



SCHOLARSHIP EXAMINATION

PHYSICS

2016

Time: 30 minutes

Name:

School:

Candidates will need a pen, pencil and ruler

A calculator can be used for this paper

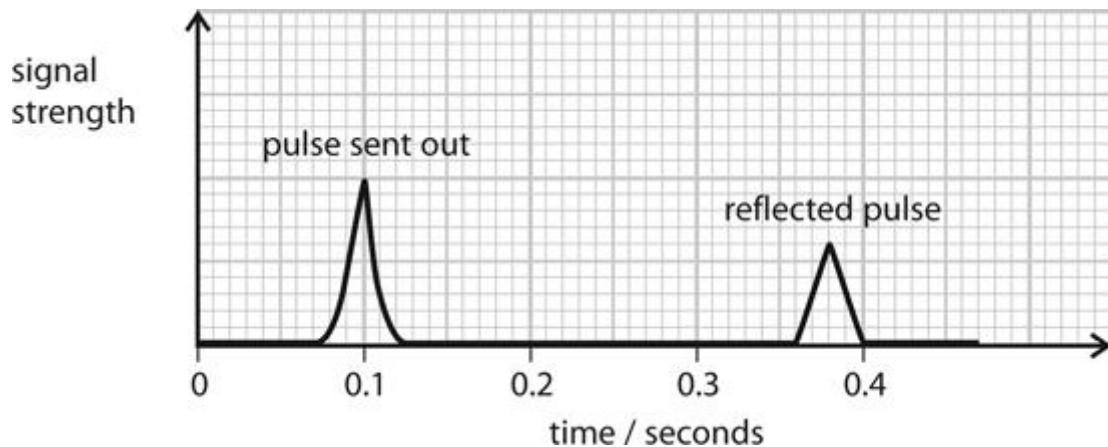
Q1.

This fishing boat has sonar equipment.



The boat's sonar sends out pulses of ultrasound.
The pulses are reflected from the seabed.
The boat's sonar detects the reflected pulses.

The graph shows a pulse sent out and its reflected pulse.



(i) How long did the pulse take to travel to the seabed and then back to the boat?(1)

time = s

(ii) The speed of ultrasound in water is 1500 m/s.
Calculate the depth of the sea under the boat.

(3)

distance = speed \times time

depth = m

(Total for question = 4 marks)

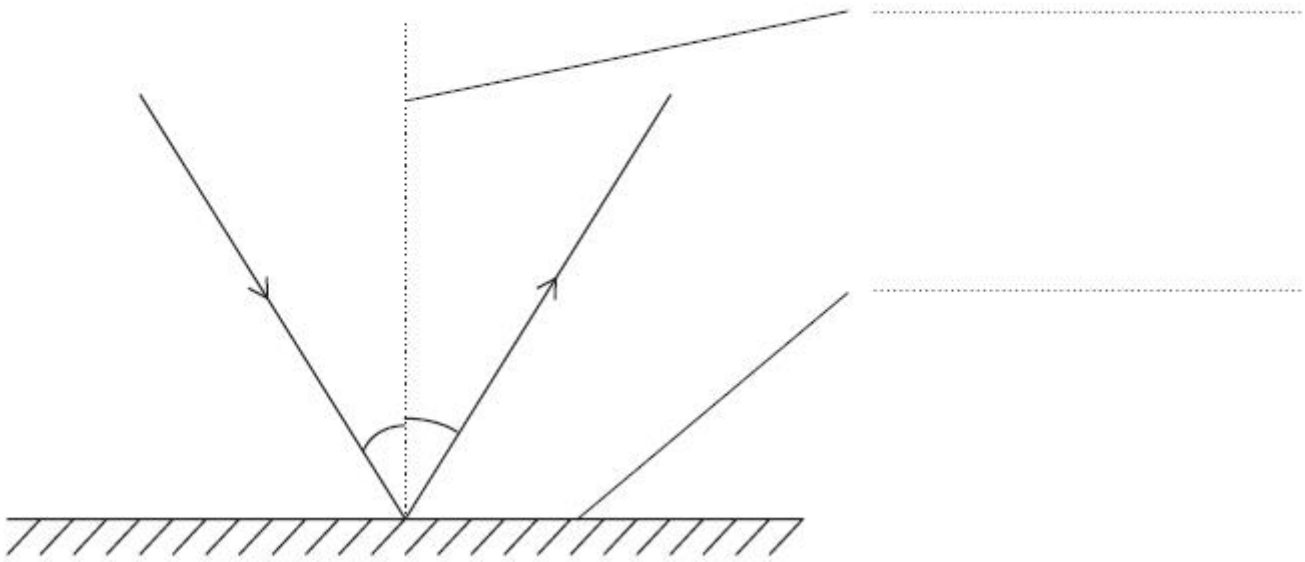
Q2.

Light from an object forms an image in a plane mirror.

(a) (i) Use words from the box to complete the labels on the diagram below.

(2)

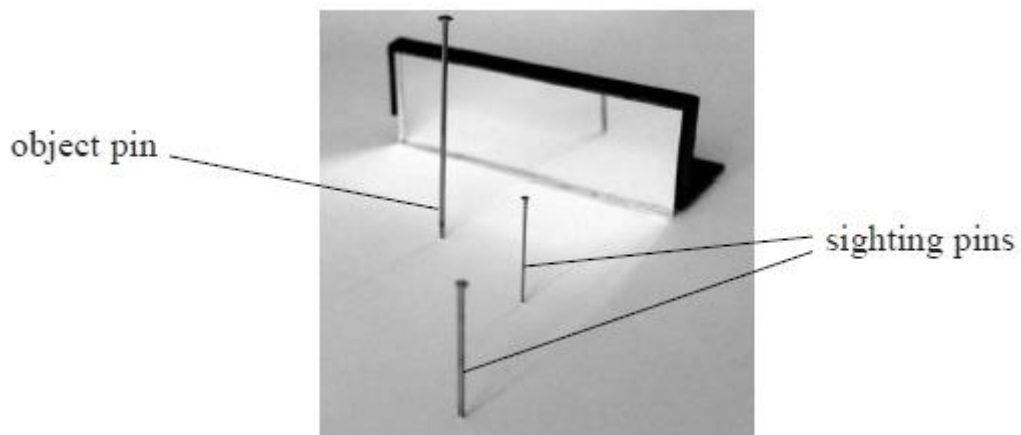
mirror normal ray reflection



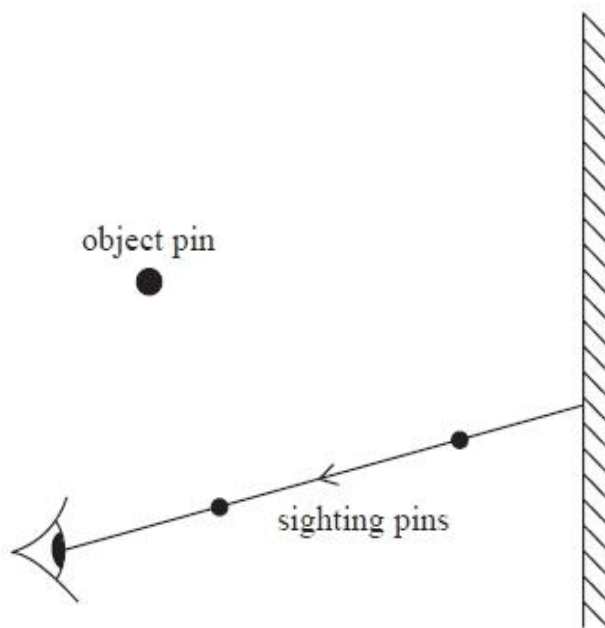
(ii) Write r on the diagram above to show the angle of reflection.

(1)

(c) A student investigates the formation of the image in a plane mirror, using the apparatus shown in the photograph.



She uses the holes that the pins make to construct this diagram.



(i) Add to the diagram to show how the student should find the position of the image.

(3)

(ii) Explain how the student could confirm that the position of the image is correct.

(2)

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(Total for question = 8marks)

Q3.

The volume of a piece of brass is 16.3 cm^3 .

A student measures its mass using an electronic balance.

The mass of the brass is 138 g.

(a) (i) State the equation linking density, mass and volume.

(1)

(ii) Calculate the density of brass.
Give the unit.

(3)

density =

(b) The student notices that the electronic balance has a zero error, so it shows mass readings that are all slightly too small.

This means that the density value is

(1)

- A incorrect and slightly too large
- B incorrect and slightly too small
- C correct because the student used three significant figures
- D correct because the mass of the block is more than zero

(Total for question = 5 marks)

Q4.

A student places a pile of coins on a table, as shown in photograph A.



Photograph A

There are 8 coins in the pile.

The weight of each coin is 0.036 N.

The area of each coin is 0.0013 m^2 .

(a) (i) State the equation linking pressure, force and area.

(1)

(ii) Calculate the pressure on the table caused by the pile of coins.

(2)

Pressure = Pa
Registered Charity SC006123

(b) The student then spreads the 8 coins out on the table as shown in photograph **B**.



Photograph B

(i) Describe how this affects the total force from the coins on the table.

(2)

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(ii) Explain how this affects the pressure on the table caused by the coins.

(2)

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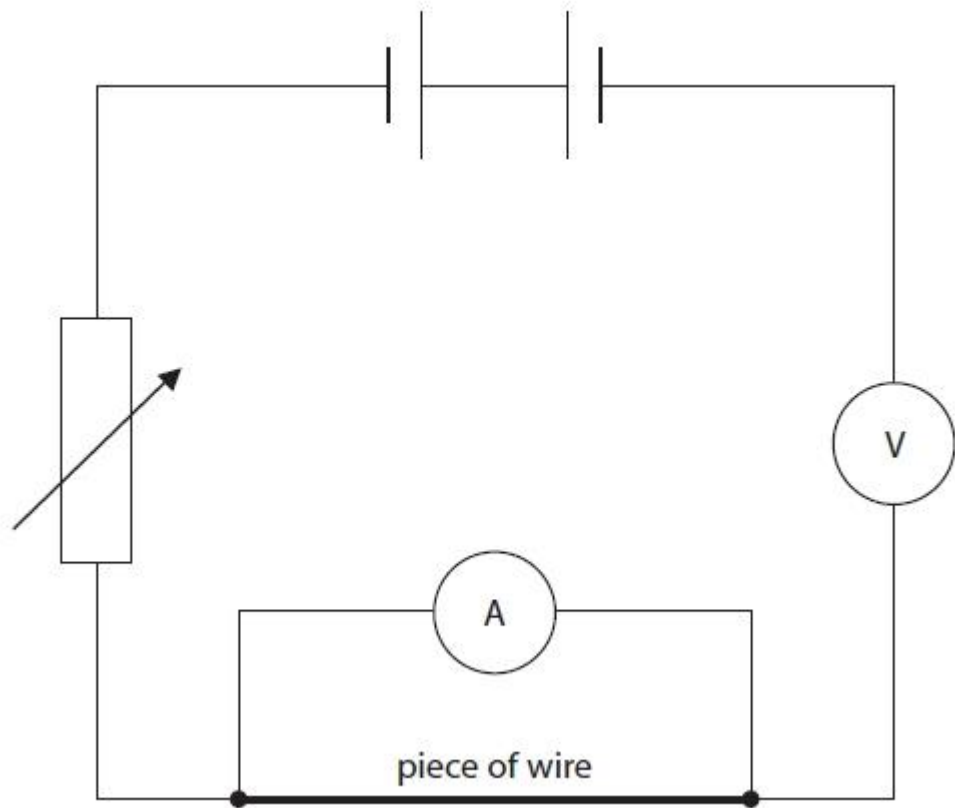
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(Total for question = 7 marks)

Q5.

A student plans to measure the resistance of a piece of wire.
He sets up this circuit and finds that it does not work.



(a) Identify the three errors in the student's circuit.

(3)

1

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2

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3

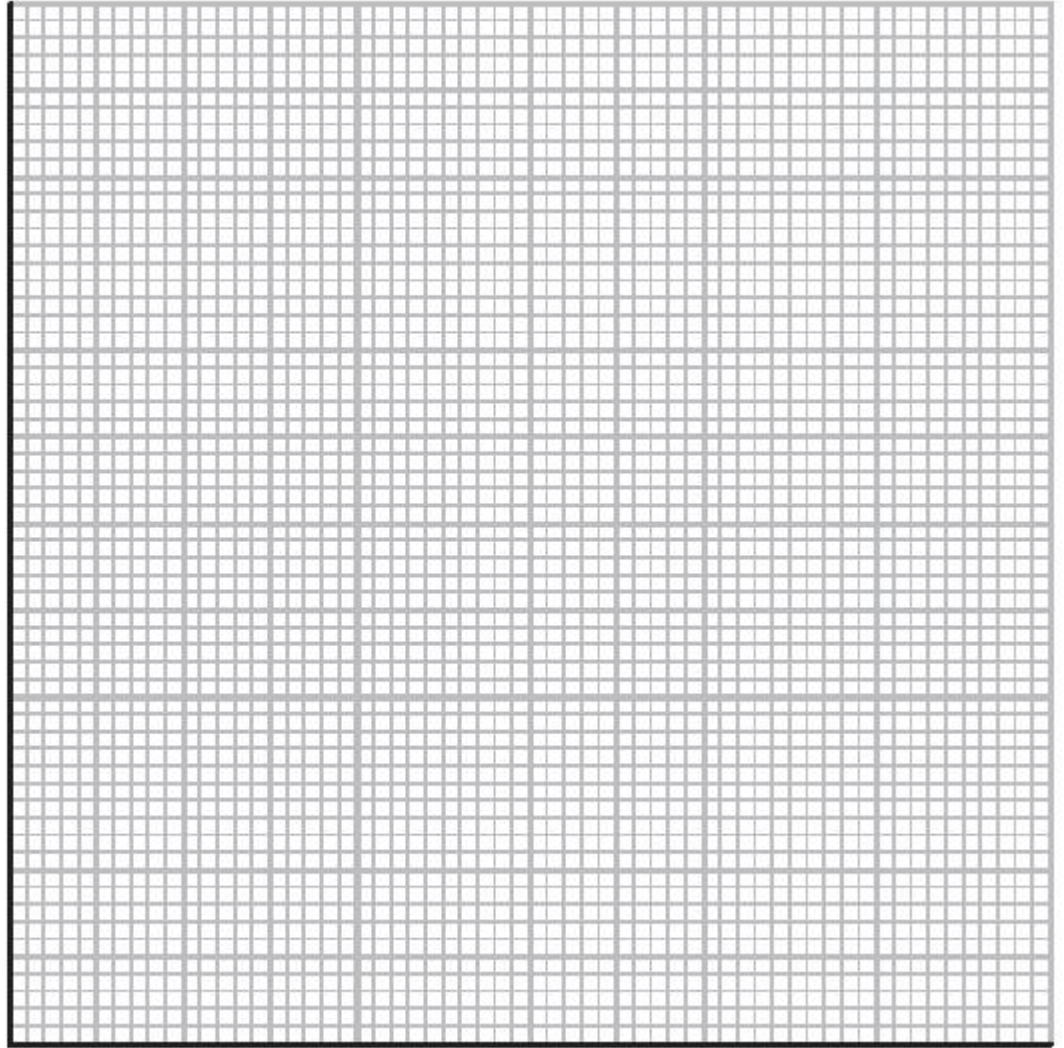
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(b) The student uses a correct circuit to obtain these results.

Current in amps	Voltage in volts
0.00	0.0
0.24	1.5
0.71	4.5
0.89	6.0
1.00	7.5
1.10	9.0

(i) Plot a graph to show the relationship between current and voltage for the wire and add the best fit line (or curve).

(5)



(ii) Find the current when the voltage is 2.5 V.

(1)

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(Total for question = 9 marks)