

Moon Phase Observation Box

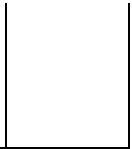
I. Experiment item :

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二、Experiment accessory	3
● Instruction of installing flatwise	4
1. Moon raises and sets <ol style="list-style-type: none"> 1. Demonstration of the moon rotation and revolution surround the earth 2. Demonstration of the earth's rotation. Observation of the sun rise from east and set in west. 3. Operation of the earth's rotation. Observation of the moon rise from the east, through the south and set in the west. 4. With moment metrics, observation of lunar phase rise from east and set in west 	5
2. The diversification of lunar during a period <ol style="list-style-type: none"> 1. The period of lunar's diversification is about 29.5 days almost 30 days. 2. The diversification of date and lunar phase. 3. The moon rises from east and set in west because the earth's rotation is from west form east. (If we overlook from north pole, it is counterclockwise rotation.) 4. The change of the diversification lunar phase at the same day is obscured hard. It is hardly changing visually. 5. The changing period of the imaging in waxing and waning from the moon because the moon orbits the earth. 6. New moon, waxing crescent, first quarter moon, waxing gibbous moon, full moon, waning gibbous moon, last quarter moon, waning crescent moon. 	7
3. Reasons for the formation of moon phases <ol style="list-style-type: none"> 1. The relative position is among the sun, earth, and moon. 2. We see the same side of the moon permanently. 3. The changed relative position from the sun, earth, and moon, we see the change in the bright part of the moon from the earth. 4. The moon is in half of bright and half of dark. 	10
● Stand-up Assembly Instructions	12
4. Demonstration rising moon moment <ol style="list-style-type: none"> 1. We can observe the moon rises from east and sets in west. 2. We can observe the azimuth of the moon. 3. The time moment when the moon appears. 4. The time when the moon rises from skyline, and it is about 50 minutes late every day. 5. When we observe at the same moment in the same month but different date, the 	13

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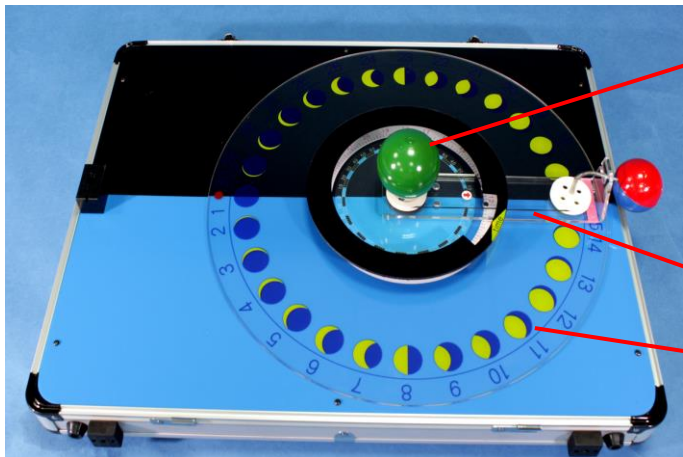


moon is in different location.




6. Daily diversification of lunar phase.
7. We can the lunar phase for tonight.



II. Experiment accessory :

Experiment device chart					
No.	Experiment device	Qty.	No	Experiment device	Qty.
1.	Lunar phase platform	1set	2.	Diversification of lunar phase, date, and time display disc.	1set
3.	Earth and moment scale disc	1set	4.	Diversification of lunar phase imitated device(with belt)	1set
5.	elastic lunar phase ball with pulley	1piece	6.	lunar phase ball with pulley (black/white)	1unit
7.	LED represents the sun light	1set	8.	power supply 3VDC/1A	1unit
9.	two points foot (with knob)	2set	10.	aluminum alloy case	1unit

	3	
1. Lunar phase platform	4	5.lunar phase ball(blue/red)
	2	
		6. imitate lunar phase ball(black/white)

	7.LED
	8.power supply
	9. two points foot

III. Experiment operation

Flatwise assemble instruction, as image 3-1 below,

Assembling Instruction:

- a. We can ensure the location of sun, earth, and moon. There is a red sun sign in the left on the lunar phase disc. When the lunar phase ball moves to the most right, it will be between 15th and 16th in lunar calendar. The white part is showing the reflection from the sun, so the white part is facing to the left.
- b. We set the bell on the pulley in the bottom of the earth(green) and the pulley in the bottom of the lunar phase.

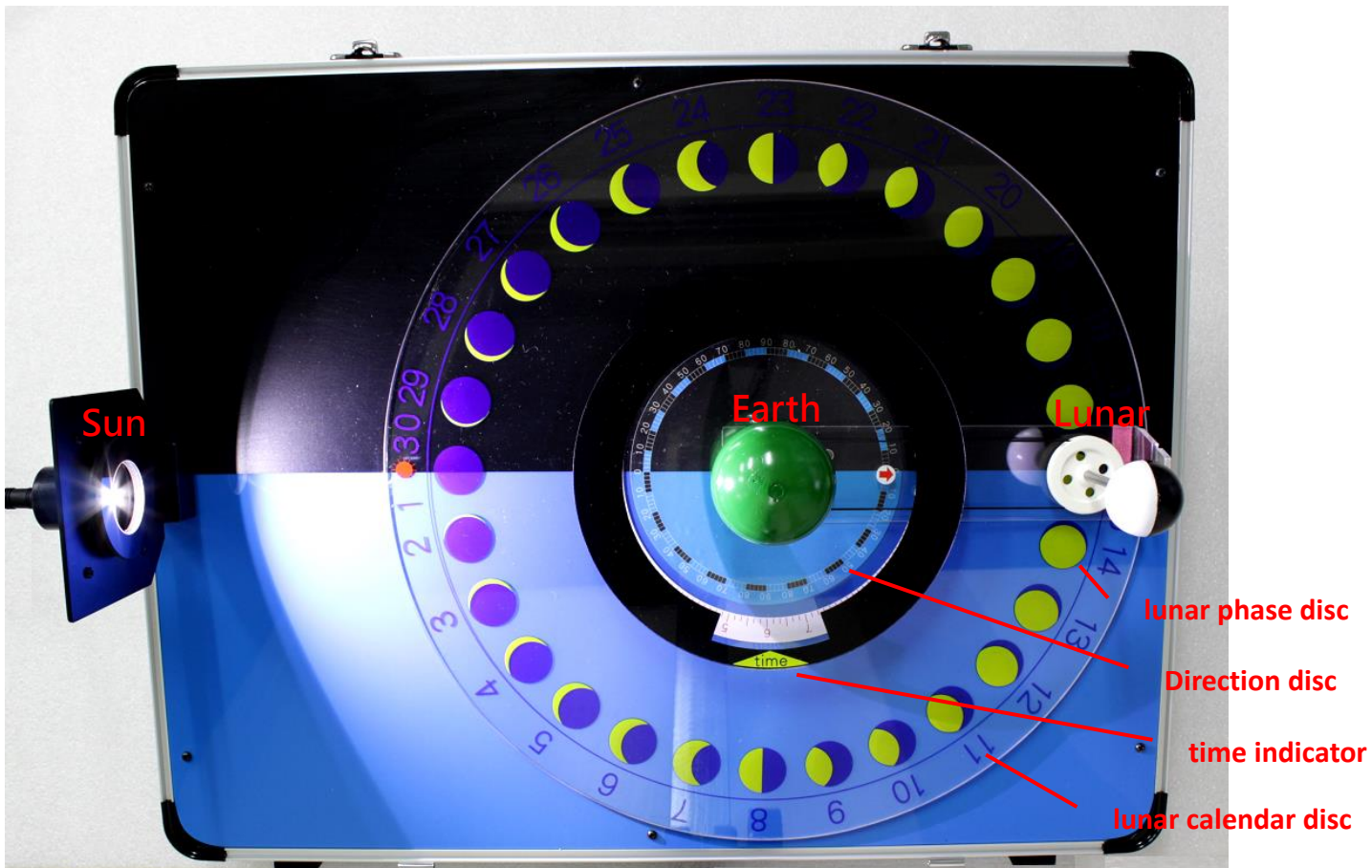


Image 3-1 When the lunar phase disc is flat, it presents that we overlook from north pole, and it shows the relation among of the sun, earth, and moon.

● **The moon is nonluminous.**

When the dark is in the night, what illuminates us is the bright moon in the night sky. However, it is nonluminous so the yellow light that we see is because of the reflection from the sun. Only light objects with self-illumination are called light source as a light bulb that is electricity making the tungsten bright. Thereby, the moon is not a light source.

● **Basic knowledge about moon.**

Moon is earth's satellite and revolving around the earth. It is also following with the earth to revolve around the sun. The moon is nonluminous so the light when people in the earth see, it is on the surface of the moon from the reflection of the sun. When the relative of location among the sun, earth, and moon change in time, people in the earth will see changed lunar phase.

I. Moon rises and sets.

1. Demonstrate the rotation of the moon and the revolution around the earth.

When we overlook from north pole, we understand the movement of the moon:

- a. The moon rotates counterclockwise with a rotation period of about 27.3 days.
- b. The moon orbits the Earth counterclockwise, and we call the track as lunar orbit. The period of the moon orbits around the earth is about 27.3 days (it is the same as the period of the rotation)

2. Demonstrate the earth rotation and observe the sun rises in the east and sets in the west.

- c. The earth rotates around the sun. When the moon orbits around the earth once (27.3 days), the earth also moves about 30 degrees in the track. Thereby, the moon must move 2.2 days, so we can see the same lunar phase again and the period of the lunar phase is 29.5 days.

3. We can operate the earth rotation. We observe the moon rises from the east, passes through the southern sky, and sets in the west.

- d. We overlook from north pole. The earth is rotation counterclockwise. We can see the moon rise in the east and set in the west. because of the earth rotation counterclockwise.
- e. The moon orbit around the earth, so the moon will delay for 50 minutes every night.

◇ Complement :

The earth rotates 1 degree in every 4 minutes (1day = 1440 minutes, $1440\text{min}/360\text{deg}=4\text{min}/\text{deg}$)

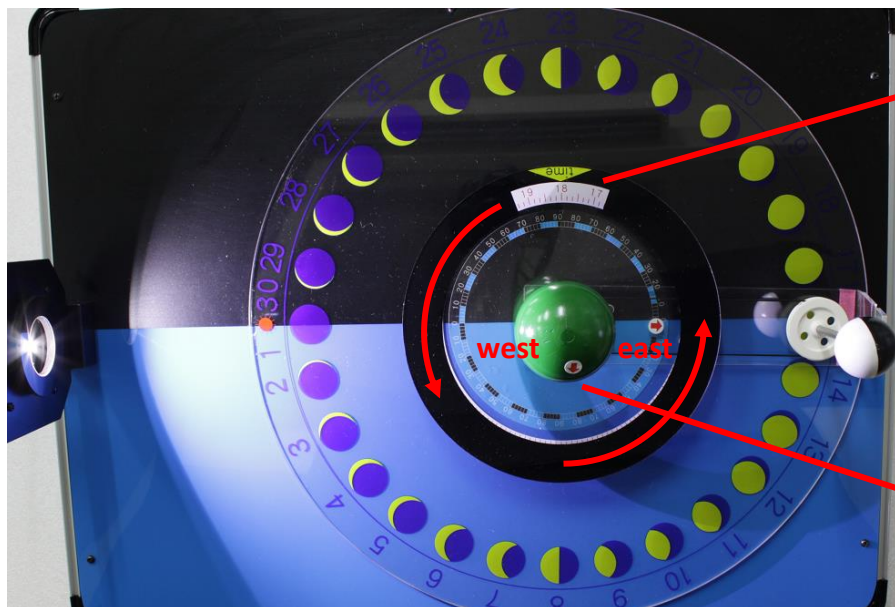
The moon moves toward the east everyday ($360\text{ degree}/29.5\text{ day}=12.2\text{ degree}$)

The earth needs to move 12.2 degree rotationally if the moon has the same position as one day before.

Thereby, the moon rises and delays about 50 minutes every day. $4(\text{min}/\text{deg})\cdot 12.2(\text{deg})=48.8(\text{min})$

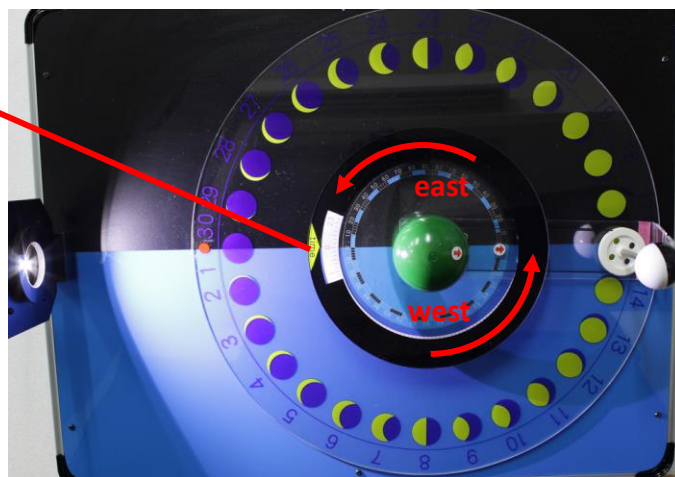
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4. We use time indicator and observe the moment of the lunar phase raising in the east and setting in the west as image below.

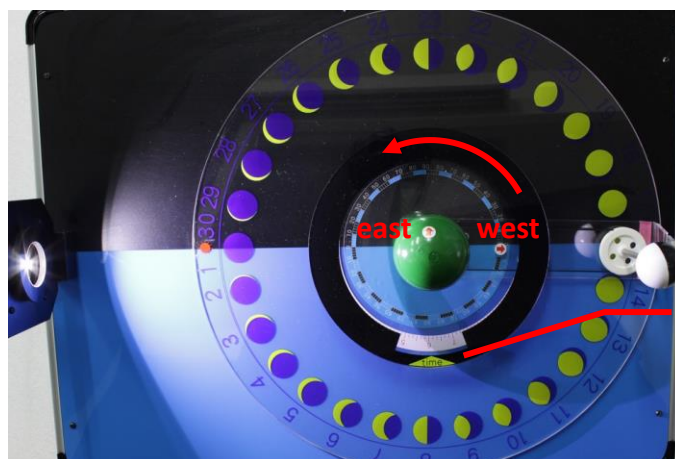


Observer faces south.

We overlook the earth rotation to demonstrate that the full moon is raising at 18:00.



We overlook the earth rotation to demonstrate when the full moon passes midheaven at 00:00.



We overlook the earth to demonstrate that the full moon sets in the west at 06:00.



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