FUKIEN SECONDARY SCHOOL

S3 First Term Uniform Test (2021-2022)

Physics

(45 minutes)

Date: 8th November 2021 Time: 11:30a.m. – 12:15p.m.

Name:	
Class:	No.:

Instructions to students:

- 1. Write your name, class and class number on both the question paper and the answer sheets.
- 2. Answer ALL questions.
- 3. Write down all the answers on the answer sheets.
- 4. Hand in the question paper and the answer sheets at the end of the examination.
- 5. The total mark of the paper is 60.
- 6. The paper consists of two sections: Section A Multiple Choice Questions (20 marks) and Section B Structured Questions (40 marks).
- 7. The numerical answers should be either exact or correct to 3 significant figures.

Section A: Multiple Choice Questions (20 marks)

1. Which of the following figures shows how light rays enable us to see a near object correctly?



2. Which of the following correctly shows the rays coming from a far object?



C.





B.





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3. A ray of light is reflected by a plane mirror as shown below. The angle between the incident ray and the reflected ray is 120°. What is the angle of incidence?



4. A ray of light is directed normally to a plane mirror as shown below. If the mirror rotates through an angle of 15°, what is the angle of reflection?



A. 7.5°

 40°

60°

 80°

120°

A.

В. С.

D.

- **B**. 10°
- C. 15°
- D. 30°
- 5. A ray of light is directed to the mirrors as shown below. What is the angle between two mirrors?



- A. 15°
- B. 30°
- C. 45°
- D. 60°

6. The figure below shows the image of a clock formed by a plane mirror. The time is



- A. 2:50
- B. 4:40
- C. 8:20
- D. 10:10
- 7. In the figure below, three pins P, Q and R are placed upright in front of a plane mirror. Which image(s) of the pins can be seen by the observer?

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- A. Ponly
- B. Q only
- C. P and Q only
- D. P, Q and R
- 8. An object (letter "b") is placed near one end of a periscope as shown below. Which of the following figures best represents the image observed?
 - A. p
 - B. d
 - C. b
 - D. q



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9. In a room *ABCD*, a tall plane mirror of width 1 m is placed at the middle of the wall *BD*. The top view of the room is shown below.



A student facing the mirror wants to see the objects placed at corners A and C at the same time. At least how far should he stand away from the mirror?

- A. 2.25 m
- B. 3 m
- C. 5 m
- D. 6 m
- 10. When parallel rays of light are incident on the irregular surface as shown in the figure below, which of the following statements is/are corrects?



- (1) This phenomenon is called regular reflection.
- (2) This phenomenon is called diffuse reflection.
- (3) All the light rays in the figure above obey the law of reflection.
- A. (1) only
- B. (2) only
- C. (1) and (3) only
- D. (2) and (3) only

End of Section A

Section B: Structured Questions (40 marks)

1. Figure 1 shows sunlight shining into a room through a window.



Figure 1

(a) Which property of light ray is shown in Figure 1?	(1 mark)
(b) Apart from the answer in (a), state TWO other properties of light.	(2 marks)

- (c) Is the light beam shown in Figure 1 convergent or divergent? Give a reason. (2 marks)
- 2. Refer to Figure 2 on the answer sheet. Two plane mirrors M_1 and M_2 are placed at right angle to each other. A light ray strikes one of the mirrors.

(a) Complete the light ray.	(2 marks)
(b) Find the angle of incidence and angle of reflection at mirror M_2 .	(2 marks)

- 3. Refer to Figure 3 on the answer sheet. Two plane mirrors M_1 and M_2 are placed at 130° to each other. A light ray strikes one of the mirrors.
 - (a) What is the angle of reflection at mirror M_1 ? (1 mark)
 - (b) Complete the light ray. (2 marks)
 - (c) Find the angle of incidence and angle of reflection at mirror M_2 . (2 marks)
- 4. A cube is placed on a mirror as shown in Figure 4a. Peter watches the image of the cube from the mirror at the position shown in Figure 4b on the answer sheet.



Figure 4a

(2 marks)

(b) Peter can **just** observe the image of the front side of the box.

(a) In Figure 4b on the answer sheet, draw the image of the box.

- (i) Draw a light ray to show how Peter observes the image of point *X*. (1 mark)
- (ii) Hence, find *d*. (3 marks)

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- 5. A boy 1.7 m tall stands a few metres in front of a plane mirror *AB*. The boy's eyes are 1.6 m above the ground. He can see himself in the mirror. In Figure 5 on the answer sheet, *PQ* represents the boy and *E* denotes his eyes.
 - (a) State three properties of the boy's image as formed by the mirror. (3 marks)
 - (b) PQ represents the boy and E denotes his eyes. In Figure 5, draw
 - (i) the image of the boy formed by the mirror,
 - (ii) the paths of two rays, one from *P* and one from *Q*, to show how the rays reach his eyes. (4 marks)
 - (c) Using (b)(ii), or otherwise, find the minimum length of the mirror *AB* for the boy to see all of himself. (2 marks)
 - (d) (i) If the boy walks 40 cm away from the mirror, will the answer in part (c) change?

(1 mark)

- (ii) If the boy stands on a small chair which is 30 cm tall, will the answer in part (c) change? (1 mark)
- 6. A teleprompter is a device that allows a presenter to read a script while keeping eye contact with the camera. With a teleprompter, the presenter can look at the written notes when presenting.



Figure 6a shows the working principle of a teleprompter. The semi-reflective glass reflects part of the light incident on it and allows the rest passing through. So, the presenter can see the text displayed on the monitor through the reflected rays, while the camera can shoot the presenter behind the glass through the transmitted rays.

- (a) In Figure 6a on the answer sheet, mark the angle of incidence (*i*) and the angle of reflection (*r*) of ray *R*. Find the value of angle θ . (3 marks)
- (b) A letter 'b' is seen upright by the presenter through the teleprompter.
 - (i) Sketch the letter on the monitor *MN* as viewed from the top. (1 mark)
 - (ii) In Figure 6b on the answer sheet, the arrow XY represents the letter on the monitor MN and q, r and s are rays emitted from XY to the semi-reflective glass G. Draw the image of XY and the reflected rays of q, r and s.(5 marks)

END OF QUESTION PAPER