HEADS UP

FINDING YOUR PLACE IN SPACE

Use this guide as a starting point, but remember: there's so much more to see and do at the Adler! Don't forget to take time to explore what interests you and your group.

THE UNIVERSE:
A WALK THROUGH SPACE AND TIME

#11 on the map (at the end of this guide)

Enter through the multi-colored tunnel and follow the formation of the universe on the panels.
Put these parts of our universe in order of their formation by writing 1, 2, etc. under each one:

stars	**hydrogen atoms**	**planets**	**galaxies**	**subatomic particles**
_____	_____	_____	_____	_____

In the tunnel, find the blue *Gravity Shapes the Universe* panel and read about dark matter; an essential part of our universe that scientists are still learning about.

Along the opposite wall, watch the visualization *Gravity Shapes the Universe*. Computer simulations like this are called "visualizations" because they show you what physics tells us parts of space should look like, even when we haven't seen those places directly.

Where do clusters of galaxies form?

_____

What pulls matter together? _____

The universe is immense! As you exit the tunnel, watch the five large screens to see what it would look like if a camera could zoom out from Chicago all the way to the cosmic web—the superclusters of galaxies and dark matter that our universe is made of. The video is a simulation—humans have not had enough time to send real cameras that deep into space. To put the distance in perspective, think about this: the Voyager 1 & 2 spacecraft that were launched in 1977 have only barely left our solar system.

What do you think? Will humans be able to travel to other stars or galaxies some day? Would you want to go on that journey? Why or why not?

_____

_____

_____

_____

_____

Stop at the *How big is BIG? How small is SMALL?* interactive to explore the scale of the universe. Pick a part of the universe to learn more about.

What did you pick? _____

How is it similar to and different from Earth?

_____

_____

_____

_____

_____

SPACE VISUALIZATION LAB

#12 on the map

Before entering, observe the orrery outside the doors. Identify the Sun, Earth, and Moon in this model, and note the months marked on the gold ring around the orrery. Note: this model is not to scale.

Northern Hemisphere

Southern Hemisphere

Watch the Earth move through a complete revolution around the Sun, paying close attention to its tilt. **What period of time is one revolution?**

_____

Which hemisphere is tilted towards the Sun in **June**? _____

Sketch Earth and Sun in June, showing the tilt.

Which hemisphere is tilted towards the Sun in **December**? _____

Sketch Earth and Sun in June, showing the tilt.

In the SVL, classify a few galaxies at the Galaxy Zoo UScientist touch table. Sketch and label the galaxies you classified here:

Think about it! Why do you think smooth galaxies are more compact?

Hint: Think about what you learned in *The Universe: A Walk Through Space and Time*. What force likely condenses them into a smooth shape?

_____

_____

TRY IT!

In the classroom or at home, you can classify more galaxies and contribute to other citizen science projects at **zooniverse.org**

Using the tablets, you can choose what gets displayed on the large screens. At the Sharing the Universe tablet (right side), choose *Solar System*, then *Moon Phases*. Watch the visualization on the screen. How long does it take to go through a whole lunar cycle?

_____

What else do you observe about the Moon as it moves through a cycle?

_____

_____

_____

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TELESCOPES: THROUGH THE LOOKING GLASS

#13 on the map

As you enter the gallery, look for an entry tunnel to the left. This tunnel is the same diameter as the primary mirror of the Hubble Space Telescope. The image shown in the tunnel was captured by Hubble. It is 1/13,000,000 of the sky and shows about 10,000 galaxies.

Do the math! If there are 10,000 galaxies visible in 1/13,000,000 of the sky, about how many total visible galaxies might there be? Multiply 10,000 x 13,000,000 to find out!

There are many galaxies that Hubble can't detect. Recent calculations that account for those galaxies estimate that there are 2 trillion galaxies in our universe!

Use the touch table and the images on the walls to explore some of the other telescopes scientists use to observe the universe. All of these telescopes are in environments that are extreme and hard for humans to live in because they are too cold, too hot, or too remote.

Think about it! Why might scientists choose these locations for telescopes? (Hint: read the labels!)

Across from the Dearborn Telescope, find the first map of the Milky Way. **When was this model made?**

While we know much more about our home galaxy today, even with this more limited model, you can connect the objects and see three of the spiral arms taking shape.

Next to the model, there is an image of the Pinwheel Galaxy, which is much larger than the Milky Way, but similar in shape.

Think about it! Why do you think the Adler doesn't have an image of the Milky Way here instead?

STARGAZERS' HUB

#14 on the map

As you enter, look for a hexagonal table with a large spoon attached to it. Use the table and the *Focus & Reflect* area around it to complete this section of the guide.

Lenses _____ light, while mirrors _____ light. Each can be used in a telescope to see far away objects.

Use the two lenses at the *Near & Far* station on the table to focus on an object across the room. Draw a model of how you positioned the lenses to make the object look larger. Label the lenses to note which is **concave** and which is **convex**.

At the *Mirrors Reflect* station on the table, examine your reflection in the flat mirror and then in one of the curved mirrors. Circle the mirror type you used:

concave **convex**

How is your reflection similar in each?
How is it different?

_____

_____

The next section can be tricky to find. Stand in the center of the compass on the floor and face WNW point. Walk straight ahead to enter the *Universe in Your Hands* exhibit, keeping to the left of the red and white astrolabe.

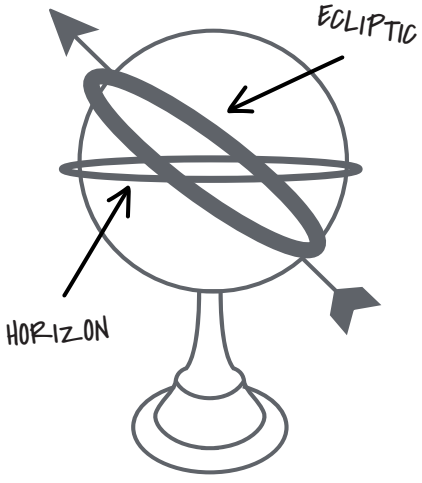
UNIVERSE IN YOUR HANDS

#6 on the map

Walk to the back right side of this area to find a *small* **armillary sphere** you can use to track patterns in how the Sun appears to move across the sky (look for Organizing the Spherical Universe).

On the armillary sphere, find the wide white band with four colored stripes on it. This band is called the **ecliptic**. When we look up from Earth, we see the Sun following the path of the ecliptic in the sky.

Next, find the compass directions: north, south, east, and west. They're on a band that represents the horizon, where the Sun rises and sets.



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UNIVERSE IN YOUR HANDS (cont.)

#6 on the map

Using the armillary sphere, see how the Sun moves at different times of the year by putting a Sun magnet on each of the different color lines, then moving the Sun from east (sunrise) to west (sunset).

What color line(s) make the Sun rise directly in the east and set in the west? _____

On what color line does the Sun go the highest? _____

What season does this represent? _____

Can you find the line that represents the Sun's path in winter?
Hint: the Sun will stay low in the sky _____

Back toward the entrance of the gallery, turn left to find a large **sundial**.
Sundials use shadows to tell time. Using the large sundial, compare shadow lengths.

On what date are shadows the longest?

_____

When are they shortest? _____

Why does the shadow's length change?
Write or draw your explanation below.

Move the Sun approximately to a date that is important to your group (maybe the last day of school!). Draw the sundial and its shadow.

Date: _____

This sundial was made to show Chicago's latitude, 42°N. Does the Sun ever shine directly over the sundial? _____

On what date is it the highest? _____

Which season is that? _____

Talk with your group: Why is the Sun highest in this season? Do you think the Sun would ever shine directly overhead in other parts of the world? Where? Why?

_____

_____

_____

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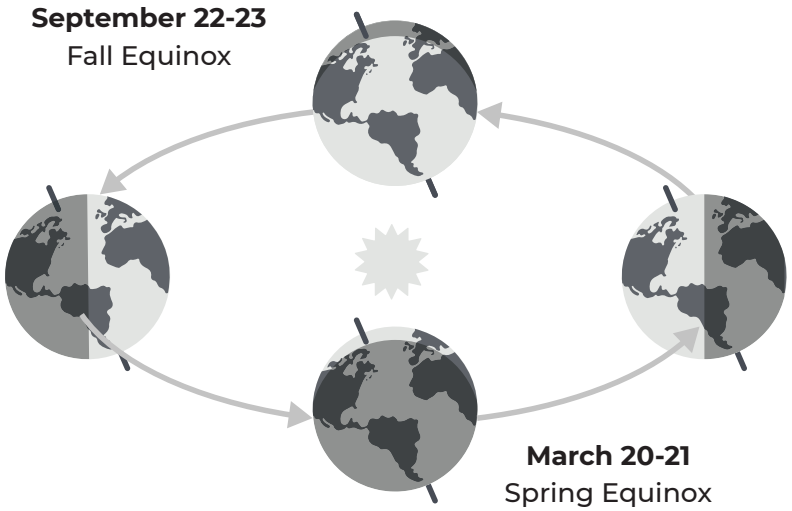
UNIVERSE IN YOUR HANDS (cont.)

#6 on the map



Put it all together! Use what you learned at the sundial and armillary sphere to draw a line connecting the date with its season and the Sun's place in the sky.
Hint: One of the answers in the third column will be used twice.

June	**Start of spring**	**Sun high in sky**
March	**Start of fall**	**Sun low in sky**
September	**Start of summer**	**Sun rises directly in the east and sets directly in the west**
December	**Start of winter**	

CHASING ECLIPSES

#15 on the map

Look at the map of the United States.

Will Chicago see a total solar eclipse in April 2023?

_____

Will any part of Illinois? _____

Watch the *Making Sense of Eclipses* video. Draw a model of a solar eclipse, showing the alignment of the Sun, Earth, and Moon.

Will Earth always see total solar eclipses?
Why not?

_____

_____

(cont. on next page)

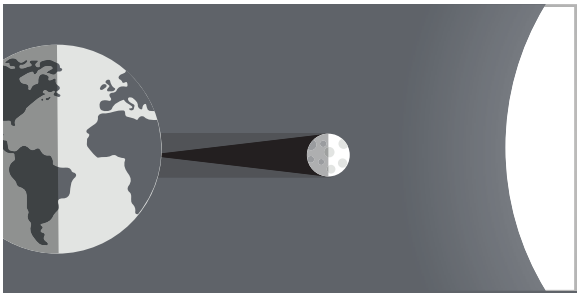
THE MAGNIFICENT MOON

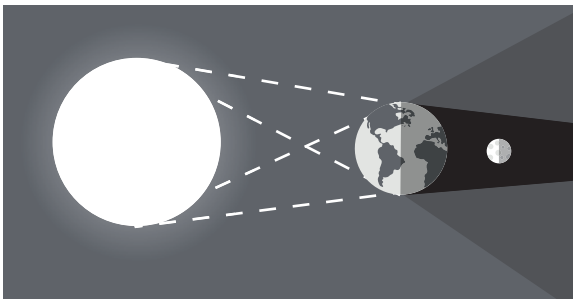
Mid Level, North Stairwell on the map

Compare the inflated Moon to the image of the Moon during a lunar eclipse.

What causes the darkening of the Moon? _____

Think about it! One of these illustrations shows a solar eclipse and the other shows a lunar eclipse. Which is which? Talk to your group to decide how you can figure it out.





OUR SOLAR SYSTEM

#3 on the map

If your group has time, visit the Red Rover: Mars Activity Station. It is open from 9:30am–12:30pm. Check in with an Adler educator to learn what activity is happening today. If you need to wait for your turn to try the activity, move on to the questions below and then come back!

Which activity did you do? (circle)

Mars Terrains or Lift-Off!

Write down something interesting that you learned or did at Red Rover.

_____

_____

Compare the information about each planet. Pick one prompt below to look for.

Planet with the biggest diameter: _____

Hottest planet: _____

Coldest: _____

Furthest from Earth: _____

Which planet in our solar system do you think is most **like** Earth? _____ Why?

_____

_____

Which planet in our solar system do you think is most **different** from Earth? _____ Why?

_____

_____

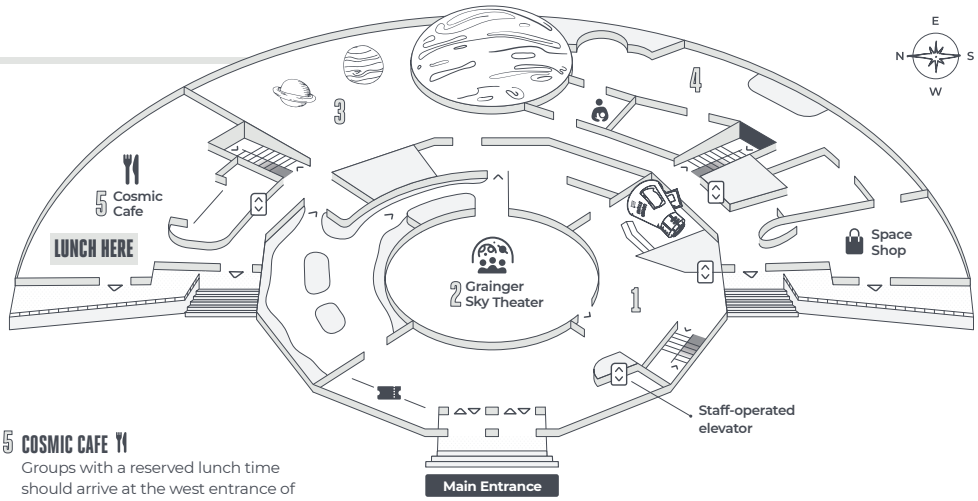
UPPER LEVEL

1 MISSION MOON
Step inside the story of Captain James A. Lovell, Jr., and witness the beginnings of America's journey into space.

2 GRAINGER SKY THEATER
Tickets available at the box offices.
Destination Solar System
Imagine the Moon

3 OUR SOLAR SYSTEM
Explore the many worlds—planets, moons, dwarf planets, and asteroids—that orbit the Sun.
Red Rover: Mars Activity Station is set up here.

4 PLANET EXPLORERS
Children in Pre–K through 3rd grade can blast off to Planet X and take the helm in this modern-day space adventure.

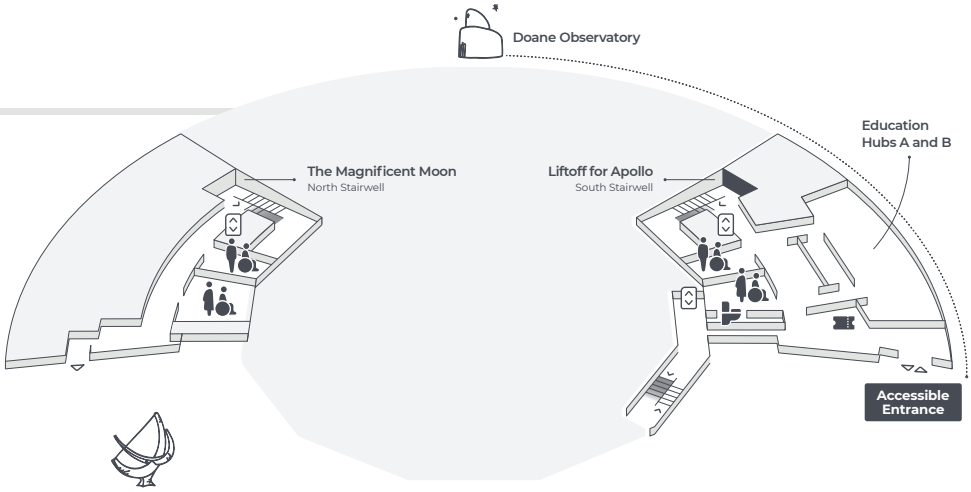


5 COSMIC CAFE
Groups with a reserved lunch time should arrive at the west entrance of the Cafe 5 minutes before their scheduled lunch.

MID-LEVEL

AMENITIES ON THIS LEVEL INCLUDE:

Restrooms equipped with changing tables
Water fountains
Ground level exits
Vending machines (South)
All Gender restroom



LOWER LEVEL

6 UNIVERSE IN YOUR HANDS
Go back in history to learn about some of the cultures that have engaged in the quest to understand their place in the Universe.

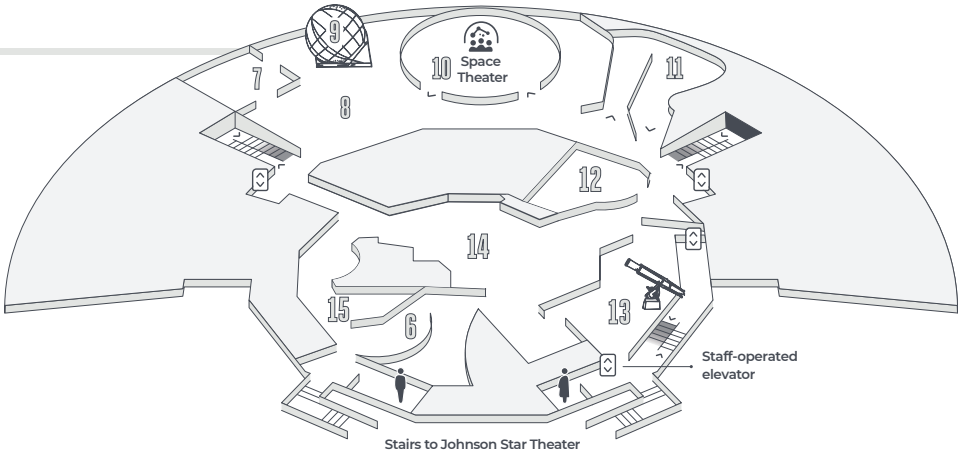
7 COMMUNITY STAR STUDIO
Let your imagination shine in this collaborative design space.
Check at exhibit for available times.

8 CHICAGO'S NIGHT SKY
Discover how your night sky connects you to everyone, past and present, in every place on Earth.

9 THE ATWOOD SPHERE
The Atwood is not operational at this time.

10 SPACE THEATER
Tickets available at the box offices.
Skywatch Live!
Planet Nine
One World, One Sky

11 THE UNIVERSE: A WALK THROUGH SPACE & TIME
Visit distant corners of the cosmos and witness how the Universe has evolved over 13.8 billion years.



12 SPACE VISUALIZATION LABORATORY
Both Adler and visiting experts collaborate to create new ways for people to virtually explore the Universe.

13 TELESCOPES: THROUGH THE LOOKING GLASS
Uncover the extraordinary beauty and technology of some of the world's most important telescopes.

14 COMMUNITY STARGAZER'S HUB
Unravel the mystery behind tools of observation.

15 CHASING ECLIPSES
Discover how people past and present have predicted when and where to stand in the narrow corridor of totality—and prepare to chase down a total solar eclipse for yourself.