I INTRODUCTION: LET'S ALL ENJOY THE SHOW!

Welcome to TheaterWorksUSA and our production of ROSIE REVERE ENGINEER AND FRlENDS. 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 one 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 clapping, laughing, and cheering 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 *Rosie Revere, Engineer and Friends.* It will provide discussion points after your class has seen the play, along with 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, 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.

II THE PLAY'S THE THING: OUR STORY

This new musical adaptation is based on the beloved and bestselling Rosie Revere books by Andrea Beaty and David Roberts.

Ms. Greer's classroom includes three inquisitive out-of-the-box thinkers. Rosie Revere has big dreams. Iggy Peck has a relentless passion for architecture. And Ada Twist's curiosity can drive her teacher crazy. But all three are needed to save the day when their fieldtrip goes awry! By using their engineering know-how and problem-solving skills, they are able to get everyone home safe and sound.

Illustrations by David Roberts

Common Core Standards II-VII:
First Grade:

CCSS. ELA-Literacy. l.1.1
CCSS.ELA-Literacy.L.1.2
CCSS. ELA-Literacy. L.1.3
CCSS. ELA-Literacy. L.1.4
CCSS.ELA-Literacy.L.1.5
CCSS. ELA-Literacy. L.1.6

Second Grade:

CCSS. ELA-Literacy. L.2.1
CCSS.ELA-Literacy.L.2.2
CCSS. ELA-Literacy. L.2.3
CCSS. ELA-Literacy. L. 2.4
CCSS.ELA-Literacy.L.2.5
CCSS.ELA-Literacy.L.2.6

Third Grade:

CCSS.ELA-Literacy.L.3.1
CCSS. ELA-literacy. L. 3.2
CCSS. ELA-Literacy. L.3.3
CCSS.ELA-Literacy.L.3.4
CCSS.ELA-Literacy.L.3.5
CCSS.ELA-Literacy. L.3.6

Fourth Grade:

CCSS. ELA-Literacy. L.4.1
CCSS. ELA-Literclcy. L.4.2
CCSS. ELA-Literacy. L.4.3
CCSS. ELA-Literacy. L.4.4
CCSS.ELA-Literacy.L.4.5
CCSS. ELA-Literacy. L.4.6

Fifth Grade:

CCSS. ELA-Literacy. L.5.1
CCSS.ELA-Literacy.L.5.2
CCSS. ELA-Literacy. L.5.3
CCSS.ELA-Literacy.L.5.4
CCSS. ELA-Literacy. L.5.5
CCSS. ELA-Literacy. L.5.6

III WHAT'S IN A NAME? OUR CHARACTERS:

ROSIE REVERE Ambitious but also shy. A sweet kid who is used to blending into the background (where she can secretly build machines) as she presumes that no one will understand her ideas. She is recently energized by her Great Great Aunt Rose and is now testing out her own confidence. She's an Engineer.

ADA TWIST Nonstop energy, a little ADD with a constantly shifting focus, happy, excited full of ideas and questions. Talks too fast and doesn't always listen to the answers to questions she peppers at people. Careless due to her excitable nature. She's a Scientist.

IGGY PECK A sophisticated young man in the body of a second grader. Fine on his own. A dreamer but a dreamer that can realize his ideas. Straightforward. Calm. Confident.

MISS LILA GREER: Teacher, worrier, prim, proper and always a little nervous.

GREAT GREAT AUNT ROSE Adventurous and fun, always cheering Rosie on.

IV KNOW BEFORE YOU GO: PREVIEW DISCUSSION

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 source material, Andrea Beaty's ROSIE REVERE books, and some may not. Encourage those who have read them to share their opinions about the books in this discussion.

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

Left to right: Kalilah Black and Kiani Nelson. Photo: Jeremy Daniel Photography.

V 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 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 aloud 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 and fill out the meanings as they hear them.

Revisit the worksheet after the students have seen the play. Ask them if they understood the meaning when these words were used in the performance. When you do this is dependent upon your own classroom management strategies and time.

ARCHITECT: A person who designs structures, like buildings.

ARCHITECTURE: Doing the work of creating the building. It also means the design of a structure.

ENGINEER: Someone trained in the skill of creating engines or machines.

VOLCANO: A mountain or a hill from which lava and ash are released.

PHYSICS: A science that looks at matter and energy and the galaxy.

CHEMISTRY: A science that looks at what substances make up our world, from the air we breathe to the things we use.

TURRET: A small tower on top of a larger tower on a castle.

INVESTIGATE: To ask questions and discover answers about anything at all!

EXPEDITION: A journey that people take with a purpose in mind, usually to investigate something.

VELOCITY: The speed at which something is moving, usually fast.

VI LET'S TALK ABOUT CHARACTER

What is the difference between a character trait and emotions? Open this discussion by differentiating between character traits and emotions.

A **character trait** is the way a person or character in the story acts. It is part of their personality and comes from inside them. We learn what traits a character has by what they say and do.

The **character's emotions** are usually temporary feelings that may be a result of an outside force, like an experiment failing, or not knowing the right answer to a problem. We learn about a character's emotions by what they say and do in response to what is happening to them.

Tell the students that after they see the play, the class is going to explore the characters in the story. Encourage them to pay attention to the characters, keeping in mind the differences between a character's traits and their emotions.

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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 THE DISCUSSION:

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 Rose and her Great Great Aunt? Among Rosie, Iggy, and Ada?
6. What does Rosie learn about failure? Is it a positive lesson or a negative one?

Distribute **WORKSHEET B**. Remind the students of your discussion before the play regarding character traits and character emotions.

Ask the students to fill out the worksheet, listing three character traits each for Rosie, Iggy, and Ada. Then, they based on what they saw and learned in the play, list the evidence of these character traits.

Open a discussion based on what the students have written on their worksheets.

Common Core Standards VIII-XIV

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

Third Grade:
CCSS.ELA-Literacy.SL.3.1
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

QUESTION PROMPTS:

1. What are Rosie's/Iggy's/Ada's character traits?
2. How does she/he/she show us those traits?
3. When is she/he/she behaving in response to a temporary or passing emotion?
4. Is that passing emotion true to her/his/her character?
5. What do you think the difference is between true character traits and passing emotion?

VIII UNDERSTANDING ROSIE AND HER FRIENDS: WHAT IS AN ENGINEER?

Open a class-wide discussion by asking, what is an engineer?

(Note that you have reviewed a very brief definition of this prior to seeing the play.)

An engineer is someone how uses science and math to develop solutions to problems. There are many kinds of engineers. List different kinds of engineers on the board. Suggestions include:

1. Traffic engineers
2. Architectural engineers
3. Agricultural engineers
4. Software engineers
5. Mechanical engineers

Separate the class into 5 groups. Assign each one kind of engineer to learn about. Ask for one student from each group to act as note-taker. Then, have the students work as a group to research their assigned engineer. This research can be done online in the classroom or in the library. This can also be done as a take-home assignment.

Have the students work in their groups to list 3 things the engineer does, and in what industries or kinds of work that they do them. Then, reconvene the class and ask for a volunteer from each group to read aloud the group's report. Ask the students what the similarities and differences are among the various kinds of engineers in the reports. Ask the students what kinds of problems would they like to solve using engineering.

Left to right: Daisy Carnelia, Kyle Sherman, Kalilah Black. Photo: Jeremy Daniel Photography.

IX I WANT TO BE AN ENGINEER!

Tell the students that they are going to learn a bit about engineering a bridge. Begin by presenting the students with some terminology. Ask them to open their notebooks and write down what you are writing on the board.

COMPRESSION: Compression is the force in which a material is squeezed together. Its opposite, or **counterforce**, is tension.

TENSION: Tension is the force in which a material is pulled apart. It's opposition or counterforce is compression.

GRAVITY: Gravity is the constant force that exists between any two objects that have mass. Earth's **gravity** is what keeps you on the ground and what causes objects to fall.

BUCKLING: Buckling is what happens when a bridge loses its shape because there is too much compression.

SNAPPING: Snapping happens when a bridge loses its shape because of too much tension.

SPAN: The distance between two points on a bridge.

Review these terms with the students, and encourage them to question any concept that they don't understand.

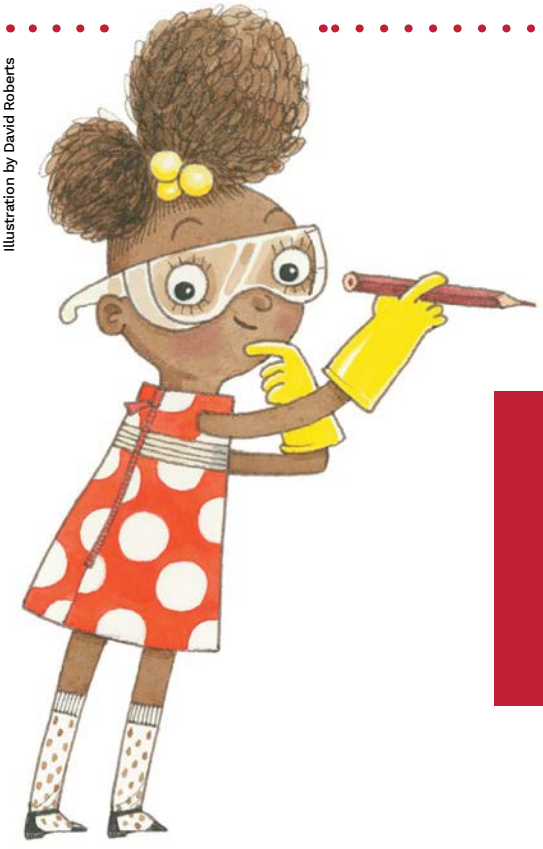

Illustration by David Roberts

X LET'S BUILD A MARSHMALLOW BRIDGE!

In this activity, the students will use marshmallows to build a bridge and see what it can carry. Separate the class into 3-4 teams depending upon classroom size and management strategies. This activity can be done in stages over more than one classroom period.

WHAT YOU WILL NEED:

- Bags of marshmallows (standard size)
- Toothpicks, 100 per group
- Two chairs placed one foot apart
- String, 3 feet
- Scissors
- A Styrofoam or plastic cup
- A cup of pennies
- Pens and paper

Instruct them to work together in their group to design a bridge. Encourage them to research bridge structures. This research can be done online, in the classroom or library, or as part of a take-home assignment. Tell them to ask themselves:

1. What shape might be the strongest?
2. How many marshmallows and toothpicks do they think they will need?

Have the students work together in their group to sketch out their chosen bridge shape and design. Once they have agreed on their final plan, they can begin to build.

First, have the students gather the materials together and organize them to be ready to use. Using the marshmallows and toothpicks, the students should construct a bridge about one foot long. Encourage them to try different approached and start over if they feel their design isn't working.

REMIND THEM OF WHAT ROSIE LEARNS IN THE PLAY:

1. That she can solve any problem once she puts her mind to it.
2. That she can learn from failure as much as success.

Once the students feel that their design is working, tell them to let the marshmallows set up and cool down from having been handled. Tell them to review their design, and compare it to what they have built. Have them ask themselves the following questions:

1. Does it reflect what they intended?
2. Does it look like real bridges that they have seen?
3. How much weight do they think it could hold?

Now, bring all the teams together. Have them each place the two chairs a little less than a foot apart. These will represent the shoreline that their bridges must span across. Have the students place their bridges across the span. Do they think that their bridge can stand the force of gravity? Will it buckle? Have them make this test:

Press down lightly and then with a bit more force on the top of the bridge. What does each student feel? Does it hold or give? What forces do they think the bridge is experiencing?

Now, have the students test if it can carry a load across. If it held steady when pressed, do this next test. Make holes in the cup for handles, then loop some string through the holes and tie it together to form a bucket. Hook the loops on the bridge with the cup-bucket positioned below. Have them begin adding pennies one by one to see how many their bridge will hold. When it begins to buckle, they will know load limit of each bridge.

Whose bridge won and held the most pennies? Compare the bridges based on the number of pennies each was able to hold, alongside their designs. Which bridges worked the best, and why?

XI POST ACTIVITY DISCUSSION

Open a class-wide discussion about what the students learned in building their bridges. Review the terms they learned at the beginning of the activity, and encourage them to try to use them.

1. What new things did you learn about bridges?
2. What is a force?
3. What is the difference between compression and tension?
4. What did the strongest bridges have in common? Use these new terms you have learned.
5. What did the weakest ones have in common?
6. Did your original group vision and design look like your final bridge? Did you make changes as you constructed your bridge? What were those changes and why did you make them?

XII EXTENSION PROJECT: A LAVA LAMP FOR ADA! SEE WORKSHEET C

XIII REALLY ROSIE: WHO WAS ROSIE THE RIVETER?

In the play, Rosie's Great Great Aunt Rose, is based on a figure from American history named Rosie The Riveter. Open up a class-wide discussion to talk about who Rosie The Riveter represented, along with other famous women in history.

TEACHING PROMPTS:

Explain to the class that the 'real' Rosie the Riveter was a famous fictional character in American history. During World War II, millions of American men were overseas fighting. So, all the jobs that kept the country running were left without anyone to do the work. Women took the place of the men who usually worked these jobs. The American government created a poster to encourage women to get jobs in factories, farms, and mills. The strong woman on the poster was nicknamed Rosie the Riveter because one of these important war-time jobs was working the factories that produced equipment for the troops - things like tanks and artillery. These were factories in which women rarely, if ever, worked. World War II was one of the first times in our history that women had access to jobs traditionally worked solely by men.

Rosie really did rivet things but that was just one of her jobs! In addition to the poster, there was even a song written about her.

Use this link to find out more about Rosie the Riveter, and to source an image of the original poster: http://www.american-historama.org/1929-1945-depression-ww2-era/rosie-the-riveter.htm 2.

Show the class the poster of the original Rosie The Riveter. Have the class draw or paint their own version of Rosie The Riveter. Ask them to think about what kind of job Rosie would do today? What would she look like?

Left to right: Kalilah Black, Kyle Sherman, Daisy Carnelia, Jenna Perez. Photo: Jeremy Daniel Photography.

FOLLOW UP:

The women who worked in these jobs during World War II were trailblazers. A trailblazer is someone who tackles something new for the first time, making it easier for others to follow and do the same. There were many women trailblazers in history. These were women who did things that were usually done only by men. Instruct the class that they are going to work in small groups to research other trailblazing women in history and learn about what they did.

Suggested List: (The teacher should feel free to pick and create their own list of figures.)

a. Bessie Coleman: First Black woman to have a pilot's license.

b. Marie Curie: A scientist who was the first woman to win the Nobel Prize.

c. Wilma Mankiller: The first woman elected to serve as chief of the Cherokee Nation.

d. Liliuokalani: The only queen and last regent of the Kingdom of Hawaii.

e. Joan Clarke: A British code-breaker who worked secretly with the British government during World War II to break Nazi codes and win the war.

INSTRUCTIONS:

1. Separate the class into 5 groups, depending upon classroom size and management strategy.
2. Assign a female trailblazer to each group.
3. Ask one student to be the group note-taker.
4. Have the students do some research about this figure. This research can be done online or in the library.
5. Have the students write down 3 important facts about their assigned figure. Reconvene the groups, and ask a student to volunteer to read their research aloud to the class and share what they learned.

XIV AND THAT'S A WRAP! FINAL DISCUSSION

Ask the students if they enjoyed seeing the play, and why. Ask them to talk about and 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 engineering and using math and science to solve problems?
5. Did seeing the play make you want to see more plays and performances in the future?

ONLINE TEACHER RESOURCES TO EXPLORE FURTHER:

ENGINEERING:

Engineering For Kids:

https://www.engineeringforkids.com

Science For Kids:
http://www.sciencekids.co.nz/sciencefacts/engineeringnz/typesofengineeringjobs

ARCHITECTURE:

Archkidecture.com, encouraging visual literacy and explaining math, science, and visual concepts to kids through architecture:
http://archkidccture.org

Kid World Citizen:
https://kidworldcitizen.org/world-architecture-for-kids/

FROM ANDREA BEATY:

https://www.andreabeaty.com/parents--teachers.html

ROSIE REVERE, ENGINEER & FRIENDS

WORKSHEET A

ARCHITECT: A person who designs structures, like buildings.

ARCHITECTURE: Doing the work of creating the building. It also means the design of a structure.

ENGINEER: Someone trained in the skill of creating engines or machines.

VOLCANO: A mountain or a hill from which lava and ash are released.

PHYSICS: A science that looks at matter and energy and the galaxy.

CHEMISTRY: A science that looks at what substances make up our world, from the air we breathe to the things we use.

TURRET: A small tower on top of a larger tower on a castle.

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VELOCITY: The speed at which something is moving, usually fast.

Left to right: Kalilah Black and Kiani Nelson.
Photo: Jeremy Daniel Photography.

Left to right: Kalilah Black, Kyle Sherman, Daisy Carnelia, Jenna Perez.
Photo: Jeremy Daniel Photography.

ROSIE REVERE, ENGINEER & FRIENDS

WORKSHEET B

LET'S TALK ABOUT CHARACTERS!

Each character in the play has distinct character traits. We learn about these traits by what they do and say. Those observations are called evidence. These are examples of behavior that match the character trait. Fill in the worksheet by listing 3 character traits for Rosie, Iggy, and Ada, and then list examples of their behavior that give us evidence of those traits.

WHO	CHARACTER TRAIT	EVIDENCE
ROSIE	1.	
	2.	
	3.	
IGGY	1.	
	2.	
	3.	
ADA	1.	
	2.	
	3.	

Illustration by David Roberts

ROSIE REVERE, ENGINEER & FRIENDS

WORKSHEET C

EXTENSTION ACTIVITY: A LAVA LAMP FOR ADA!

In the play, scientist Ada tries to build a volcano. What is another project Ada might like? Creating a LAVA LAMP!

What is a lava lamp? Maybe you've seen one! A lava lamp is a transparent electric lamp which has a thick liquid in it as decoration. Inside the thick liquid, bright colors are suspended and rise and fall inside the lamp base. The shapes and colors change as these colors rise and fall. We can mimic what a lava lamp does in a simple water bottle.

FOR THE TEACHER:

A carbon-dioxide powered lava lamp is a low-cost, safe classroom activity. Oil and water are added to a container, along with food coloring. The food coloring will not dissolve in the oil layer, but will instead dissolve in the water layer.

By adding an Alka-Seltzer tablet, the student will create carbon dioxide bubbles. These carbon dioxide bubbles created by the Alka-Seltzer tablet will carry drops of colored water into the layer of oil. When the bubbles reach the surface, the colored water drops will be released and then sink back into the bottom of the bottle.

First, open a discussion with the students to explain three key concepts to them:

DENSITY: Density is how much mass a substance has. Dense objects are usually heavy and less dense objects can be as light as air.

MASS: Mass is how much matter is in something. Think of matter as something you can physically touch. It's in everything and is everywhere.

SOLUBILITY: Solubility is how chemicals are able to dissolve into other chemicals. Solubility is the ability to dissolve into (become a part of) another substance, like the way sugar dissolves in hot chocolate.

CHEMICAL REACTION: A chemical reaction is when the parts in the matter change and new matter is formed. Think of cooking. Flour, sugar, butter, and eggs can be turned into cookies. Those cookies will never be just flour, sugar, butter, and eggs again, but are now made of those things – but turned into something new.

MAKING A LAVA LAMP

WHAT YOU NEED:

- Alka-Seltzer Tablets
- Water Bottles
- Vegetable Oil
- Food Coloring

Fill the glass or plastic bottle two thirds of the way with vegetable oil. Then, pour in water, but leave about an inch of space at the top.

- What happens when you pour the water in?
- Does it settle on the bottom or rest on the top of the oil?

Then, add several drops of food coloring – any color you want. Watch as the drops break through to the water layer and disperse.

Next, break an Alka-Seltzer tablet into a few pieces. Once the liquid has settled and cleared, drop the tablets into the bottle.

When the tablets begin to fizz, what happens? You will see that the tablets create gas and carry the colored water with it through the oil. This is a lava lamp effect!

When the tablets stop fizzing, and the lava lamp effect stops, you can add more food coloring and Alka-Seltzer to start it up again and mix the colors.

Ask the students what they see happening in the bottle, using the terms density, solubility, and chemical reaction.

- Which has more density – the water or the oil?
- What is the chemical reaction happening?
- Is the food coloring soluble in water, oil, or both?

Illustration by David Roberts