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Student number

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Name _____

Date _____

Attempt/Time taken _____

GCSE PHYSICS

Topic Paper: 6.2 Electromagnetic waves, lenses, sound waves (Physics only)
Part 1

Time allowed: 35 minutes

Materials

For this paper you must have:

- the Periodic Table/Data Sheet, provided as an insert (enclosed)
- a ruler with millimetre measurements
- a calculator, which you are expected to use where appropriate.

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- All working must be shown.
- Do all rough work in this book. Cross through any work you do not want to be marked.

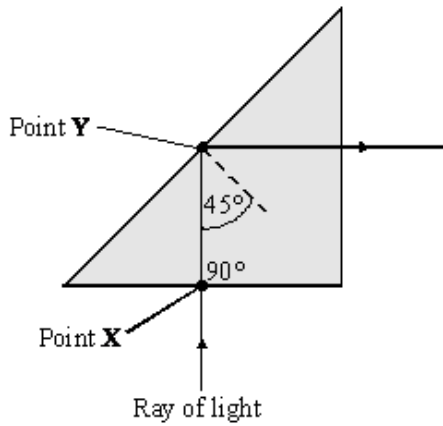
Information

- The Periodic Table/Data Sheet is provided as in insert.
- You are reminded of the need for good English and clear presentation in your answers.
- When answering questions you need to make sure that your answer:
 - is clear, logical, sensibly structured
 - fully meets the requirements of the question
 - shows that each separate point or step supports the overall answer.



30 Marks

Q1. The diagram shows a glass prism.



(i) Explain why refraction has **not** occurred at point **X**.

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.....

(1)

(ii) (A) Give the full name for the process which has occurred at point **Y**.

.....

(1)

(B) Explain why this process has occurred.

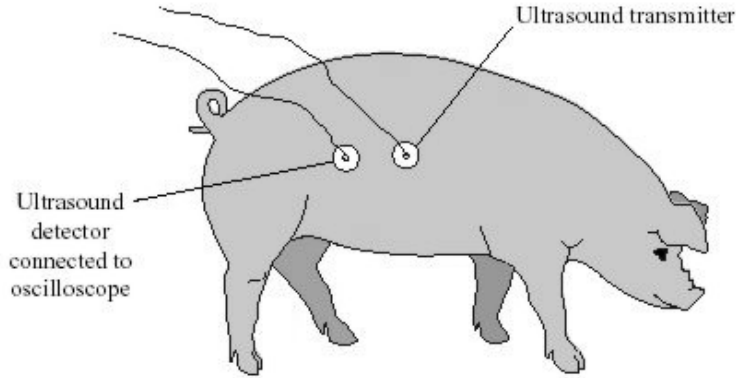
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(2)

(Total 4 marks)



Q2. Pigs have a layer of fat in their skin. Underneath the fat is a layer of muscle. Ultrasonic waves are used to measure the thickness of the layer of fat. An ultrasound transmitter and detector are attached to the skin of the pig.



(a) Explain why ultrasound can be used to measure the thickness of the layer of fat.

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.....

(2)

(b) The oscilloscope does not measure distance directly.

(i) What does the oscilloscope measure in this case?

.....

.....

(1)

(ii) What other information is needed to calculate the thickness of the layer of fat in a pig?

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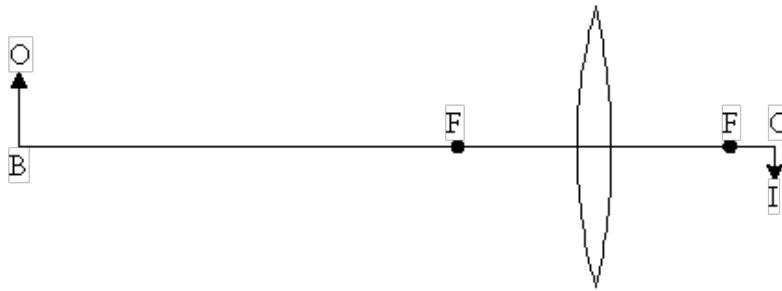
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(1)

(Total 4 marks)



Q3. The diagram shows the image IC formed by a lens, of an object OB a long way from it. The points F mark the focal points of the lens.



(a) Describe, either by writing below or drawing on the diagram, how the size and position of the image changes:

(i) when the object OB is moved towards the focal point F.

.....
.....

(ii) when the object OB is moved past F to a point nearer the lens than the focal point.

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.....

(4)

(b) Explain how a converging lens in a camera is used to produce sharp images on the film when the object is a long distance away from the camera, and when it is close to the camera.

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.....
.....

(3)

(Total 7 marks)

Q4. (a) The diagram shows a lens used as a magnifying glass. The position of the eye is shown and the size and position of an object standing at point O.

(i) What type of lens is shown in the diagram?

.....

(1)



(ii) Two points are marked as **F**. What are these points?

.....

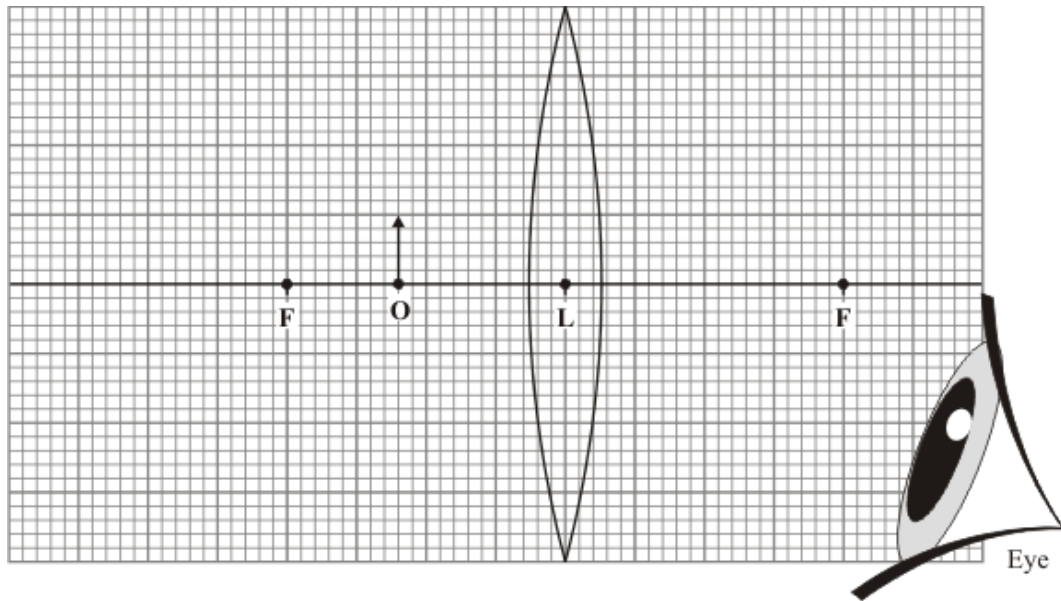
(1)

(iii) What is the name of the straight line which goes through the point **F**, through the point **L** at the centre of the lens, and through the point **F** on the other side?

.....

(1)

(iv) On the diagram, use a ruler to construct accurately the position of the image. You should show how you construct your ray diagram and how light appears to come from this image to enter the eye.



(5)

(v) The image is *virtual*. What is a *virtual* image?

.....

.....

(1)



- (b) The lens shown in the diagram in part (a)(iv) can be used in a camera to produce a *real* image.

Explain why a *real* image must be produced in a camera and how the object and the lens are positioned to produce a *real* image which is **smaller** than the object.

Do **not** draw a ray diagram as part of your answer.

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(3)
(Total 12 marks)

- Q5.** The picture shows a pre-natal scan obtained using ultrasonic waves.



- (i) Explain how ultrasonic waves are used to produce the image of an unborn baby.

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(2)

- (ii) Give another use for ultrasonic waves.

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(1)
(Total 3 marks)