

Optics Kit (D)

A. Experiments	Page
1. When white light passes through a prism, it turns into a beautiful rainbow	5
2. Will colored lights turn into a beautiful rainbow when they pass through a prism?	7
3. Different responses of an object to different colored lights	9
4. Are shadows always black?	11
5. Color mixing experiment of three primary colors	13
6. Why can't we have white color by mixing pigments?	15
7. Principles of imaging formation in lenses	
8. Can images be formed in a concave mirror?	
9. Principles of image formation on eyes	
10. Causes and correction of myopia	
11. Causes and correction of hyperopia	
12. Principles of camera	
13. Reflection of lights in a mirror	
14. Reflection of lights in a concave mirror and determination of its focal point	
15. Reflection of lights in a convex mirror and determination of its focal point	
16. Reflection of lights in a convex lens and determination of its focal point	
17. Refraction of lights in a concave lens and determination of its focal point	
18. How do lights refract in a right-angle prism?	
19. Do lights refract in water?	
20. Do lights refract in a thick acrylic brick?	
21.Diffraction phenomena when laser passes through a single slit.	
22.Interference phenomena when laser passes through the double slits	
23. What phenomenon would occur when laser passes through the diffraction grating sh	



B. Instruments

No.	Accessory	Qty.	No.	Accessory	Qty.
1	Aluminum track	2	2	Slide implement	5
3	LED light source (with handle)	1	4	DC power supply	1
5	Convex lens (with handle)	1	6	Concave mirror (with handle)	1
7	Concave lens (with handle)	1	8	Convex mirror (with handle)	2
9	Screen (with handle)	1	10	Penumbra screen (with handle)	1
11	Cross-shaped grating (with handle)	1	12	Parallel laser light source	1
13	Normal eye lens	1	14	Myopia lens	1
15	Hyperopia lens	1	16	Myopia correction lens	1
17	Hyperopia correction lens	1	18	Normal eye teaching board	1
19	Myopia teaching board	1	20	Hyperopia teaching board	1
21	Camera principles teaching board	1	22	Geometrical optics laser board	1
23	Mirror (cylinder)	1	24	Concave and convex mirror (cylinder)	1
25	Convex lens (cylinder)	1	26	Concave lens (cylinder)	1
27	Right-angle prism (cylinder)	1	28	Semicircular sink	1
29	Parallel prism (cylinder)	1	30	Tricolor grating (with handle)	1
31	Single grating (with handle)	1	32	Single hole (with handle)	1
33	Filters (red, green, blue and yellow)	4	34	Prism	1
35	Prism base	1	36	Track connector	2
37	Screen fixer	1	38	Storage box-geometrical optics accessory	3
39	Single double slit sheet	1	40	Diffraction grating	1
41	Laser source point (Laser source \ dimmer \ power supply 4.5 VDC)	1	42	Movable join slide	1



26	27	28	29	30
	0			
21	22	23	24	25
16	17	18	19	20
		288		
11	12	13	14	15
	Aiis Laser Ray •• @ Box			
6	7	8	9	10
	Area Tom			
1	2	3	4	5
	+++		Laser/LED 3VDC	E HE

			Atis
31	32	33	34
35	36	37	38
Aus Brann aus Starm aus Starm aus Starm aus Starm aus Starm aus Starm aus Starm aus Starm aus Starm	EDUCATIONAL DIFFRACTION GRATING	Laser/LED 3VDC	
39	40	41	42



C. Experiments

1. When white light passes through a prism, it turns into a beautiful rainbow.

White is not a color but a combination of all colored lights. Sunlight is a very good example to explain color white. A white object is white under white light because the object reflects frequencies of all visible lights and a colored object shows its color. When a white light passes through a prism and refracts several times, then white screen shows the dispersion of different frequencies of visible lights.

No.	Accessory	Qty.	No.	Accessory	Qty.
1	Aluminum track	2	2	Slide implement	4
3	LED light source (with handle)	1	4	DC power supply	1
5	Convex lens (with handle)	2	9	Screen (with handle)	1
31	Single grating (with handle)	1	34	Prism	1
35	Prism base	1	36	Track connector	2

• Spectrum of a prism



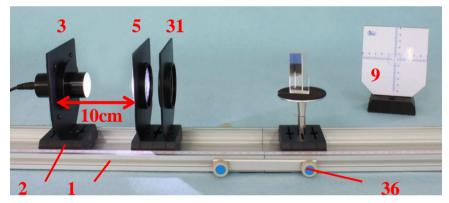


Figure 1-1

- 1. The experiment setup is displayed as **figure 1-1**. Put three slide implements from the edge of track into the track. Place accessories (with handle) on the track.
- 2. Slide implement 1: LED light source (connect to the power supply)Slide implement 2: a convex lens and a single gratingSlide implement 3: a prism and its baseSlide implement 4: a screen (do not place it into the track)
- 3. Use the focal length (f: 100 mm) of the convex lens to adjust the distance between the lens and the light source. Keep the distance at 10 cm so the light is parallel. This can enhance the outcome of the experiment and make it easier to observe.
- 4. Find the spectrum around the prism. The experiment result is displayed as figure 1-2.



• Experiment results

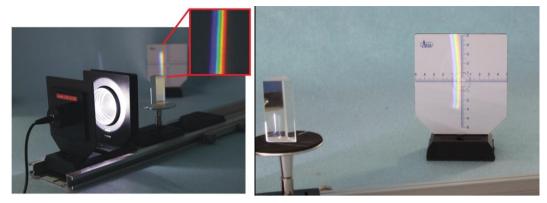


Figure 1-2 When white light passes through a prism, the light disperses and presents the spectrum.



2. Will colored lights turn into a beautiful rainbow when they pass through a

prism?

Different colored lights have different refractive indices. Hence, when lights pass through a prism, they will have different deflection angles and have the phenomenon of dispersion. Observe the dispersion results when red, green, blue and yellow colors pass through a prism.

No.	Accessory	Qty.	No.	Accessory	Qty.
1	Aluminum track	2	2	Slide implement	5
3	LED light source (with handle)	1	4	DC power supply	1
5	Convex lens (with handle)	2	9	Screen (with handle)	1
31	Single grating (with handle)	1	32	Single hole (with handle)	1
33	Filters (red, green, blue and	4	34	Prism	1
	yellow)				
35	Prism base	1	36	Track connector	2

• Dispersion of a prism

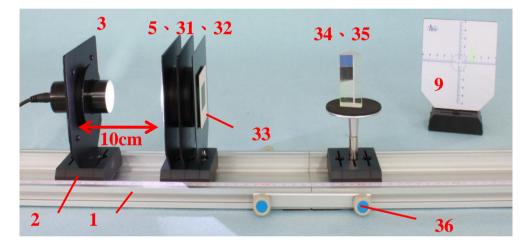


Figure 2-1

- 1. The experiment setup is displayed as **figure 2-1**. Put four slide implements from the edge of track into the track. Place accessories (with handle) on the track.
- 2. Slide implement 1: LED light source (connect to the power supply)Slide implement 2: a convex lens, single grating and a single hole (with handle) and filtersSlide implement 3: a prism and its baseSlide implement 4: a screen (do not put it into the track.)
- 3. Use the focal length (f: 100 mm) of the convex lens to adjust the distance between the lens and the light source. Keep the distance at 10 cm so the light is parallel. This can enhance the outcome of the experiment and make it easier to observe.
- 4. Replace filters and find the dispersion around the prism. Experiment results are displayed as **figure 2-2**.



• Experiment results

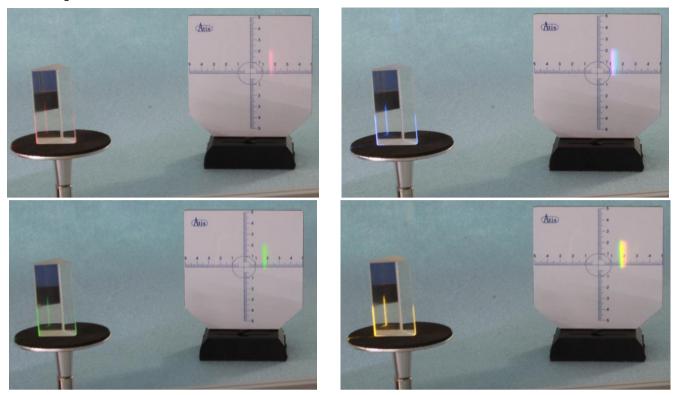


Figure 2-2 Dispersion situation of different colors Upper left – Red color / Upper right - Blue color Lower left- Green color / Lower right - Yellow color



3. Different responses of an object to different colored lights

The color of an object is determined by the way it reflects lights. Most objects absorb certain frequencies of lights and reflect other frequencies of lights. Take green leaves as an example. Under the sunlight, green color is reflected and other colors are absorbed by cells of leaves so the color of leaves is green.

No.	Accessory	Qty.	No.	Accessory	Qty.
1	Aluminum track	2	2	Slide implement	5
3	LED light source (with handle)	1	4	DC power supply	1
5	Convex lens (with handle)	2	9	Screen (with handle)	1
32	Single hole (with handle)	1	33	Filters (red, green, blue and	4
				yellow)	
36	Track connector	2			

• Reflection of colors

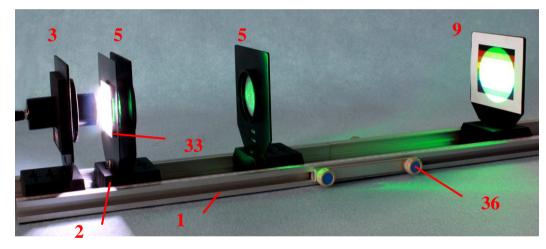


Figure 3-1

- 1. The experiment setup is displayed as **figure 3-1**. Put four slide implements from the edge of the track into the track. Place accessories (with handle) on the track.
- 2. Slide implement 1: LED light source (connect to the power supply)

Slide implement 2: a convex lens (f: 75 mm) and a single hole (with handle) and filters

Slide implement 3: a convex lens (f: 100 mm)

Slide implement 4: Color screen

- 3. Use the focal length (f: 75 mm) of the convex lens to adjust the distance between the lens and the light source. Keep the distance at 7.5 cm so the light is parallel. This can enhance the outcome of the experiment and make it easier to observe.
- 4. Replace color filters and observe results on the screen. Experiment results are displayed as **figure 3-2**.