

3. Does this prove that the world is round in every direction like a ball? - No; only that it is round in the direction in which the ship sails.
4. Why do we say the world is a sphere or globe? - Because it is round in every direction, like a ball.
5. How is this proved? - When nothing hides the view to a great distance, the land sinks out of sight all around us, and we are standing in the middle of a circle.
6. What causes this effect? - The rounding of the surface of the world; we cannot see straight on as if it were flat.
7. Does this prove that the world is a sphere? - Yes; because the same effect may be seen in every part of the world; it is round in every direction.
8. What is this circle called? - The horizon; the world and the sky seem to meet all around.
9. Can the roundness of the world be seen in any other way? - Yes; it rises between us and objects at a distance, hiding the lower parts of them from view.
10. Mention such an object. - A ship coming in to land: when she first appears we cannot see her hull.

## **Lesson V**

### **The Star**

Twinkle, twinkle little star;  
How I wonder what you are!  
Up above the world so high,  
Like a diamond in the sky.

When the blazing sun is gone,  
When he nothing shines upon,  
Then you show your little light--  
Twinkle, twinkle, all the night.

Then the traveller in the dark,  
Thanks you for your tiny spark;  
He could not see which way to go  
If you did not twinkle so.

In the dark blue sky you keep,  
Yet often through my window peep;  
For you never shut your eye  
Till the sun is in the sky.

As your bright but tiny spark  
Lights the traveller in the dark,  
Though I know not what you are,  
Twinkle, twinkle, little star.

Jane Taylor

## Lesson VI

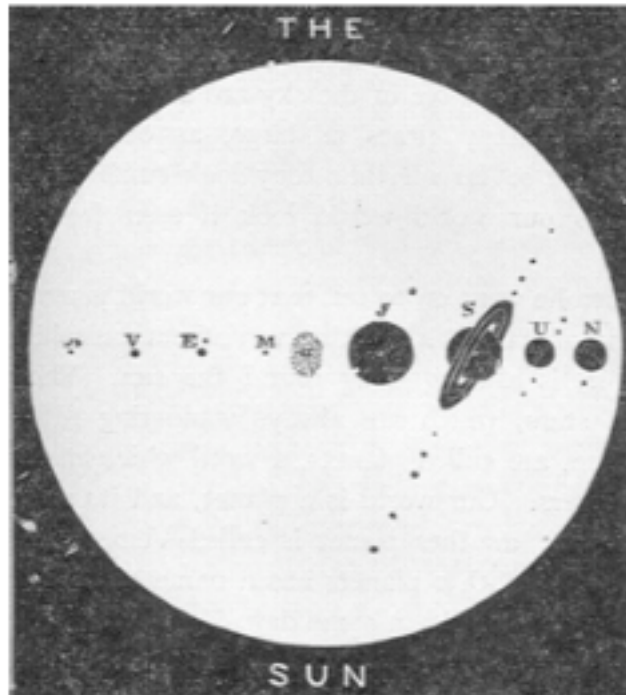
### Our World and Other Worlds

#### Part I

Long ago, there lived a wise man, named Galileo, who spent his nights in watching the stars, and in considering how they moved. Perhaps you think the stars are little shining lamps, lit up in the sky every night which do not move at all. Galileo knew better; and, in his long night-watches, he found out some wonderful things about our world which you will hear.



Not that he was the first to make these discoveries. But Galileo was among the first who wished to make others as wise as himself. He wrote his wonderful secrets in a book, and taught the people. Alas, his books were burned, and he, himself, was imprisoned. Men said his strange tales were not true, and were angry with the man who wished to teach them.



Have you noticed that things look smaller and smaller the farther you are from them? That a kite flies up, till it looks like a speck; that a man in the distance looks no bigger than a child? Get far enough away, and the very largest thing looks no bigger than a dot. Even our own great world would seem no larger than one of the stars in the sky if we could get far enough away to see it so small; which we never can, because we cannot get out of our own world. Of course, the astronauts who go up into outer space in rockets can see this very thing, as they are the only ones able to get so far away from the earth they call home.

Galileo's wonderful discovery was, that nearly all the stars we see in the sky are as large, some of them many times as large, as our world. They are so far away that they look small to us, just as our world would look if seen from a far away star.

Next Galileo went on to tell that our world is really a kind of star, which, with seven others something like it, is always going round the sun. These eight stars, which are always wandering round the sun, are called planets, a word which means wanderers. Our world is a planet, and its name is Earth; another planet is called Venus; and each of the other planets has a name of its own which you may learn some day.

But, you say, the stars all shine like lamps; how then can our earth look like a star? It is not on fire. It is true that more of the stars do shine and burn like the sun, but these eight planets, of which our earth is one, shine in another way.

Have you ever seen the windows of a house look red and bright when the sun was shining on them in the evening? Sometimes you would think the house was on fire, they look in such a blaze; but it is only the light of the sun which they are sending back, or reflecting. On a sunshiny, hot day by the sea-side you can hardly bear to look at anything. Water and houses and pavement dazzle you so with the sun's light, which they are reflecting, that it is almost as bad as trying to look at the sun himself.

If we were off our earth, far, far away, up in space, we should not see houses, trees, and water, but just a ball shining all over with the light of the sun, which it is giving back or reflecting. And that is how it is that these eight planets, and our moon also, shine like bright stars, though they are not really bright themselves. They send back, or reflect, the bright light of the sun.

## **Lesson VII**

### **Our World and Other Worlds**

#### **Part II**

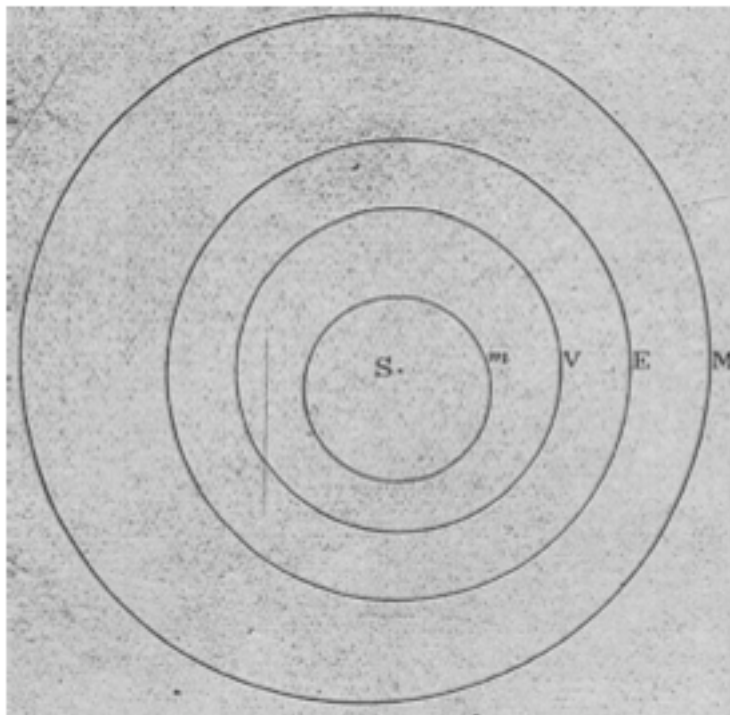
The great sun is very glorious and beautiful, and is always pouring out floods of light and of fierce heat. His light gives day to all the planets; and his heat enables corn to grow upon our earth, and men to live there; and makes warm summer days when children may play in the fields.

But his fiercest heat does not come to our earth; we are far, far away from the great fire of the sun; and only get the gentle warmth which makes our world pleasant. Some parts of the world get much more of the sun's heat than others; why they do so, you will know soon; but it is nowhere scorching hot. Everywhere, nearly, people and animals may live, and plants grow; and the sun is a kind friend which gives life and pleasure to all living things.

Day and night, never resting for a moment, the eight planets are continually moving around the sun. When the journey is finished they begin again, silent, punctual, never tired; so punctual are they, that astronomers (the wise men like Galileo who study the stars) know just in what part of the sky to look for a planet at any time. And it comes—more true to time than a railway train, but without any blowing of whistles or ringing of bells, without any bustle or noise or smoke. And the astronomers are filled with delight to see how well these wonderful works of God obey the law He has given them.

The eight planets do not travel round the sun side by side. Some are much farther from the sun than our earth. Some are nearer to him. As each one keeps at a regular distance from the sun all through its journey, the more distant the planet is, the longer is the time it takes to finish its course. The length of our year is 365 days, but the planet Saturn, which is much farther from the sun than the earth is, has a year nearly thirty times as long as ours. That is to say, he has a far larger circle to move round, so it takes him nearly thirty times as long as it takes the earth to go round the sun.

Supposing each of the planets left a shining track which we could see as it went on its course, there would be eight shining circles round the sun at different distances from him. These would show us the orbits or paths of the planets. The path our earth takes through space in her journey around the sun is her orbit. Not that there is any real path or waymark of any kind for her to follow.



Yet, year after year, she journeys over the same course, and never gets nearer to the sun or farther from him. Should she lose her way by any chance, and get nearer to the sun, terrible things would follow. Trees, grass and houses would all blaze up; the very hills and ground would burn; and our whole world would become a great fire, kindled by the fierce heat of the sun. But there is no chance in the matter. God keeps the earth and the other planets moving around in their own places by two wonderful laws which cannot be broken. But you are too young to understand about these yet.

## Questions on Lesson VI and VII

1. What discovery did Galileo make? - That our world is a planet.
2. What is a planet? - A body that looks bright like a star and travels round the sun.
3. How do planets shine? - By reflecting the sun's light. They have none in themselves.
4. Is not our world larger than the stars and planets? - A great deal smaller than the stars, which are very far away: smaller than most of the planets.
5. What is our world's name as a planet? - Earth
6. How long is our year? - Rather more than 365 days.
7. Is there any reason why our year should be 365 days in length? - That is the time the earth takes to perform her journey round the sun.
8. What is the path she takes round the sun called? - Her orbit.

## Lesson VIII

### The Sunshine

I love the sunshine everywhere  
In wood and field, and glen;  
I love it in the busy haunts  
Of town-imprisoned men.

I love it when it streameth in  
The humble cottage door,  
And casts the chequered casement-shade  
Upon the red brick floor.

I love it where the children lie  
Deep in the clovery grass,  
To watch among the twining roots  
The gold-green beetles pass.

How beautiful, where dragon-flies  
Are wondrous to behold,  
With rainbow wings of gauzy pearl,  
And bodies blue and gold!

How beautiful on harvest-slopes  
To see the sunshine lie;  
Or on the paler reaped fields  
Where yellow shocks stand high!

Oh! yes; I love the sunshine!  
Like kindness or like mirth,  
Upon a human countenance  
Is sunshine on the earth!

Upon the earth; upon the sea;  
And through the crystal air,  
On piled up clouds; the gracious sun;  
Is glorious everywhere.

Mary Howitt

## Lesson IX

### Day and Night

The earth not only travels around the sun in a year, but the whole of that time it is itself turning around, or rotating. Just so, a top, while spinning quickly, might at the same time move along the floor. Turn round a few times on your heels and you will see how. It takes you a much longer time to spin around than the top requires, because you are so much larger than the top. And the earth is so huge that it cannot rotate, or spin round, in less than twenty-four hours, a whole day and night. As there are 365 days in a year the earth turns quite round 365 times while she is moving round the sun, as you might turn round ten times while moving across the room.



Have you ever wondered why it is we have bright day to work in and play in, and then dark night to rest in, and that these never fail to come, the one after the other?

Our earth, without the sun, would be quite dark and cold. Every ray of light, every ray of heat, comes from the sun. And that is why the earth is made always to journey around the sun, and never to wander away; for what could she do out in the cold and dark?

But the earth is round, the shape of an orange. Some evening, hold an orange close to a candle, and you will see exactly half of the orange made bright with the light. The other part is in the shade, and there is a clear, though faint, line between the light part and the dark part. Do the same thing with a very large ball and the light and dark parts will show more clearly. Hold any round object before a light, and half the object will be lit up; the other half will remain dark. The earth is a round object; the sun is its light. Is one half of the world bright, beautiful, and warm; and the other half always dark, and cold, and dreary, without moving creature or growing plant? No! and the reason of this you can easily prove.

Run a knitting needle through your orange, and turn the orange very slowly around on the needle before the candle. Half is always in the light; half, in the shade. Thus every bit has its turn in the dark.