I INTRODUCTION: LET'S ALL ENJOY THE SHOW!

Welcome to TheaterWorksUSA ("TWUSA") and our production of **THE MAGIC SCHOOL BUS: Lost in the Solar System!** We hope this guide will help your students learn more about the play and its content, as well as give you creative ways to make the play part of your curriculum. A trip to the theater is always very special and unique, and it can create a life-long passion for performance and storytelling. We hope our play will inspire your students. You may want to review some basic theater etiquette with your students, as this might be many of their first theater experiences. Talking or being disruptive during the performance is distracting to the actors and fellow audience members. However, we highly encourage laughing, cheering, and clapping at the parts they enjoy. Feel free to use this guide as a starting point for you and your students to explore the play and its rich content.

This study guide is designed to enhance your students' experience in seeing *The Magic School Bus: Lost in the Solar System!* It will provide discussion points prior to the viewing of the play, as well as post-viewing lessons and in-class activities. These in-class activities will extend the topic-specific ideas within the play, and engage the students in a hands-on classroom project. These lessons and activities are guideposts for the teacher to adapt to fit their classroom management style, the range of student ability, and time constraints.

Please know that all question prompts are suggestions. Feel free to adapt or change any discussion prompts or material to suit your classroom and style.

Common Core Standards II-VII:

First Grade

CCSS.ELA-Literacy.RI.1.1
CCSS.ELA-Literacy.RI.1.2
CCSS.ELA-Literacy.RI.1.3
CCSS.ELA-Literacy.RI.1.4
CCSS.ELA-Literacy.RI.1.5
CCSS.ELA-Literacy.RI.1.6
CCSS.ELA-Literacy.RI.1.7
CCSS.ELA-Literacy.RI.1.8
CCSS.ELA-Literacy.RI.1.9
CCSS.ELA-Literacy.RI.1.10

Second Grade

CCSS.ELA-Literacy.RI.2.1
CCSS.ELA-Literacy.RI.2.2
CCSS.ELA-Literacy.RI.2.3
CCSS.ELA-Literacy.RI.2.4
CCSS.ELA-Literacy.RI.2.5
CCSS.ELA-Literacy.RI.2.6
CCSS.ELA-Literacy.RI.2.7
CCSS.ELA-Literacy.RI.2.8
CCSS.ELA-Literacy.RI.2.9
CCSS.ELA-Literacy.RI.2.10

Third Grade

CCSS.ELA-Literacy.RI.3.1
CCSS.ELA-Literacy.RI.3.2
CCSS.ELA-Literacy.RI.3.3
CCSS.ELA-Literacy.RI.3.4
CCSS.ELA-Literacy.RI.3.5

CCSS.ELA-Literacy.RI.3.6
CCSS.ELA-Literacy.RI.3.7
CCSS.ELA-Literacy.RI.3.8
CCSS.ELA-Literacy.RI.3.9
CCSS.ELA-Literacy.RI.3.10

Fourth Grade

CCSS.ELA-Literacy.RI.4.1
CCSS.ELA-Literacy.RI.4.2
CCSS.ELA-Literacy.RI.4.3
CCSS.ELA-Literacy.RI.4.4
CCSS.ELA-Literacy.RI.4.5
CCSS.ELA-Literacy.RI.4.6
CCSS.ELA-Literacy.RI.4.7
CCSS.ELA-Literacy.RI.4.8
CCSS.ELA-Literacy.RI.4.9
CCSS.ELA-Literacy.RI.4.10

Fifth Grade

CCSS.ELA-Literacy.RI.5.1
CCSS.ELA-Literacy.RI.5.2
CCSS.ELA-Literacy.RI.5.3
CCSS.ELA-Literacy.RI.5.4
CCSS.ELA-Literacy.RI.5.5
CCSS.ELA-Literacy.RI.5.6
CCSS.ELA-Literacy.RI.5.7
CCSS.ELA-Literacy.RI.5.8
CCSS.ELA-Literacy.RI.5.9
CCSS.ELA-Literacy.RI.5.10

II THE PLAY'S THE THING: OUR STORY

This new musical adaptation is based on the beloved and bestselling Scholastic Publishing series, *THE MAGIC SCHOOLBUS*. In this adventure, the Magic School Bus kids blast off into space! Teacher Ms. Frizzle takes the kids into space to explore the solar system. But Ms. Frizzle gets separated from the group and her class must travel through the planets and beyond to rescue her. Will they be able to get everyone back to earth in one piece? The kids must put rivalries aside to work together or risk getting lost in space forever!

III WHAT'S IN A NAME? OUR CHARACTERS:

MS. FRIZZLE: the exuberant and slightly wacky teacher

LIZ: her pet lizard

ARNOLD: the star pupil

JANET: Arnold's know-it-all cousin

RALPHIE: the class clown

WANDA: the class loner

CARLOS: the class double loner

IV KNOW BEFORE YOU GO: PREVIEW DISCUSSION

Your students may or may not have read the book on which this material is based, *The Magic School Bus: Lost in the Solar System.* If possible, break the students into small groups of 4 to read the book together over the course of a few days prior to seeing the play. These small group reading sessions can be done in class in a series of 15-minute sessions. The students should take turns reading sections aloud within their groups.

Reading the book is not necessary for the students to see and enjoy our production, but it can help the students see how books are transformed into live performance.

If your students or the majority of them have not read the book:

1. Open a class-wide discussion about the play you are all going to see. Using the information above, present the play's storyline and characters to the class. Encourage your students to ask any questions they might have about the story or the characters. Some of your students may be familiar with *The Magic School Bus* series, and/or with the specific book on which the play is based, and some may not. Encourage those who have read the book to share their opinions about the book in this discussion.

2. Tell the students that they will be discussing the play in greater detail after they have seen it.

V FROM PAGE TO STAGE

If your classroom has been able to read the book prior to seeing the play, open class-wide discussion about the book. Explain that they are going to see an adaptation of the novel. Tell them that in this **adaptation**, a playwright, composer, and lyricist have taken the themes, characters, and major plot points of a book and found a new way to tell the story.

Suggested questions for the discussion about the book on which the play is based:

1. What is the story about?
2. Who are the main characters?
3. What problems do the characters encounter?
4. How do they create solutions to the obstacles they face?
5. What is the relationship like between Arnold and Janet? Why?
6. What do they learn about each other through their adventure in the solar system?
7. How does this change their relationship?

Instruct the students to think about the book while they are seeing the play. What is the same in both versions? What is different?

All of these questions can be revisited as part of a class-wide discussion after the students have seen the play. See Section VII for the post-viewing discussion questions.

VI WHAT'S THAT YOU SAID? SOME KEY VOCABULARY WORDS

In order to fully experience and understand the play, your students should be familiar with and understand some of the key vocabulary words. Distribute Worksheet A, and open a class-wide discussion. With the Worksheet in front of them, ask a student to volunteer to read the list out loud, or read it for them. Through question and answer, ask the students if they know what the following words mean. If they don't, explain the term to them. Tell them to follow along using their worksheet.

ADAPTATION: when a writer takes the themes, characters, and major plots points of a story and finds a new way to tell the story.

PRIMARY SOURCE MATERIAL: The primary source is the original version of the story that the writer has adapted.

INTERPRETATION: The way a writer creates their own version of the story, using the primary source as their guide.

ORBIT: The repeating path that one object in space takes around another. For example, the earth orbits around the sun.

SOLAR: Solar means sun. The Sun is the center of our solar system. The solar system is the collection of eight planets and their moons in orbit around the sun. The Earth is part of this solar system.

ASTEROIDS: Asteroids are small rocky objects that orbit the sun.

GRAVITY: Gravity: Gravity is an invisible force that pulls together any two objects. For example, gravity pulls us down toward our planet Earth, and holds us connected to it.

CALCULATION: Using math to figure out the size or number of something.

OBSERVATION: The gathering of information, using all of your senses. In science, this also means the gathering of information and data using scientific methods and tools.

ATMOSPHERE: The atmosphere is the layer of gas that surrounds the Earth. It is often called air. Other planets have their own atmospheres. The gases that make up the Earth's atmosphere are held close by gravity.

Revisit the worksheet after the students have seen the play. Ask them if they understood the meaning when any of these words were used in the performance.

VII: EVERYONE'S A CRITIC: POST VIEWING DISCUSSIONS AND ACTIVITIES

Now that your class has seen the play, tell your students that you are going to be exploring the play and doing some activities related to the play.

Open a class-wide discussion about what the students just saw.

Suggested questions for discussion:

1. What was the story about?
2. What did Arnold learn about Janet?
3. What did Janet learn about Arnold?
4. Did their relationship change? If so, how?
5. Do you think that when you work with someone to solve a problem together it can change your opinion of that person? Why do you think that is?

VIII: UNDERSTANDING THE WORLD OF THE MAGIC SCHOOL BUS: LOST IN THE SOLAR SYSTEM

In-class Q&A: What did you learn from the play? The teacher should feel free to use the following prompts as suggestions and create their own Q&A.

QUESTION PROMPTS:

1. What planet is closest to the sun?
2. Does Venus have any gravity?
3. What is another name for the planet Mars?
4. Which planet has bright rings you can see from Earth?
5. Which planet is the largest?
5. How many Earths would fit into the Sun?
6. What planets did the Magic School Bus Visit?

KEY:

1. Mercury
2. Yes
3. The Red Planet
4. Saturn
5. Jupiter
6. 1.3 Million
7. Mercury, Venus, and Mars.

Common Core Standards VIII-XII

First Grade:
CCSS.ELA-Literacy.SL.1.1
CCSS.ELA-Literacy.SL.1.2
CCSS.ELA-Literacy.SL.1.3
CCSS.ELA-Literacy.SL.1.4
CCSS.ELA-Literacy.SL.1.5
CCSS.ELA-Literacy.SL.1.6

Second Grade:
CCSS.ELA-Literacy.SL.2.1
CCSS.ELA-Literacy.SL.2.2
CCSS.ELA-Literacy.SL.2.3
CCSS.ELA-Literacy.SL.2.4
CCSS.ELA-Literacy.SL.2.5
CCSS.ELA-Literacy.SL.2.6

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CCSS.ELA-Literacy.SL.3.2
CCSS.ELA-Literacy.SL.3.3
CCSS.ELA-Literacy.SL.3.4
CCSS.ELA-Literacy.SL.3.5
CCSS.ELA-Literacy.SL.3.

Fourth Grade:
CCSS.ELA-Literacy.SL.4.1
CCSS.ELA-Literacy.SL.4.2
CCSS.ELA-Literacy.SL.4.3
CCSS.ELA-Literacy.SL.4.4
CCSS.ELA-Literacy.SL.4.5
CCSS.ELA-Literacy.SL.4.6

Fifth Grade:
CCSS.ELA-Literacy.SL.5.1
CCSS.ELA-Literacy.SL.5.2
CCSS.ELA-Literacy.SL.5.3
CCSS.ELA-Literacy.SL.5.4
CCSS.ELA-Literacy.SL.5.5
CCSS.ELA-Literacy.SL.5.6

Write the name of the planets Mercury, Venus, and Mars on the board. Now, separate the students into 3 groups, and assign one planet to each group. Ask for a student to volunteer as note-taker. Ask them to work together to think of everything they learned about their assigned planet from the play. Reconvene the class and ask a volunteer from each group to read the group's answers aloud to the class.

IX EXTENSION ACTIVITY: TAKE HOME ASSIGNMENT

As a homework assignment, ask the students to look up three facts about their assigned planet from the previous in-class activity. This research can be done online or in the library. Ask them to write out these three facts. In class, have the groups convene and share their answers with each other and create a single master list of facts. Ask a student from each group to volunteer as note-taker. Reconvene the class and ask a student volunteer from each group to read their master list of planet facts aloud to the class. Instruct the students to keep notes of what they learn.

X HANDS ON ACTIVITY: LOOK AT THE SOLAR SYSTEM!

In this activity, the students are going to build a model of our solar system, using Styrofoam balls to represent the planets relative to their size and placement. Ask the students to look up the planets in our solar system, and find out the order of the planets, and list them planets from largest to smallest. This can be done in-class or at home Have a student volunteer write 3 lists on the board.

1. The names of the planets.
2. The order of the planets in our solar system.
3. A list of the planets from largest to smallest.
   (Include placement of the Sun and Earth's Moon.)

Key: Jupiter, Saturn, Uranus, Neptune, Earth, Venus, Mars, Mercury. Show the students an image depicting our solar system. One can be found here: www.planetsforkids.org

Separate the classroom into groups, depending upon number of students and classroom strategy. Have each group create a mobile/model of the solar system by connecting the Styrofoam balls in the proper order from the sun, and ensuring that each ball represent the planet relative to its size. This activity can take place over multiple class sessions, depending upon scheduled time allotted, classroom size, and management strategies.

What the classroom needs:

- Styrofoam balls representing the planets relative to their size. Be sure to include a foam ball representing the sun, and one representing the moon. You will need Styrofoam balls in the following sizes: 5, 4, 3, 2.5, 2, 1.5, and 1.25 inches. You will need two each of the 1.5 and 1.25-inch balls.
- You will also need a Styrofoam sheet that is .5 inches and 5 x 5 inches. You will use to make Saturn's rings.
- If possible, get acrylic craft paints in red, orange, yellow, green, blue-green, dark blue, cobalt blue, light blue, white and black. These will be used to paint the Styrofoam balls for each planet.
- Pipe cleaners or wooden skewers that can be connected to the various Styrofoam balls
- A wooden dowel from which to hang your planets. Look for one that is about 30 inches long.
- Some yarn or string, which you will use to hand the planets from the wooden dowel.
- Craft glue to glue the yarn to the Styrofoam planets.
- A glue-on hook to hang the mobile from the ceiling.
- A ruler.

Some color suggestions:

THE SUN:	Yellow
MERCURY:	Orange
VENUS:	Blue-green
EARTH:	Dark blue and green
MARS:	Red
JUPITER:	Orange with red and white stripes
SATURN:	Yellow, with the rings painted orange
NEPTUNE:	Light blue
URANUS:	Darkest blue
THE MOON:	Silver/grey

Stick a wooden skewer or pipe cleaner into each Styrofoam ball to hold them up while you paint them. Paint each one an appropriate base color to represent each planet. Do them in order of size to match the order of planet size in our solar system. Feel free to be creative with your design, adding more than one color or patterns if you wish. Let them dry.

Put the Styrofoam balls on their sticks upright in a vase or jar to dry completely.

Now, cut the yarn or string that the planets, the sun, and the moon will all hang from. They need to be cut at different lengths so that your mobile will accurately represent the order in which the planets exist in the solar system.

Cut the string for the sun the shortest. Make it about 4 inches. Cut the next string two inches longer so the planet will hang a little bit lower. If you cut the string for the sun at 4 inches, then cut the string for Mercury at 6 inches. Then, cut each string 2 inches longer as you go. Uranus should have the longest piece of yarn or string to hang at the lowest level of the mobile.

Now, attach each string to each planet using the glue. Tie a knot at the end of each string to glue into the hole left by the skewer. The knot will make it easier to glue in a glob onto each Styrofoam planet.

THINGS TO KEEP IN MIND:

Remember, the shortest string goes into the sun at the top on the left! This is where you start. The next longest goes into Mercury, and onward from there! Keep an eye on the sample picture of the solar system to make sure you are hanging your planets in the right order from the sun, the moon, and each other. Don't let the Styrofoam planets touch, as they might get stuck together. Let the glue dry completely, overnight if possible.

Once the entire mobile is completely dry, arrange to have them hung by a glue hook somewhere in the classroom – on a ceiling or overhanging bookcase.

XI POST-ACTIVITY DISCUSSION

Open a class-wide discussion about what they learned from creating a mobile of the Solar System. Review some of the material in Section VII, and encourage them to integrate that information and knowledge in this discussion. Some question prompt ideas:

1. Was it hard to picture the solar system before working on it?
2. Is it easier to picture the solar system now?
3. Can they name all of the planets in order of their distance from the sun?
4. What was the most difficult part of creating the solar system mobile?

XII EXTENSION ACTIVITY: ARE WE ALONE IN THE UNIVERSE?

In the play, the characters travel to other planets. Science does not yet know if there are any other planets anywhere in the galaxy that can support human life. In the 1940s, an American fiction writer named Jack Williamson created a word that describes the process of turning a planet that can't support human life into one that can. This word is **TERRAFORMING**.

Open a class-wide discussion and explain the term 'terraforming'. Tell the class of its history and derivation. Write the word on the board and ask the class to pronounce it. Explain that 'terra' refers to the planet Earth, and that the word means 'earth-forming' or 'earth-shaping.' It means changing everything about a planet, including its atmosphere, weather, temperature, soil, climate to be just like Earth, and allow human beings to live it on.

Tell the students that they are going to work in groups to terraform Mars. They are going to create a list of everything that would need to be created and sustained on Mars for people to live there. Encourage the students to think beyond the basics, such as temperature and climate. Some questions to keep in mind:

1. What do human beings use on the planet earth?
2. What keeps human beings alive?
3. What supplies human beings with these things?
4. What can't human beings live without?
5. What would Mars look like after it was terraformed?

This activity can be done in a series of classroom sessions. The students should conduct some research, either on-line or in the library. Each student should keep his own list and the students should share their lists to create one master list at the end of the project.

After all the groups have created their master list for a terraformed Mars, reconvene the class. Ask a volunteer from each group to read their list aloud and open a discussion. Some question prompts:

1. Did all the students come up with the same list?
2. Were their visions for a terraformed Mars similar? Different?
3. What did this activity teach them about life on Earth?
4. What can each of us do to take care of planet Earth?

This Terraforming Activity can be developed into a fuller classroom activity in which the students create a model of their terraformed Mars using the materials from the Solar System activity in Section **X**.

XIII AND THAT'S A WRAP! FINAL DISCUSSION

Ask the students if they enjoyed seeing the play and why. Ask them to share their thoughts about the following:

1. What part of the play did you like best, and why?
2. What character did you like best, and why?
3. If you haven't read the book, did seeing the play make you want to read the book?
4. Did seeing the play make you want to learn more about space travel and the solar system?
5. Did seeing the play make you want to see more plays and performances in the future?

ONLINE TEACHER RESOURCES TO EXPLORE FURTHER:

The Alan Alda Center for Communicating Science:
www.aldacenter.org

Astronomical Society of the Pacific (activities):
www.astrosociety.org/education/hands-on-astronomy-activities
National Geographic For Kids, Planets:
https://kids.nationalgeographic.com/explore/space/what-is-a-planet/#planetary-lineup.jpg
Kid's Astronomy:
https://kidsastronomy.com/

The Magic School Bus™
Lost in the Solar System

THEATER WORKS USA

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Back Row, L to R: Lindsey Brett Carothers, Kari Gunberg, Tom Meglio. Front Row, L to R: Sumi Yu, Junior Mendez, Jared Loftin. Photo by Jeremy Daniel Photography.

Left to right: Sumi Yu, Junior Mendez, Lindsey Brett Carothers, Tom Meglio and Jared Loftin. Photo by Jeremy Daniel Photography.