

Surname	Initial(s)
Signature	

American Academy Larnaca
Year 4 Test
Double Science

Physics

Topic P1a.11: *Now you see it, now you don't*

Date:

Time: 20 minutes

Formulae:

$$\text{speed} = \text{distance} \div \text{time}$$

$$\text{speed} = \text{wavelength} \times \text{frequency}$$

SQ PAPER

Question 1

Parts of the electromagnetic spectrum have various uses.

(a) Which part is used for

(i) heaters and night vision equipment,

..... (1)

(ii) sterilising food and medical equipment?

..... (1)

(b) All the parts of the electromagnetic spectrum are transverse waves.

(i) State **one** property which all the parts have in common but which is **not** shared with other waves.

..... (1)

(ii) Give **one** example of a transverse wave which is **not** part of the electromagnetic spectrum.

..... (1)

(iii) Complete the sentence below.

In a transverse wave, each point on the wave is moving in a direction which is

..... to the direction in which the of

the wave is moving.

(2)

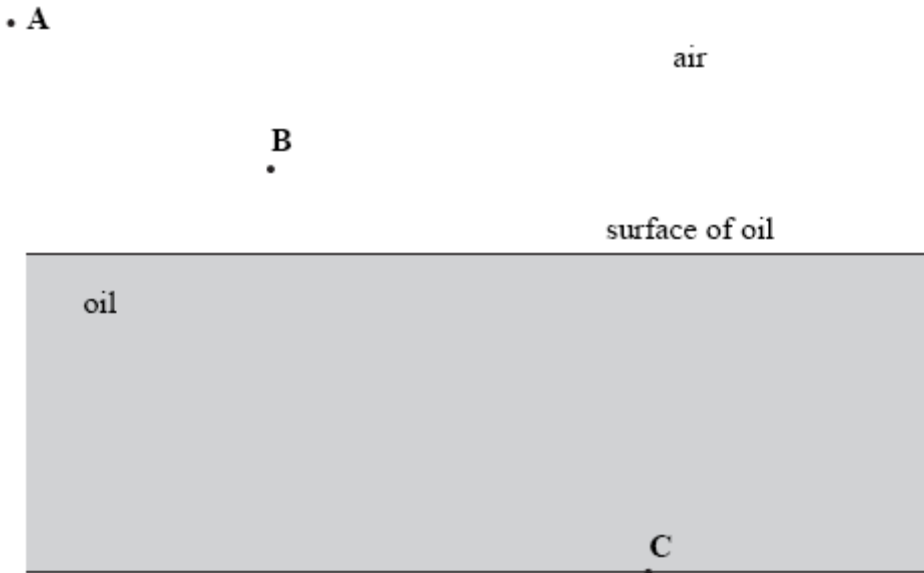
(Total 6 marks)

SQ PAPER

Question 2

A student plans to investigate the path of a ray of light as it travels from air to oil at different angles.

The diagram shows a container of oil and points **A**, **B** and **C**.



- (a) Draw a line through points **A** and **B** to show the ray of light in air. Continue your line to the surface of the oil. Label the point where your line meets the surface as point **D**. (1)
- (b) Draw the normal line (1)
- (c) Draw a line from **D** to **C** to show the ray of light in the oil. (1)
- (d) A friend of the student says that this investigation will be difficult to carry out.

Describe **two** problems which the student will have. In each case, explain how the student might solve the problem.

Problem 1:

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(2)

SQ PAPER

Problem 2:

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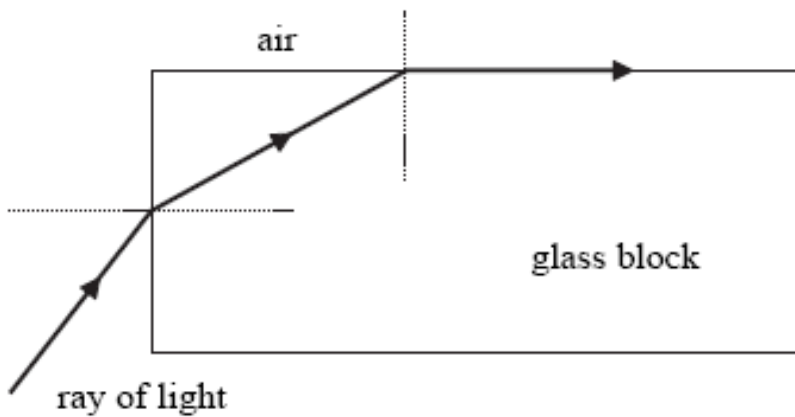
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(2)

(Total 7 points)

Question 3

A student shines a ray of light at a glass block as shown below.



Show on the diagram for this ray of light

- (a)
- (i) the angle of incidence from air to glass and label it **I**,
- (ii) the angle of refraction inside the glass and label it **R**,
- (iii) the critical angle and label it **C**.
- (b) What does the term **critical angle** mean?

(1)

(1)

(1)

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.....

.....

(1)

(Total 4 marks)

Question 4

Ultrasound is used to produce pictures of the fetus in the womb. One of these appears below.



What is ultrasound?

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(1)

Explain how ultrasound can be used to build up a picture of a fetus within the womb.

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(2)

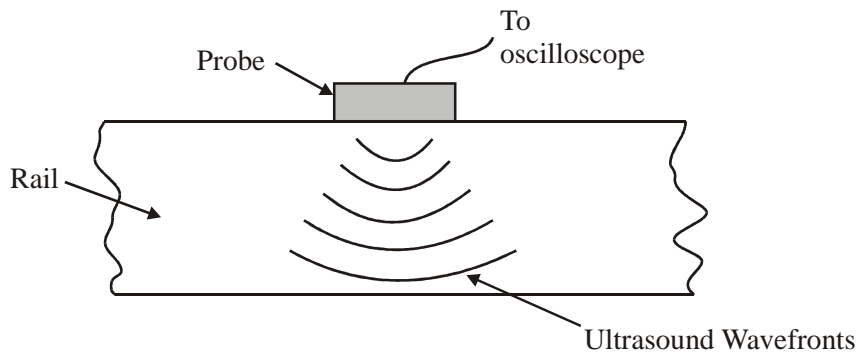
(Total 3 marks)

(Total SQ 20 marks)

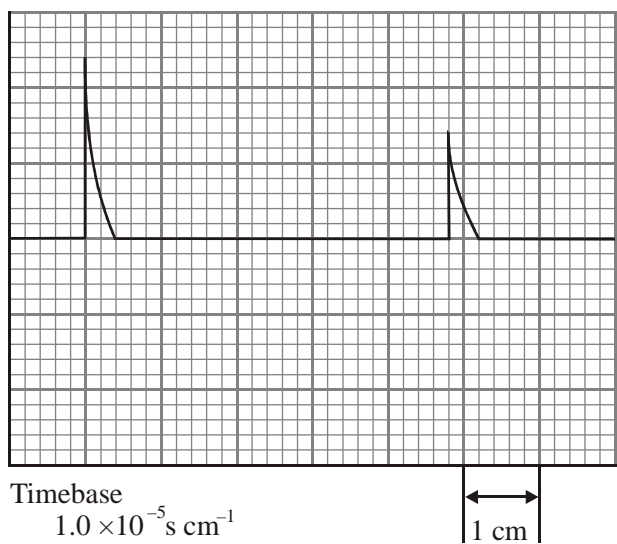
(Turn over for the bonus question)

Bonus Question

(a) In testing railway lines for faults, an ultrasonic probe is placed on a rail.



Every 1.0×10^{-1} s, the probe emits a short pulse of ultrasound. The speed of ultrasound in steel is 5100 m s^{-1} . The probe, which also acts as a receiver, is connected to an oscilloscope which displays the trace shown below.



Explain briefly how the two peaks of the trace are formed.

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(2)

SQ PAPER

How can you tell that the left peak represents the emitted pulse?

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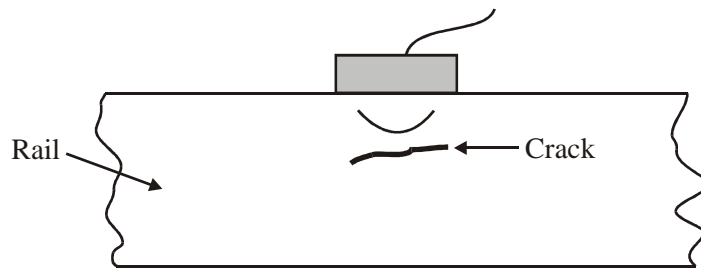
(1)

Calculate the depth of the rail using a measurement from the oscilloscope trace.

.....
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.....
.....

(3)

The probe is now moved to another position on the rail where there is a crack one third of the way down from the top.



Describe how the oscilloscope trace will change.

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(2)

Give two reasons why **pulses** of ultrasound waves are needed.

.....
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(2)

(Total 10 marks)