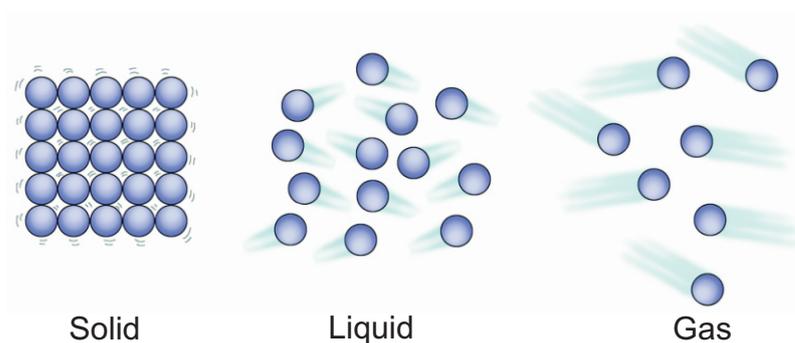
Clay (If unavailable use dough), toothpicks or broom sticks or any available sticks, notebook and pen

## Procedure:

Make small balls of clay or dough. Use sticks to connect them.  
Make different molecular models out of it.



Represent solid, liquid gases in form of molecular distances,  
with the help of small balls of clay or dough



Click pictures of your molecules and share with us



# Air pressure pump

## Miracles of atmospheric pressure



### Objectives:

Understanding concept of air pressure  
Knowing atmospheric pressure  
Physics of pressure

### Materials:

A balloon, straw, pet bottle, clay or dough

### Procedure:

1. Make a hole in the lid of a bottle and on any side of it
2. Insert small piece of straw in balloon and tie with rubber band or thread
3. Fill bottle with water. 3/4th of its capacity
4. Insert a longer straw from the other hole which is made on the side of a bottle
5. Put clay or dough around these holes to stop leakage
6. Inflate the balloon and insert the straw in the hole at lid.
7. Observe and infer. Share pictures with us.

Video Link



### Facts about atmospheric pressure

1. Air pressure is the weight of air molecules pressing down on Earth
2. The barometers are used to measure the air pressure at different places and different times of day.
3. Average air pressure per square centimeter is 1 Kg.
4. That means on your head (varies according to surface area) you have 80 Kgs
5. On weather maps, air pressure is shown with line called isobars. These lines join places of equal pressure together.
6. Breathing is difficult on high peaks because the air pressure is low and oxygen present in the air is more difficult to be absorbed in the blood.

Find more such facts and enjoy learning by doing !



# Sinking and Floating

## Buoyancy and Archimedes Principle



### Objectives:

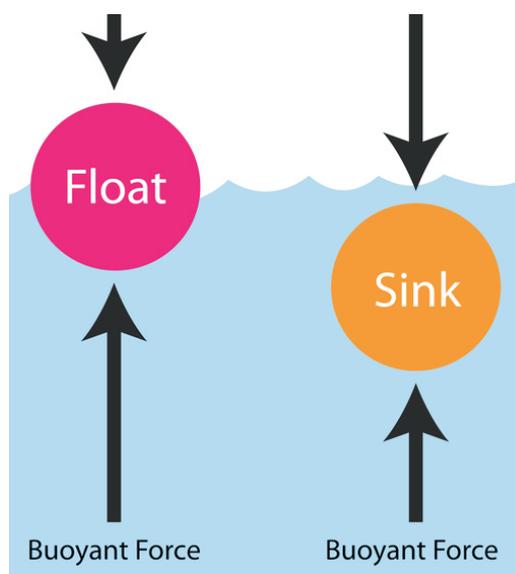
Understanding concepts of density, sinking and floating  
Knowing buoyancy and Archimedes principle

### Materials:

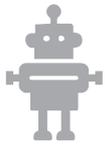
A bowl with water, piece of paper, a coin, rice, wooden stick, aluminum foil (if available), few drops of oil etc.

### Procedure:

1. In a bowl filled with water, add above things one by one
2. Observe what sinks and what floats
3. Find out why wooden sticks float easily on water
4. Observe what happens with oil
5. Take a pet bottle and push it into this bowl full of water
6. See if height of water in the bowl changes, if yes find out why?



This code will take you to a video for more details on the topic

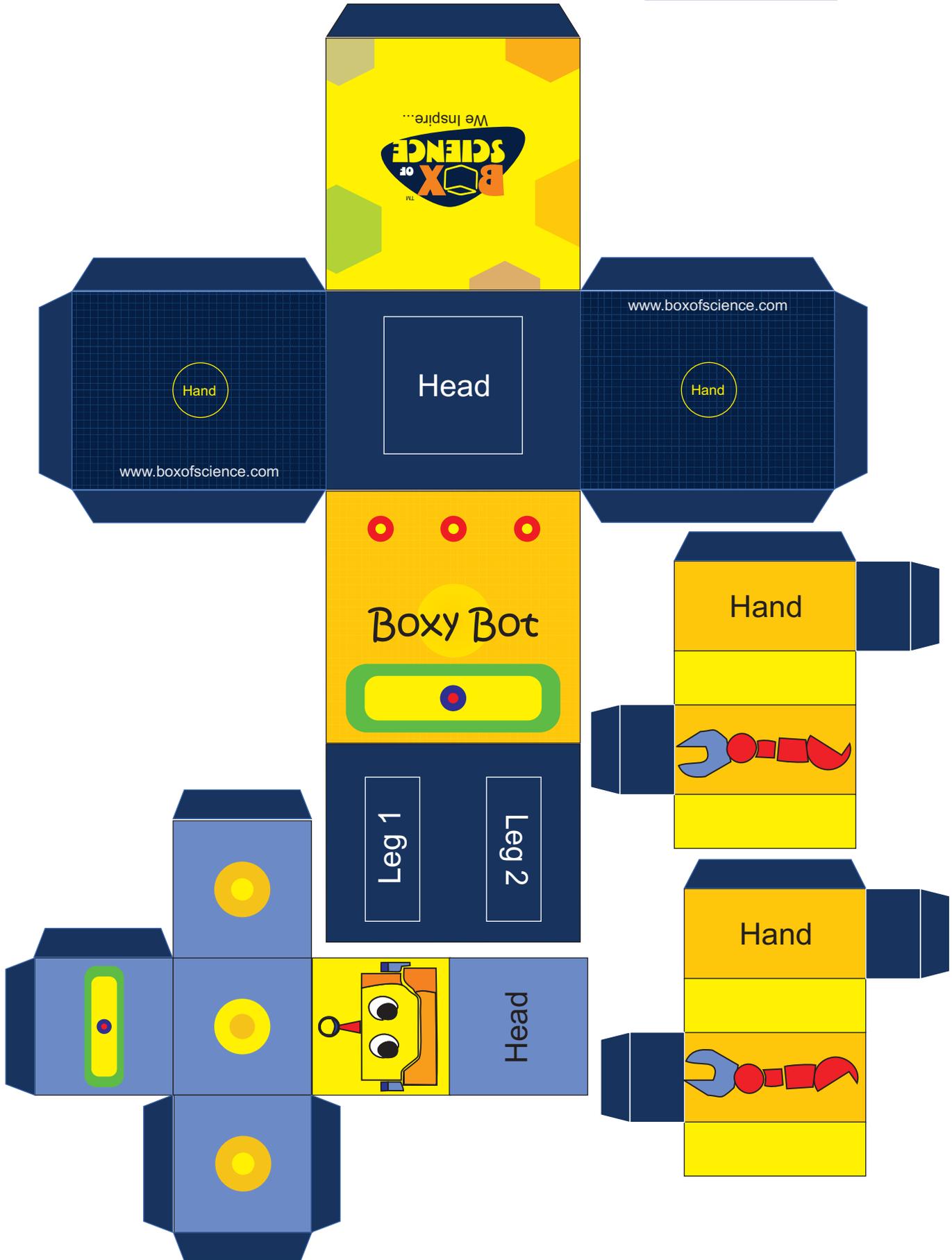


# DIY Paper robot

Make your own BoxyBot



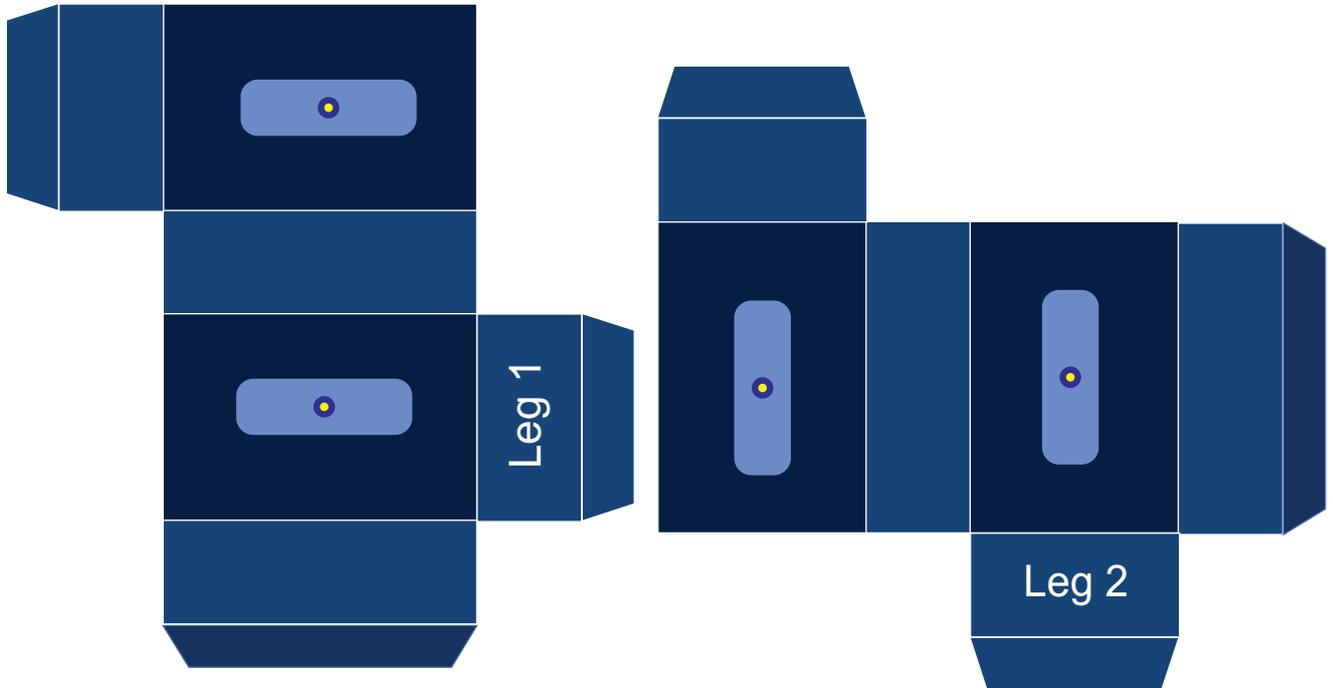
www.boxofscience.com





# DIY Paper robot

Make your own BoxyBot



## Procedure:

1. Print the 'Part 1' and 'Part 2' pages.
2. Cut out the box outline and paste them on a cardsheet.
3. Fold all cutouts to make boxes out of it.
4. Stick hands, legs, head on their places.
5. Enjoy your BoxyBot

Make a list of areas, fields where automation, robotic machines are helping humans.

Take picture of your Boxy and share with us



# Space for Notes

Explore STEM with Box of Science

