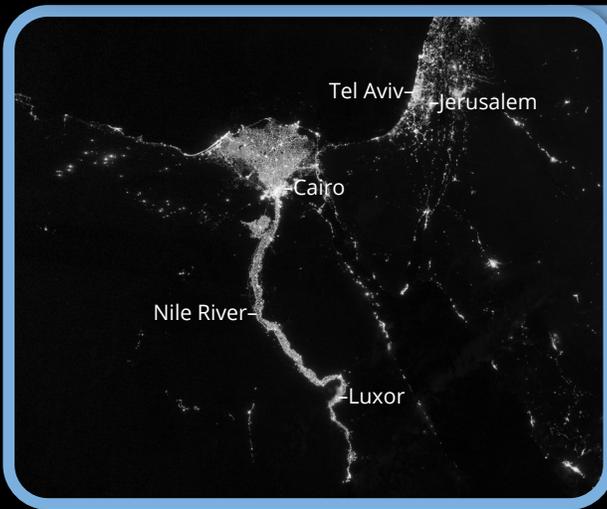




The night side of Earth sparkles with light. Our homes, offices, factories, highways, amusement parks, airports, and city squares glow each night. These artificial lights can tell us where people live and how they shape the Earth. They also help us figure out how much energy we are using and when it has been cut off by storms, earthquakes, or floods.



Night lights help us map human settlements. Many are along coasts, rivers, and waterways. Dark areas may be deserts, mountains, or unsettled forests and plains – places with few or no lights.

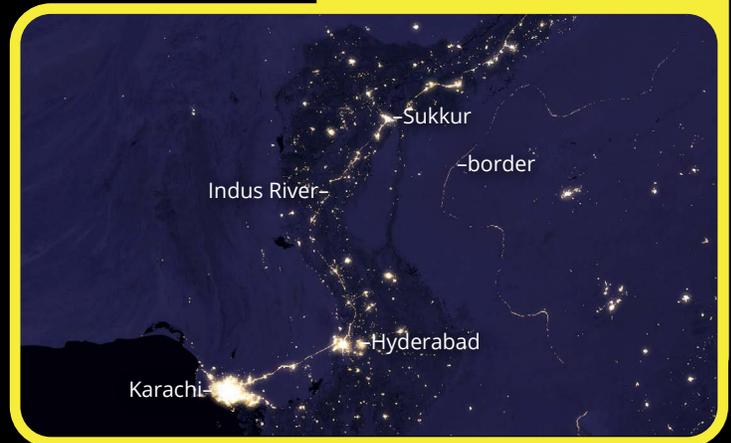


### Jewels of the Nile

The Nile River Valley and Nile Delta make up less than 5 percent of Egypt's land area, but 97 percent of the country's people call these areas home.

### All Along the River

Many of the largest cities in Pakistan sit along the Indus River. The border between Pakistan and India also stands out because there is a fence lined with bright floodlights.



### Vocabulary

**artificial lights** – made by humans and powered by electricity; as opposed to sunlight and moonlight.



# Light Up Our Lives

For 40 years, satellites and astronauts have gathered images of Earth at night. Those photos and data show patterns and changes in where and how we live. For instance, we can see which cities are growing and where our buildings, roads, and borders have changed the landscape. We also can see infrastructure – the highways and railways we use to ship goods and to travel.

## Who Turned Up the Lights?

It's not always easy to spot changes around bigger, older cities. But scientists did just that when they compared night lights near Chicago. Between 2012 and 2016, Interstate 90 between Chicago and Rockford was expanded from two to four lanes, bringing more businesses and lights.



Coldwater, Michigan, grew brighter thanks to the construction of greenhouses with lights that make it possible to grow vegetables at night and in winter.

## Connect the Dots

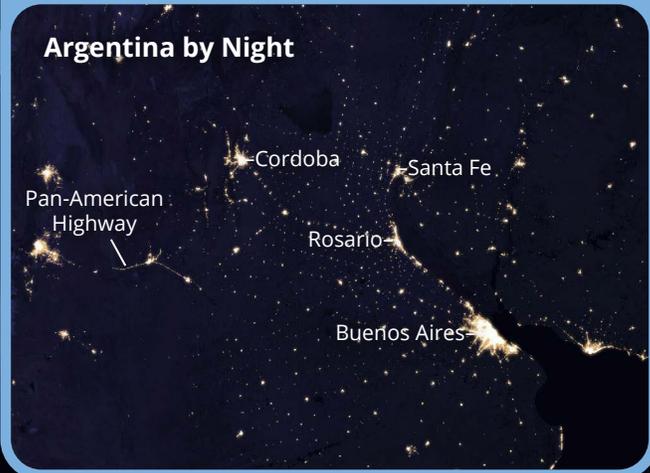
Night lights can show us things we cannot see by day. If you look at central Argentina in sunlight, you can barely see any human settlements. But by night, the area could be mistaken for a game of connect-the-dots. Rows of bright, evenly-spaced lights reveal the presence of towns. They appear every 30 to 50 kilometers (20 to 30 miles), where towns grew around railway stations.



Argentina by Day

## More or Less

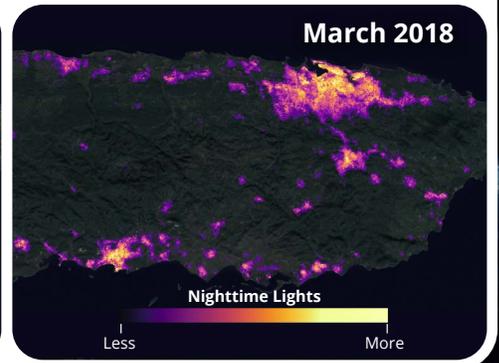
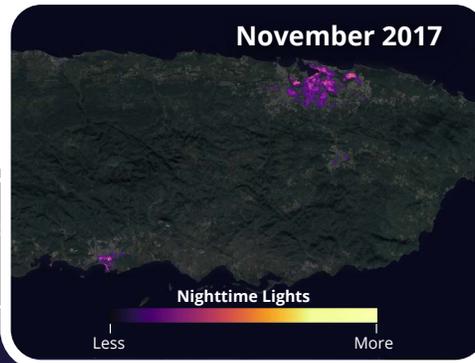
City lights usually tell us where people live, but this isn't always the case. The Korean Peninsula shows why. South Korea is home to 51 million people; North Korea has about 25 million. But where South Korea is gleaming with city lights, North Korea has hardly any at all. The lights reveal differences in where electricity is available.



Argentina by Night

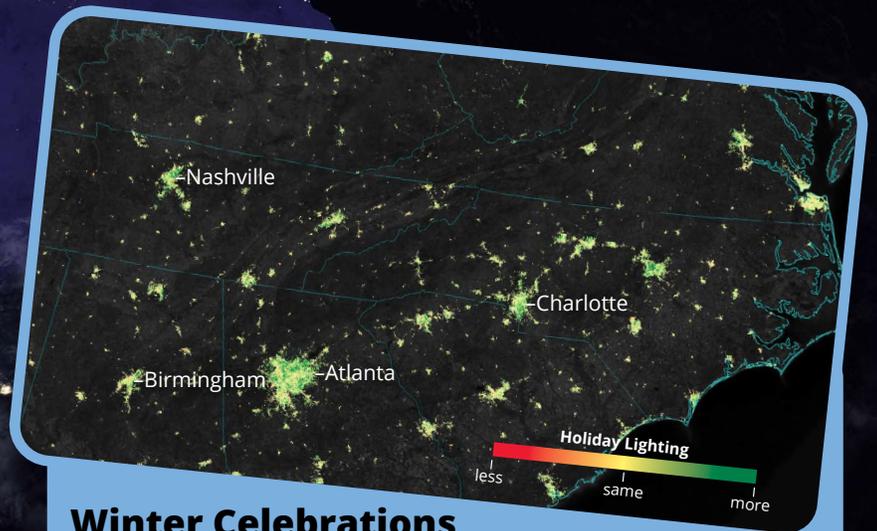
## Slow Recovery from a Hurricane

In September 2017, Hurricane Maria brought deadly rain, wind, and flooding to Puerto Rico. The storm wiped out power lines and left citizens in the dark for months. These maps show where there was power in Puerto Rico in November 2017 and March 2018. Satellite views of night lights can help countries and states know where to send aid as they work to recover from disasters.



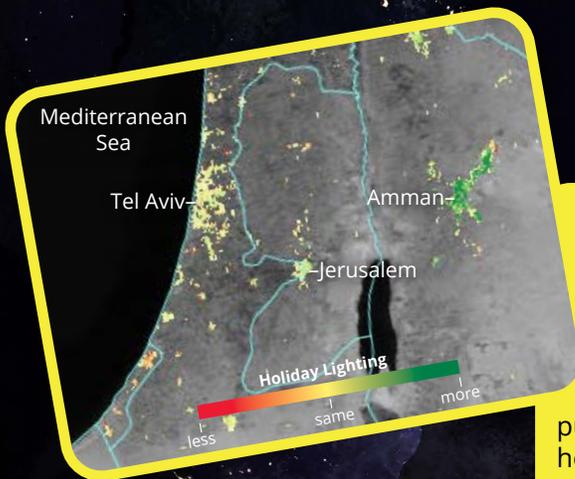
## Home for the Holidays

Whatever holidays you celebrate, you probably like to decorate. Many of us get festive or prayerful by decorating our homes, worship spaces, and businesses with lights. **Remote sensing** scientists have been studying this habit, and they have learned some things about how humans use energy differently around holidays.



## Winter Celebrations

Nighttime lights near cities in the United States shine brighter around Thanksgiving, Christmas, Hanukkah, and New Year's Eve than during the rest of the year. Scientists found that suburban neighborhoods on the outskirts of cities grew brighter by 30-50 percent. Inner city lights – which are already pretty bright – increased by 20-30 percent.



## Holy Days and Night Lights

In the Middle East, cities with high Muslim populations, like Amman, were 50 to 100 percent brighter in the Islamic holy month of Ramadan. Cities like Tel Aviv, where the population is primarily Jewish, did not change. The light changes because Muslims fast by daylight during Ramadan. This pushes meals, gatherings, errands, and business into nighttime hours, making the nights appear brighter than at other times of year. The peak of the lights comes with the Eid al-Fitr celebration.

## Vocabulary



**remote sensing** – studying Earth from above using satellites, airplanes, and the space station.

1. The United States and parts of Canada and Mexico.
2. H5, I5, H6, I6; Florida
3. East coast. It is brighter because there are more large cities.
4. The lines are roads connecting cities.
5. Denver, Colorado metro area
6. Oil drilling platforms, Gulf of Mexico
7. Answers will vary

**Answers to the activity:**

# Data Detective

## Solving the Night Light Puzzle

Night lights tell us a lot about where people live, where they work, and where they travel. Areas without lights reveal bodies of water or unsettled areas like forests, mountains or deserts. Can you solve this puzzle?

### Instructions

- 1 Print the Lights at Night image from Page 5.
- 2 Using the Lights at Night image, answer these questions:

### Materials

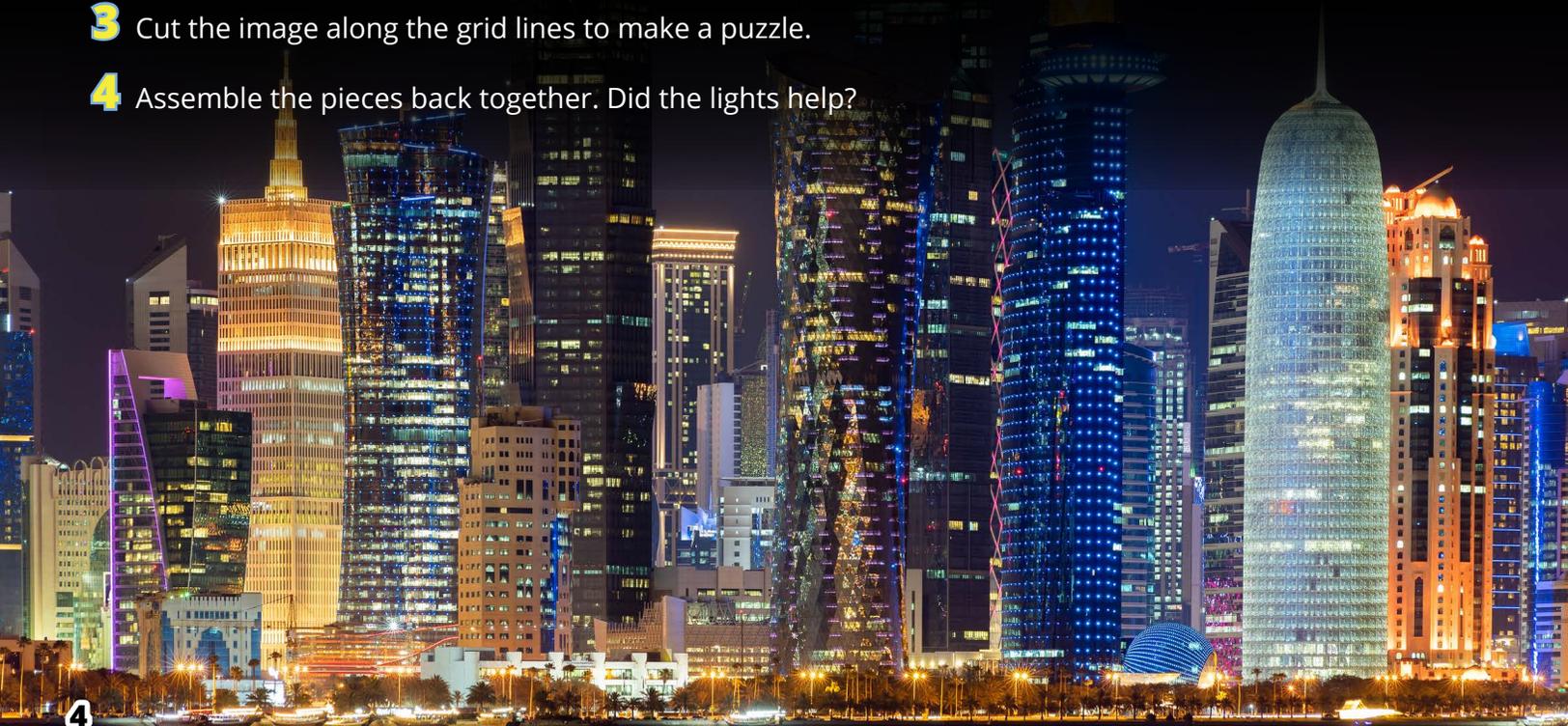
- color printer
- cardstock paper
- scissors

### Questions:

(see answers on page 3)

1. What countries do you see?
2. Can you see a bright and large peninsula – land surrounded by water on three sides? In what 4 squares is it located? Do you know what state it is?
3. In which part of the country do most people live? How do you know?
4. Can you spot any “lines” of lights? Why do they look like lines?
5. What is the bright light in D3?
6. In F6 there are lights in the middle of a body of water. What are the lights and where are they located?
7. Bonus: Can you find your state or city?

- 3 Cut the image along the grid lines to make a puzzle.
- 4 Assemble the pieces back together. Did the lights help?



# Lights at Night

