

Other Applications of Light

Question Paper

Level	GCSE
Subject	Physics
Exam Board	AQA
Unit	P3
Topic	Other Applications of Light
Difficulty Level	Bronze Level
Booklet	Question Paper

Time Allowed: 37 minutes

Score: /37

Percentage: /100

Q1.(a) Digital cameras and human eyes both form images.

Complete **Table 1** by putting a tick in the correct column(s) to show if the parts are found in the digital camera or in the human eye or in both.

The first part has been completed for you.

Table 1

Part	In a digital camera	In the human eye
Cornea		✓
Lens		
Pupil		
Charge-coupled device (CCD)		

(3)

(b) Some humans are short-sighted.

Complete the following sentence.

Short sight can be caused by the eyeball being too

(1)

(c) Spectacles can be worn to correct short sight.

Table 2 gives information about three different lenses that can be used in spectacles.

Table 2

	Lens feature		
	Material	Mass in grams	Type
Lens A	Plastic	5.0	Concave (diverging)
Lens B	Glass	6.0	Convex (converging)

Lens C	Glass	5.5	Convex (converging)
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Which lens from **Table 2** would be used to correct short sight?

Draw a ring around the correct answer.

Lens A

Lens B

Lens C

Give the reason for your answer.

.....

(2)

(d) Every lens has a focal length.

Which factor affects the focal length of a lens?

Tick (✓) **one** box.

The colour of the lens

The refractive index of the lens material

The size of the object being viewed

(1)

(e) A lens has a focal length of 0.25 metres.

Calculate the power of the lens.

Use the correct equation from the Physics Equations Sheet.

.....

Power of lens = diopres

(2)

- (f) Laser eye surgery can correct some types of eye defect.

Which of the following is another medical use for a laser?

Tick (✓) **one** box.

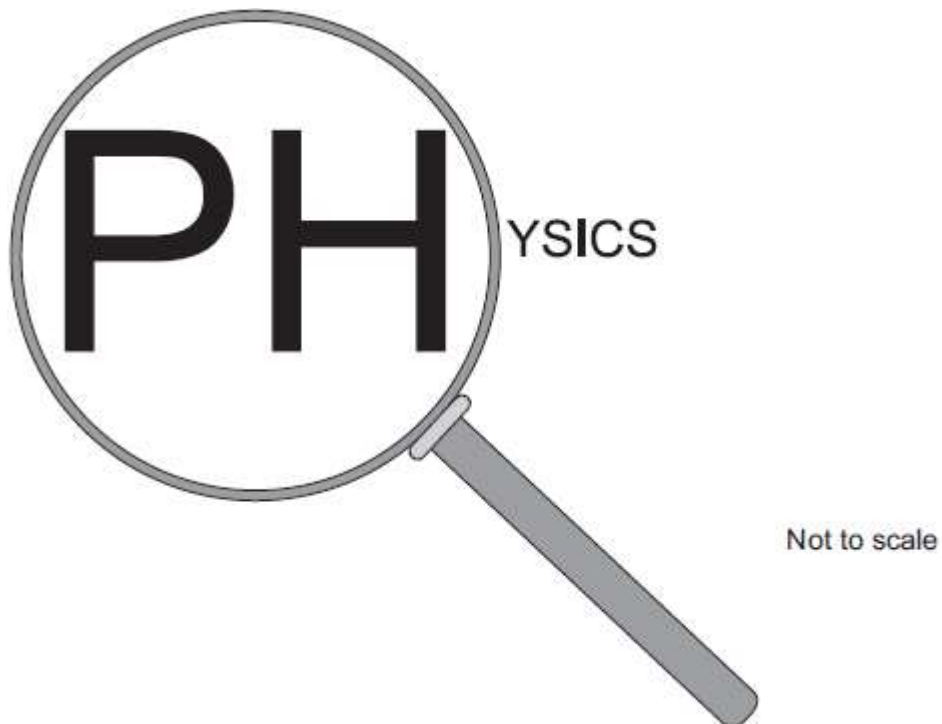
Cauterising open blood vessels

Detecting broken bones

Imaging the lungs

(1)

- (g) The figure shows a convex lens being used as a magnifying glass.



An object of height 14 mm is viewed through a magnifying glass.

The image height is 70 mm.

Calculate the magnification produced by the lens in the magnifying glass.

Use the correct equation from the Physics Equations Sheet.

.....

Magnification =

(2)
 (Total 12 marks)

Q2.(a) Visible light can be sent along optical fibres.

Which diagram correctly shows the path of light along an optical fibre?

Tick (✓) **one** box.

Optical fibre

(1)

(b) Complete the sentence to describe what happens to light as it travels through an optical fibre.

At the walls of the optical fibre, light undergoes total internal

(1)

- (c) Which device passes light through optical fibres to produce images of the inside of the body?

Draw a ring around the correct answer.

endoscope

stethoscope

X-ray machine

(1)

- (d) Lasers are an energy source.

Which **one** of the following is a use for a laser?

Draw a ring around the correct answer.

CT scanning

digital camera

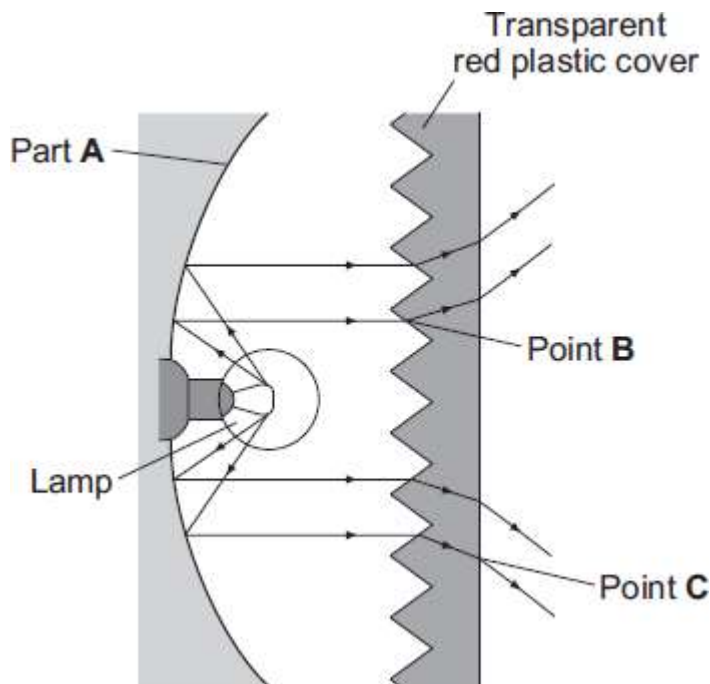
eye surgery

(1)

(Total 4 marks)

- Q3.** At night, it is important that the lights of a car can be seen by other drivers but it is dangerous if these lights dazzle them.

The diagram shows a rear light of a car.



(a) (i) Name part **A**.

.....

(1)

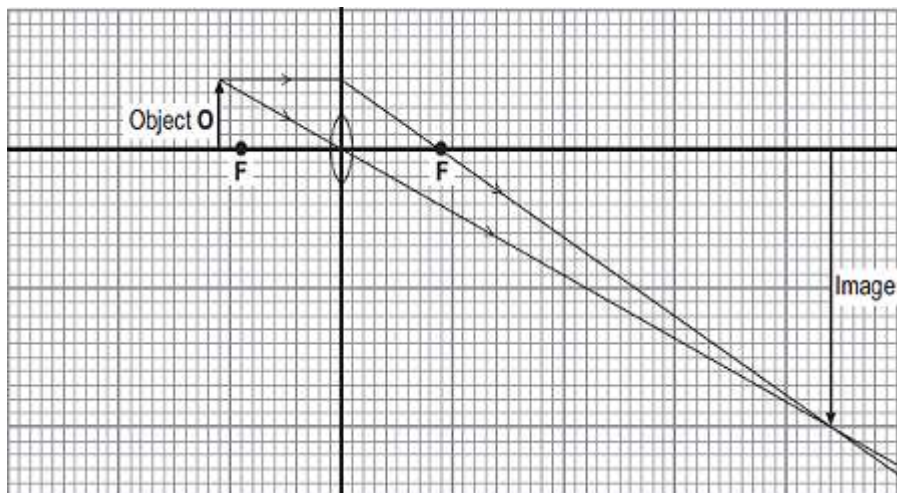
(ii) Name the process which occurs at point **B** and at point **C**.

.....

(1)

(b) A headlamp of a car contains a lens.

The ray diagram shows the position and size of the image, **I**, of an object, **O**, formed by a lens similar to the one inside a car headlamp.



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

Draw a ring around your answer.

converging

diverging

plane

(1)

(ii) The ray diagram is drawn to scale.

Use the equation in the box to calculate the magnification produced by the lens.

$\text{magnification} = \frac{\text{image height}}{\text{object height}}$

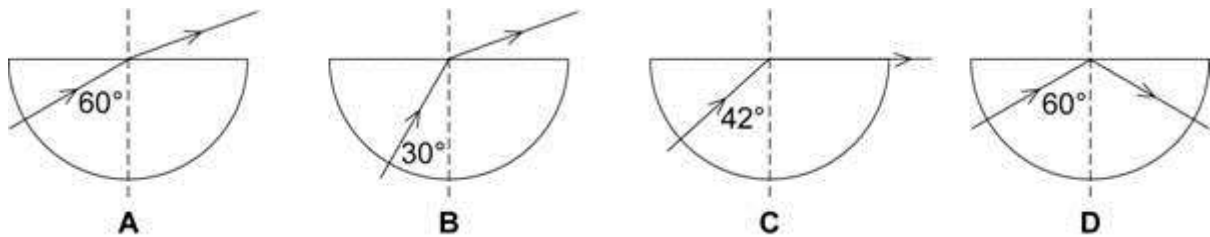
Show clearly how you work out your answer.

.....

Magnification =

(2)
 (Total 5 marks)

- Q4.** (a) Each diagram shows a light ray incident on a glass-air boundary.
The critical angle for glass is 42° .

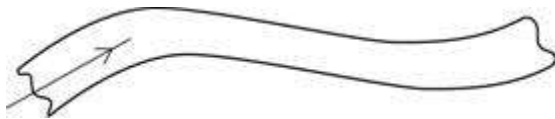


Which **one** of the diagrams, **A**, **B**, **C** or **D**, shows total internal reflection?

Write the correct letter in the box.

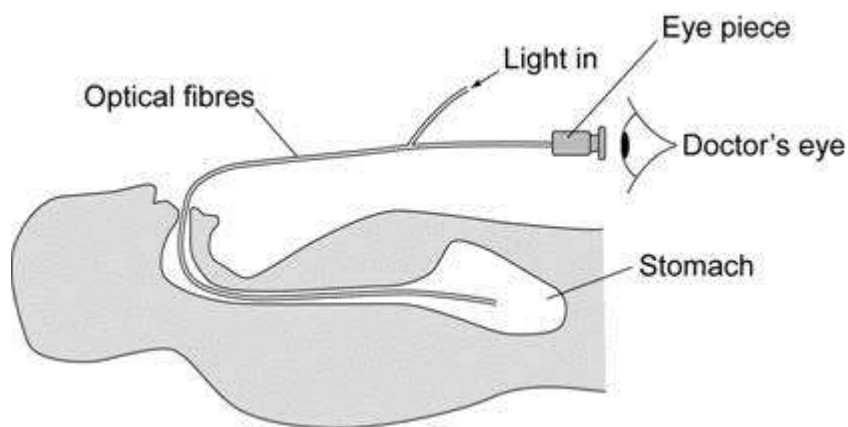
(1)

- (b) (i) Complete the diagram to show the path taken by the light ray as it travels through the optical fibre.



(2)

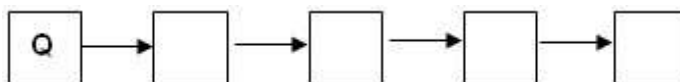
- (ii) The diagram shows an endoscope being used by a doctor to look inside a patient's stomach. Light travels into the stomach through a bundle of optical fibres.



The following sentences describe how the endoscope allows the doctor to see inside the patient's stomach. The sentences are in the wrong order.

- Q** Light passes through a bundle of optical fibres into the patient's stomach.
- R** The inside of the stomach reflects some of the light.
- S** The optical fibres take the light to an eyepiece.
- T** The doctor looks through the eyepiece to see inside the patient's stomach.
- U** The reflected light passes through a second bundle of optical fibres.

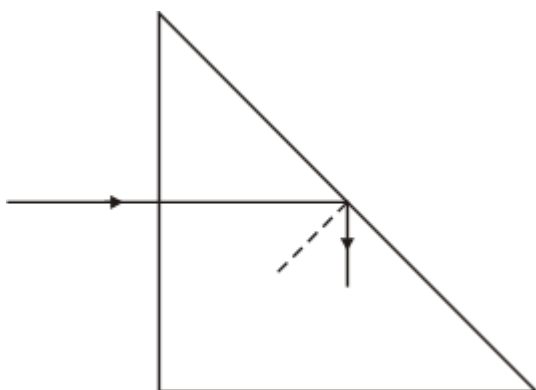
Arrange these sentences in the correct order. Start with letter **Q**.



(3)
(Total 6 marks)

Q5. Glass prisms are used in many optical devices.

- (a) The diagram shows what happens to a ray of light as it travels through a glass prism.



To gain full marks for this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

Use the words in the box to help you to explain why the ray behaves in this way.

angle	critical	normal
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.....

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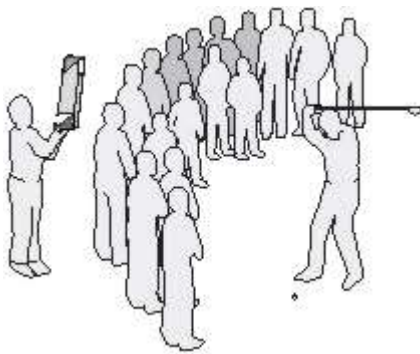
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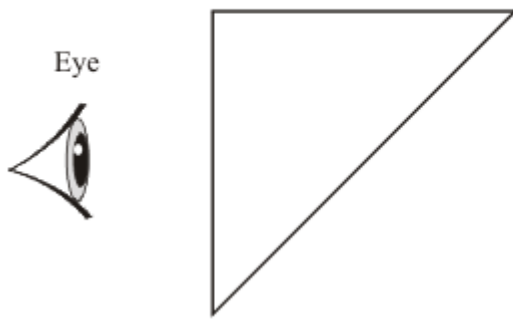
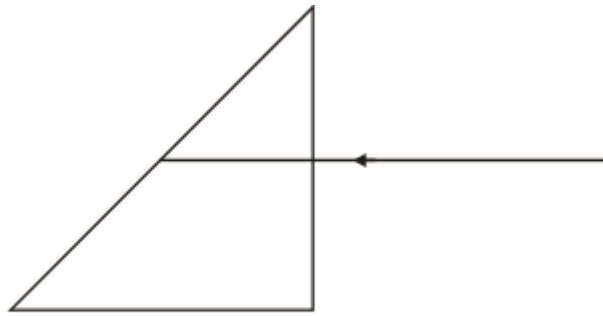
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(3)

(b) Periscopes can be used to look over the heads of other people.

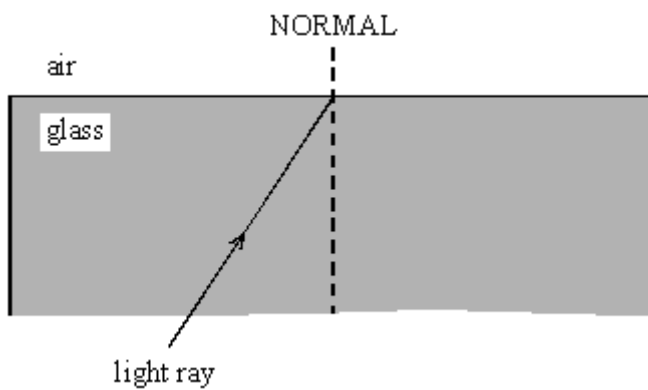


A periscope contains two glass prisms.
Complete the diagram to show the ray of light reaching the person's eye.



(3)
(Total 6 marks)

Q6. The diagram shows a ray of light travelling through a glass block.



- (a) Complete the diagram to show what happens to the ray of light when it comes out of the glass.

(2)

- (b) Explain why this happens to the ray of light.

.....

(2)

(Total 4 marks)