

# Grade 8

## Science Focus



## Lab Workbook

### Unit 3

## Light and Optical Systems

# Inferring The Law of Reflection

Investigation 3-A  
Pages 190 - 191

**Problem:** How does light behave when it reflects off a flat surface?

**Hypothesis:** \_\_\_\_\_  
\_\_\_\_\_

**Investigative Procedure:** Follow the directions outlined on pages 190-191

**Data Collection:**

| Point          | Angle of Incidence | Angle of Reflection |
|----------------|--------------------|---------------------|
| P <sub>1</sub> |                    |                     |
| P <sub>2</sub> |                    |                     |
| O              |                    |                     |

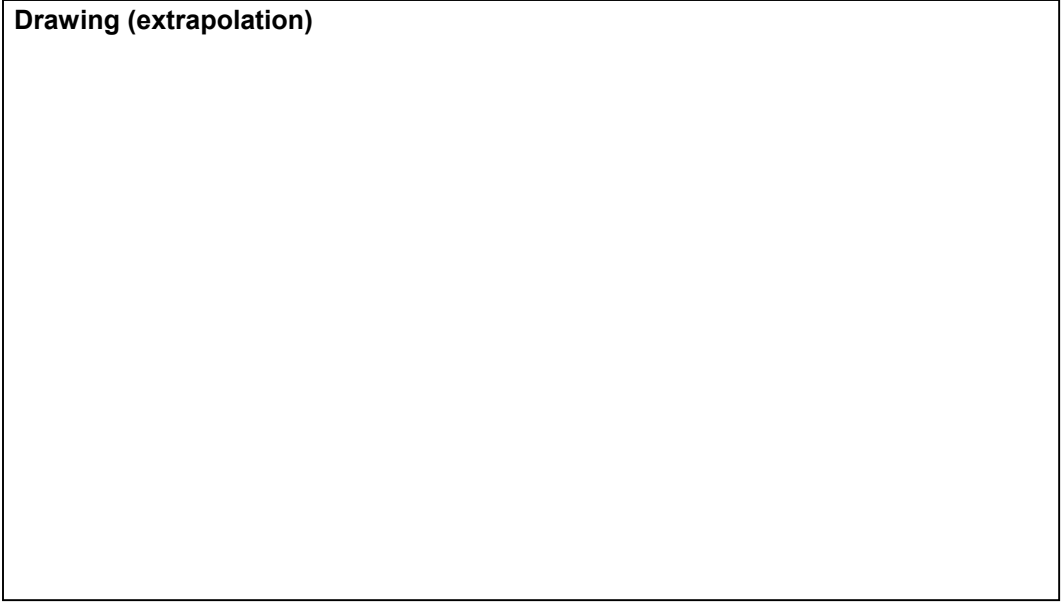
**Scientific Illustration of Procedure:**

**Analysis of Data:**

1. \_\_\_\_\_  
\_\_\_\_\_

2. \_\_\_\_\_  
\_\_\_\_\_

3. **Drawing (extrapolation)**



\_\_\_\_\_  
\_\_\_\_\_

**Conclude and Apply:**

4. \_\_\_\_\_  
\_\_\_\_\_

5. \_\_\_\_\_  
\_\_\_\_\_

6. \_\_\_\_\_  
\_\_\_\_\_

Lab Investigation 1-A submitted by \_\_\_\_\_

Date \_\_\_\_\_

# When Light Reflects

Investigation 3-B  
Pages 192 - 193

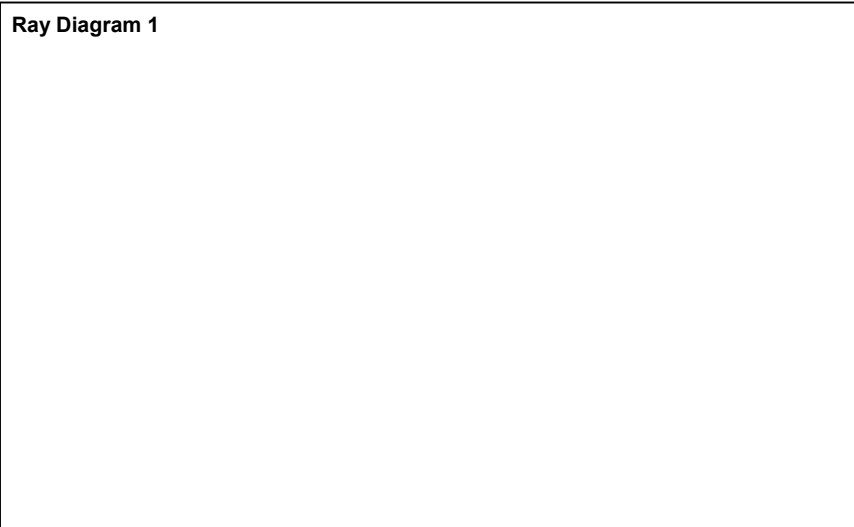
**Problem:** Does light reflect off liquid surfaces according to the same principles that it reflects off a flat, solid mirror surface?

**Hypothesis:** \_\_\_\_\_  
\_\_\_\_\_

**Investigative Procedure:** Follow the directions outlined on pages 192-193

**Data Collection:**

Ray Diagram 1



Ray Diagram 2



**Observations:**

|  |
|--|
|  |
|  |
|  |
|  |
|  |
|  |

**Analysis of Data:**

1. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Conclude and Apply:**

3. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Lab Investigation 3-B submitted by \_\_\_\_\_

Date \_\_\_\_\_

# When Light Refracts

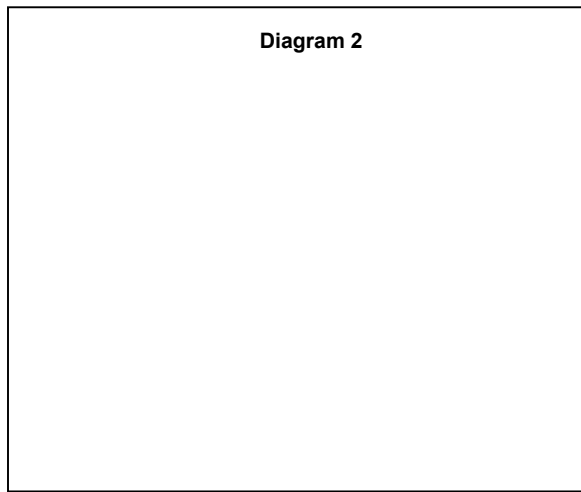
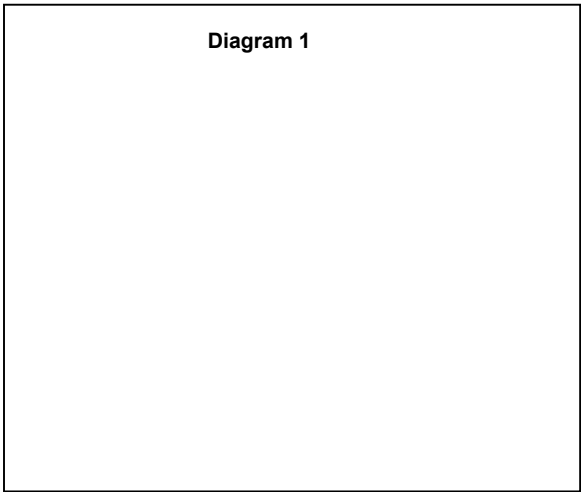
Investigation 3-C  
Pages 192 - 193

**Problem:** What happens to light when it travels from one medium to another?

**Hypothesis:** \_\_\_\_\_  
\_\_\_\_\_

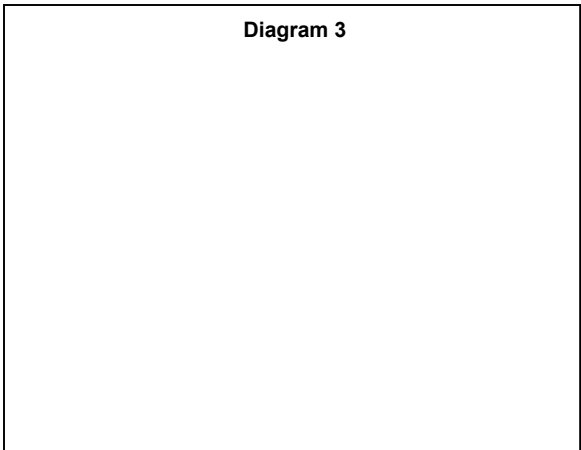
**Investigative Procedure:** Follow the directions outlined on pages 192-193

**Observations:**



\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Analysis of Data:**

1. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Conclude and Apply:**

3. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Lab Investigation 3-C submitted by \_\_\_\_\_

Date \_\_\_\_\_

# Follow That Refracted Ray

Investigation 3-D  
Pages 202 - 203

**Problem:** Is there a pattern that describes the path of light during **Refraction**?

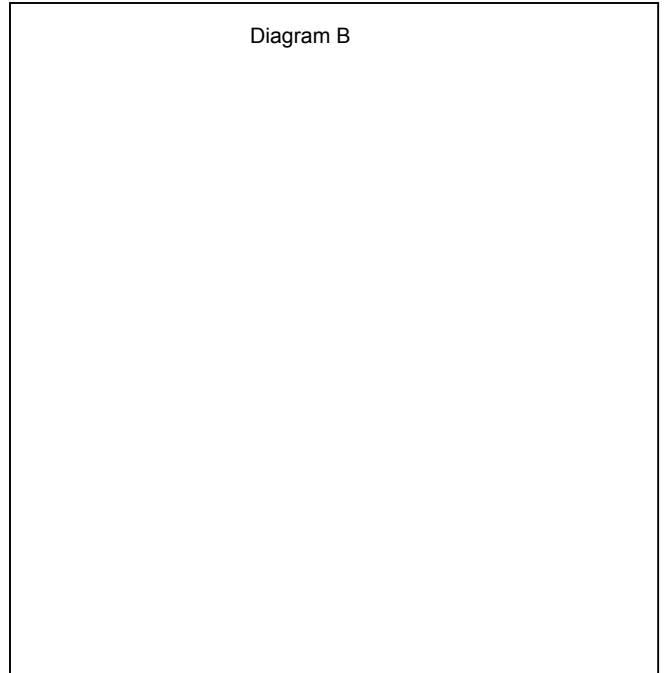
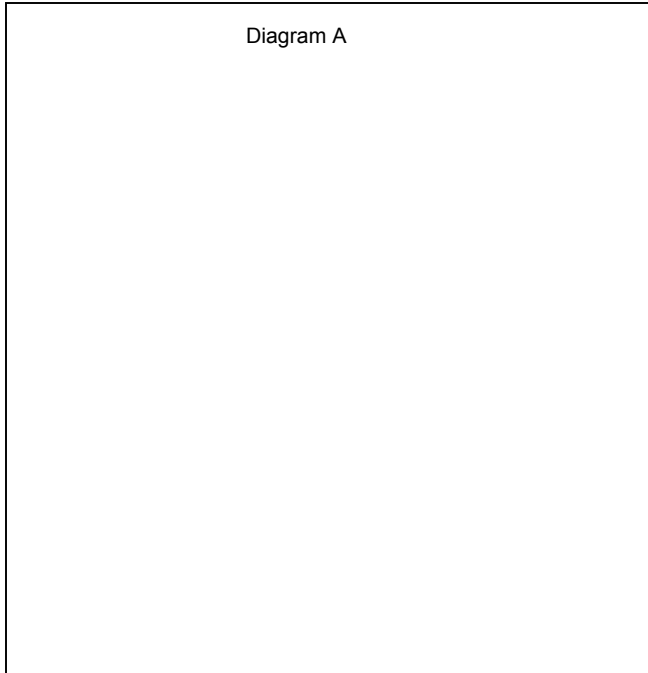
**Hypothesis:** \_\_\_\_\_  
\_\_\_\_\_

**Investigative Procedure:** Follow the directions outlined on pages 202-203

**Procedure Outline:** (Use only as many steps as you need to explain how you will investigate the question)

1. \_\_\_\_\_  
\_\_\_\_\_
2. \_\_\_\_\_  
\_\_\_\_\_
3. \_\_\_\_\_  
\_\_\_\_\_
4. \_\_\_\_\_  
\_\_\_\_\_
5. \_\_\_\_\_  
\_\_\_\_\_
6. \_\_\_\_\_  
\_\_\_\_\_
7. \_\_\_\_\_  
\_\_\_\_\_
8. \_\_\_\_\_  
\_\_\_\_\_
9. \_\_\_\_\_  
\_\_\_\_\_
10. \_\_\_\_\_  
\_\_\_\_\_

**Observations:** (Complete diagrams to record your observations)



**Analysis:**

1. \_\_\_\_\_  
\_\_\_\_\_

2. (Draw the Normal on your diagrams)

3. Diagram A ( Angle i ) \_\_\_\_\_ ( Angle r ) \_\_\_\_\_

Diagram B ( Angle i ) \_\_\_\_\_ ( Angle r ) \_\_\_\_\_

4. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

5. \_\_\_\_\_  
\_\_\_\_\_

6. \_\_\_\_\_  
\_\_\_\_\_

7. \_\_\_\_\_  
\_\_\_\_\_

8. \_\_\_\_\_



9. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Lab Investigation 3-D submitted by \_\_\_\_\_

Date \_\_\_\_\_

# The Camera

Investigation 3-E  
Pages 212 – 214

**Problem:** How are the brightness and sharpness of an image in a camera controlled?

**Hypothesis:** \_\_\_\_\_  
\_\_\_\_\_

## Part 1 – Getting Ready

**Investigative Procedure:** Follow the directions outlined on pages 212 – 213

## Part 2 – Setting Up the Camera

**Data Collection:**

| Object Distance (cm) | Image Distance (cm) | Image size |
|----------------------|---------------------|------------|
|                      |                     |            |
|                      |                     |            |
|                      |                     |            |
|                      |                     |            |
|                      |                     |            |
|                      |                     |            |
|                      |                     |            |

**Analysis:**

manipulated variable \_\_\_\_\_

responding variable \_\_\_\_\_

controlled variables were \_\_\_\_\_

1. Use Excel to graph your results and attach the graph to the next page

Horizontal Axis ( *x-axis* ) ... object distance

Vertical Axis ( *y-axis* ) ... image distance

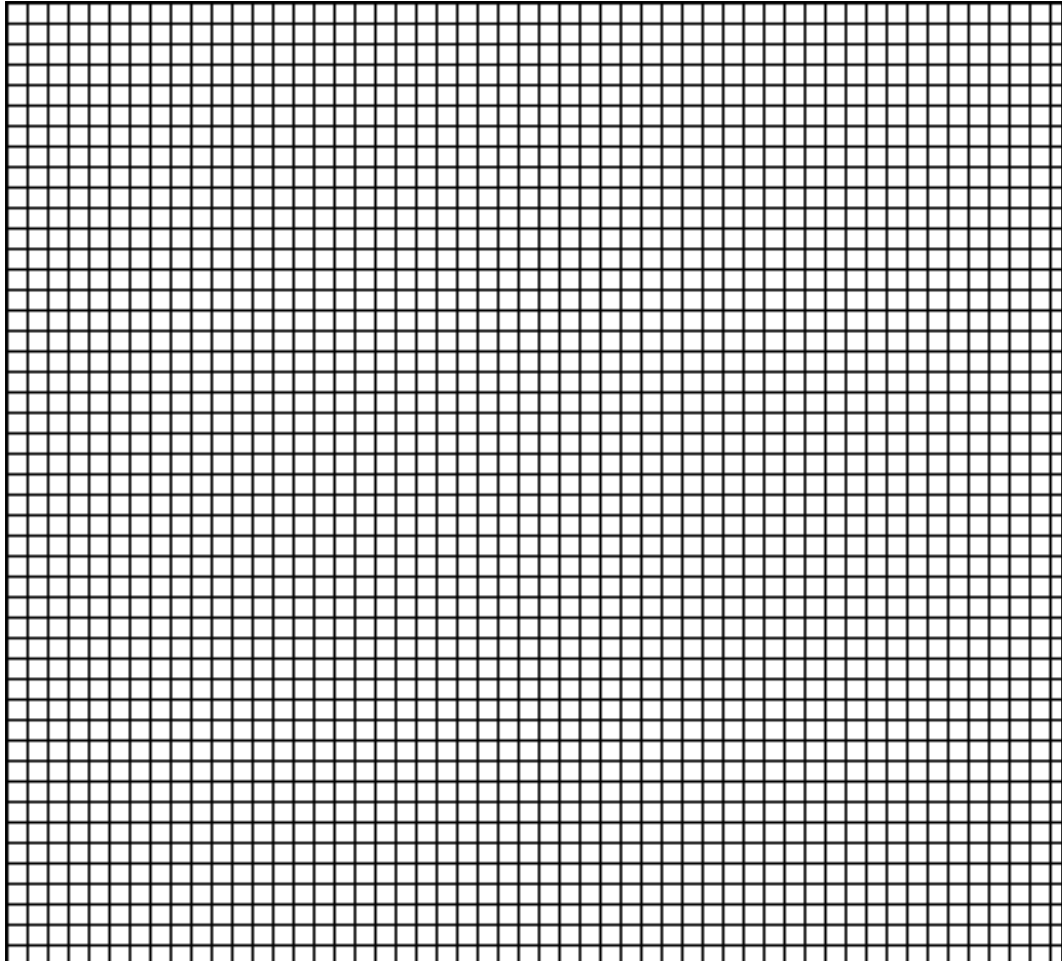
(a) identify region where image is smaller than the object

(b) identify region where image is larger than the object

(c) identify the point where the image and the object are the same size

Excel Graph

Title \_\_\_\_\_



**Conclude and Apply:**

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

Lab Investigation 3-E submitted by \_\_\_\_\_

Date \_\_\_\_\_



# Microscopes on the Job

Investigation 3-G  
Page 225

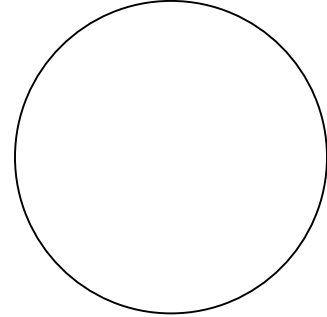
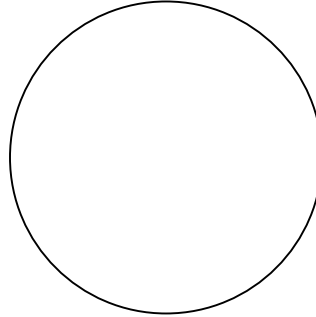
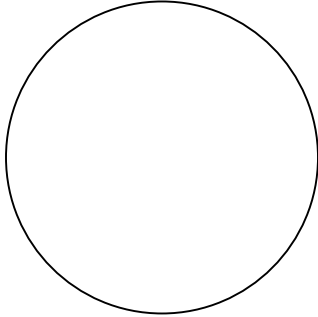
**Challenge:** Choose a specific career in which a microscope is used.

**Research:**

*Purpose* \_\_\_\_\_

*Type of microscope* \_\_\_\_\_

*Typical views*



*Follow-up with the information (How is it used?)*

\_\_\_\_\_

*Make a Pamphlet that promotes your chosen occupation*

|  |  |  |
|--|--|--|
|  |  |  |
|--|--|--|

Lab Investigation 3-G submitted by \_\_\_\_\_

Date \_\_\_\_\_

(This Investigation is no longer a part of the program)

## Spotlight on Colour

Investigation 3-H  
Page 232

**Problem:** How can you produce the effect of white light using fewer than the seven colours of the solar spectrum?

**Hypothesis:** \_\_\_\_\_  
\_\_\_\_\_

**Investigative Procedure:** Follow the directions outlined on page 232

### Analyze:

1. \_\_\_\_\_  
\_\_\_\_\_
2. (a) \_\_\_\_\_  
(b) \_\_\_\_\_  
(c) \_\_\_\_\_

### Conclude and Apply:

3. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
4. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Lab Investigation 3-H submitted by \_\_\_\_\_

Date \_\_\_\_\_

# Exploring Frequency and Wavelength

Investigation 3-I  
Pages 240 – 241

**Problem:** What is the relationship between the frequency and the wavelength of a wave?

**Hypothesis:** \_\_\_\_\_  
\_\_\_\_\_

**Investigative Procedure:** Follow the directions outlined on pages 240 - 241 **Data Collection:**

|  |
|--|
| Low Frequency Wave<br><br><br><br><br><br><br><br><br><br>Wavelength _____ |
|--|

|   |
|---|
| High Frequency Wave<br><br><br><br><br><br><br><br><br><br>Wavelength _____ |
|---|

**Analyze:**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. (a) manipulated variable \_\_\_\_\_  
(b) responding variable \_\_\_\_\_
8. (a) \_\_\_\_\_  
\_\_\_\_\_  
(b) \_\_\_\_\_

Lab Investigation 3- I submitted by \_\_\_\_\_

Date \_\_\_\_\_

# Why Are Colours Different?

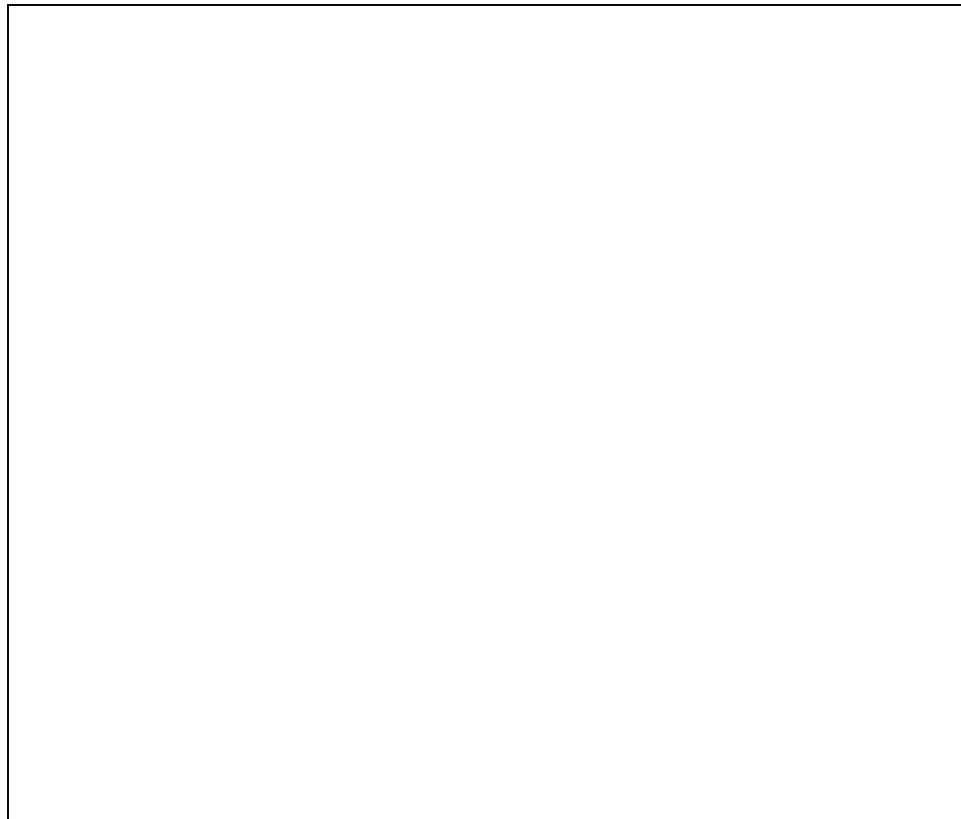
Investigation 3-J  
Pages 242 - 243

**Problem:** If a light behaves like a wave, how is the wave for one colour different from the wave for another colour?

**Hypothesis:** \_\_\_\_\_  
\_\_\_\_\_

**Investigative Procedure:** Follow the directions outlined on page 242

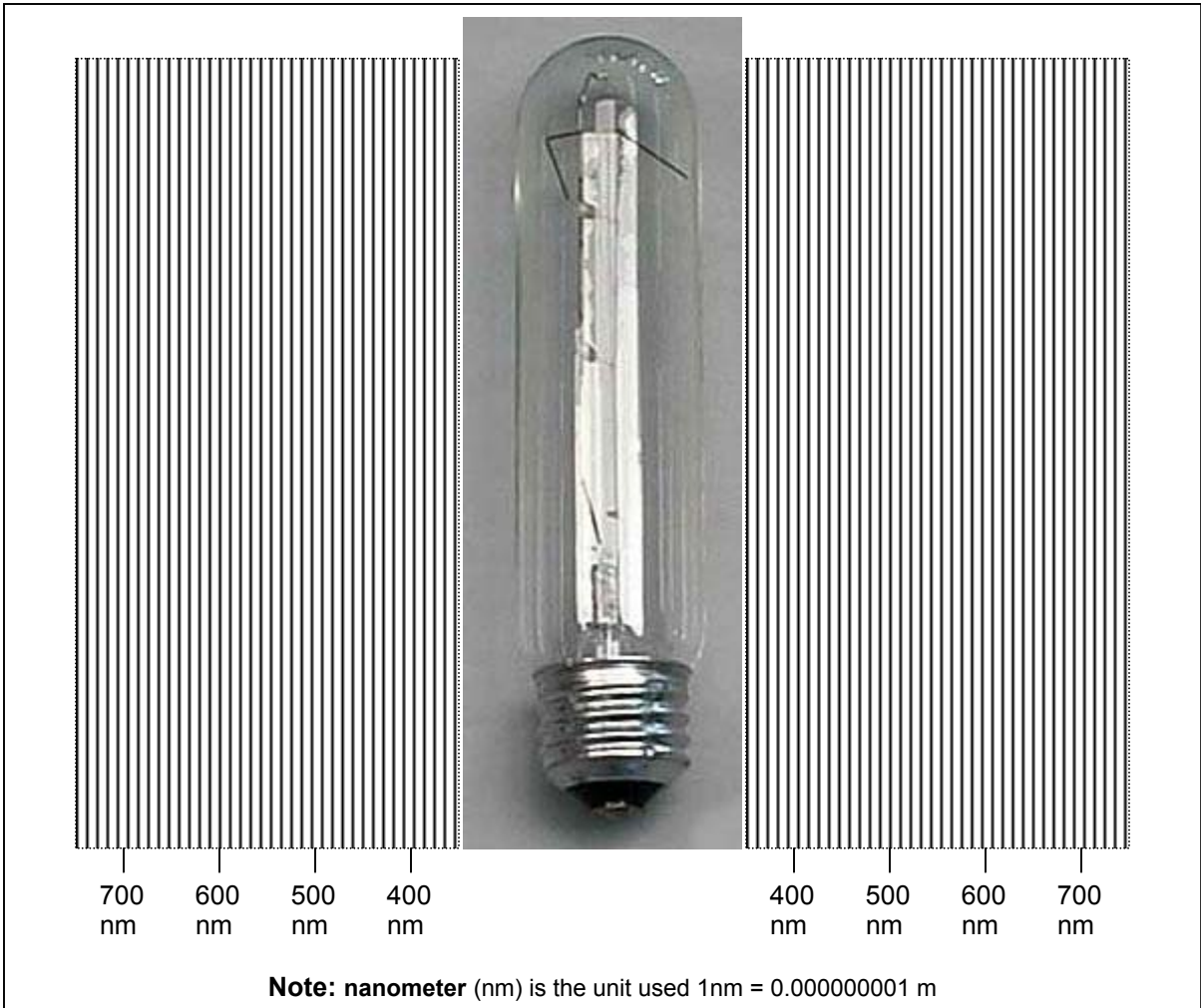
**Observations:**



**Analyze:**

1. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
2. Longest Wavelength \_\_\_\_\_ Shortest Wavelength \_\_\_\_\_

3.



4. (a) \_\_\_\_\_  
(b) \_\_\_\_\_  
(c) \_\_\_\_\_  
(d) \_\_\_\_\_  
(e) \_\_\_\_\_

**Extend your Knowledge:**

5. \_\_\_\_\_  
\_\_\_\_\_

6. (a) \_\_\_\_\_

\_\_\_\_\_

(b) \_\_\_\_\_

\_\_\_\_\_

(c) \_\_\_\_\_

\_\_\_\_\_

(d) \_\_\_\_\_

\_\_\_\_\_

(e) \_\_\_\_\_

\_\_\_\_\_

7. (a) \_\_\_\_\_

\_\_\_\_\_

(b) \_\_\_\_\_

\_\_\_\_\_

(c) \_\_\_\_\_

\_\_\_\_\_

(d) \_\_\_\_\_

\_\_\_\_\_

(e) \_\_\_\_\_

\_\_\_\_\_

Lab Investigation 3- J submitted by \_\_\_\_\_

Date \_\_\_\_\_

# Extending Night Vision

## Think About It

(Choose a Scope and Find out Specifications to present in class)

Eg. Night Scope ( latest model )



*Night Vision*

Cost \_\_\_\_\_  
[http://www.aabinoculars.com/night\\_vision.html](http://www.aabinoculars.com/night_vision.html)

Maintenance \_\_\_\_\_

**Safety Issues**  
[http://www.nightvisionoptics.bigstep.com/generic.html;\\$sessionid\\$JBB5CTYAAAEI4P5MFMKJPQR53QVSNPX0?pid=2](http://www.nightvisionoptics.bigstep.com/generic.html;$sessionid$JBB5CTYAAAEI4P5MFMKJPQR53QVSNPX0?pid=2)

Lab Investigation 3- K submitted by \_\_\_\_\_

Date \_\_\_\_\_

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## Testing SPF

A separate handout will be provided for this Activity