



## SCIENCE LASER SPECTACULAR PART 2 TEACHER GUIDES

Dear Assembly Coordinator and Teachers,

The following pages contain teacher guides to be used in conjunction with Prismatic Magic's Science Laser Spectacular Part 2 assembly and the Science Laser Spectacular Part 2 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

*SCIENCE LASER SPECTACULAR PART 2*

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**

Many bar graphs can be constructed about the performance. Choose a few songs from the performance and graph the popularity of each one. Which part of the show was the most popular - the science demonstrations or the laser show? 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:

Three children in 2nd grade liked it when the balloon popped. Two children in 1<sup>st</sup> grade did not. How many more children liked it when the balloon popped than didn't like it?

There were three classes watching the show. Two children in each class sang along with every song. How many children sang every song?

Three grocery stores are on Main Street. Each store has 5 cash registers that use lasers to scan prices. How many cash registers are there altogether?

## Science

### **Heat absorption/light reflection**

Different colors absorb heat at different rates. Gather two objects, like rocks, shirts, pieces of paper, etc. The objects need to be as similar as possible except for their color. Leave the objects in the sun for several hours. Which object is the hottest? What can be generalized about color and heat absorption? (The lighter the color, the less heat is absorbed and more light is reflected. The darker the color, the more heat is absorbed and less light is reflected.) This is the way a barcode works – the laser is absorbed/not reflected by the black lines and reflected/not absorbed by the white spaces. That should have been discussed in the program.

### **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. The students or the teacher then try to hit a target, the ceiling, or the wall with the beam of light. The trick is that they have to reflect the light off of a mirror before hitting the target. Have them notice how the reflected light moves based on the position of the flashlight.

## Art and Music

### **CD/DVD art**

Students should have seen the reflective side of a cd or dvd and noticed the “rainbow” effect. You may want to show them again. How about making art out of it? Give each student a coffee filter. Have them cut the center out so it has a hole like a cd or dvd. If the students are too young, you may want to have the center cut out beforehand. Using various colors of markers, the students should draw lines from the center hole out to the edge. The lines can be various widths – from one pen tip width to an inch or two wide. It works best if they leave space between different colors. After they have finished with the markers, fold the filter in half, then in half again, then at least one more time so it looks like a triangle. Dip the filter quickly in water, unfold and lay flat on blank paper to dry. The colors should run together a bit. When the filters are dry, hang them from the ceiling on string or hang them in the window.

### **Art skills**

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.

## **Laser show painting**

This is a fun way to create a picture that looks like a laser show.

Materials needed:

White piece of 9"x12" construction paper

Piece of string about 24" long

Container of paint

Heavy book, dimensions of the cover larger than 6"x9"

1. Fold the paper in half so each half measures 6"x9".
2. Open the paper and lay it flat.
3. Dip the string in the paint, leaving one end dry so you can hold onto it.
4. Lay the string in a curved design without overlapping itself on one half of the paper.
5. The end of the string should hang out the bottom of the paper.
6. Refold the paper, making sure the end of the string is still hanging out of the paper.
7. Place the heavy book on the folded paper.
8. Pull on the end of the string until the entire string is out of the paper.
9. Open the paper and look at your laser show!

You should see a heavy line of paint where the string was placed which represents the laser image seen on the screen. You should also see faint smears of paint coming from the heavy line where the string was pulled out of the paper. This represents the lasers going through smoke so you can see the laser beams. You may want to try this before doing it with the students to make sure you get the proper length of string, amount of paint on the string, that the book is heavy enough, etc. The process can be repeated with a second color or even a third to make a more complex design.

## **Safety**

### **Precautions**

We take every necessary precaution to ensure safety during the show. One important thing we will go over during the show is eye safety. 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!!



TEACHER GUIDE  
GRADES 3 - 5

*SCIENCE LASER SPECTACULAR PART 2*

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## Acronyms

The word laser is an acronym. Each letter in the word stands for a large and possibly confusing word. (**L**ight **A**mplification by **S**timulated **E**mission of **R**adiation - we will tell the students what the letters stand for, but will not go into detail about what each word means.) Help the students understand what an acronym is. Technically, there is a difference between acronyms (pronounceable words created from the first letter or letters of words) and initials or abbreviations (the name of each letter is said or a word is just shortened). Make a list of common acronyms the students know. Some common acronyms are:

Scuba – **S**elf-**C**ontained **U**nderwater **B**reathing **A**pparatus, NATO – **N**orth **A**tlantic **T**reaty **O**rganization, Radar – **R**Adio **D**etection **A**nd **R**anging, Ram – **R**andom **A**ccess **M**emory, NASA – **N**ational **A**eronautics and **S**pace **A**dministration

Expand the list to include initials. Common initials include:

ASAP – **A**s **S**oon **A**s **P**ossible, ATM – **A**utomatic **T**eller **M**achine, TV – **T**ele**V**ision

The list can be expanded further to add words that are combinations of acronyms, initials, abbreviations, or are other ways of shortening words. For example:

CD-Rom – **C**ompact **D**isc - **R**ead **O**nly **M**emory, 3D – **T**hree **D**imensional, 4WD – **F**our **W**heel **D**rive, phone – tele**ph**one

An explanation and lists of acronyms and other ways of shortening words and be found at the following Web address : <http://en.wikipedia.org/wiki/Acronym>.

## 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. The worksheet included about the parts of speech may also be completed as a whole-class activity. Have a contest to see which student or group of students can come up with the most adjectives or other part of speech to describe the show.

## 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?

## Math

### **Graphing**

Many bar graphs can be constructed about the performance. Choose a few songs from the performance and graph the popularity of each one. Which part of the show was the most popular – the science demonstrations or the laser show? Graph it and find out.

### **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.

## Science

### **Heat absorption/light reflection**

Different colors absorb heat at different rates. Gather two objects, like rocks, shirts, pieces of paper, etc. The objects need to be as similar as possible except for their color. Leave the objects in the sun for several hours. Which object is the hottest? What can be generalized about color and heat absorption? (The lighter the color, the less heat is absorbed and more light is reflected. The darker the color, the more heat is absorbed and less light is reflected.) This is the way a barcode works – the laser is absorbed/not reflected by the black lines and reflected/not absorbed by the white spaces. That should have been discussed in the program.

### **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?



## Art and Music

### **CD/DVD art**

Students should have seen the reflective side of a cd or dvd and noticed the “rainbow” effect. You may want to show them again. How about making art out of it? Give each student a coffee filter. Have them cut the center out so it has a hole like a cd or dvd. Using various colors of markers, the students should draw lines from the center hole out to the edge. The lines can be various widths – from one pen tip width to an inch or two wide. It works best if they leave space between different colors. After they have finished with the markers, fold the filter in half, then in half again, then at least one more time so it looks like a triangle. Dip the filter quickly in water, unfold and lay flat on blank paper to dry. The colors should run together a bit. When the filters are dry, hang them from the ceiling on string or hang them in the window.

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### **Art skills**

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### **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.

### **Safety**

#### **Precautions**

We take every necessary precaution to ensure everyone's safety during the show. One important thing we will go over during the show is eye safety. 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**

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TEACHER GUIDE  
GRADES 6 - 8

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