

Name: Fox

**Optics Unit Test Practice**  
**SNC2D**

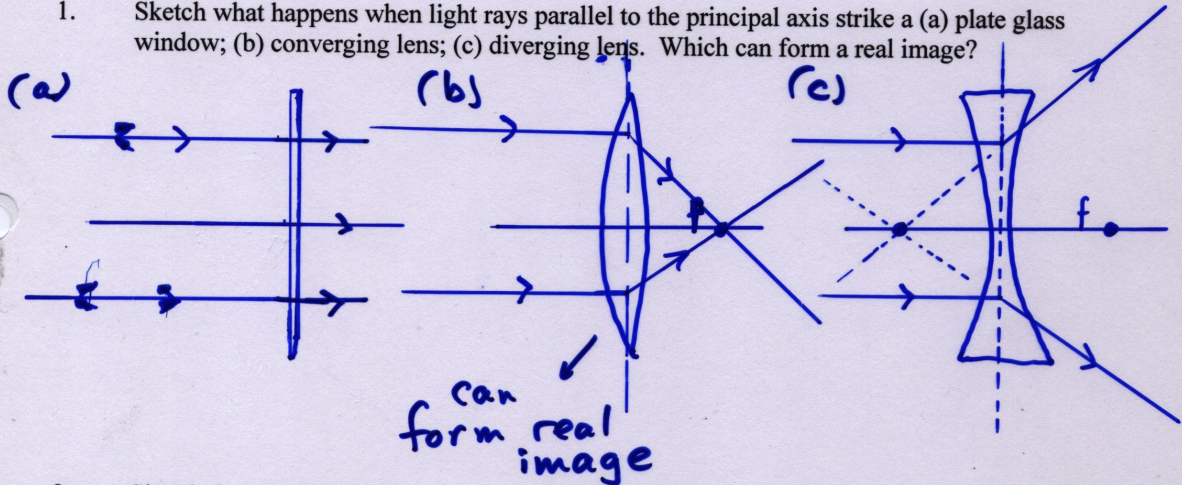
**Part 1: Multiple Choice (13 marks, 1 mark each)**

- 4
- Which of the following types of electromagnetic waves travels fastest in a vacuum?  
A. microwaves  
B. visible light  
C. x-rays  
D. They all travel at the same speed.
  - If the wavelength of visible light is changed, the \_\_\_\_\_ of the light will change.  
A. brightness  
B. colour  
C. speed  
D. all of the above
  - A light ray travelling through air meets a boundary with glass. The light ray travels \_\_\_\_\_ in the glass.  
A. faster  
B. more slowly  
C. at the same speed  
D. It cannot be determined
  - If the light ray in Question 3 makes an angle with the glass, the light ray is refracted:  
A. toward the normal with the boundary  
B. away from the normal with the boundary  
C. at an equal angle with the normal to the boundary  
D. It cannot be determined.
  - 9 A ray is incident on a plane mirror at an angle of  $25^\circ$  from the normal. The angle of reflection is \_\_\_\_\_ from the normal.  
A. less than  $25^\circ$   
B. greater than  $25^\circ$   
C. equal to  $25^\circ$   
D. It cannot be determined.
  - The image formed in a plane mirror is always:  
A. real and upright  
B. real and inverted  
C. virtual and upright  
D. virtual and inverted
  - The image formed in a convex mirror is always:  
A. real and larger  
B. real and smaller  
C. virtual and larger  
D. virtual and smaller
  - 4 An object is positioned at the focal point of a converging lens. The image will be:  
A. the same size and real  
B. the same size and virtual  
C. larger and virtual  
D. There is no image formed.
  - Hyperopia or farsightedness of the eye occurs when an image is in focus at a position behind the retina. Hyperopia is corrected by lenses that are:  
A. converging  
B. diverging  
C. either converging or diverging  
D. neither converging nor diverging

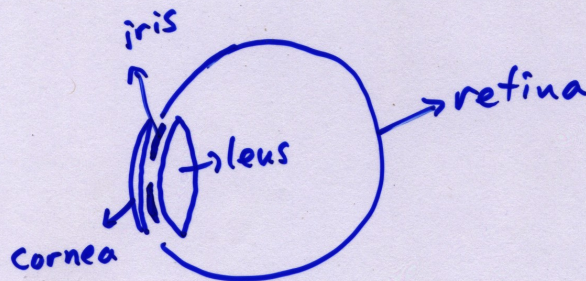
10. Most of the refraction of the eye occurs in the:  
 A. cornea      B. crystalline lens      C. pupil      D. retina
11. An object that reflects all colours of light will appear:  
 A. black      B. colourless      C. opaque       D. white
12. Dispersion can occur when white light is:  
 A. absorbed      B. reflected       C. refracted      D. all of the above
13. Light produced by an object at a high temperature is called:  
 A. chemiluminescent      B. fluorescent       B. incandescent      D. triboluminescent

Part 2: Short Answer and Diagrams (4 marks each)

1. Sketch what happens when light rays parallel to the principal axis strike a (a) plate glass window; (b) converging lens; (c) diverging lens. Which can form a real image?

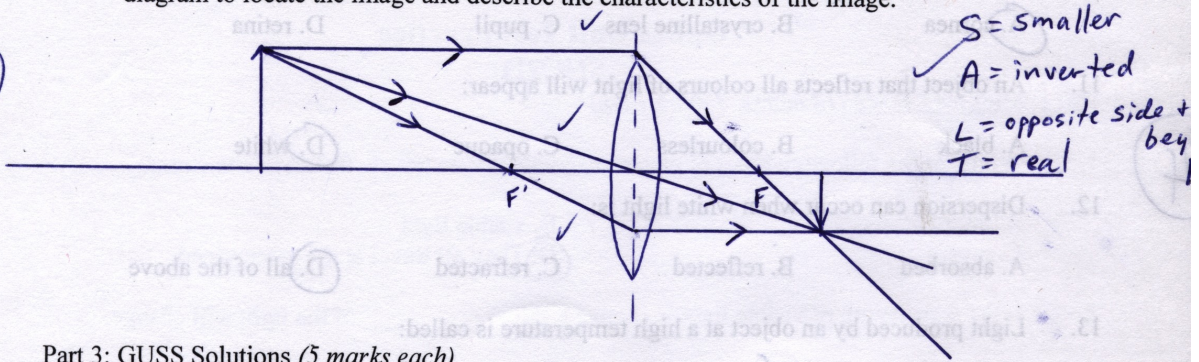


2. Sketch the eye and label the cornea, crystalline lens, retina, and iris.



3. An object is placed 6.0 cm from a converging lens with a focal length of 2.0 cm. Sketch a ray diagram to locate the image and describe the characteristics of the image.

4



Part 3: GUSS Solutions (5 marks each)

1. (a) What is the frequency of a light ray of wavelength  $650 \times 10^{-9} \text{ m}$ ? (2 marks)

2

G:  $\lambda = 6.50 \times 10^{-7} \text{ m}$   
 $v = c = 3.0 \times 10^8 \text{ m/s}$

S:  $3.0 \times 10^8 = f(6.50 \times 10^{-7})$

U:  $f = ?$

$f = \frac{3.0 \times 10^8}{6.50 \times 10^{-7}}$

S:  $v = f\lambda$

$f = 4.6 \times 10^{14} \text{ Hz}$

- (b) If the ray is incident on a transparent surface at an angle of  $36^\circ$  and the angle of refraction within the material is  $25^\circ$ , find the refractive index of the material. (3 marks)

3

G:  $\theta_1 = 36^\circ$ ,  $n_1 = 1.00$   
 $\theta_2 = 25^\circ$

$(1.00) \sin 36^\circ = n_2 \sin 25^\circ$

$n_2 = \frac{(1.00) \sin 36^\circ}{\sin 25^\circ}$

U:  $n_2 = ?$

$n_2 = 1.39$

S:  $n_1 \sin \theta_1 = n_2 \sin \theta_2$

2. An object of height 3.0 cm is placed 8.0 cm from a converging lens of focal length 6.0 cm. Find (a) the location and (b) the height of the image.

4

(a) G:  $d_o = 8.0 \text{ cm}$   
 $h_o = 3.0 \text{ cm}$   
 $f = 6.0 \text{ cm}$

$\frac{1}{d_i} = \frac{1}{6.0} - \frac{1}{8.0}$

$\frac{1}{d_i} = \frac{4-3}{24}$

$d_i = 24 \text{ cm}$

U:  $d_i = ?$

(b)  $\frac{h_i}{h_o} = -\frac{d_i}{d_o} \rightarrow h_i = -\frac{d_i h_o}{d_o}$

S:  $\frac{1}{d_i} + \frac{1}{d_o} = \frac{1}{f}$

$h_i = -\frac{(24)(3.0)}{8.0} = -9.0 \text{ cm}$

$\frac{1}{d_i} = \frac{1}{f} - \frac{1}{d_o}$