

# Optics Kit

A04-300S-Y03(C) junior high  
 A04-300S-Y13(D) senior high



## Purpose

1. RGB light mixing experiment
2. Effects of different colored lights on objects.
3. Is shadow always black?
4. Why do colors become darker after color mixing?
5. When white light passes through a prism, will it form a rainbow?
6. Does a colored light form a rainbow when it passes through a prism?
7. Lens imaging principle
8. Do concave mirrors form an image?
9. Eye imaging principle
10. Causes and correction of myopia
11. Causes and correction of hyperopia
12. How does a camera work?
13. Reflection of lights in a plane mirror
14. Reflection and focus determination of a concave mirror
15. Reflection and focus determination of a convex mirror
16. Refraction and focus determination of a convex lens
17. Refraction and focus determination of a concave lens
18. Refraction through a prism
19. Does a ray of light refract in water?
20. Does a ray of light refract through thick acrylic tiles?

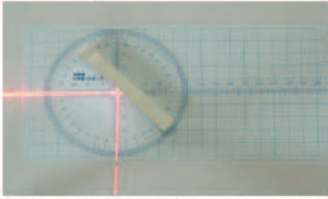


Including an aluminum case with a manual and a set of accessories.

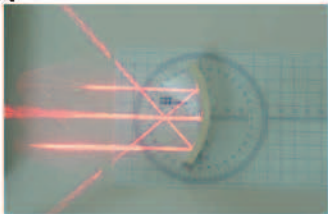




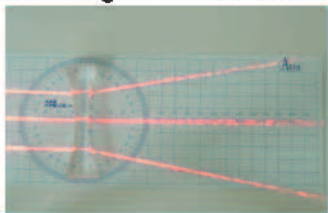
## • Laser geometrical optics experiment



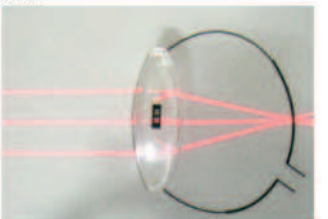
**(Plane mirror reflection)**  
Verify the law of reflection: the angle of incidence equals the angle of reflection. Verify the principle of optical lever: when the plane rotates  $\theta$  degree, the rotation of the reflected light is  $2\theta$ .



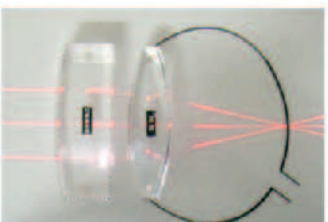
**(Reflection of concave mirror)**  
When the parallel light passes through a concave mirror, the reflected light intersects the focus.



**(Determination of a convex lens focus)**  
When the parallel light passes through a convex lens, the refracted light intersects the focus.



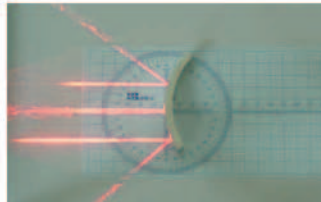
**(Human eye imaging theory)**  
Light is focused on the retina



**(Hyperopia correction)**  
Use convex lenses to gather light source on the retina.



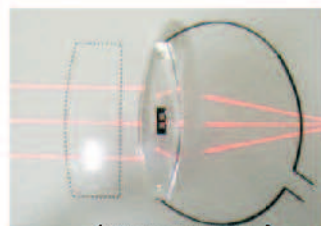
**(Total reflection of prism)**  
When the light passes through the right-angle prism, the reflected light is parallel to the incident light.



**(Reflection of concave mirror)**  
When the parallel light passes through a concave mirror, the reflected light intersects the focus.



**(Refraction of light in a plane parallel plate)**  
Light changes speed when it moves from one medium to another.  $n = \frac{\sin i}{\sin r}$   
•  $i$ :  $\lambda$  angle •  $r$ : refraction angle



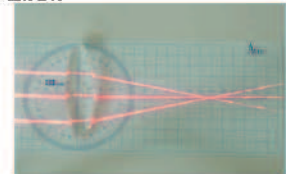
**(Hyperopia)**  
Hyperopia occurs when light rays focus behind the retina because the eye is too short.



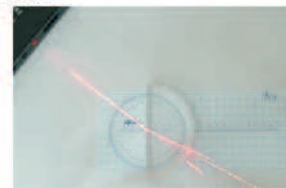
**(Myopia: Cause and correction)**  
Use concave lenses to focus light source on the retina.



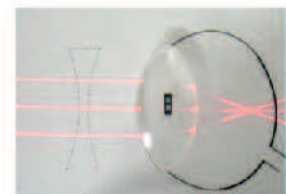
**(Refraction of prism)**  
After the parallel light passes through a prism, the light is still parallel.



**(Determination of a convex lens focus)**  
When the parallel light passes through a convex lens, the refracted light intersects the focus.



**(Light refraction in a sink)**  
When light passes from air to water (from a less dense to a more dense substance), the light is refracted (or bent) towards the normal.

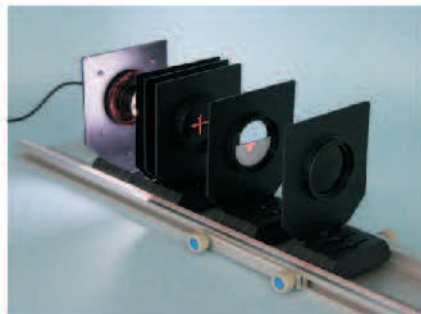


**(Myopia)**  
Myopia occurs when light rays focus in front of the retina because the eye is too long.



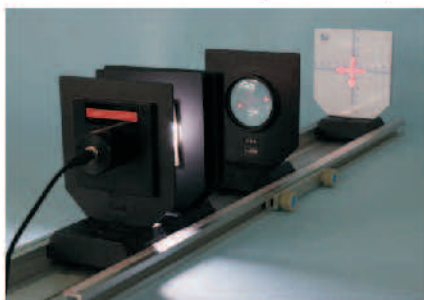
**(Camera theory)**  
The light from the subject is refracted by the convex lens and focuses on the film or digital receptor inside the camera.





(Concave mirror imaging experiment)

A real image is formed when the actual light rays reflect off the surface and converge to one point.



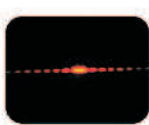
(Convex imaging)

Move the convex lens and the screen in the groove rails until the image is clear. Find the object's distance and the image's distance.

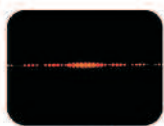
Single-slit diffraction (0.05mm)



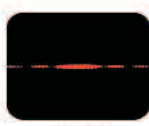
Single-slit diffraction (0.1mm)



Double-slit interference (0.05mm)



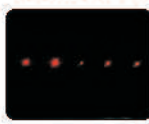
Double-slit interference (0.1mm)



100 lines/mm



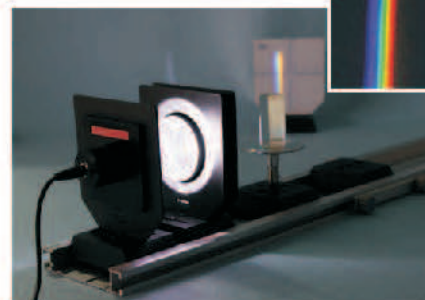
300 lines/mm



600 lines/mm



White light can be formed by mixing RGB lights



When white light passes through a prism, the band of colors will form a rainbow.

Instrument features



Interference and diffraction grating film can be sucked on the grating holder.

## Specification

Accessory	A04-300S-Y03	A04-300S-Y13	Accessory	A04-300S-Y03	A04-300S-Y13
1 Aluminum Track	2	2	22 Columnar Convex Mirror	1	1
2 Slide Implement	5	5	23 Cylindrical Plane Mirror	1	1
3 LED Lamp with Handle	1	1	24 Cylindrical Lens	1	1
4 Concave Mirror with Handle	1	1	25 Cylindrical Concave Lens	1	1
5 Convex Mirror with Handle	1	1	26 Prism	1	1
6 Concave Lens with Handle	2	2	27 Geometrical Optics Laser Board	1	1
7 Convex Lens with Handle	1	1	28 Geometrical Optics Accessories Box	3	3
8 Screen with Handle	1	1	29 Prism Seat	1	1
9 Penumbra Screen with Handle	1	1	30 Tricolor Grating with Handle	1	1
10 Normal Eyesight Lens	1	1	31 Laser	1	1
11 Myopia Lens	1	1	32 DC Power Supply (DC 3V)	1	1
12 Hyperopia Lens	1	1	33 Track Connector	2	2
13 Myopia Correction Lens	1	1	34 Cross Grating with Handle	1	1
14 Hyperopia Correction Lens	1	1	35 Single Hole with Handle	1	1
15 Normal Eyesight Teaching Board	1	1	36 Single Grating with Handle	1	1
16 Myopia Teaching Board	1	1	37 Screen Seat	1	1
17 Hyperemia Teaching Board	1	1	38 Filter (Red、Blue Green、Yellow)	4	4
18 Camera Teaching Board	1	1	39 Single-slit, Double-slit		1
19 Semi-circular Tank	1	1	40 Diffraction Grating		1
20 Parallel Cylindrical Prism	1	1	41 Laser Light Source		1