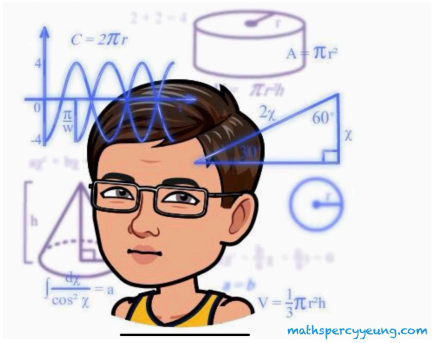
2024-2025 S3
2nd Term Exam
PHY Section A



2024-2025 S3 SECOND TERM EXAMINATION
PHYSICS
Section A
Question Book
12th June, 2025
10:15 am – 11:15 am (1 hour)
This paper must be answered in English

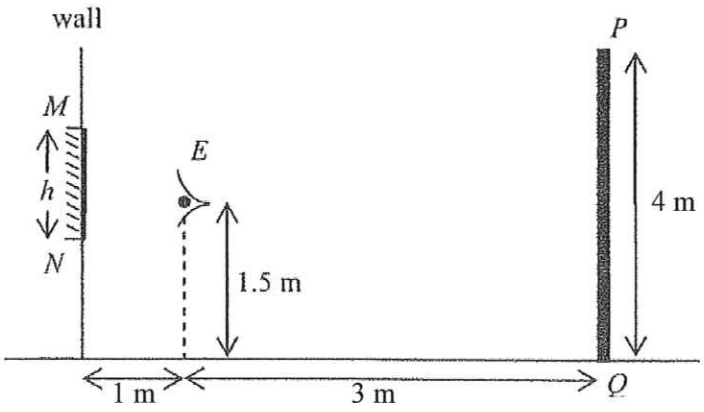
Instructions

1. Read carefully the instructions on the MC Answer Sheet. After the announcement of the start of the examination, you should first insert the information required in the spaces provided. No extra time will be given after the 'Time is up' announcement.
2. When told to open this book, you should check that all the questions are there. Look for the words **'END OF SECTION A'** after the last question.
3. All questions carry equal marks.
4. **ANSWER ALL QUESTIONS**. Use an **HB pencil** to mark all the answers on the **MC Answer Sheet**, so that wrong marks can be completely erased with a rubber. You must mark the answers clearly; otherwise you will lose marks if the answers cannot be captured.
5. You should mark only **ONE** answer for each question. If you mark more than one answer, you will receive **NO MARKS** for that question.
6. No marks will be deducted for wrong answers.
7. The diagrams in this paper are **NOT** necessarily drawn to scale.
8. Calculators pad-printed with the "H.K.E.A. APPROVED" / "H.K.E.A.A. APPROVED" label can be used for this paper.

Section A: Multiple-choice Questions (30 marks)

Use an **HB pencil** to mark your answer on the **MC Answer Sheet** provided.

1.



In the figure, a plane mirror *MN* of height *h* is mounted in an adjustable vertical position on a vertical wall. *E* is an observer's eye which is 1 m from the wall and 1.5 m above the ground. *PQ* is a vertical post of height 4 m and is 3 m behind the observer. Looking into the mirror the observer can see the whole image of the post. What is the minimum value of *h*?

A. 0.4 m

B. 0.6 m

C. 0.8 m

D. 2 m

2. Which of the following phenomena is/are caused by the refraction of light?

(1) If a man who is spear-fishing aims his spear at where the fish appears to be, he will miss it.

(2) A spectrum is formed when white light passes through a prism.

(3) A light ray is transmitted through a curved glass fibre.

A. (1) only

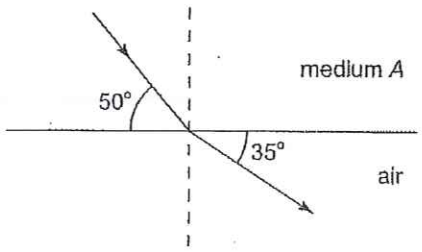
B. (3) only

C. (1) and (2) only

D. (2) and (3) only

3. A ray of light emerges from medium A into air as shown in the figure.

Find the refractive index of medium A.



A. 1.34

B. 1.27

C. 0.78

D. 0.75

4. Which of the following statements concerning virtual images is/are correct?

(1) Virtual images cannot be formed on a screen.

(2) Virtual images cannot be photographed with a camera.

(3) Virtual images are always diminished.

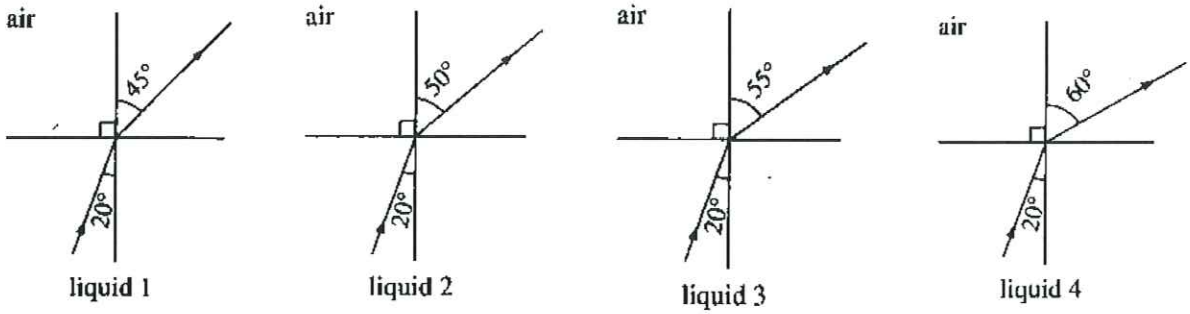
A. (1) only

B. (3) only

C. (1) and (2) only

D. (2) and (3) only

5. The incident and refracted angles when light emerges from each liquid, 1, 2, 3 and 4 into the air are shown below.



The speed of light is highest in liquid

A. 1

B. 2

C. 3

D. 4

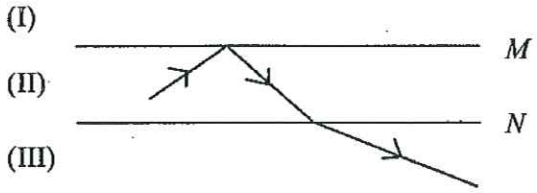
6. In the figure, M and N are two parallel boundaries separating media (I), (II) and (III). A light ray undergoes total internal reflection and then refraction as shown. Arrange the refractive indexes of the three media in descending order.

A. (I) > (II) > (III)

B. (I) > (III) > (II)

C. (II) > (III) > (I)

D. (III) > (I) > (II)



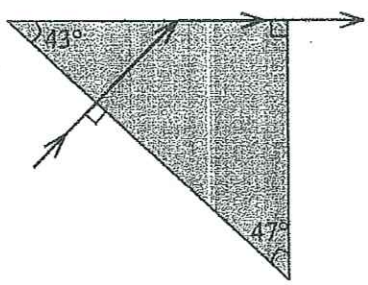
7. A ray of light enters a glass prism and travels along the path as shown. Find the refractive index of the glass.

A. 0.68

B. 1.07

C. 1.37

D. 1.47



8.

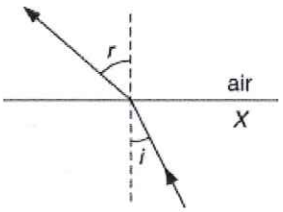


Figure (a)

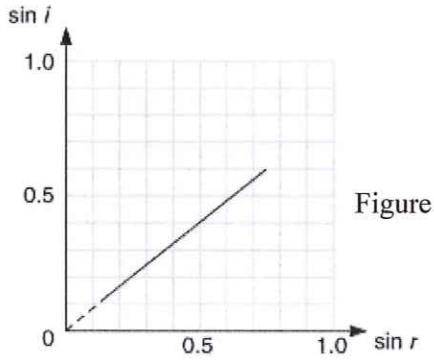
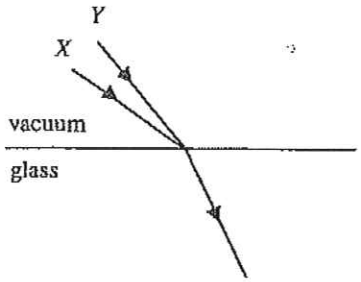


Figure (b)

A light ray travels from medium *X* to air as shown in the Figure (a). Figure (b) shows the graph of sin *i* against sin *r*. Find the refractive index of medium X and the speed of light in medium X.

	Refractive index of X	Speed of light in X
A.	0.8	2.4×10^8 m s^{-1}
B.	0.8	3.75×10^8 m s^{-1}
C.	1.25	2.4×10^8 m s^{-1}
D.	1.25	3.75×10^8 m s^{-1}

9.



Two coloured lights, X and Y, travel from vacuum to glass. They undergo refraction and travel along the same path in glass. Which of the following descriptions about the two coloured lights is correct?

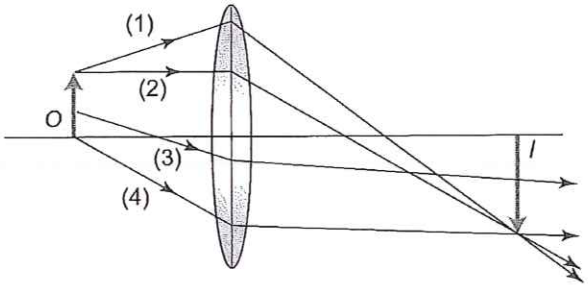
A. Glass has a greater refractive index for X and X travels slower than Y in vacuum.

B. Glass has a greater refractive index for X and X travels with the same speed as Y in vacuum.

C. Glass has a smaller refractive index for X and X travels with the same speed as Y in vacuum.

D. Glass has a smaller refractive index for X and X travels faster than Y in vacuum.

10.



In the diagram, I is the image of object O. Which of the following rays is incorrectly drawn?

A. (1) B. (2)

C. (3) D. (4)

11. A lens is placed above a newspaper as shown.

Which of the following statements are correct?

(1) The lens is a concave lens.

(2) The image is virtual.

(3) The image distance must be smaller than the object distance.

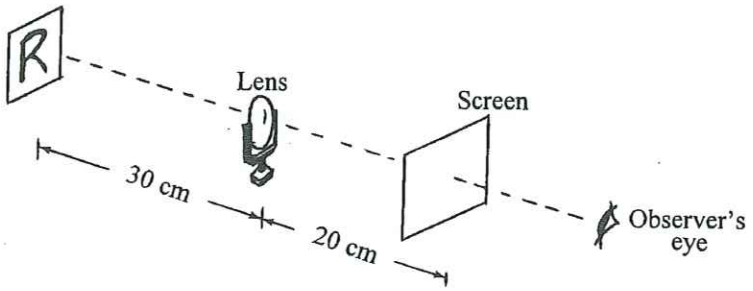
A. (1) and (2) only

B. (1) and (3) only

C. (2) and (3) only

D. (1), (2) and (3)

12. An illuminated letter 'R' is placed in front of a lens as shown below and an image is formed on a translucent screen. The object distance is 30 cm and the image distance is 20 cm.



Which of the following statements are correct?

(1) The lens is a converging lens.

(2) The image cannot be seen by the observer if the screen is removed.

(3) The shape of the image seen by the observer is 'Ꞵ'.

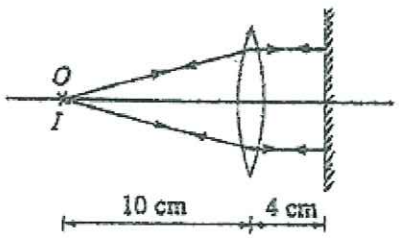
A. (1) only

B. (3) only

C. (1) and (2) only

D. (2) and (3) only

13.



When an object O is placed in front of a convex lens and a plane mirror as shown above, an image I is formed at the same position as the object. Which of the following statements is/are correct?

(1) The image I is real.

(2) The focal length of the lens is 10 cm.

(3) If the distance between the lens and the plane mirror is changed to 2 cm, the position of the image I remains unchanged.

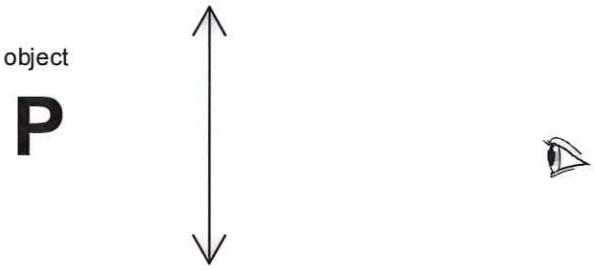
A. (3) only

B. (1) and (2) only

C. (2) and (3) only

D. (1), (2) and (3)

14.



A student views an object P with a convex lens as shown. Which of the following figures could **not** be the image observed?

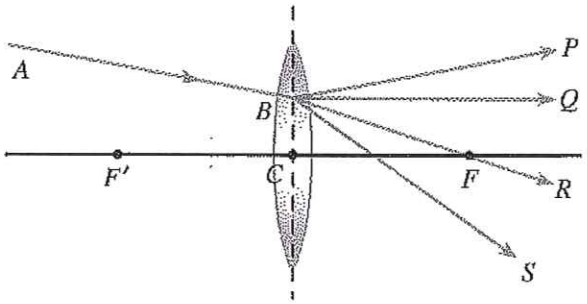
A. P B. P C. d D. d

15. A fixed convex lens is used to form a real, inverted and diminished image of an object on a screen. If the object is moved slightly away from the lens, how should the screen be moved in order to form a sharp image on the screen again? What is the change in magnification of the image?

	Movement of the screen	Magnification
A.	away from the lens	decrease
B.	away from the lens	increase
C.	towards the lens	decrease
D.	towards the lens	increase

16. F and F' are the foci of the above lens and AB is an incident ray. Which light ray best represents the emergent ray?

A. P
B. Q
C. R
D. S



17. A student uses a magnifying glass of focal length 20 cm to view a distant object. Which of the following statements about the image formed is/are correct?

(1) The image will be erect.
(2) The image will be diminished.
(3) The student must use a screen in order to see the image.

A. (1) only
B. (2) only
C. (1) and (3) only
D. (2) and (3) only

18. Which of the following optical devices can form an erect image which has the same size as the object?

(1) Plane mirror

(2) Convex lens

(3) Concave lens

A. (1) only

B. (3) only

C. (1) and (2) only

D. (2) and (3) only

19. An object is placed at the focus of a concave lens of focal length 10 cm. What is the magnification of the image formed?

A. 0.5

B. 1.0

C. 2.0

D. infinite

20. A converging lens forms a sharp image of an object on a fixed screen and the image height is 4 cm. By moving the lens towards the screen, a second lens position is found at which a new sharp image of the object is formed on the screen and the image height becomes 1 cm. What is the height of the object?

A. 1 cm

B. 2 cm

C. 3 cm

D. 4 cm

END of SECTION A

2024-2025 S3
2nd Term Exam
PHY Section B

B

Name	
Class	
Class No.	

2024-2025 S3 SECOND TERM EXAMINATION

PHYSICS

SECTION B

Question-Answer Book

12th June, 2025

10:15 am – 11:15 am (1 hour)

This paper must be answered in English

Marks	
Section A	**/30**
Section B	**/30**
Total	**/60**

Instructions

(1) After the announcement of the start of the examination, you should first write your Name, Class and Class Number in the spaces provided in this Question-Answer Book.

(2) When told to open this book, you should check that all the questions are there. Look for the words **'END OF PAPER'** after the last question.

(3) Answer **ALL** questions. Write your answers in the spaces provided in this Question-Answer Book.

(4) The diagrams in this paper are **NOT** necessarily drawn to scale.

(5) Supplementary answer sheets will be supplied on request. Write your Name, Class, Class Number and your Question Number on each sheet, and submit them with this Question-Answer Book.

(6) No extra time will be given to students for writing anything after the 'Time is up' announcement.

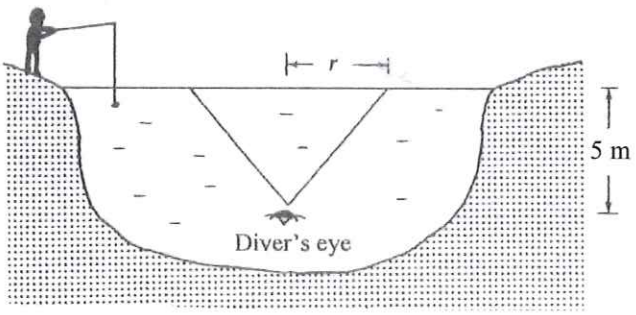
(7) Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures. Clear and neat handwriting is required.

Section B : Questions (30 marks)

Give your answers in the spaces provided.

1.

Figure 1.1



A diver stays at a depth of 5 m under water in a lake. A fisherman stands beside the lake. When the diver looks upwards, the scene above the water surface is compressed into a circular region of radius r at the water surface as shown in Figure 1.1. The refractive index of water is 1.33.

(a) Calculate the critical angle of the water. (2 marks)

(b) Calculate the radius r. (2 marks)

(c) Draw a light ray in Figure 1.1 to show how the diver sees the fisherman. (1 mark)

2. You are given a spherical convex lens, a ruler and a screen. You can see a distant building through a window. With the aid of a ray diagram, describe how you would use the above apparatus to find the focal length of the lens. (5 marks)

Ray diagram

3. An object *HK* is placed in front of a lens *Z* and a light ray *x* from H passes through lens *Z* as shown in Figure 3.1.

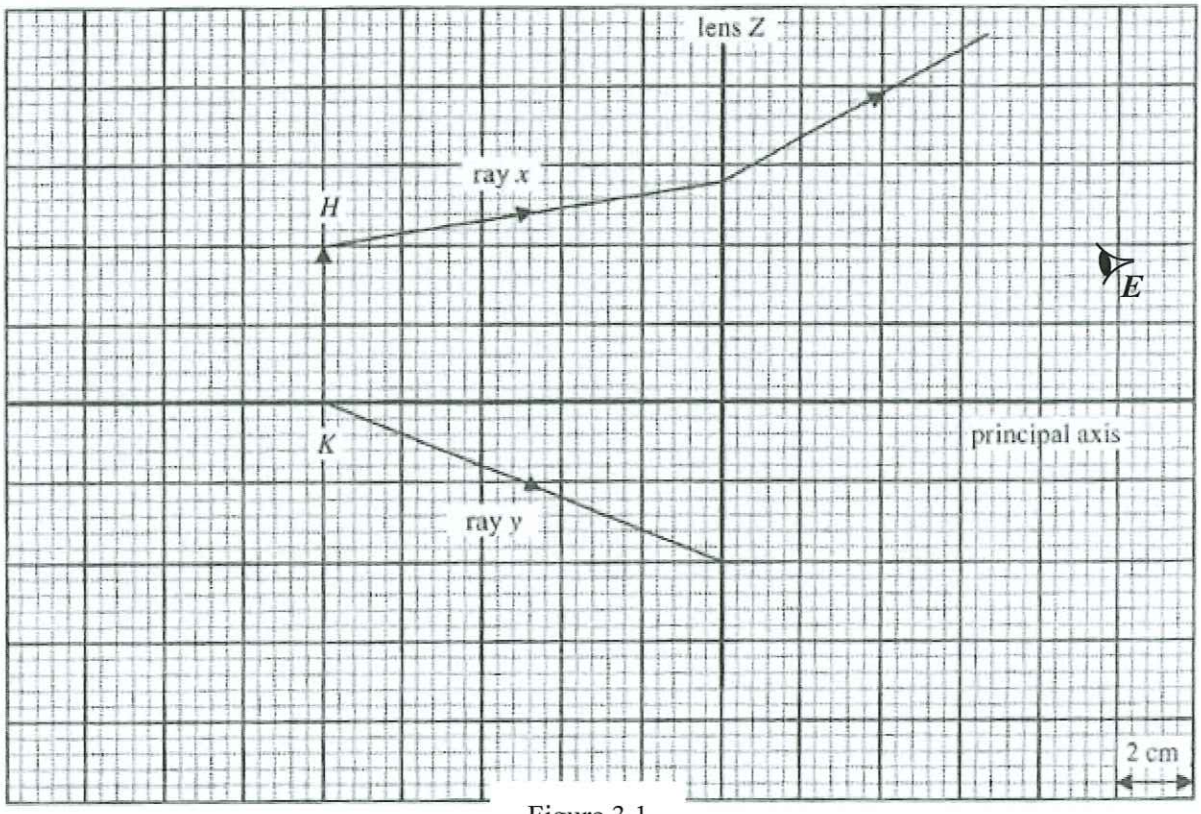


Figure 3.1

(a) What kind of lens is lens *Z*? Explain your answer. (2 marks)

_____

_____

_____

(b) (i) Draw suitable light ray(s) on Figure 3.1 to show how the image of *HK* is formed. (3 marks)

(ii) Hence, find the magnification of the image. (1 mark)

_____

_____

(c) Draw the refracted ray of ray *y* on Figure 3.1. (1 mark)

(d) Draw a light ray on Figure 3.1 to show how the eye *E* shown can see the image of head *H* through lens *Z*. (2 marks)

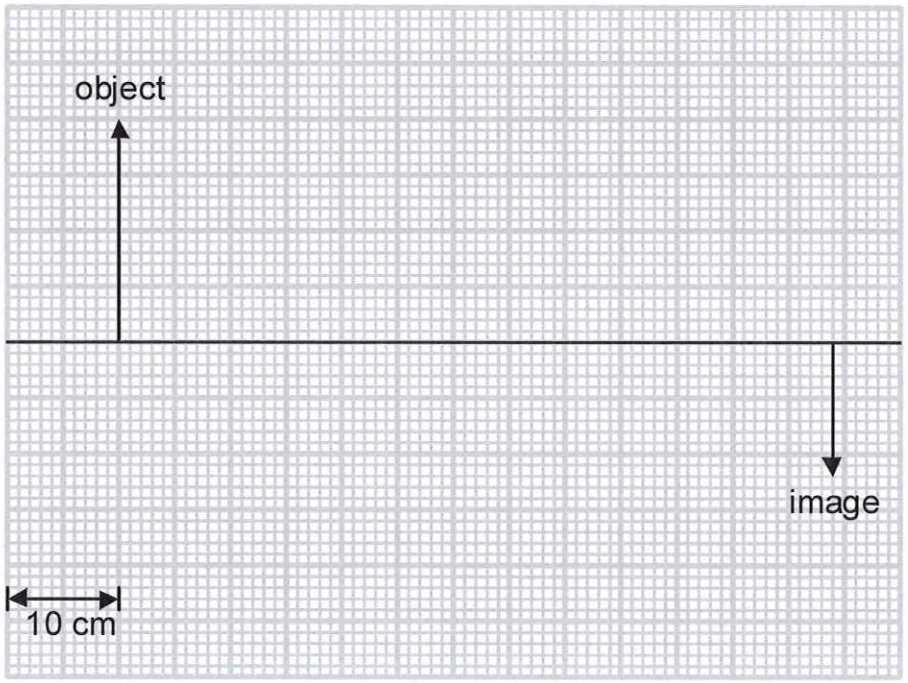
(e) State an application of lens *Z* in daily life. (1 mark)

_____

_____

4. Figure 4.1 shows the position of an object and its image formed by a lens L (not shown).

Figure 4.1



(a) State the nature of the image. (2 marks)

_____

_____

(b) What kind of lens is used? (1 mark)

_____

(c) Draw a suitable light ray on Figure 4.1 to locate the optical centre O of lens L and hence draw the position of lens L. (2 marks)

(d) By drawing an additional light ray, mark the principal focus F of lens L on Figure 4.1 and hence find its focal length. (2 marks)

Focal length = _____

(e) If the thickness of lens L is increased, how do the image height and image distance change? (2 marks)

_____

_____

(f) If the upper half of the lens is covered by a piece of opaque paper, how would the image be affected? (1 mark)

_____

END OF PAPER