

Concepts of this Module

- The Electromagnetic Spectrum
- Traveling and Standing Waves
- The Introductory Optics Kit



**Course
Concepts**

Activity 1 – The Electromagnetic Spectrum

Please make a table in your notebook to order the following forms of electromagnetic radiation from shortest to longest wavelength, and, for each, list:

Column 1: name

Column 2: Typical wavelength

Column 3: Typical photon energy

Column 4: Briefly mention of one or two applications, properties or concerns.

- Gamma Rays
- Infrared Radiation
- Microwaves
- Radio Waves
- Ultraviolet
- X-rays
- Visible Light



**Course
Concepts**

Activity 2 – Travelling and Standing Waves

Go to the course web-site, click on Practicals, and click on “Waves Animation” in the first session link in the schedule. Play with wave-on-a-string.jar applet.

Try the following settings: “Oscillate”, “No End” and choosing: Amplitude = 5, Frequency = 25, Damping = 0, tension = highest.

- Use “pause/play”, “Rulers” to determine: What are A and λ for this wave?
- Change the end setting to “Fixed End”. What happens? What harmonic is this?
- If you leave it on “Fixed End” and double the frequency to 50, what happens? (You may need to click “Reset” to get another standing wave) What harmonic is this?
- Change the end setting to “Loose End”, and choose a frequency which is $(5/6)$ of 25, or about 21, what happens? (You may need to click “Reset” to get another standing wave) What harmonic is this?

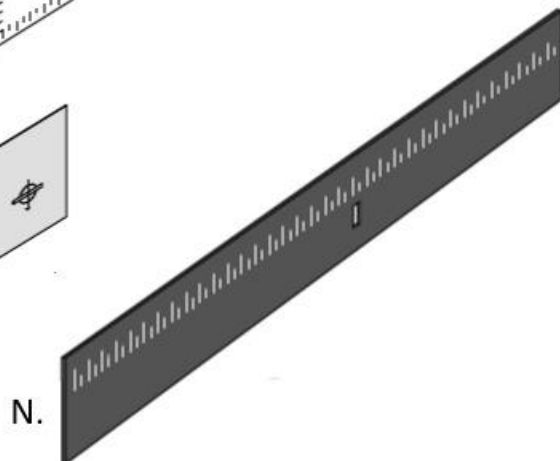
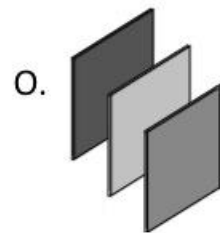
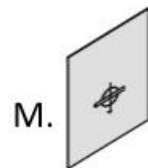
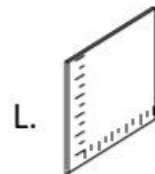
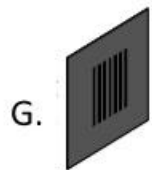
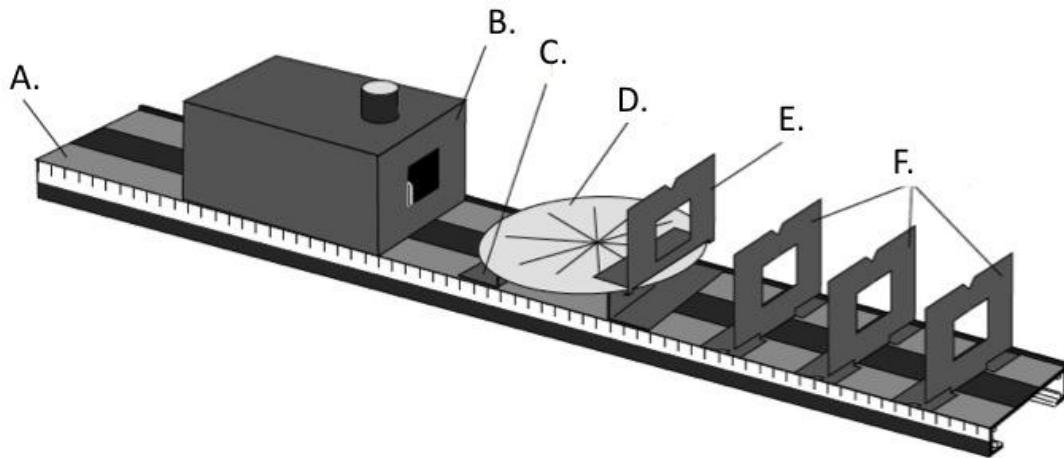


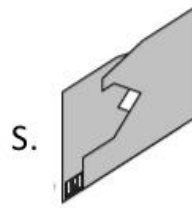
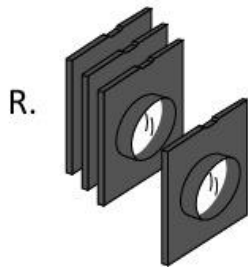
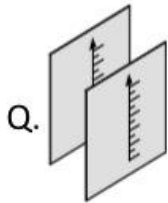
Activity 3 – Identifying Items in the Introductory Optics Kit

You have a box called an “Introductory Optics Kit” from PASCO. It has 21 kinds of items in it, which are pictured in the drawings on the next 2 pages. Each drawing has a letter.

Below is a list of 21 descriptions. In your notebook, please make a table of Column 1: number, in order, and Column 2: corresponding letter. For example, if you think the letter O is the color filters described in number 1, then the first row in your table should be: 1. O.

#	Name of component or components in drawing
1	Color Filters (×3): Red, Green and Blue/Green
2	Component Holders (×3)
3	Crossed Arrow Target
4	Cylindrical Lens
5	Diffraction Grating
6	Diffraction Plate
7	Diffraction Scale
8	Incandescent Light Source
9	Lenses (×3): 75, 150 and -150 mm focal lengths, Spherical Mirror: 50 mm focal length
10	Optics Bench
11	Parallel Ray Lens
12	Polarizers (×2)
13	Ray Optics Mirror
14	Ray Table
15	Ray Table Base
16	Ray Table Component Holder
17	Slit Mask (with one rectangular opening)
18	Slit Plate (with multiple slits)
19	Variable Aperture
20	Viewing Screen
21	Virtual Image Locators (×2)





This Student Guide was written by Jason B. Harlow, Dept. of Physics, Univ. of Toronto, in the Winter of 2012.

Last revision: October 11, 2012 by Jason Harlow.