

STEM Activity Program

(Age - 5 yrs. and above)



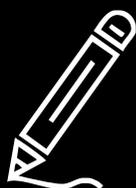
# DO-it-Yourself Astronomy Activities



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 '**STEAM-Astronomy**' 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.

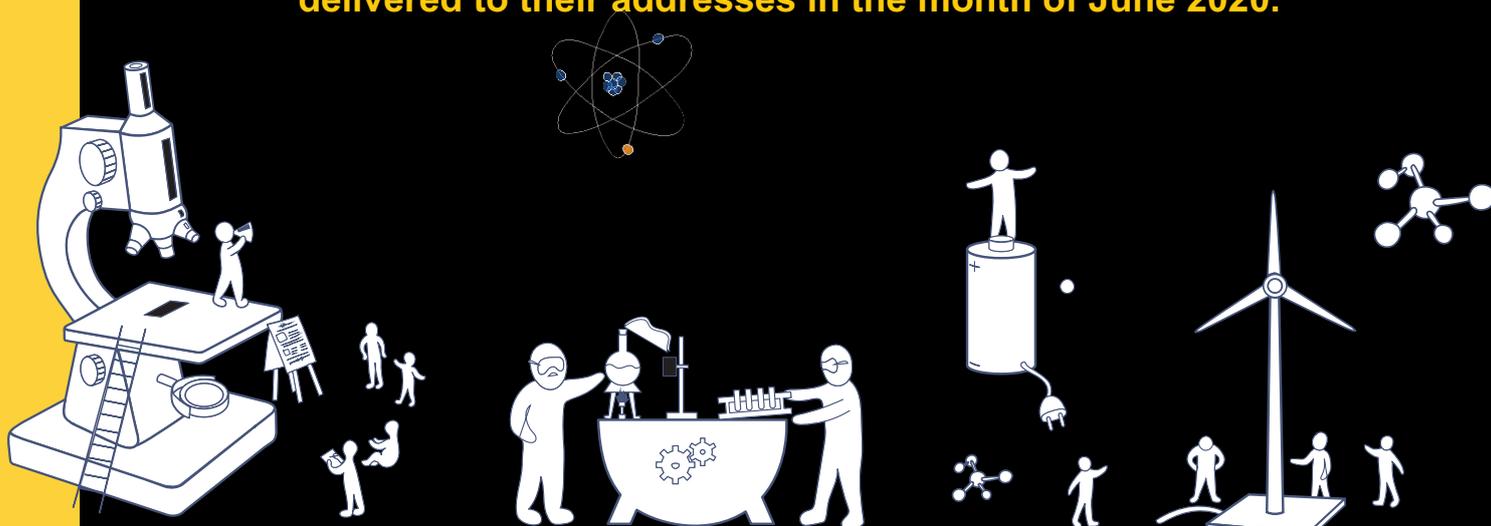
In India, the COVID 19 situation is tough. It is everyone's responsibility now to follow instructions given by experts and authorities. As every dark cloud has silver lining, the situation gave ample time for kids to enhance their skills. Hence we have decided to launch this initiative.

At 'Box of Science', we will be developing interesting 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.**





# Sun Dial Activity

## DIY Sundial



### Objectives:

Knowing about measuring time, Mathematics of time scale,  
Working of Sundial, Ancient astronomy

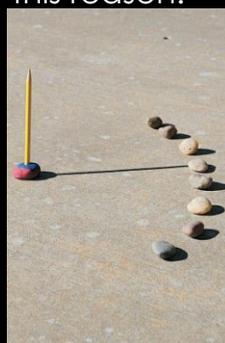
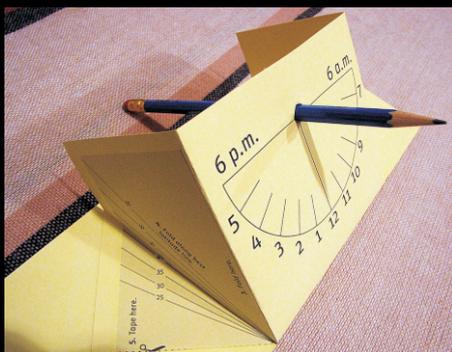
### Background Information

Sundials are one of the oldest of scientific instruments. They may, in fact, be the oldest of scientific instruments. There is evidence for their use as early as 1500 B.C.

Sundials require no winding, batteries, or other power source. It is said that a clock or watch may keep time, but only a sundial can find time.

Sundials allow us to tell time by the constant movement of a shadow that is cast by an object called a gnomon ("know'-mon"). The simplest sundial is a vertical stick rising from a flat horizontal surface.

As the Sun rises, passes the highest point in its path (at noon and to the south, in the northern hemisphere) and sets, the shadow rotates around the stick in a clockwise direction, and its position can be used to mark time. Indeed, it has been claimed that the "clockwise" direction in which the hands on a clock rotate was chosen for this reason.



### Find out yourself

In ancient India, astronomy was studied with precision techniques. Sundials and planetary dials can be seen at many buildings, temples, structures. Find out places and structures where these sundials are located.

### Make your SunDial

- Take a print of page 4 (Next Page) or draw similar layout on a blank paper
  - Cut out on given lines
  - Find out latitude of your place (Find over internet)
  - Look for grey part where lines with numbers are printed
    - These are latitudinal angles
    - Fold upon the line which is closest to your latitude
- For example latitude for Delhi is 28.7 degrees, so fold in between 25 and 30
  - Make a small hole through a circle given at the top center
  - Insert a pencil or wooden stick through it (refer picture 1 above)
    - The pencil must point towards polestar (North Direction)
- A magnetic compass can be used to align direction of the pencil (download magnetic compass app on your mobile)
- Once this is done set the shadow on number given in semi-circular scale
  - Your sun-dial is ready to use

5. Tape here.

3. Fold here.

4. Fold along best latitude line.

55 50 45 40 35 30 25

6 p.m.

6 a.m.

5 4 3 2 1 12 11 10 9 8 7

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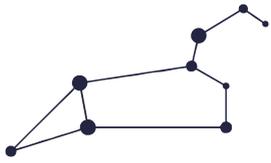
5. Tape here.

3. Fold here.

4. Fold along best latitude line.

55 50 45 40 35 30 25





# Constellation Projector

## DIY Starry night



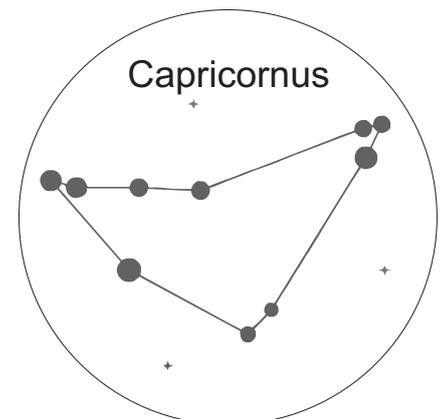
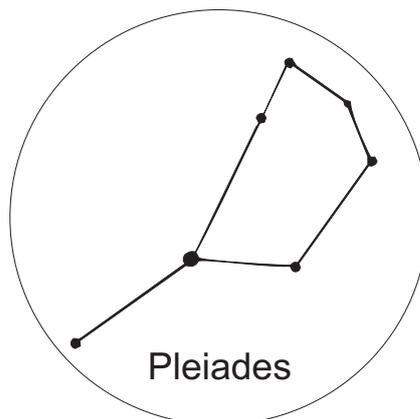
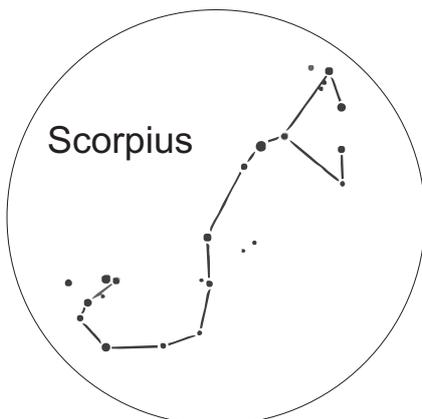
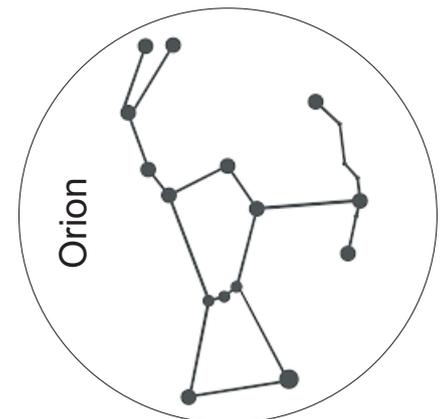
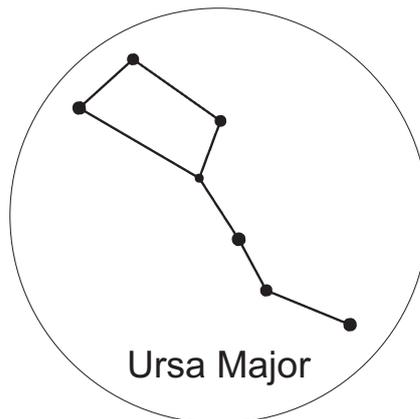
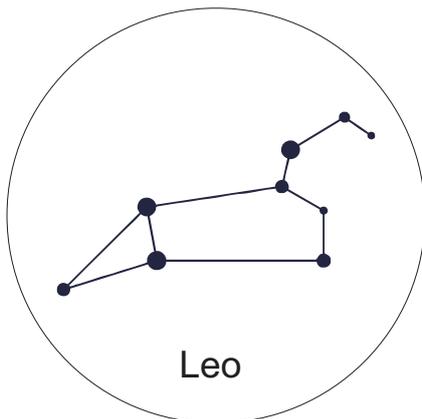
### Objectives:

Knowing constellations, star clusters and zodiac signs

Fun with star projection

### Procedure:

1. Cut out the constellation circles given below
  2. Make holes for the stars using pencil
  3. Holes should be neat
  4. You may also draw these constellations if printing facility is unavailable
  5. Stick these cut-outs in front of a torch to project them on wall
- Your constellation projector is ready to enjoy. Make more of such constellations.





# Phases of the Moon

## 2D dial DIY model

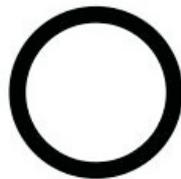


### Objectives:

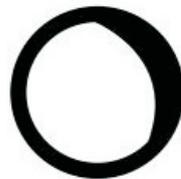
Knowing phases of the moon, orbit and motion of our moon, different phases and their names

### Procedure:

1. Cut out the dials given on page 7
2. Cut the yellow part from 'Top Dial'
3. Draw different phases and their names on 'Bottom Dial'
4. Total 8 sections are given on 'Bottom Dial'. Use following diagram for drawing 8 phases.
5. Put 'Top dial' on the "bottom Dial' and insert a push pin  
Your dial is ready to use. Observe night sky for checking current phase.



**FULL MOON**



**WANING GIBBOUS**



**WANING HALF  
(FIRST QUARTER)**



**WANING CRESCENT**



**NEW MOON**



**WAXING CRESCENT**



**WAXING HALF  
(LAST QUARTER)**



**WAXING GIBBOUS**

### Phases of the Moon

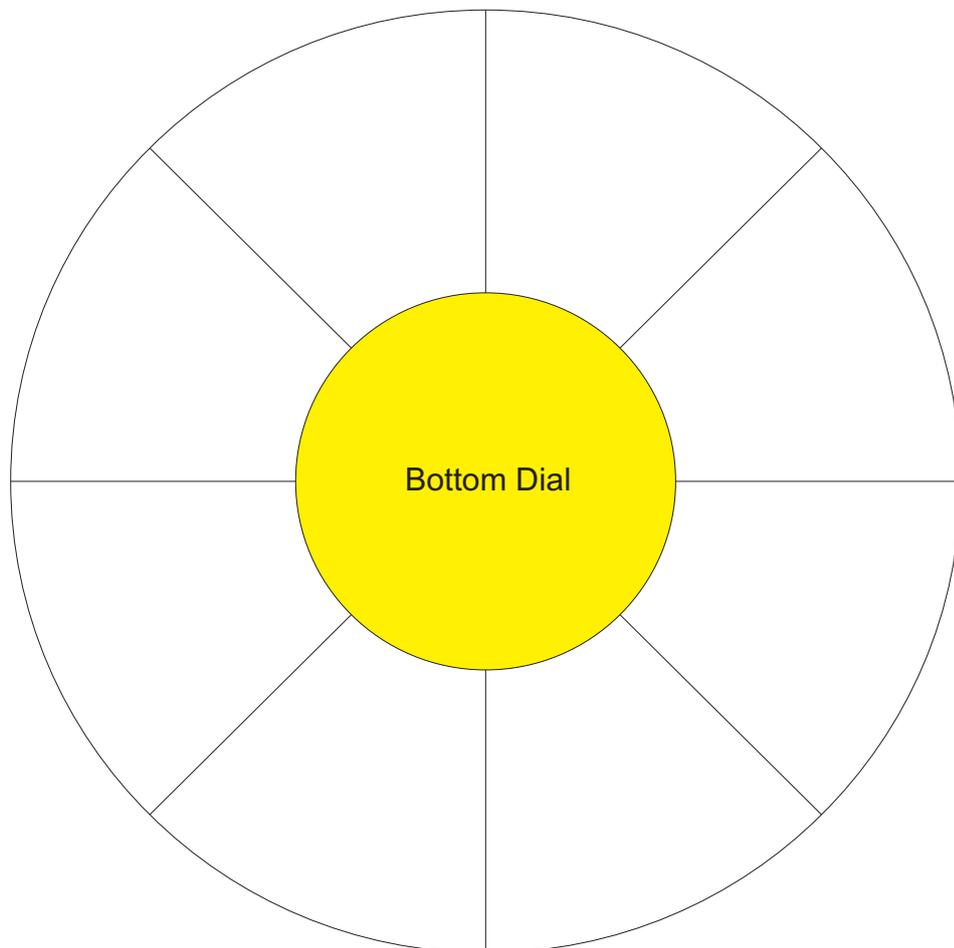
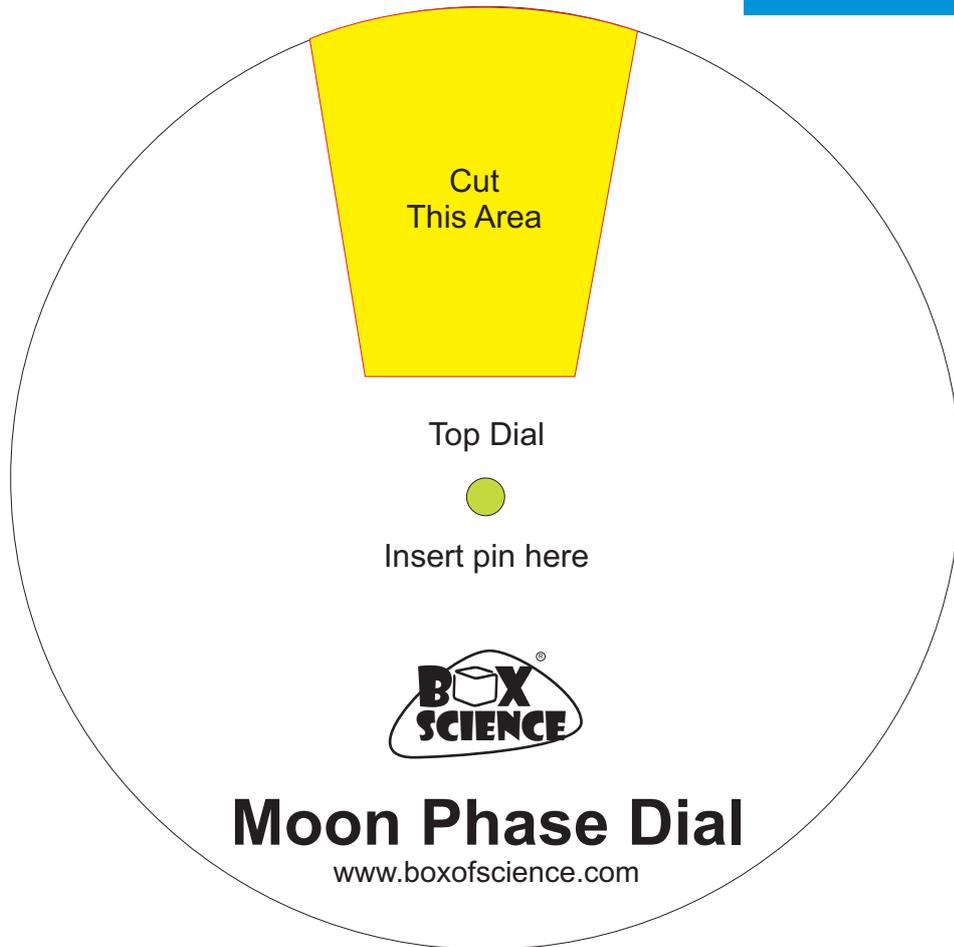
Moon phases tell us about, which part of the moon are observed as lightened and shadowed. As the moon proceeds through it's orbit, the change of phases is easily observed. During a full moon phase, the entire side of the moon is visible. During a new moon, the entire moon is seen as shadowed one. At first quarter and third quarter , one half of the moon is seen.

The times in between are known as crescent and gibbous.



# Phases of the Moon

## 2D dial DIY model





# Scale Model of Planets

World of tiny particles



## Objectives:

Knowing comparative sizes of the planets,  
Understanding features and facts about solar system  
Studying interplanetary distances

## Materials:

Plain paper, color pencils/ pens/ water color or any coloring pens,  
a scale, scissor, glue

## Procedure:

Draw circles of the given size roughly with free hands,  
Color them (use images of these planets over internet as a reference)  
Cut these planetary figures and paste them on a separate page  
Name them and enjoy your planetary system

Planet	Diameter in kilometers	Relative Diameter Compared to Earth	Rounded off Size in cm
Mercury	4800	.376	.5 cm
Venus	12100	.949	.9 cm
Earth	12750	1.00	1 cm
Mars	6800	.533	.5 cm
Jupiter	142800	11.2	11 cm
Saturn	120660	9.46	9 cm
Uranus	51800	4.06	4 cm
Neptune	49500	3.88	3 cm





# DIY Spaceship Model

Make your own spaceship



## Objectives:

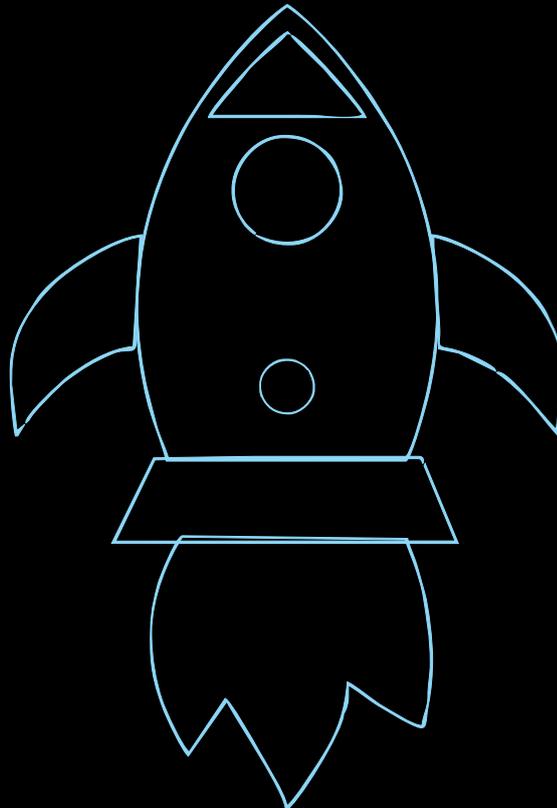
Knowing about space travel, spaceships and human space missions,  
making of a 2D spaceship model

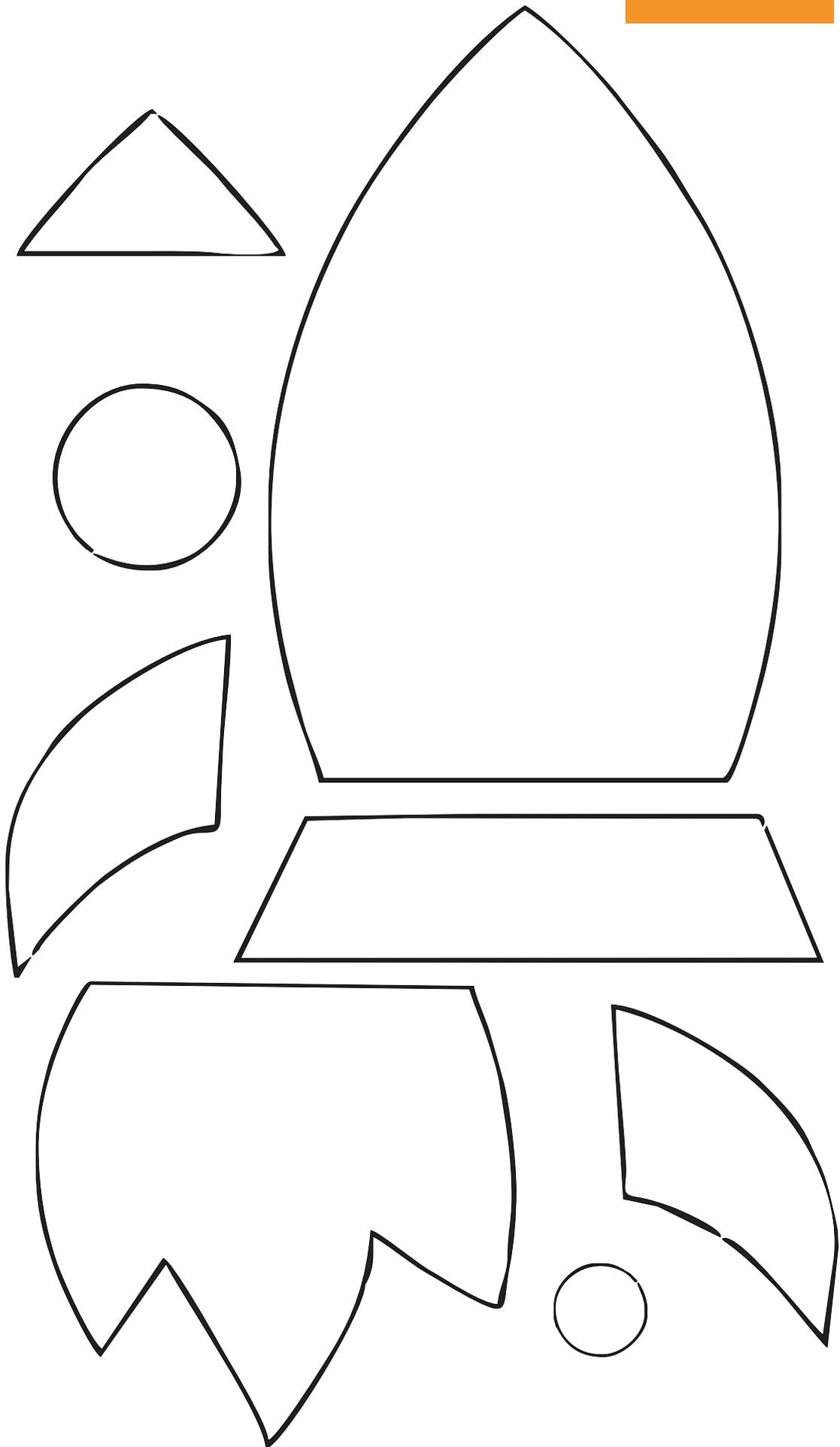
## Materials:

Coloring material, a scissor

## Procedure:

1. Take a print of page 10 or draw on a plain paper (if printing facility is unavailable)
2. Color these parts with your favorite colors
3. Cut them out and arrange in appropriate way
4. Paste them as per sequence (refer following diagram)
5. Share photos of your spaceship with us





# Space for Notes

Explore STEM with Box of Science

