A04-300S-Y13

# Optics Kit (D)

## 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 |

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| **1** | **2** | **3** | **4** | **5** |
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| **6** | **7** | **8** | **9** | **10** |
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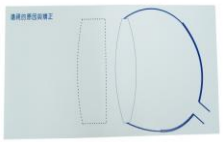
| **11** | **12** | **13** | **14** | **15** |
|  |  |  |  |  |
| **16** | **17** | **18** | **19** | **20** |
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| **21** | **22** | **23** | **24** | **25** |
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| **31** | **32** | **33** | **34** |
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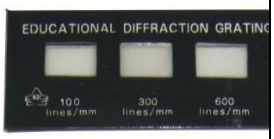
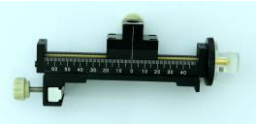
| **35** | **36** | **37** | **38** |
|  |  |  |  |
| **39** | **40** | **41** | **42** |

## 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**

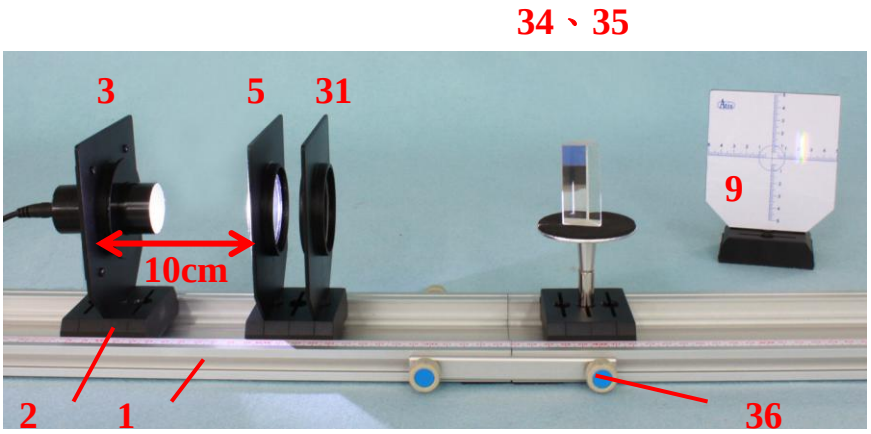



**Figure 1-1**

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 grating
   Slide implement 3: a prism and its base
   Slide 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**

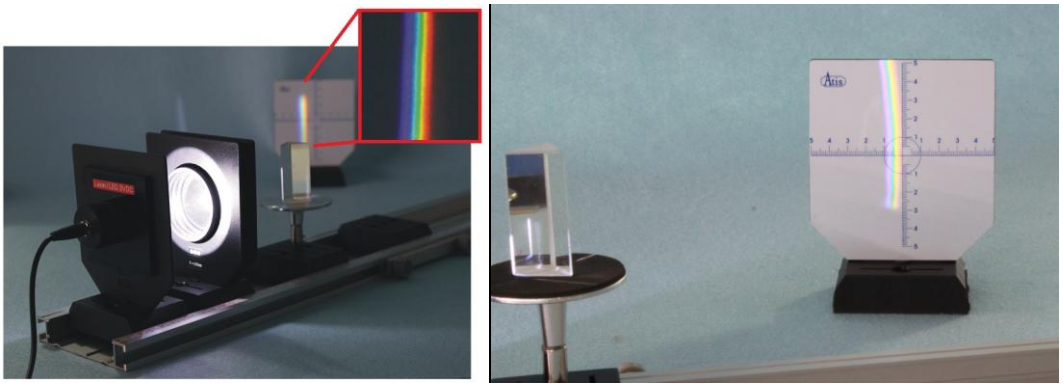


**Figure 1-2** When white light passes through a prism, the light disperses and presents the spectrum.

## 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 yellow) | 4 | 34 | Prism | 1 |
| 35 | Prism base | 1 | 36 | Track connector | 2 |

- **Dispersion of a prism**

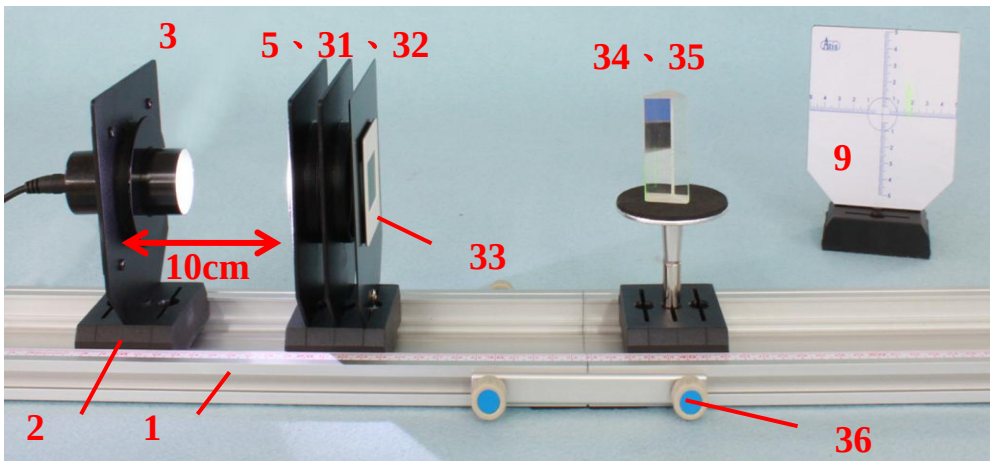



**Figure 2-1**

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 filters
   Slide implement 3: a prism and its base
   Slide 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**

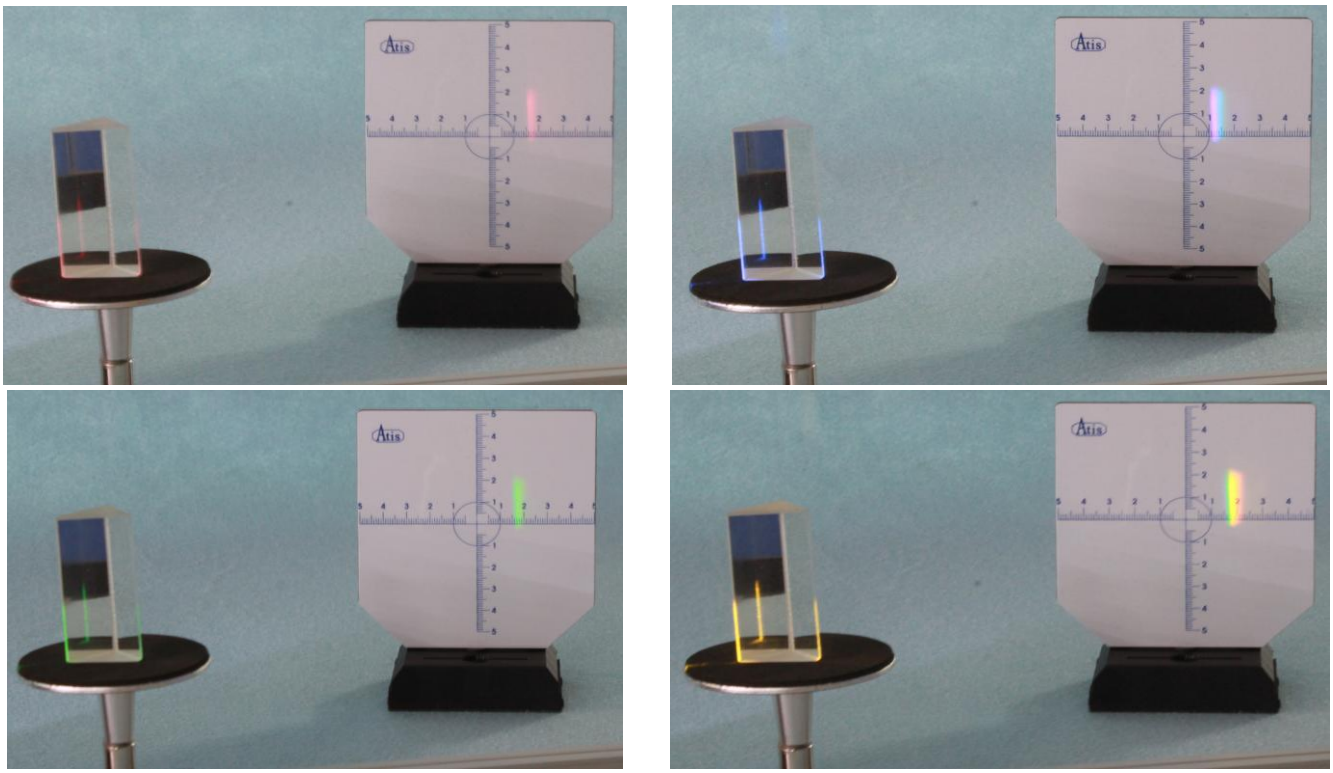


**Figure 2-2** Dispersion situation of different colors

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 yellow) | 4 |
| 36 | Track connector | 2 | | | |

- **Reflection of colors**

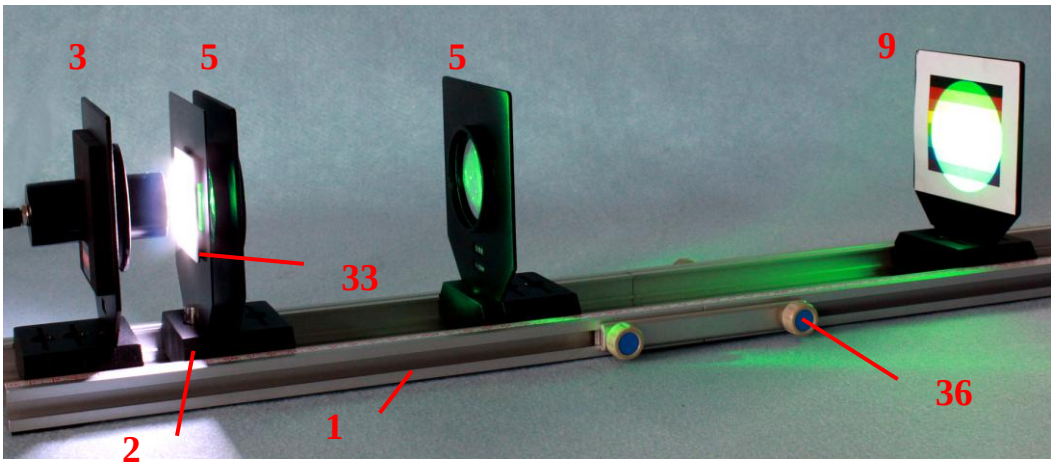



**Figure 3-1**

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**.