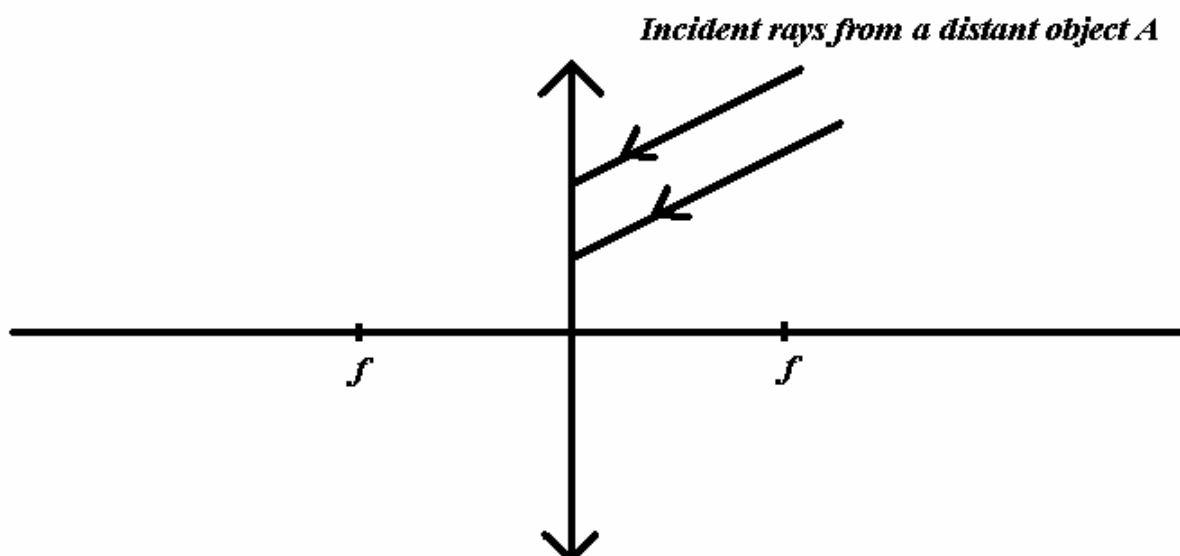


# Optics Concept Quiz 1:



Name: \_\_\_\_\_ Class No.: \_\_\_\_\_ Marks: \_\_\_\_\_ / 100



Instructions: 1. Time allowed: 30 minutes 2. Closed-book Quiz




1. What is the Law of Reflection? (10 marks)
2. State four characteristics of the image formed by a plane mirror. (10 marks)
3. State 2 kinds of surface where diffusion reflection will occur. (5 marks)
4. What is the Law of Refraction? (10 marks)
5. What is the relationship between Refraction and velocities in two different media? You can state it using mathematical equation(s). (10 marks)
6. State the refractive index of glass in terms of angle of incident in glass  $\theta_g$  and angle of refraction in air  $\theta_a$ . State the name of the physics' law (if necessary) to support your answers. (10 marks)
7. State the necessary conditions for the occurrence of total internal reflection. (10 marks)
8. Derive the critical angle of glass,  $C = \sin^{-1}\left(\frac{1}{n}\right)$ . You may draw a ray diagram to explain your derivations (10)
9. What is the difference between real images and virtual images? (5 marks)
10. State one application of concave lens. (5 marks)
11. Which one is diverging lens? Concave lens or Convex lens? (5 marks)
12. Complete the ray diagram below. Locate the image  $I_A$  of a distant object A. (10 marks)



**Optics Concept Quiz 1 Answers (with detailed Solutions)**

No.	Solutions	Marks
1.	<p>Law of Reflection states that:</p> <p>a. <u>Angle of incident is equal to Angle of reflection</u></p> <p>b. <u>The incident ray, the reflected ray and the normal are lie on the same plane / horizontal surface.</u></p> <p>黎 Sir 提提你  :</p>	<p>5 marks</p> <p>5 marks</p>
2.	<p>Image formed by a plane mirror is <u>erect, same size, virtual and laterally inverted</u></p> <p>黎 Sir 提提你  :</p>	<p>2.5 marks each</p>

3.	<p><u>book surface / blackboard surface / wood surface / concrete wall / any reasonable answers</u></p> <div style="border: 1px solid black; padding: 10px; min-height: 250px;"> <p>黎 Sir 提提你  :</p> </div>	<p>Any 2 2.5 marks each</p>
4.	<p>Law of Refraction states that:</p> <p>a. <math>\frac{\sin i}{\sin r} = \text{constant } t</math>, where <math>i</math> is the angle of incident in one and <math>r</math> is the angle of refraction in another medium.</p> <p>b. <u>The incident ray, the reflected ray and the normal are lie on the same plane / horizontal surface.</u></p> <div style="border: 1px solid black; padding: 10px; min-height: 250px;"> <p>黎 Sir 提提你  : Snell's law <math>\frac{\sin i}{\sin r} = \text{constant } t</math></p> </div>	<p>5 marks  5 marks</p>

5.	$\frac{\sin i}{\sin r} = \frac{v_i}{v_r}$ , where $v_i$ and $v_r$ are velocity in incident medium and velocity in refracted medium.  黎 Sir 提提你  :	10 marks
6.	$\frac{\sin \theta_a}{\sin \theta_g} = n_{glass}$ . <u>Law of reversibility of light.</u>  黎 Sir 提提你  :	5 marks  5 marks
7.	Total internal reflection requires: a. <u>Light rays incident from a dense medium to a less dense medium.</u> b. <u>The angle of incident is greater than the critical angle.</u>  黎 Sir 提提你  :	

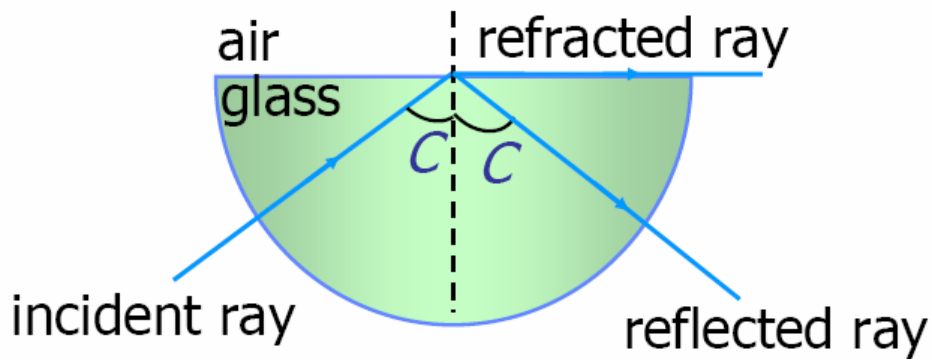
8.

When the refracted angle is  $90^\circ$ ,

$$\frac{\sin 90^\circ}{\sin C} = n$$

$$\frac{1}{n} = \sin C$$

$$C = \sin^{-1}\left(\frac{1}{n}\right)$$



黎 Sir 提提你 🧑🏻 :

1 mark

1 mark

1 mark

2 marks

1 mark if the final answer is wrong.

9.

Real images can be formed on a screen whereas virtual images cannot be formed on a screen.

黎 Sir 提提你 🧑🏻 :

5 marks

10.	<u>Short-sighted glasses.</u> 黎 Sir 提提你 🧐 :	5 marks
11.	<u>Concave lens</u> 黎 Sir 提提你 🧐 :	5 marks
12.	<div style="text-align: center;"> </div> 黎 Sir 提提你 🧐 :	3 marks for correct construction line  4 marks for correct refracted rays  3 marks for correct image location $I_A$

The End.