



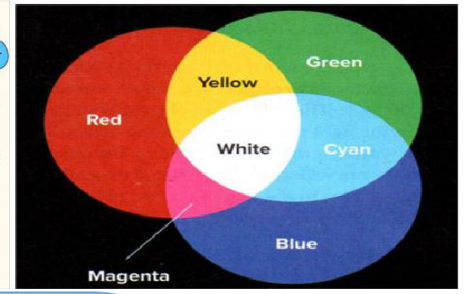
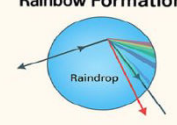
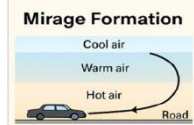
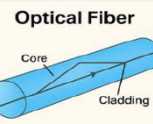
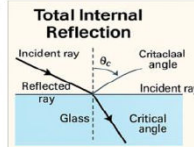
physics

FINAL EXAM EoT1

2025-2026

12 AD

FAHED KAMAL ALSAGHBEENI



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PHYSICS

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يمكنكم الإنضمام لقناتنا الجديدة على Telegram بمسح الباركود :

او الضغط على الرابط: <https://t.me/FahedKamal>

Quantities of Light

1. What is luminous flux?

- A. The amount of light falling on a surface
- B. The electrical energy used to power a lamp
- C. The total amount of light emitted by a source in all directions
- D. The number of photons passing per second

2. What is the SI unit of luminous flux?

- A. Candela (cd)
- B. Lux (lx)
- C. Watt (W)
- D. Lumen (lm)

3. What is illuminance?

- A. The amount of light reflected by a surface
- B. The total light emitted by a source
- C. The amount of light reaching a unit area of surface
- D. The heat energy produced by the lamp

4. What is the SI unit of illuminance?

- A. Watt per square meter (W/m^2)
- B. Lumen per square meter (lm/m^2), called Lux (lx)
- C. Candela per square meter (cd/m^2)
- D. Joule per second (J/s)

4. What is the relationship between luminous flux and illuminance?

- A. Illuminance increases as surface area increases
- B. Illuminance is directly proportional to luminous flux
- C. Illuminance does not depend on luminous flux
- D. Luminous flux decreases as illuminance increases

5. What happens to illuminance when the distance from the light source doubles?

- A. It increases four times
- B. It remains constant
- C. It decreases to half
- D. It decreases to one-fourth

6. Which statement represents the inverse -square law? (Inverse-Square Law)?

- A. Illuminance is directly proportional to the square of the distance
- B. Illuminance is inversely proportional to the square of the distance
- C. Luminous flux is proportional to current squared
- D. There is no relation between illuminance and distance

Diffraction and the Wave Model

7. What is diffraction?

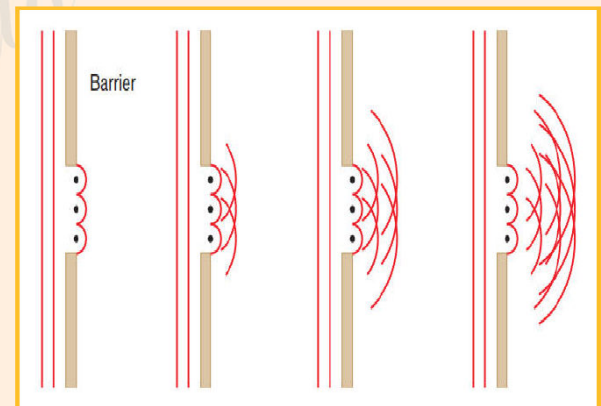
- A. The bending of light as it passes the edge of a barrier
- B. The reflection of light from a mirror
- C. The spreading of particles in all directions
- D. The absorption of light by a surface

8. Who first observed diffraction of light?

- A. Christiaan Huygens
- B. Isaac Newton
- C. Francesco Maria Grimaldi
- D. Albert Einstein

9. According to Huygens' principle, how can each point on a wavefront be described?

- A. As a single beam of light
- B. As a point of reflection
- C. As a new source of smaller wavelets
- D. As a fixed point with no motion



10. What happens to light waves when they pass through a narrow opening?

- A. They stop completely
- B. They become stronger
- C. They bend and spread out
- D. They travel in straight lines only

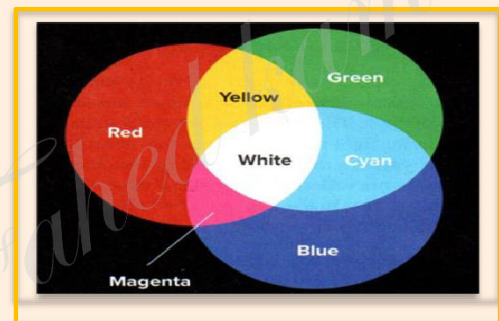
Color and Pigments

11. What determines the color of light?

- A. Its speed only
- B. The brightness of the source
- C. Its wavelength and frequency
- D. The size of the source

12. Which color of visible light has the shortest wavelength?

- A. Red
- B. Blue
- C. Green
- D. Yellow



13. Which color of visible light has the longest wavelength? |

- A. Blue
- B. Violet
- C. Red
- D. Green

14. What are the three primary colors of light?

- A. Cyan, Magenta, and Yellow
- B. Red, Green, and Blue
- C. Red, Yellow, and Blue
- D. Green, Orange, and Violet

Complementary color :.....

Conclusion: The color we see depends on the type of light falling on the object and the absorption/reflection properties of the object.

15. What are the secondary colors of light formed by mixing two primary colors?

- A. Cyan, Magenta, and Yellow
- B. Orange, Green, and Purple
- C. White, Black, and Gray
- D. Red, Blue, and Green

16. What are the primary pigments?

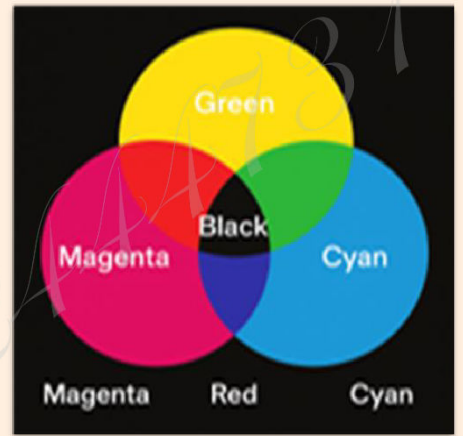
- A. Red, Green, and Blue
- B. Red, Yellow, and Blue
- C. Cyan, Magenta, and Yellow
- D. Green, Orange, and Violet

17. When pigments are mixed, what happens to the light?

- A. More light is reflected
- B. The wavelength increases
- C. The light becomes white
- D. Less light is reflected (more absorbed)

18. What gives green leaves their color?

- A. The absorption of green light
- B. The reflection of red and blue light
- C. The reflection of green light by chlorophyll
- D. The emission of yellow light



Polarization and Malus's Law

Malus's Law: $I = I_0 \cos^2 \theta$ | : $I = I_0 \cos^2 \theta$

19. What is polarization of light?

- A. The reflection of light from a mirror
- B. The bending of light as it passes an edge
- C. The restriction of light vibrations to one direction
- D. The spreading of light waves after diffraction

20. Which type of light vibrates in all directions perpendicular to its motion?

- A. Polarized light
- B. Unpolarized light
- C. Reflected light
- D. Refracted light

21. What device is used to produce polarized light?

- A. Mirror
- B. Lens
- C. Polarizing filter
- D. Prism

Notes:

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22. What does Malus's law describe?

- A. Relation between color and wavelength
- B. Reflection of polarized light
- C. Refraction of light in glass
- D. Change in intensity of polarized light passing through an analyzer

23. According to Malus's law, the intensity of transmitted light (I) is given by:

- A. $I = I_0 \sin^2 \theta$
- B. $I = I_0 \tan^2 \theta$
- C. $I = I_0 \cos^2 \theta$
- D. $I = I_0 \theta^2$

24. If the analyzer is aligned at 0° with the polarizer, what fraction of light intensity passes through?

- A. 0%
- B. 25%
- C. 50%
- D. 100%

25. If the analyzer is at 90° with respect to the polarizer, what happens to the transmitted light?

- A. Maximum light passes
- B. Half of the light passes
- C. No light passes
- D. Quarter of light passes

26. The angle between a polarizer and analyzer is 60° . If the incident light is already polarized, what fraction of intensity passes through?

- A. 25%
- B. 50%
- C. 75%
- D. 100%

27. Unpolarized light passes through a single polarizing filter. What fraction of the initial intensity is transmitted?

- A. 25%
- B. 50%
- C. 75%
- D. 100%

28. Unpolarized light passes through two polarizers that make a 45° angle. What is the transmitted intensity relative to the initial intensity?

- A. 25% of I_0
- B. 35% of I_0
- C. 50% of I_0
- D. 100% of I_0

Notes:.....
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Doppler Effect for Light

Doppler shift formula: $\Delta\lambda / \lambda = v / c$

29. What is the Doppler effect for light?

- A. The bending of light through a prism
- B. The change in frequency or wavelength due to motion of source or observer
- C. The scattering of light in all directions
- D. The reflection of light from a surface

30. When a light source moves toward the observer, the wavelength becomes shorter.

- A. True
- B. False

31. When a light source moves away from the observer, the light is red-shifted.

- A. True
- B. False

32. What happens to the observed frequency when a galaxy is red - shifted?

- A. Frequency increases
- B. Frequency decreases
- C. Frequency remains constant
- D. Frequency becomes zero

33. If the speed of light is 3.0×10^8 m/s and the observed wavelength of light from a moving source is 520 nm while the emitted wavelength is 500 nm, what is the approximate relative speed of the source?

- A. 1.2×10^7 m/s (toward)
- B. 1.2×10^7 m/s (away)
- C. 5.0×10^6 m/s (toward)
- D. 1.0×10^7 m/s (toward)

34. If light of wavelength 486 nm is emitted from a galaxy moving toward Earth at 1.0×10^7 m/s, what wavelength would be observed?

- A. 484 nm
- B. 470 nm
- C. 500 nm
- D. 488 nm

35. A star emits yellow light of wavelength 580 nm, but it appears as 600 nm to an observer. What can be concluded?

- A. The star is moving toward Earth
- B. The star is stationary
- C. The star is moving away from Earth
- D. The light is polarized

36. The equation for the Doppler shift for light (for small speeds) is:

- A. $\Delta\lambda / \lambda = v / c$
- B. $f = v / \lambda$
- C. $\lambda = v \times c$
- D. $\Delta f / f = c / v$

37. A galaxy emits light at 400 nm, and we observe it at 440 nm. What is the galaxy's speed relative to Earth?

- A. 1.5×10^7 m/s
- B. 3.0×10^7 m/s
- C. 3.0×10^7 m/s (away)
- D. 2.0×10^8 m/s (toward)

38. Which of the following observations supports the idea that the universe is expanding?

- A. Blue-shift of galaxies
- B. Red-shift of galaxies
- C. No shift in starlight
- D. Periodic variation in color

39. What does the law of reflection state?

- A. The angle of incidence equals the angle of reflection
- B. The angle of incidence is greater than the angle of reflection
- C. The angle of incidence is less than the angle of reflection
- D. The reflected ray is always perpendicular to the incident ray

40. What is the normal line in reflection

- A. A line parallel to the surface
- B. A line showing the reflected ray
- C. A line drawn along the mirror's edge
- D. A line perpendicular to the surface at the point of incidence

41. Which type of reflection occurs on a smooth surface like a mirror?

- A. Diffuse reflection
- B. Polarized reflection
- C. Scattered reflection
- D. Specular reflection

42. What type of reflection occurs on a rough surface?

- A. Specular reflection
- C. Total reflection
- B. Diffuse reflection
- D. Partial reflection

43. In the law of reflection, the incident ray, the reflected ray, and the normal all lie in the same _____.

- A. direction
- B. angle
- C. plane
- D. medium

44. A light ray strikes a plane mirror at an angle of incidence of 35° . What is the angle of reflection?

- A. 25°
- B. 55°
- C. 45°
- D. 35°

45. A light ray strikes a mirror with an incident angle of 52° . The mirror is then rotated by 5° toward the ray. What is the new angle between the incident and reflected rays?

- A. 104°
- B. 107°
- C. 110°
- D. 100°

46. A light ray hits a mirror at an angle of incidence of 40° . If the mirror is rotated by 10° , how much does the reflected ray rotate?

- A. 5°
- B. 10°
- C. 20°
- D. 40°

47. A beam of light hits a rough surface. Which of the following statements is correct?

- A. No reflection occurs
- B. The reflected rays are parallel to each other
- C. The surface causes regular reflection
- D. The angle of incidence equals the angle of reflection for each ray

48. In a ray diagram, if the incident ray makes an angle of 45° with the mirror surface, what is the angle of incidence with the normal?

- A. 45° with surface means 45° from normal = 45°
- B. 90°
- C. 55°
- D. 45°

Plane Mirror Images

Relations for plane mirrors: $x_i = -x_o$, $h_i = h_o$

49. What is the image position in a plane mirror?

- A. Behind the mirror at the same distance as the object in front
- B. In front of the mirror at double the distance
- C. Behind the mirror but farther than the object
- D. On the mirror surface

50. Which of the following equations represents the image position in a plane mirror?

- A. $x_i = 0$
- B. $x_i = x_o$
- C. $x_i = 2x_o$
- A. $x_i = -x_o$

51. How does the height of the image compare to the height of the object in a plane mirror?

- A. $h_i < h_o$
- B. $h_i > h_o$
- C. $h_i = h_o$
- D. $h_i = 0$

52. What is the orientation of the image formed by a plane mirror?

- A. Inverted
- B. Upright
- C. Reversed vertically
- D. Enlarged

53. The image formed by a plane mirror is:

- A. Virtual and upright
- B. Real and inverted
- C. Virtual and enlarged
- D. Real and reduced

54. Which statement about lateral inversion is correct?

(lateral inversion)?

- A. Both sides and top are reversed
- B. Top and bottom are reversed
- C. Left and right sides are reversed
- D. No reversal occurs

55. If a man stands 2 m in front of a plane mirror, how far is his image from him?

- A. 1 m
- B. 3 m
- C. 4 m
- D. 2 m

56. If the object distance from the mirror is $x_o = 1.5$ m, what is the image distance x_i ?

- A. $x_i = -1.5$ m
- B. $x_i = 1.5$ m
- C. $x_i = 3.0$ m
- D. $x_i = 0.75$ m

57. A candle is placed 30 cm in front of a plane mirror. Where will the image appear to be?

- A. 15 cm behind the mirror
- B. 30 cm behind the mirror
- C. 60 cm behind the mirror
- D. On the mirror surface

58. Which of the following best describes the image properties of a plane mirror?

- A. Virtual, same size, upright, laterally inverted
- B. Virtual, smaller, inverted
- C. Real, enlarged, upright
- D. Real, reduced, upright

Concave mirrors and defects

59. Describe defects in concave mirrors, such as curved aberration, and how they can be corrected.

- A. Curved aberration occurs when all parallel rays reflect at the same point.
- B. Rays are not reflected at all.
- C. Rays far from the center do not meet at the same focus.
- D. Reflected rays are parallel to the principal axis.

60. One method to correct spherical aberration in concave mirrors is:

- A. Use a flat mirror.
- B. Place a concave lens in front of the mirror.
- C. Reduce the mirror's diameter or use rays near the principal axis.
- D. Increase the curvature of the mirror.

61. Concave mirrors are commonly used in:

- A. Car headlights and shaving mirrors.
- B. Small magnifying lenses.
- C. Side mirrors of cars only.
- D. Window glass and elevators.

62. The main reason dentists use concave mirrors is:

- A. To magnify the image for clarity.
- B. To reduce light reflection.
- C. To invert the image upside down.
- D. To produce a small virtual image. | .

63. Why does no image form when an object is placed at the focal point of a concave mirror?

- A. Because reflected rays meet at the focal point.
- B. Because reflected rays are parallel and never meet.
- C. Because the focal point is behind the mirror.
- D. Because the object blocks all reflected rays.

64. For an object placed beyond C ($2f$) in a concave mirror, the image is...

- A. real, inverted, and reduced between F and C.
- B. real, upright, and enlarged beyond C.
- C. virtual, upright, and enlarged.
- D. virtual, inverted, and reduced.

65. For an object placed at C ($2f$) in a concave mirror, the image appears...

- A. beyond C, virtual, enlarged.
- B. at F, real, reduced.
- C. at C, real, inverted, same size.
- D. at the mirror surface, upright.

66. For an object placed between F and the mirror (concave), the image is...

- A. virtual, inverted, reduced.
- B. real, inverted, enlarged beyond C.
- C. real, inverted, reduced between F and C.
- D. virtual, upright, enlarged behind the mirror..

67. A convex mirror always forms an image that is...

- A. real, inverted, and enlarged in front of the mirror
- B. virtual, upright, and reduced behind the mirror.
- C. real and same size at C.
- D. virtual and enlarged at F.

68. An object is placed 20 cm in front of a concave mirror that has a focal length of 10 cm. What is the image distance?

- A. 5 cm
- B. 10 cm
- C. 15 cm
- D. 20 cm

69. An object is placed 30 cm in front of a concave mirror with a focal length of 15 cm. What is the image distance?

- A. 10 cm
- B. 15 cm
- C. 30 cm
- D. 45 cm

70. The magnification (m) of a mirror is given by:

- A. $m = h_i/h_o = -d_i/d_o$
- B. $m = h_o/h_i = d_i/d_o$
- C. $m = d_i/h_o$
- D. $m = f/d_o$

$m = -1$

$|m| > 1$

$|m| < 1$

71. If the magnification (m) is positive, the image is:

- A. Real and inverted
- B. Virtual and upright
- C. Real and upright
- D. Virtual and inverted

72. For a plane mirror, the focal length (f) is considered:

- A. Negative
- B. Zero
- C. Infinite
- D. Positive

Notes:

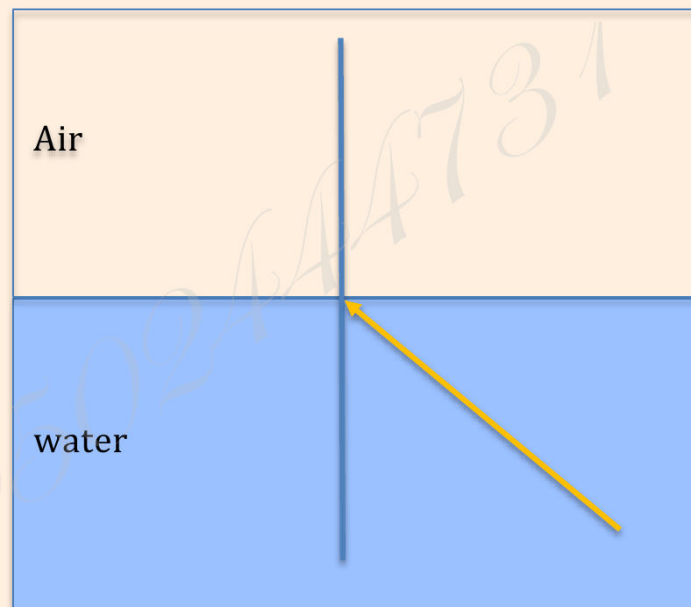
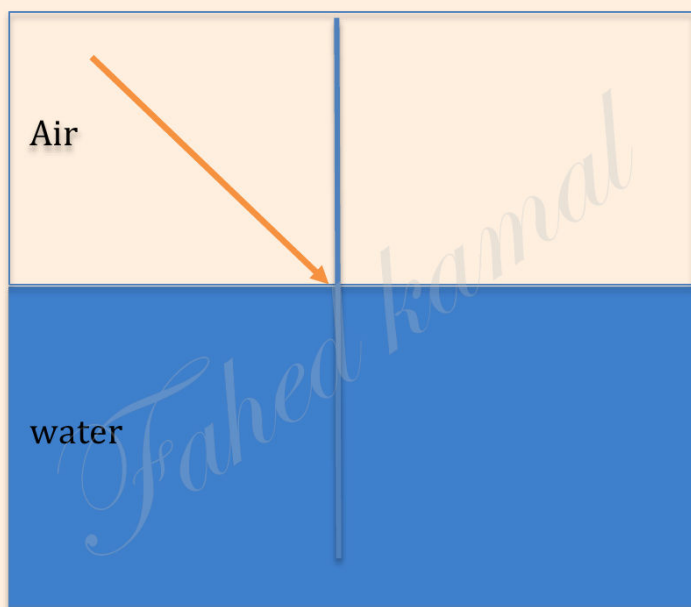
Describe refraction of light

73. Refraction occurs when:

- A. Light travels in a vacuum only
- B. Light reflects off a surface
- C. Light is absorbed by a medium
- D. Light changes direction as it crosses between two different mediums

74. The cause of refraction is:

- A. A change in the color of light
- B. A change in the speed of light in different media
- C. A change in the frequency of light
- D. A change in the mirror curvature



75. The index of refraction (n) of a medium is defined as:

- A. The ratio of the speed of light in vacuum to the speed of light in the medium
- B. The ratio of the wavelength of light in air to that in water
- C. The angle between the incident and refracted rays
- D. The amount of light reflected from the surface

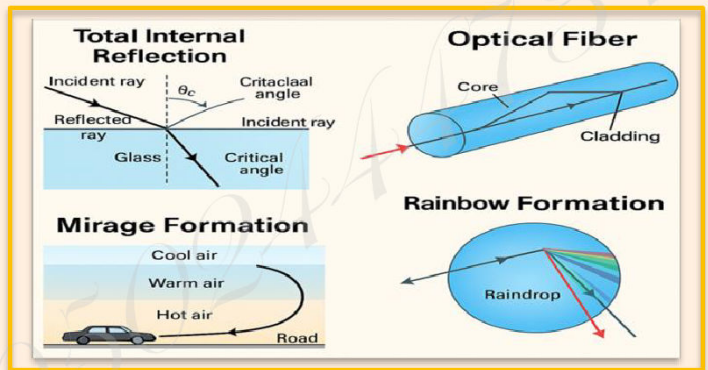


76. Total internal reflection occurs when:

- A. The angle of incidence equals zero
- B. Light travels from a rarer to a denser medium
- C. Light travels perpendicular to the boundary
- D. Light travels from a denser to a rarer medium and the angle of incidence is greater than the critical angle

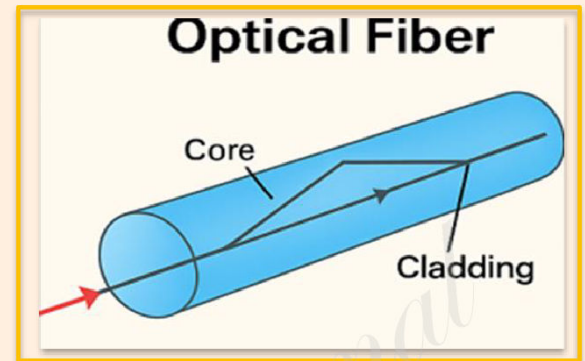
77. Which of the following is not an application of total internal reflection?

- A. Optical fibers
- B. Diamond sparkle
- C. Mirage
- D. Plane mirror



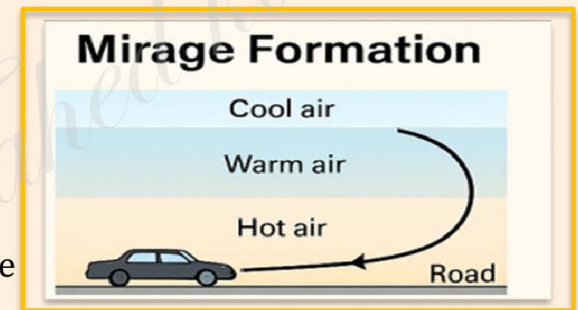
78. Optical fibers work on the principle of:

- A. Refraction of light
- B. Total internal reflection
- C. Dispersion of light
- D. Polarization of light



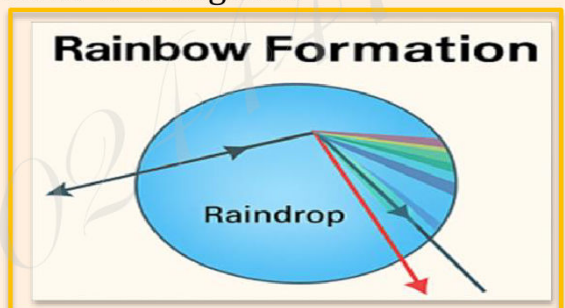
79. A mirage occurs because of:

- A. Reflection from a mirror-like surface
- B. Scattering of light by dust particles
- C. Dispersion of sunlight in the atmosphere
- D. Refraction and total internal reflection due to temperature differences in air



80. The rainbow is formed due to:

- A Dispersion, refraction, and internal reflection of sunlight in raindrops
- B. Only refraction of light
- C. Polarization of light in clouds
- D. . Only reflection of light



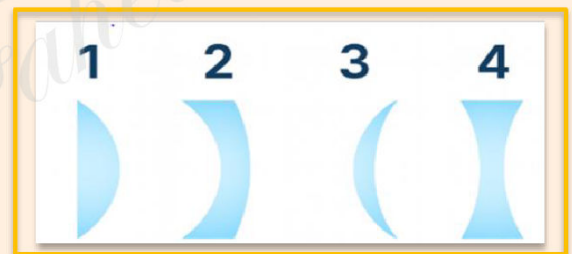
81. The word **LEFT** is placed in front of a **plane mirror** as shown below. Which option shows how the word will appear in the mirror?

82. Define dispersion and explain the dispersion of light through a prism. Which of the following statements best describes this phenomenon?

- A. Dispersion is the reflection of light from a smooth surface.
- B. Dispersion is the bending of light when it passes from one medium to another.
- C. Dispersion is the splitting of white light into its component colors when passing through a prism.
- D. Dispersion is the scattering of light by dust particles in the air.

83. Classify the lenses (1–4) according to their types.

- A Convex – Concave – Convex – Concave
- B Convex – Convex – Concave – Concave
- C Concave – Convex – Concave – Convex
- D Convex – Concave – Concave – Convex



84. Which statement correctly describes **spherical aberration** and its correction?

- A. Spherical aberration occurs because peripheral rays focus at a different point than central rays. It can be corrected by using a parabolic lens or a small aperture.
- B. It occurs because light of different colors refracts differently.
- C. It occurs because the lens is too thin at the center.
- D. It can be corrected only by using two concave lenses.

85. Which combination of lenses is used to reduce chromatic aberration?

- A. Two convex lenses.
- B. One convex and one concave lens (achromatic doublet).
- C. Two concave lenses.
- D. A convex lens with a mirror.

86. What is nearsightedness (Myopia)?

- A. A defect in which distant objects appear blurred because the image forms in front of the retina
- B. A defect in which near objects appear blurred because the image forms behind the retina.
- C. A defect in which the eye lens cannot change its focal length.
- D. A defect corrected by using a convex lens only.

87. What type of lens is used to correct **nearsightedness (Myopia)**?

- A. Parabolic lens
- B. Convex lens.
- C. Cylindrical lens.
- D. Concave lens.



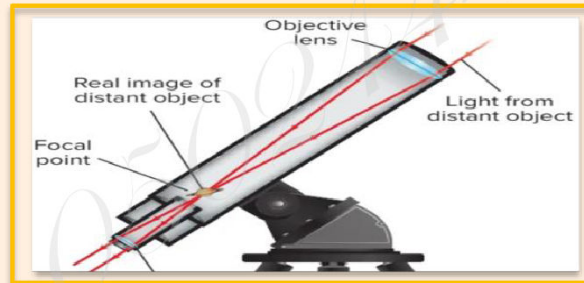
88. What is **farsightedness (Hyperopia)**?

- A. A defect in which near objects appear blurred because the image forms behind the retina.
- B. A defect in which distant objects appear blurred because the image forms in front of the retina.
- C. A condition where all objects appear equally clear.
- D. A defect corrected by a concave lens.



89. What type of image does the **eyepiece lens** produce in a telescope?

- A. Real and inverted.
- B. Virtual and enlarged.
- C. Virtual and reduced.
- D. Real and upright.

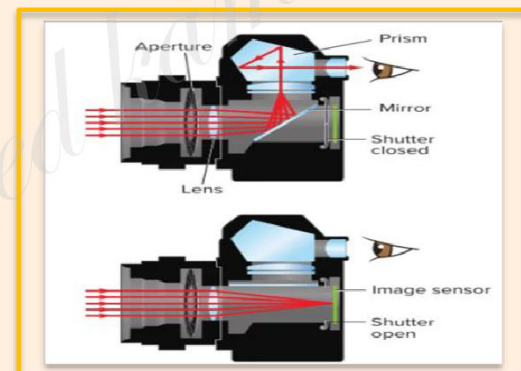


90. How does a telescope make a distant object appear closer?

- A. By reflecting light through concave mirrors.
- B. By refracting light through two convex lenses.
- C. By bending light using a concave and convex lens.
- D. By forming a virtual upright image directly on the retina.

91. What is the function of the **lens** in a camera?

- A. To reflect light to the prism.
- B. To block unwanted light rays.
- C. To collect and focus light onto the image sensor.
- D. To adjust the brightness of the picture.

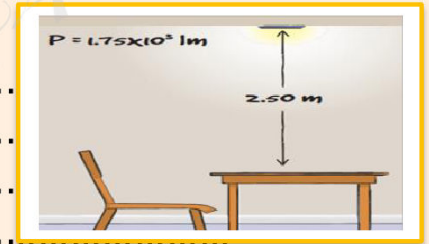


92. What type of image is formed on the **image sensor**?

- A. Virtual and upright.
- B. Virtual and inverted.
- C. Real and upright.
- D. Real and inverted.

Part 2

- 1- What is the illuminance on your desktop if it is lit by a 1750 lm lamp that is 2.50 m above your desk?



- 2- Luminous Intensity Two lamps illuminate a screen equally from distances shown in Figure 12. If lamp A is rated 75 cd, what is lamp B rated?

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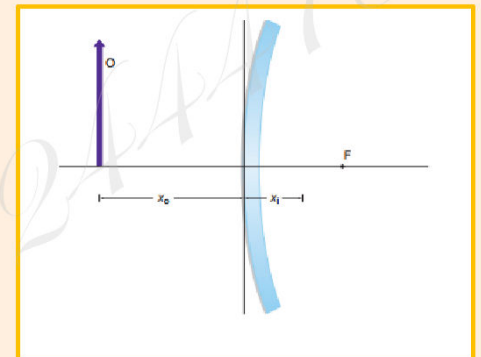
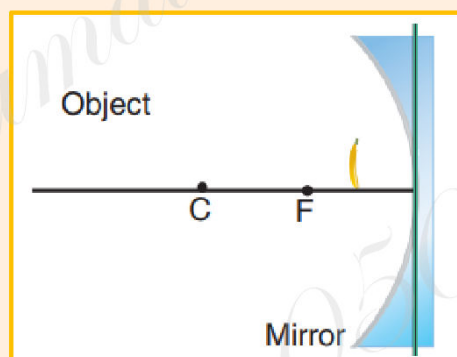
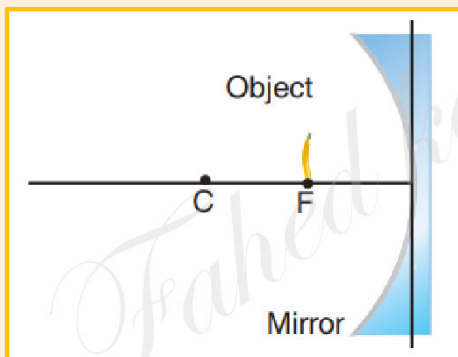
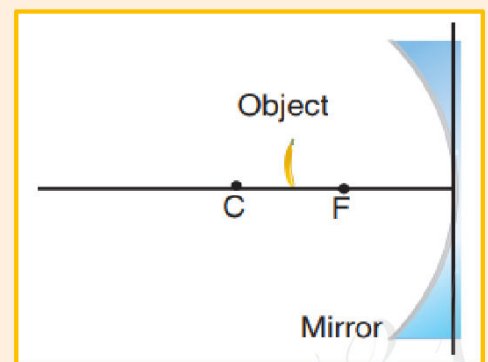
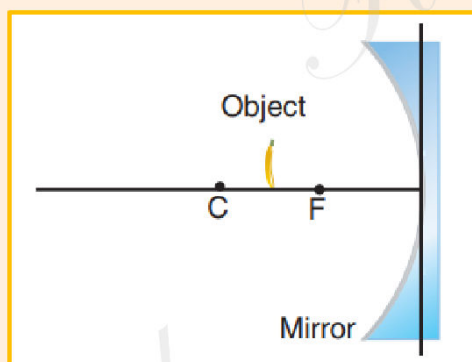
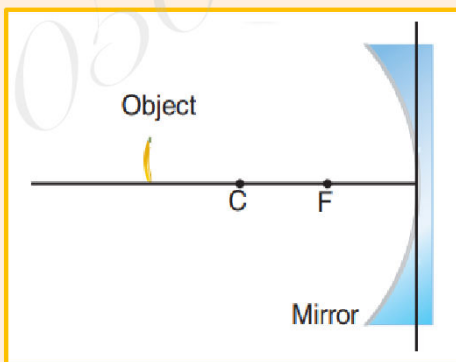
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- 3 Draw and write the properties of images:



- 4- Concave mirror has a radius of curvature of 20.0 cm. You place a 2.0 cm tall object 30.0 cm from the mirror. What are the image position and image height?

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- 5- A convex security mirror in a warehouse has a 0.50 m focal length. A 2.0 m tall forklift is 5.0 m from the mirror. What are the image position and image height?

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- 6- A laser beam in air enters ethanol at an angle of incidence of 37.0° . What is the angle of refraction?

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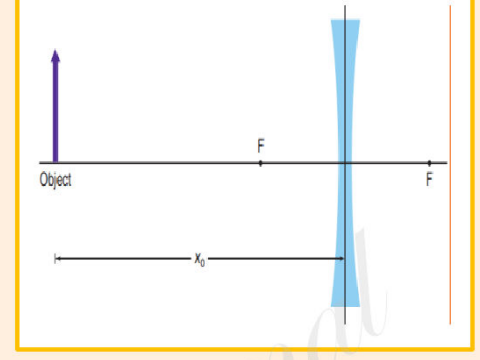
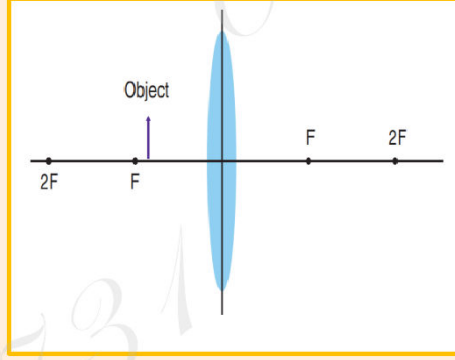
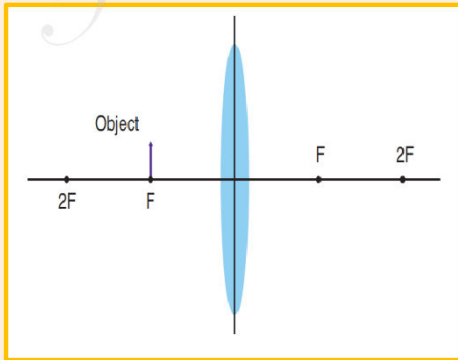
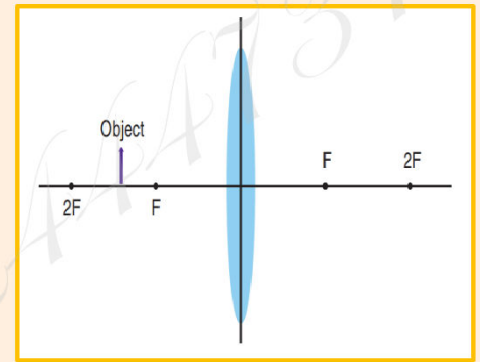
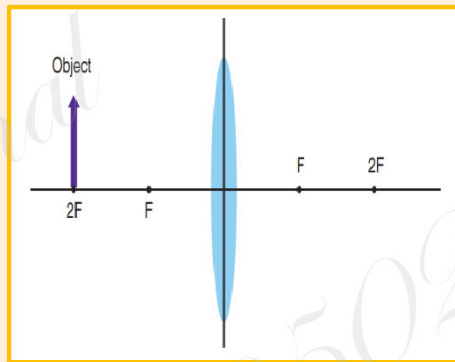
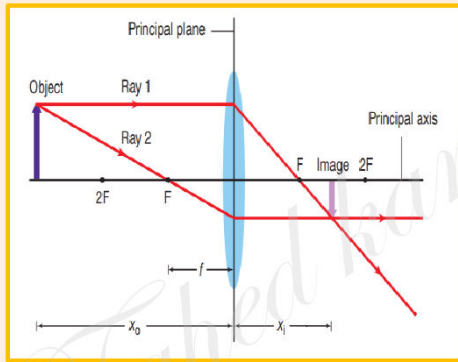
- 7- A block of unknown material is submerged in water. Light in the water enters the block at an angle of incidence of 31° . The angle of refraction of the light in the block is 27° . What is the index of refraction of the material of the block? If you know the wavelength light in water 700 nm calculate the wavelength light in another material?

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- 8- a critical angle for light traveling from glass to water?

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9- Draw and write the properties of images:



- 10-** calculate the image position and height of a 2.0 cm tall object located 25 cm from a convex (converging) lens with a focal length of 5.0 cm. What is the orientation of the image?

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- 11-** An object is placed 6.0 cm from a diverging lens that has a focal length of 9.0 cm. Where is the image located, and what is its magnification? The magnification?

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GOOD LUCK



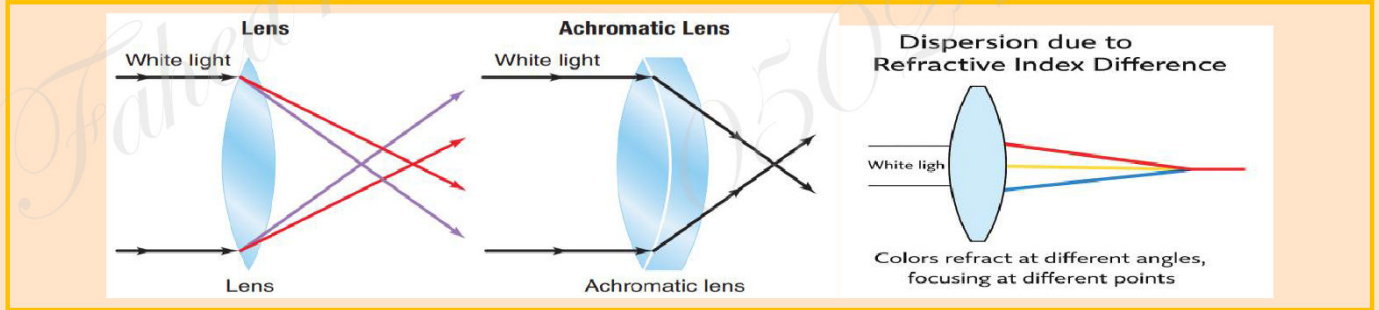
يمكنكم الإنضمام لقناتنا الجديدة على Telegram بمسح الباركود :
او الضغط على الرابط: <https://t.me/FahedKamal>

Refraction and lenses

عيوب العدسات الكروية – Defects of Spherical Lenses

The following table summarizes the main defects of spherical lenses and the methods used to correct them.

يبين الجدول التالي أهم عيوب العدسات الكروية وطرق تصحيح كل منها



العيوب بالعربية	Defect (in English)	الشرح المختصر	Brief Description	طريقة التصحيح	Correction Method
الانحراف الكروي	Spherical Aberration	الأشعة القريبة من حواف العدسة لا تلتقي في نفس النقطة مع الأشعة المارة من المركز، مما يؤدي إلى صورة غير واضحة.	Rays near the lens edges do not converge at the same point as central rays, causing a blurred image.	استخدام عدسات رفيعة أو حواف أو عدسات مركبة لتقليل الخطأ.	Use thinner lenses or combine lenses to minimize the effect.
الانحراف اللوني	Chromatic Aberration	الضوء الأبيض ينكسر بألوانه المختلفة بزوايا مختلفة، فتتكون حواف ملونة تشبه قوس المطر.	White light splits into colors due to different refraction angles, forming rainbow-like edges.	استخدام عدسة لا لونية (Achromatic Lens) مكونة من عدستين من مواد مختلفة.	Use an achromatic lens made of two lenses of different materials.
تششت الألوان بسبب اختلاف معامل الانكسار	Dispersion due to Refractive Index Difference	اختلاف معاملات الانكسار للمواد يؤدي إلى انحراف مختلف للألوان.	Different refractive indices cause light of various colors to bend differently.	اختيار مواد ذات معاملات انكسار مناسبة لتجميع الألوان في نقطة واحدة.	Choose lens materials with proper refractive indices to converge colors at one point.