ACTIVITY GUIDE

michelee puppets

Empowering lives through the art of puppetry.

MISSION STEAMPOSSIBLE

for Grades K-2

SCIENCE IS FOR EVERYONE!

Discover how to apply science to unlock the mysteries of our universe; and how to use technology to solve the problems of our world.

Activities were designed by Angela Roller and Kimberly Seaver, educators with Orange County Public Schools. Thank you!

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GETTING READY

Mission STEAMpossible is designed to connect with children through a compelling story that engages students on an intellectual and emotional level. Puppets and captivating visuals draw students into the world of our main character, Magnificent. Magnificent is a teen inventor, who dreams of becoming an engineer on the first mission to Mars. Magnificent's hilarious robot sidekick, DinoBot, is programmed to fetch balls and to help Magnificent use the scientific method to compete in the Mission STEAMpossible Challenge. When her dreams collide with the needs of her little brother, Marcus, who is physically disabled, Magnificent learns that through her own ingenuity and engineering skills, she can help her brother and still reach for the stars.

MicheLee Puppets has a long history of using puppetry to dispel stereotypes and to elicit understanding between people who are different. Mission STEAMpossible tackles the stereotypes of "science nerds" and the false notion that girls are not smart enough for science and math. Even as we feature a female main character, girls and boys alike are spellbound by the captivating story that unfolds.

Please help us make this program more valuable to your students by preparing them for our visit.

PERFORMANCE REQUIREMENTS

- We arrive 2 hours before the first show to load in and set up. Please assign a contact person and/or custodian to meet our team so that we can load into your building right away. It will take 30 minutes to unload the van, and then we will move the van to your designated parking area.

- Make your cafeteria/auditorium space ready by clearing your stage completely. We have a large set and will use the entire stage area.

- If you have windows in your cafeteria, please use black craft paper to block outside light. We are using black light in the show, and the effects won't work unless your room is dark.

- We want your students to have an extraordinary experience. If possible, we prefer for the kids to be seated on the floor, centered in front of the stage for the best sight lines. If you cannot have the tables moved for the kids to sit on the floor, the second option is to push tables toward the center so that no one is sitting too far to the right or the left of the stage.

- Teachers present to help students stay in their places during the performance.

PRE-SHOW

Discussion & Activities

WHAT IS A PUPPET?

A puppet is an inanimate (non-living) object that is brought to life by the manipulation/movement of a puppeteer. Mission STEAMpossible uses the styles of “hand puppet” and “hand and rod” puppet.

- **Hand Puppet:** A hand puppet is a puppet which is controlled by a puppeteer’s hand. In Mission STEAMpossible, DinoBot is a hand puppet.
- **Hand and Rod Puppet:** A hand and rod puppet is a puppet which is controlled by both hands. The puppeteer’s hand goes into the head of the puppet, operating the mouth. The puppeteer’s other hand controls the “arm rods” connected to the puppet’s hand or hands. In our story Magnificent’s brother, Marcus, is a hand and rod puppet.

WHAT IS A PUPPETEER?

A puppeteer is a performer that manipulates a puppet to tell a story. The puppeteer’s role is to use an audience’s “willing suspension of disbelief” to convince them that the object being performed is a living, breathing character. Two puppeteers perform live voices for the characters, Marcus and DinoBot, in Mission STEAMpossible.

WHAT IS THE ROLE OF THE AUDIENCE?

MicheLee Puppets encourages an interactive audience experience including laughing, sharing of ideas, and active listening. A successful live theatre experience requires the focus of both the performers onstage and of the audience offstage, including students and teachers.

DISCUSS AUDIENCE ETIQUETTE

- **How is a live performance different than a TV show or movie?** In a live show the performers can see and hear you. What can you do to keep from being distracting?

- **How can I respect my fellow audience members?** Being considerate of others’ space and talking only when prompted by the actors. How else?

- **How can I respect the performers?** Clapping shows appreciation to the performers. Following directions and staying focused on the show make a better experience for all. How else?

PRE-SHOW

Discussion & Activities

PREPARING K-2 STUDENTS FOR MISSION STEAMPOSSIBLE

Let your students know the following about Mission STEAMpossible:

- The main character is a girl named Magnificent
- Magnificent is a teen inventor
- She is excited by science, technology, engineering, art and math
- She dreams of becoming an engineer on the first mission to Mars
- She invented a robot sidekick, DinoBot, that is programmed to fetch balls
- Magnificent has a little brother, Marcus, who is physically disabled
- Marcus likes to look at constellations in the sky every night
- Magnificent is building a rover for the NASA Mission STEAMpossible Challenge

POST SHOW DISCUSSION QUESTIONS

These question samples may help you to engage students in meaningful discussion:

- What career did Magnificent want to have in the future? How is she working toward her goals?
- Why does Magnificent want to go into space? Do you think she will make it? Why or why not?
- What do you think an engineer does?
- How do you think Magnificent built DinoBot?
- What would you like to invent for yourself?
- What did you like best about the show?
- What did you learn that you never knew before?

VOCABULARY

OBJECTIVE

- Introduce students in grades k-2 to vocabulary words from Mission STEAMpossible
- Introduce students in grades k-2 to definitions of vocabulary words from Mission STEAMpossible

Constellation	A group of stars forming a recognizable pattern
Engineer	A person who designs, builds, or maintains engines, machines, products, structures or public works
Engineering Design Process	Ask, Imagine, Plan, Create, Improve
Experiment	A scientific test or procedure that is carried out under controlled conditions to answer a scientific question
Inference	An explanation based on evidence that is not directly observed
Investigation	An organized scientific study of the natural world that may include making systematic observations, asking questions, gathering information, analyzing data, summarizing results, drawing conclusions, and/or communicating results
Model	A way to show what something is like or how something works
Moon	Information about the natural world gathered through the senses and/or scientific instruments
Prediction	A statement that can be tested scientifically through experiments and/or other scientific investigations
Solar System	A system of planets and other bodies that orbits a star
Star	A large object in space that is made of gas and produces its own light
Sun	A star at the center of our solar system

ACTIVITY

Build a Constellation Projector

SIMPLE CONSTELLATION PROJECTOR PLAN FOR YOUNG STUDENTS:

PlaygroundParkbench.com/Printable-Constellation-Cards

READ THE SCENARIO BELOW

Marcus enjoys looking at patterns of stars every night. These patterns of stars are known as constellations. In the play, Marcus is not always able to view the constellations.

When was Marcus unable to view the constellations? What are some other possible reasons Marcus would be unable to view the constellations?

Engineers solve problems. Today, we will act as engineers to help Marcus solve his constellation viewing problem! Marcus needs you to use the available supplies to design a constellation projector so that he can view constellations every night.

I challenge you to use science, technology, engineering, art, and math to build Marcus a constellation viewer that projects at least one star pattern on to the wall or ceiling in a dark room. You will have **(XX)** amount of time to complete your project.

XX: Set the amount of time you are giving students to complete the project

POSSIBLE MATERIALS

In engineering design, you can add, substitute, or subtract supplies as available or to achieve a desired effect:

- Aluminum foil
- Black construction paper
- Coffee Cans with lids or breadcrumb containers (cylinder shaped)
- Plastic cups
- Rubber bands
- White crayons
- Duct Tape
- Pieces of cardboard from cereal boxes, tissue boxes or any leftover cardboard around your school
- Something for poking star holes in device (i.e., sharpened pencil, wooden skewer, thumb tack, nail - you know your students best)
- Mirrors- to use to aim your light for reflection
- 1 flashlight per projector being made

SUGGESTED SETUP

- Place dark bulletin board paper over windows and door openings, so the room will be dark to test students' constellation projectors.
- Layout materials for student selection.
- Students could work individually or in groups of 2 to 4.

ACTIVITY

Build a Constellation Projector

WATCH THIS VIDEO

YouTube.com/watch?v=wE-z_TJyzil

Use this video to introduce the engineering design process. Stop to discuss each part of the engineering process: **ASK, PLAN, BUILD, TEST, IMPROVE.**

- **ASK:** Engineers are asked to solve a problem. What problem are you solving for Marcus?
- **PLAN:** Engineers plan. When you are planning, you should brainstorm many possible solutions to create a constellation projector, draw and label your designs, list materials you will need and imagine which design might work best considering any constraints you are under (materials available, time to complete, etc.).
- **BUILD:** Engineers then get to build prototypes. This is when you will construct your constellation projector.
- **TEST:** Engineers test so that they can see if their design works to solve the problem. They ask: What is working well? What is not working or could be working better?
- **IMPROVE:** Finally, engineers imagine ways that the device could be improved. Any of the areas that were not working well during the test should be addressed along with any possible improvements to make it work even better.

THE ENGINEERING DESIGN PROCESS

Ask: What is the problem you are trying to solve? _____

_____

_____

Plan: Constellation Research _____

_____

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Constellation Projector Diagram with Materials labeled:

Test: What is working well? _____

_____

What is not working well? _____

_____

How well does it represent the constellation when projected? _____

_____

Improve: What can you add or change so that your projector works better? _____

_____

_____

What is not working well? _____

_____

How well does it represent the constellation when projected? _____

_____

Questions to Ponder: Does your projector make your constellation appear to move across the sky from east to west? If not, could it? What causes this apparent movement of the real constellations? _____

_____

_____

_____

Is your projector able to change out constellations so that Marcus can view multiple constellations on the one projector? If not, could it? If yes, why is this a beneficial feature for your viewer? _____

_____

What other cool features could you add to your projector to make it the one Marcus would choose as the perfect constellation projector? _____

_____

Improved Diagrams:

ACTIVITY

Build a Constellation Projector

FOLLOW THE STEPS OF THE ENGINEERING DESIGN PROCESS TO SOLVE MARCUS' PROBLEM

Teacher - Pass out the Student Planning Page. The students use the planning sheet as they work through the process. Below are standards based, targeted questions teachers can ask during each stage of the process.

- **ASK:** Students need to understand the problem and constraints. Ask: What is the problem you are trying to solve? What materials are you able to use? How much time do you have to complete this project?

- **PLAN (ELA):** This is when your ELA activity should be completed. Research a constellation to use in your constellation viewer. While students research constellations to use for their projectors ask:

  Science: How are the stars in your constellation alike? How are they different? Are the stars evenly scattered all over the nighttime sky? The sun is a medium sized star. Have students diagram their constellation viewer plans. While they are doing this ask:

  Technology: How is the flashlight going to help you in solving Marcus' problem? Could the problem be solved without the flashlight technology? How can the internet help you in solving this problem?

  Engineering: How will this plan work to solve Marcus' problem? Will you be able to build your plan within the time restrictions set for this project? Do you have access to all of the materials that you are showing in your plan? What materials are you allowed to use?

  Art: What will your device look like? What will draw Marcus to your device over others if they were all set out on a table? If you were creating your own constellation, what would it look like?

  Math: How are you going to make the model of your constellation? How can you use measurement to help you? Do you see angles in your constellation? What math tools could help you build your model? What do you think will happen to the distance between stars in your constellation when you project it onto the wall? How many line segments are in your constellations? Vertices? Rays? Will the length of the line segments change when projected on the wall? Can you see 2D shapes in your constellation? How about 3D shapes?

- **BUILD:** Engineers then get to build prototypes. This is when you will construct your constellation projector.

- **TEST:** Engineers test so that they can see if their design works to solve the problem. They ask: What is working well? What is not working or could be working better?

- **IMPROVE:** Finally, engineers imagine ways that the device could be improved. Any of the areas that were not working well during the test should be addressed along with any possible improvements to make it work even better.

ELA EXTENSIONS

OPTION 1

Write a story about your constellation. Tell how it looks, where it was seen, and what shape it is.

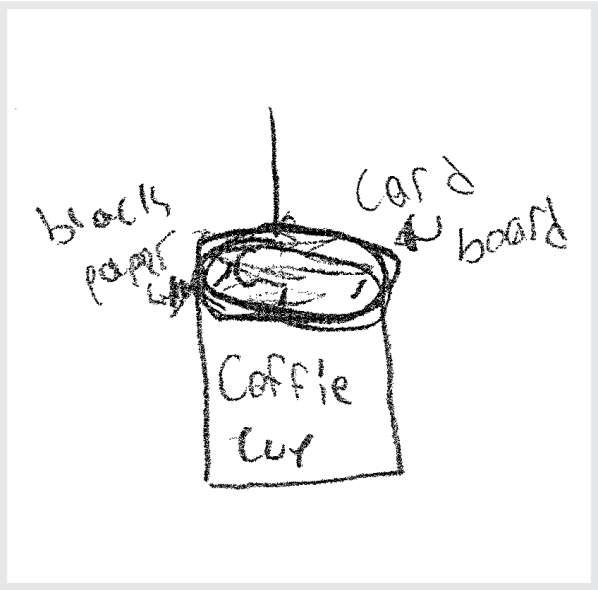
OPTION 2

Draw a new constellation. Write a story to go with your constellation. Where did it come from? What shape is it in? What did you name it?

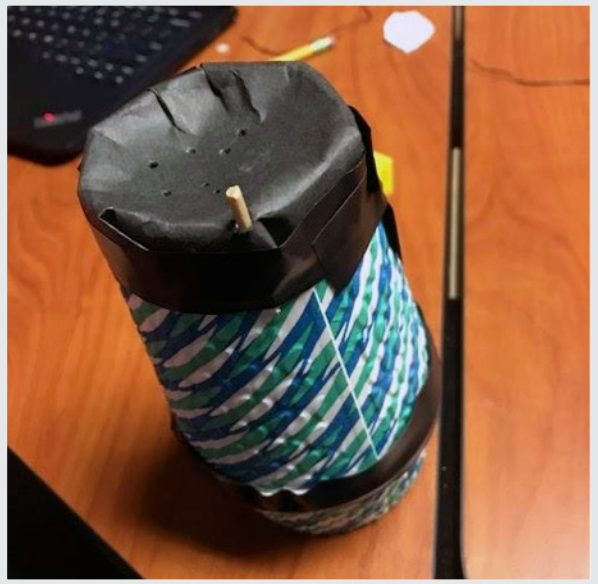
OPTION 3

Does Dinobot remind you of any family pets? Which parts of Dinobot would you prefer in a family pet? Draw a picture of a robotic pet you would like to have. Label his unique parts. Write down how he would help your family members.

STUDENT SAMPLES



Sample Student Plan



Sample Student Constellation Viewer

TEACHER WEBSITES

Engineering Design Extension Videos and Activities

IRON MAN GIVES A BIONIC ARM TO A 7 YEAR OLD BOY

TheGuardian.com/film/2015/mar/12/iron-man-robert-downey-jr-gives-child-bionic-arm

Teacher Discussion Questions

- Who has seen the movie Iron Man?
- How do you think Iron Man's body parts were made?
- What material are Iron Man's body parts made out of?

A LOCAL STUDENT PRESENTS A NEED THAT IS SOLVED BY UCF COLLEGE OF ENGINEERING STUDENTS AT AN AFFORDABLE COST

YouTube.com/watch?v=qY5pKXmc8dU

Teacher Discussion Questions

- How are Magnificent and the boy's parents similar?
- What did you notice the UCF students do before they started building?
- What characteristics make the UCF students good engineers?
- How are the UCF student engineers similar to doctors?

LIMBITLESS SOLUTIONS

This video shows Albert Manero who is a graduate in the UCF school of engineering. Albert founded Limbitless Solutions which is a nonprofit devoted to bringing 3-D printed bionic arms and hands to children at no cost to their families.

UCF.edu/impact/albert-manero

Teacher Discussion Questions

- What was Albert Manero's dream?
- What was the problem that Albert Manero was trying to solve?
- How is this problem similar to Marcus' in Mission STEAMpossible?
- Would Albert Manero be able to help Marcus?
- How was Magnificent's solution for Marcus similar to what Alberto Manero designed?

TEACHER WEBSITES

Engineering Design Extension Videos and Activities

ASK, PLAN, BUILD, TEST, IMPROVE

PBSkids.org/designsquad/build/helping-hand

In this activity ask students to design a hand that assists with grabbing objects.
Materials and a video on how levelers work is included.

Teacher Discussion Questions

- How would a robotic hand be helpful to Marcus?
- Who would design a robotic hand?
- How is a robotic hand similar and different than a human hand?
- Would a robotic hand need to be replaced often? What materials should be used to construct it?
- How should it be cared for?
- What activities would Marcus be able to do with the robotic hand that he couldn't do without it?

ROBO WHEEL

Students can design a robo wheel using paper bowls. Students can fill in their wheels with patterns. Students can practice using the engineering process as well, asking what will they build? Plan their designs, create their designs, test designs, and improve designs.

PBSkids.org/designsquad/build/robo-wheel

Teacher Discussion Questions

- Ask students to make a list of everyday objects that use wheels.
- In what ways are wheels helpful to us?
- When wheels are in motion, what shapes are enabling them to rotate?
- How are the robo wheel designs similar to wheels on a wheelchair?

STANDARDS BASED STEAM FOLLOW UP ACTIVITY

with ELA standards also included

SC.K.E.5.5	Observe that things can be big and things can be small as seen from earth.
SC.K.E.5.6	Observe that some objects are far away and some are nearby as seen from Earth.
SC.1.E.5.1	Observe and discuss that there are more stars in the sky than anyone can easily count and that they are not scattered evenly in the sky.
LAFS.K.W.3.8	With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.
LAFS.K.SL.2.4	Describe familiar people, places, things, and events and, with prompting and support, provide additional detail.
LAFS.1.W.3.8	With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.
LAFS.1.SL.2.4	Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly.
LAFS.2.W.3.8	Recall information from experiences or gather information from provided sources to answer a question.
LAFS.2.SL.2.5	Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings.
MAFS.K.G.1.1	Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to.
MAFS.1.G.1.1	Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.
MAFS.2.G.1.1	Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.