



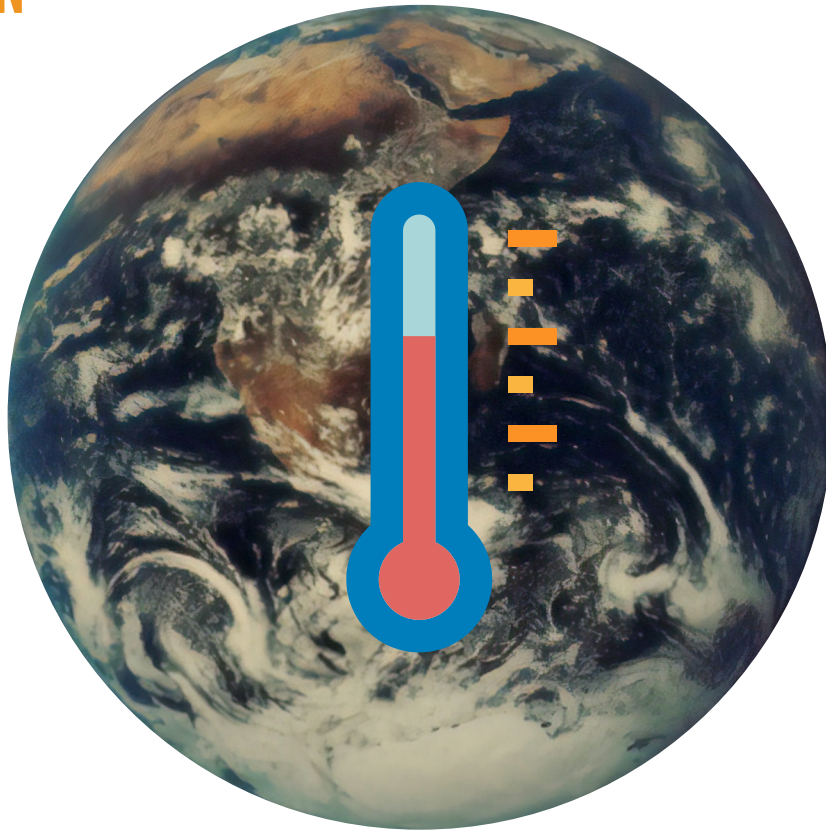
**WORLD'S  
LARGEST  
LESSON**

Total time

1 x 45 mins  
1 x 1 hour

Age range

8-14 years old



# Spotlight from Space: Taking the Earth's Temperature



## Part 1

Students explore satellites, how they work, what they tell us about the world

## Part 2

Students make their own satellite and decide on a personal action for the Global Goals

## Learning outcomes

- To identify the characteristics of a satellite
- To follow a series of steps to build a satellite model
- To explore how scientists use imagery from space to understand the changing world
- To illustrate the world's temperature
- To reflect why temperature changes over time and how humans impact climate change
- To decide on a personal action that helps to tackle climate

## Key Questions

- What is a satellite?
- Why are satellites important?
- How are satellites helping monitor life on Earth's temperature?
- What are the impacts of climate change on our planet?

## Note to Educators

Have a look at both options to make the satellite model with or without LED light and see what works best for your class.

If your students are new to learning about the Global Goals check out this great short video introduced by Malala Yousafzai: [vimeo.com/138852758](https://vimeo.com/138852758)

You can also find a 30 minute introduction to the Global Goals lesson plan here:

[cdn.worldslargestlesson.globalgoals.org/2017/07/1\\_Introducing\\_30\\_Lesson\\_Plan-copy.pdf](https://cdn.worldslargestlesson.globalgoals.org/2017/07/1_Introducing_30_Lesson_Plan-copy.pdf)

## Classroom Resources

1. Post-its
2. Colored and white paper
3. Pencils
4. Crayons or markers
5. Computer
6. Projector

## To build the satellite resources per child

- a. Template model
- b. 1 Copper Tape w/ Conductive Adhesive or aluminum foil
- c. CR2032 Coin Cell Battery
- d. 1 LED – Blue Color
- e. Project Template
- f. Glue stick
- g. Scissors
- h. 3 Popsicle sticks
- i. Tape

Follow the accompanying Powerpoint for the lesson: [bit.ly/wllsatellite](https://bit.ly/wllsatellite)

With thanks to students at TU Delft University who are building a satellite in celebration of Leonardo Da Vinci's 75th Anniversary. To follow regular updates on their work, check out [@davincisatellite](https://twitter.com/davincisatellite) [www.delta.tudelft.nl/article/ae-students-working-jubilee-satellite](http://www.delta.tudelft.nl/article/ae-students-working-jubilee-satellite)

# Part 1: Exploring how satellites work and what they tell us about our world

## Step 1 Group Discussion

5  
mins

Ask students if Global Goal 13 Climate Action is important to them, short discussion with partners. Next ask the class, *if we were going to try and explain climate change to other people and try and get them to care about it, what data might be helpful for us to explain?*

See if students mention satellites and if not – show an image of them on the board.

Ask students: *What is a satellite? How does it work? What does it look like?*

*What are the different types of satellites? Natural (moon) artificial (man-made satellites)*

## Step 2 Exploring How Artificial Satellites Work

15  
mins

Open up this video <https://youtu.be/Ezn1ne2Fj6Y> (4.40 min) and ask students throughout:

*What is a human-made satellite? How can satellites help us to understand our planet?*

You can use **Slide 5** to demonstrate the different spheres of the earth's atmosphere.

Next open up **Slide 6**. Ask students – *what might this show? Are you surprised by this?* Explain to students that these are all the satellites orbiting the earth right now.

**Slide 7** Explain that some satellites use infrared light to monitor the Earth's temperature.

**Slide 8** The two images demonstrate the difference when infrared light is used. The picture on the left is without infrared light, and the picture on the right is with infrared.

Explain that infrared is a type of energy, invisible to human eyes but can be spotted using special heat cameras.

Use **slide 9** to explain to students that there are different types of satellites and we will focus today on the satellite that monitors Earth's temperature. *What Global Goals might this help us to take action for?* Global Goal 13, 14, 15 ?

## Step 3 Word Wall – Student Activity

15  
mins

Student Activity **slide 10** – ask students to complete the “Word Wall” about satellites to check understanding. They answer the following questions:

- How do satellites make you feel?
- Which words do you know to describe it (nouns & adjectives)
- What can satellites do? (Verbs)
- New words you don't understand yet? (they can look them up as a follow up activity or for homework)

## Step 4 Learning Recap

5  
mins

Time for student reflection on learning – *what have we learnt today? How does our learning link to the Global Goals?*

## Part 2: Building a Satellite & Deciding on a Personal Action

### Step 1 Recap of Previous Learning

5  
mins

What did we learn about satellites last time? How do they help us to take action for Global Goal 13 Climate Action?

### Step 2 Students Build Their Own Satellites

30  
mins

**Note to educators:** Follow the instructions on the accompanying slides <http://bit.ly/wllsatellite>  
Show an image of the finished satellites to students before they begin  
Students can work individually or in pairs to create their satellites.

Instructions: Students can either use **Appendix 2 How to Make a Satellite** or **Appendix 3 How to Make a Satellite with an LED Light** to follow instructions or you can talk them through **Slides 12-23**

### Step 3 Exploring the Earth's Temperatures

15  
mins

Next link student's building of satellites to how it helps us understand how our earth is changing.  
Tell students that we are going to imagine our satellites have infrared lights. **Slide 29-30.**

Open up this link: [earthobservatory.nasa.gov/global-maps/MOD\\_LSTD\\_M](http://earthobservatory.nasa.gov/global-maps/MOD_LSTD_M) it showcases Earth's surface temperature every month from 2000 to 2020. Ask students to pick their birthday, and investigate how warm or cold different countries were at that time.

Give **Appendix 6 World Map** for students to colour in to showcase the different temperatures.

**Extend Student Learning:** Link to Maths learning by asking students to look at how temperatures have changed over time. Using their birthday as the date, they look at how temperatures have changed from when they were 2 years old to 4 years old to 8. They can present their findings as a bar chart.

### Step 4 Reflect on Learning

5  
mins

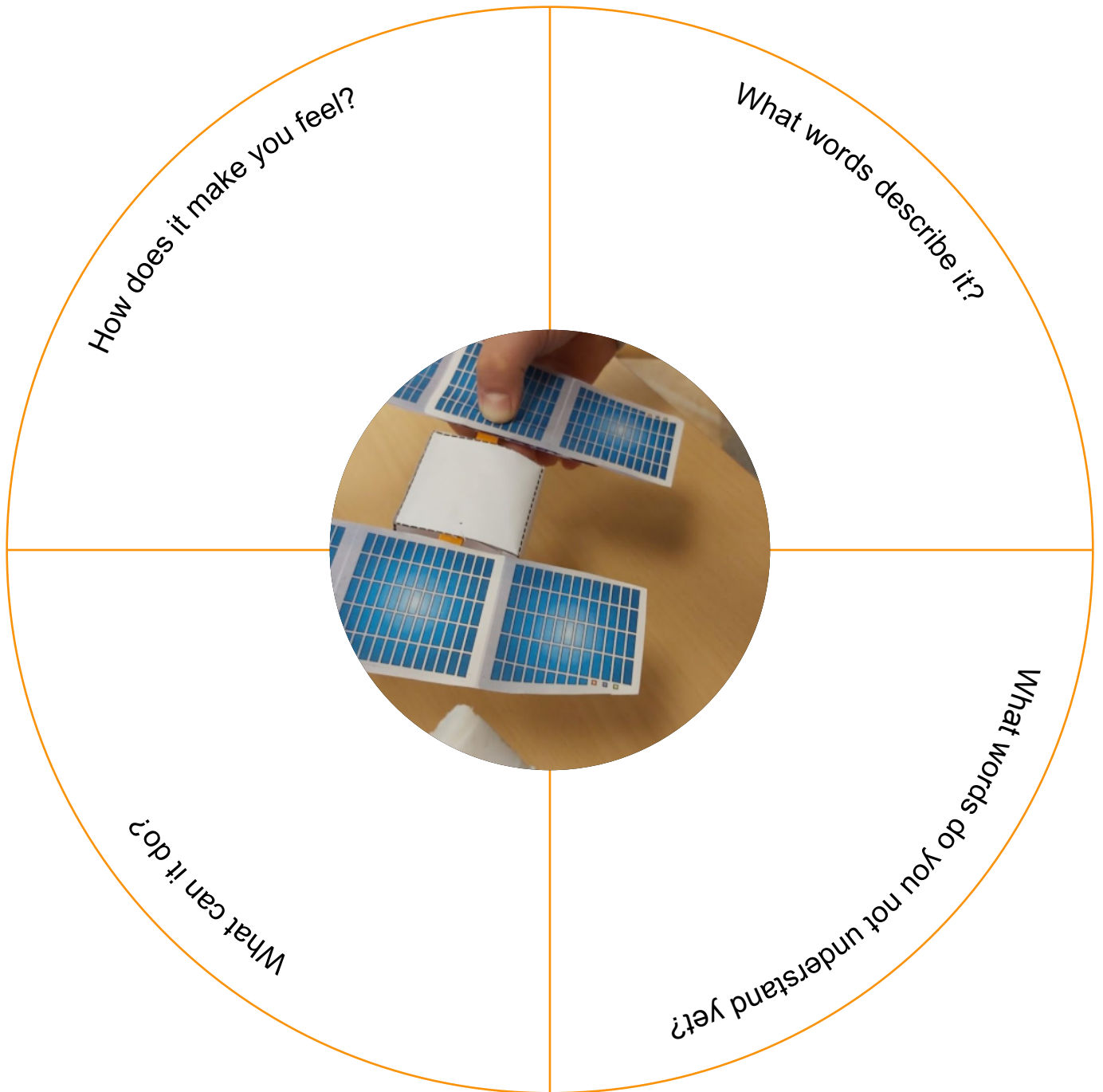
Discuss with the students: *Can you see how the temperature is changing from February 2000 to January 2020? Why do you think that might have happened? What impacts might humans have had on this temperature increase?* Use **Appendix 7** to reflect on student learning.

**Extend student learning:** Use this as an opportunity to link student learning to the IPCC's report of Global Warming and the need to keep global temperature increases to a maximum of 1.5c  
[www.ipcc.ch/sr15/resources/headline-statements/](http://www.ipcc.ch/sr15/resources/headline-statements/)

### Step 5 Turning Learning to Action

10  
mins

Discuss personal actions that students can take to halt global temperature increases.  
Re-watch Call to Learning film from ideas from different activists. *What do students do already? How can they influence others to do this too?*



## Appendix 2 How to Make a Satellite (without LED Light)

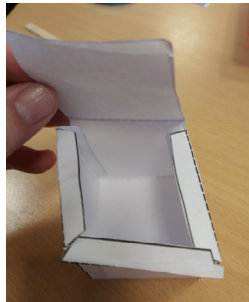
### Materials you need:

- Project template
- 3 lolly sticks

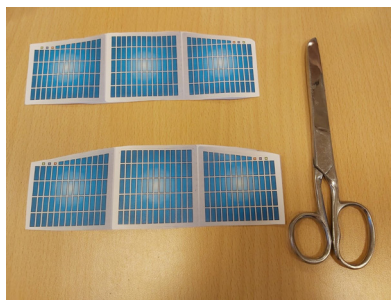
### Make sure you have enough:

- Tape
- Glue sticks
- Scissors

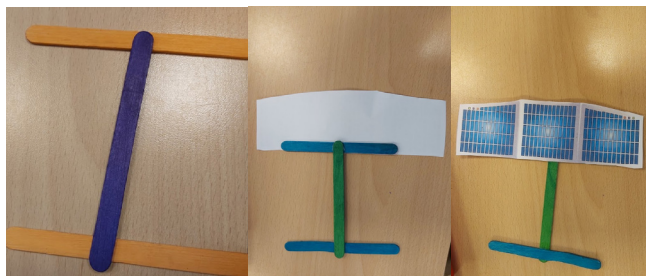
1. Print out the project template (find in appendix) and cut along the solid lines. Then, fold the dashed lines and paste



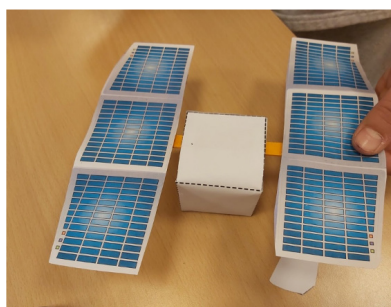
2. Cut the solar panels from the template



3. Glue the lolly sticks together (see in pic) and glue the solar panels to the sticks



4. Attach the solar panels to the cube and glue together the last part of the cube. It should look like this >



## Appendix 3 How to Make a Satellite (with LED Light)

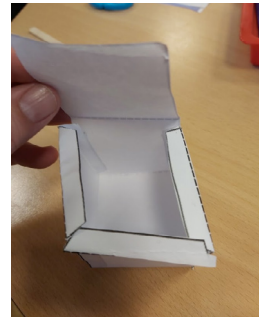
### Materials you need [LED light]

- CR2032 coin cell battery
- 2 small pieces of copper tape
- 1 LED – blue or ultraviolet
- Project Template
- 3 lolly sticks

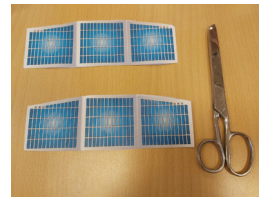
### Make sure you have enough:

- Copper tape w/ conductive adhesive or aluminium foil
- Tape
- Glue stick
- Scissors

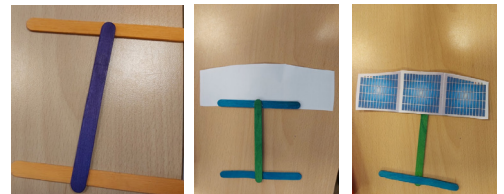
1. Print out the project template (find in appendix) and cut along the solid lines. Then, fold the dashed lines and paste



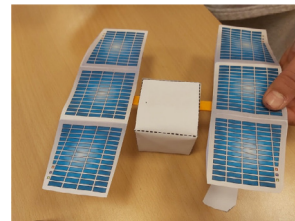
2. Cut the solar panels from the template



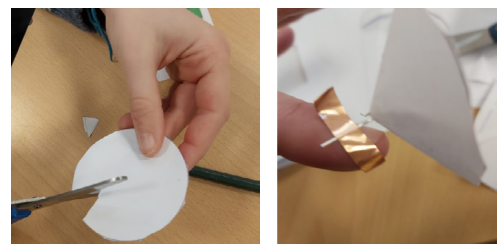
3. Glue the lolly sticks together (see in pic) and glue the solar panels to the sticks



4. Attach the solar panels to the cube and glue together the last part of the cube. It should look like this >



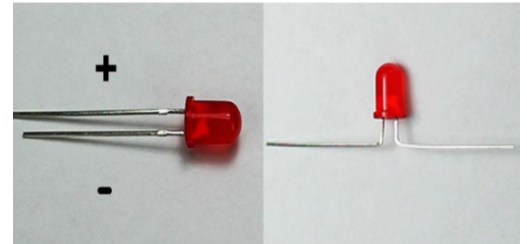
5. Cut the circle from template and glue it to make it look like an antenna. Insert the LED light in the middle of the antenna



## Appendix 3 How to Make a Satellite (with LED Light)

### 6. Next, you need to mount the LED light

- Identify which leg is positive and negative. The longer leg is the positive (+) and the shorter is the negative (-)
- Bend the legs at 90-degree angle
- Attach the copper tape to the positive leg and stick it to the satellite

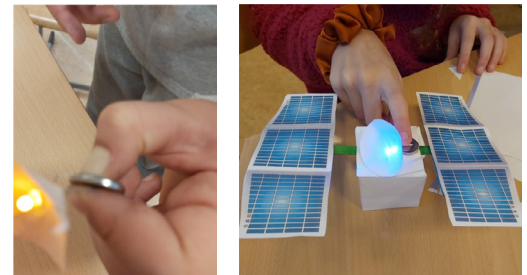


### 7. Attach coin cell battery to the satellite

- Cut a small piece of copper tape and roll it up with the sticky side facing the negative side of the battery
- Stick the negative (short) leg of the LED lamp with the copper tape to the negative side of the battery
- The long positive leg needs to touch the positive side of the battery, and the negative leg needs to touch the negative side

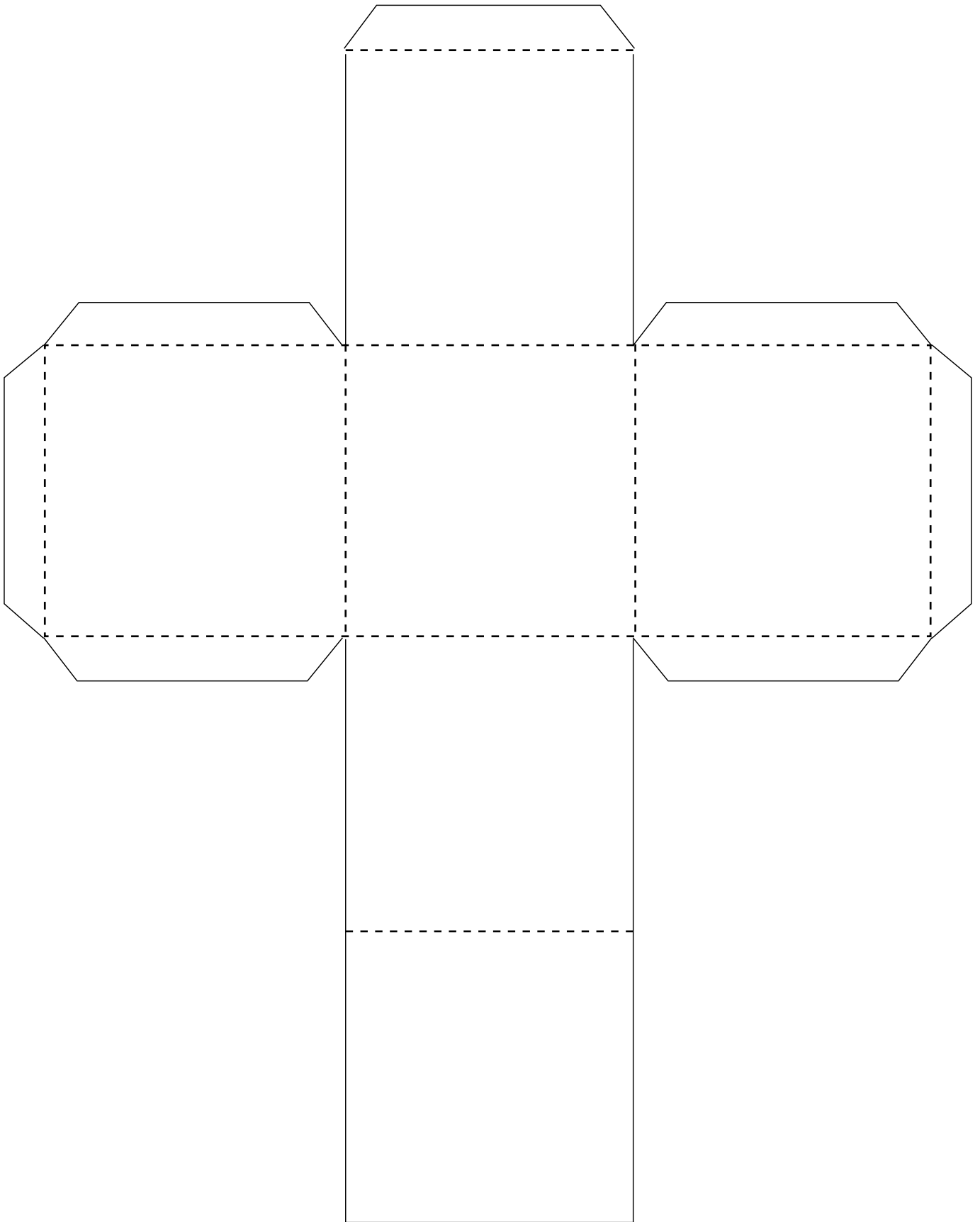


- ### 8. Test the light in the satellite. Press the leg against the battery and watch it turn on!



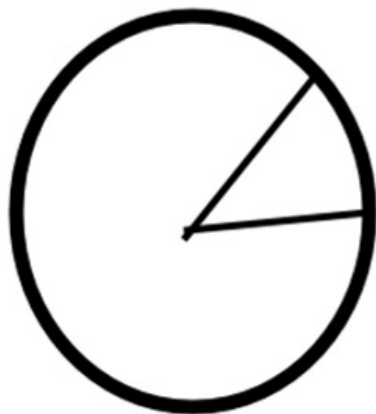
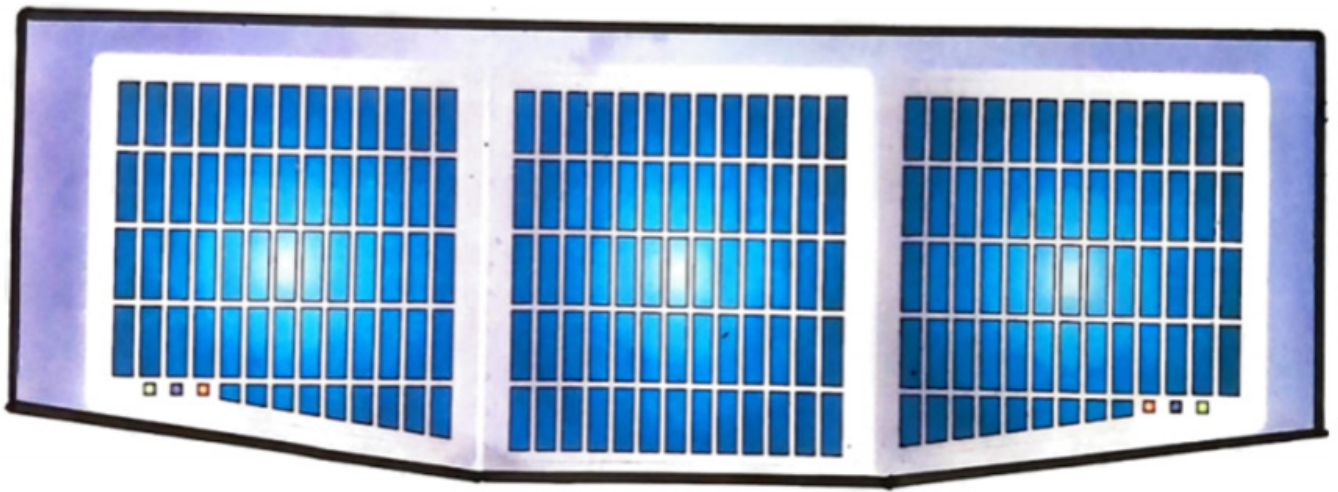


## Appendix 4 How to Make a Satellite (without LED Light)



## Appendix 5 Satellite Solar Panels

Note: Print on A3 29.7cm x 42.0cm







## Appendix 6 Blank World Map



Name: \_\_\_\_\_

Date: \_\_\_\_\_

Criteria	Mastering 	Developing 	Beginning  
Demonstrate knowledge characteristics of satellites	I can explain at least two characteristics of satellites	I can explain at least one characteristic of satellites	I can explain characteristics of satellites with support
Follow a sequence of steps to make a satellite model	I can make a model of how a satellite and explain how to do it.	I can make a model of the satellite.	I can make the model of the satellite with support.
Find patterns on Earth's temperature	I can mention at least two patterns on Earth's temperature.	I can mention at least 1 pattern on Earth's temperature.	I can mention patterns on Earth's temperature with support.
Discuss the connection between climate change and human impact.	I can mention at least two reasons why humans impact Earth's temperature.	I can mention at least one reason why humans impact Earth's.	I can mention why humans impact Earth's with support.