



SPACE SCIENCE TEACHER GUIDES

Dear Assembly Coordinator and Teachers,

The following pages contain teacher guides to be used in conjunction with Prismatic Magic's Space Science assembly and the Space Science Student Worksheet Masters located on Prismatic Magic's Web site.

The teacher guides provide additional information about the laser show. They give ideas and suggestions for ways to tie the assembly into the curriculum for specific grade level ranges but you may use ideas from any age group you would like. All ideas are suggestions and may be used as deemed appropriate by individual teachers.

Sincerely,

Your Friends at Prismatic Magic



TEACHER GUIDE
GRADES K - 2

SPACE SCIENCE

To increase the educational aspect of the laser program, this guide is to be used AFTER the performance.

Language Skills

Parts of Speech

Make a list of as many adjectives the students can think of to describe the show. If they haven't learned about adjectives yet, ask them how they would describe the show or the lasers or the performance. Make a list of all the nouns they saw during the performance in person or on the screen. What happened during the show? Make a list of verbs. How did those things happen? Make a list of adverbs. Have a contest to see which student or group of students can come up with the most adjectives, nouns, verbs, or adverbs.

Writing

Write about what happened during the performance. What was their favorite part? What did they like or dislike? What would they have changed? What songs would they have added or taken out? Depending on the students' writing level, have them write a sentence, a paragraph, or a story about the show. Or have them draw a picture and dictate a sentence or paragraph about what they drew.

Math

Graphing

Bar graphs can be constructed about the performance. Choose a few songs or portions of the performance and graph the popularity of each one. Which part of the show was the most popular – constellations, music, laser images? Graph it and find out.

Basic Math Facts

Make up some simple stories about the laser show that can be used to teach basic math facts. Examples:

- The sun was shown 2 times in one piece and 3 times in another. So what was the total number of times the sun appeared in the show?
- Three children in 2nd grade sang to a *song*. Two children in 1st grade did not. How many more children sang than did not?
- Three classes watched the show. Two children in each class clapped along with every song. How many children clapped with every song?

Art

Constellations

Students can create their own constellations. Have them randomly make 8 – 15 dots on a blank sheet of paper. They can connect the dots in anyway. They should look for a picture in what they just created. Do they see an animal, a plant, a machine, etc? Have them fill in some details like eyes, arms, leaves, etc. To extend the activity, have them write a sentence, paragraph or story about their constellation and what it represents.

Constellations part 2

Let stars and constellations fill your classroom. Give students a blank sheet of black construction paper. They can poke random holes in the paper with a thumbtack or pin – they can even use objects that will make different sizes of holes. Or you can give the students copies of constellations on white copy paper. They can lay the white paper over the black paper and poke holes where the stars are. Remove the white paper and hang the black construction paper in the windows of the classroom. Group them together with no spaces in between and it will look like a night sky. The sun will shine through the holes making them look like stars.

Space Scratch Art

Here is a popular art project that can be easily adapted to fit with lasers and Space Science.

Materials needed:

- one sheet of white paper or cardboard for each student
- crayons
- large paperclip or other object for scratching
- optional – black tempura paint with a drop or two of liquid soap mixed in it

Directions:

1. Students color heavily on the white paper using many colors.
2. Students may either cover all the colors by going over the entire page with a black crayon or by painting a layer of black tempura paint with a drop or two of soap mixed in. (For younger children, the teacher may need to do the painting and give the pages back to the children to finish the art project after the paint has dried.)
3. If using paint, it must be completely dry before going to the next step.
4. Using an unfolded paperclip or other scratching tool, students scratch lines through the layer of black crayon or the layer of paint to reveal the colors underneath.

Students should draw something related to space – space station, planets, stars, comets, constellations, astronauts, etc. Because they will be using outlines to create a picture, it will look similar to a laser show in which all images are created with outlines only. Since the background will be black, it will look like the picture is in outer space.

Magic Space Pictures

Make a fun, motion-filled piece of art

Materials needed:

Crayons

Construction paper

Paper clips

Small magnet, one per student

1. Using the crayons, have each student draw a space scene – stars and planets, the inside of the space shuttle, etc.
2. Cut out a shape from the construction paper and color it. This should be something the students want to have move around the picture. If they drew an outer space scene, they could cut out a rocket, space shuttle, moon, etc. If they drew the inside of the space shuttle, they could cut out an astronaut.
3. Clip a paper clip onto the shape they cut out.
4. Put the cut out shape on top of the picture. To make it move, hold a magnet underneath the picture and move the magnet around. It will look like a space shuttle is flying through space, a moon is orbiting a planet or an astronaut is floating inside the space shuttle.

Your ideas

Go ahead and draw on your knowledge and skills to come up with any other activities. Relate the lasers to something you are teaching in any subject. Who better to come up with activities than you – the teacher!!



TEACHER GUIDE
GRADES 3 - 5

SPACE SCIENCE

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Language Skills

Parts of Speech

Make a list of as many adjectives the students can think of to describe the show. Make a list of all the nouns they saw during the performance in person or on the screen. What happened during the show? Make a list of verbs. How did those things happen? Make a list of adverbs.

Writing

Write about what happened during the performance. What was their favorite part? What did they like or dislike? What would they have changed? What songs would they have added or taken out? Have the students write an informative article about the performance, an advertisement or brochure for the performance, a critique of the show, a persuasive argument for or against this assembly, etc. Have the students come up with a theme for their own laser show. What would it be? What songs would go with their theme?

Word Puzzles

Give the students graph paper and let them create word searches, crossword puzzles, codes, etc., using patriotic words or phrases. Then let them trade puzzles with other students to see if they can solve them. As a class, create a giant puzzle on a piece of butcher paper and share it with another class.

How Many Words?

Write an American themed word on the board. How many words can the students come up with using only those letters?

Example word: *constellation*

Words from *constellation*: *tell, stale, tale, late, slate, ate, eat, eats, sent, etc . . .*

Math

Graphing

Bar graphs can be constructed about the performance. Choose songs or portions from the performance and graph the popularity of each one. Which part of the show was the most popular - learning about space, music or the laser images? Graph it and see.

Distance to the moon

Lasers have been used to measure the distance from the earth to the moon. Can the students figure out that approximate distance with a few pieces of information? Speed of light, including lasers = approx. 186,000 miles per second. Time it takes a laser to travel to the moon, reflect off a mirror, and return to the earth = about 4 seconds.

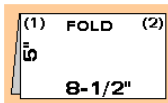
$186,000 \text{ miles per second} \times 4 \text{ seconds} = 744,000 \text{ miles}$. That number must be divided by 2 since the laser is traveling to the moon and back. That means the moon is about 372,000 miles from the earth.

Art and Music

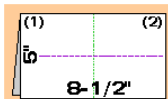
Five-Pointed Star

We talked a lot about stars in the program. Students should know that stars do not really have five points on them, but they are round, just like our sun. It is fun to make a five-pointed star out of paper with just one cut. It is kind of tricky to fold the paper just right, but if you can do it and teach it to the students, it is worth it. You might not want to tell them what shape they will be making – just teach them how to fold the paper, make the cut, and watch their surprise...

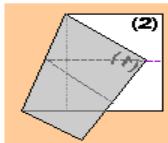
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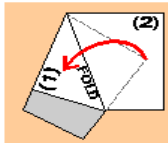
Step 1. Fold an 8-1/2" x 10" piece of paper in half.



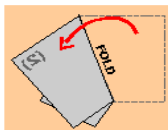
Step 2. Fold and unfold in half both ways to form creased center lines. (Note: be sure paper is still folded in half.)



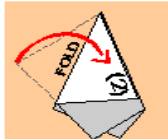
Step 3. Bring corner (1) right to meet the center line. Be sure to fold from the vertical crease line.



Step 4. Bring corner (1) left till edges coincide, then make the fold.



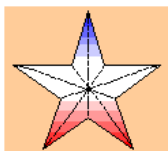
Step 5. Bring corner (2) left and fold.



Step 6. Bring corner (2) right until edges coincide. Then fold.



Step 7. Cut on the angle as shown in the picture. Then unfold the small piece.



Step 8. Marvel at your perfect (we hope!) 5-pointed star! If your star is not perfect, take a fresh piece of paper (8-1/2" x 10" — not 8-1/2" x 11") and [return to Step 1](#).

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Constellations in the Classroom

Let stars and constellations fill your classroom. Give students a blank sheet of black construction paper. They can poke random holes in the paper with a thumbtack or pin – they can even use objects that will make different sizes of holes. Or you can give the students copies of constellations on white copy paper. They can lay the white paper over the black paper and poke holes where the stars are. Remove the white paper and hang the black construction paper in the windows of the classroom. Group them together with no spaces in between and it will look like a night sky. The sun will shine through the holes making them look like stars.

Design a constellation

Give each student a blank sheet of paper. Have them place 8 – 15 dots randomly around the paper. They should then connect the dots in any order they wish. They should study the image they have made, turning the paper if needed, and find an object in it – an animal, a person, a plant, a machine, etc. They can fill in more details, like eyes, arms, etc. They can name their constellation and color it.

Design a constellation part 2

Help the students understand that the constellations have stories that go along with them, mostly relating to Greek mythology. Find stories about some constellations and share them with the students. To extend the activity into writing, have them write 10 words on the back of the paper where they designed a constellation that describe their constellation – scary, kind, lost, sad, royalty, etc. Then have them write a paragraph or story describing the origin of their constellation, what it represents, etc.

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Science

Mapping the stars

Can students find the Big Dipper in the night sky? Hopefully most of them have seen it before. But if they look carefully, they can find many more constellations. The Internet is full of constellation maps. Because links change and Web sites move and disappear, we won't list any specific sites here. Just do a search for constellations and you will have many from which to choose.

Your ideas

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TEACHER GUIDE
GRADES 6 - 8

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Writing

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Math

Distance to the moon

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Science

Reflection

Reflection is what makes the lasers move around during the laser show. A fun way to learn about reflection of light is to gather several small mirrors and a flashlight. Cover the flashlight with an opaque material with a small hole in it. This will allow only a small beam of light to shine from the flashlight. Have the students try to hit a target with the beam of light. The trick is that they have to reflect the light off of one or more mirrors before hitting the target. How many mirrors can they use and still hit the target? This can be done as a class or in small groups. Throw some math into the mix by having the students measure and calculate angles. Have them plan out a path for the light beam using precise angles and draw it on a piece of paper. Then let them set it up in the classroom and try it. Did they calculate the angles correctly?

History

Laser History

What do the students know about lasers? Who invented lasers? When were lasers invented? What else are they used for? Let them get on the Internet and search away! Have the students write a paragraph or make a poster about another use of lasers or a laser scientist.

Views of the Solar System

Do the students know much about Galileo and Copernicus and the many others who helped shape our view of the solar system. Again, let them research and make posters, pamphlets, or even have a debate about which theory is correct, each acting as the person they researched.

Art and Music

Art skills with music

Have the students draw a picture of their favorite part of the performance. They can also decide what they would like to include in a laser show and draw that. Or have them think of their favorite song and draw a laser scene from it. Listen to music and have students picture how they could create the music visually. Then have them create it. The movies *Fantasia* and *Fantasia 2000* are excellent examples of this.

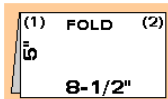
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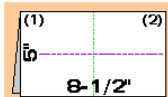
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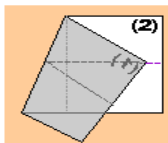
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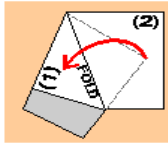
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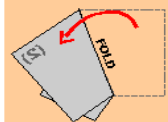
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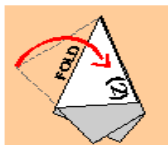
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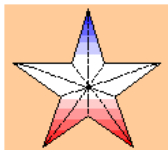
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Step 7. Cut on the angle as shown in the picture. Then unfold the small piece.



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These instructions with larger pictures can be found at:
<http://www.ushistory.org/betsy/flagstar.html>

Astronomy

Mapping the stars

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Safety

Precautions

We take every necessary precaution to ensure everyone's safety during the show. It is not safe to shine any kind of laser directly into the eyes. Permanent damage may result. It is wise not to allow a laser to shine directly on any part of the body either as harmful radiation is emitted from a laser. You may want to emphasize that if lasers are used safely, they can be fun.

Your ideas

Go ahead and draw on your knowledge and skills to come up with any other activities. Relate the lasers to something you are teaching in any subject. Who better to come up with activities than you – the teacher!!