

SCHOLARSHIP EXAMINATION

PHYSICS

2018

Time: 30 minutes

Name: \_\_\_\_\_

School: \_\_\_\_\_

Candidates require a pen, pencil, ruler and calculator and also that they need an A4 sheet of graph paper.

This question is about the night sky

1a Name a natural object which can be seen outside of our atmosphere which is an example of a luminous object. (1)

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b Name a natural non-luminous object that is visible in the night sky (1)

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Why are we able to see it? (2)

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c Occasionally we are able to see the International Space Station above Scotland. Describe a difference between what you see this do over a 5 minute period and the other non-luminous object. (1)

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2 a Write down the relationship (equation) which links the mass, density and volume of an object. (1)

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b You have access to a displacement can (Eureka can), a top pan balance a measuring cylinder labelled 0-25 cm<sup>3</sup>, and a water tap and about 400 spheres.

Write some instructions for an experiment that would allow you to measure the density of the lead spheres which are approximately 2mm in diameter. (7)

Drawing a diagram of the apparatus once the lead has been added to the water would help you.

You also need to say what you would do with your measurements to find the density.

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**3** The results table below shows how the current flowing through an electrical component inside a sealed box changes as the Potential Difference (Voltage) applied to it increases.

Potential Difference (volts)	Current (amps)
2.0	0.39
2.5	0.50
3.0	0.62
3.5	
4.0	0.79
4.5	0.89
5.0	1.00

**Put your name on the graph paper**

- a) Use the graph paper to plot a graph of the current on the vertical axis plotted against the Potential Difference on the horizontal axis. (3)
- b) Add the best fit line to the graph. (1)
- c) Use the graph to predict the missing value in the table. Show clearly how you used the graph\_\_\_\_\_ (2)
- d) Draw a circuit diagram of a circuit which could have been used to get these results using a battery, the box with 2 external connections, a variable resistor, an ammeter and a voltmeter. (4)

**4** A 5 metre long plank of wood is used as a see-saw and balances when pivoted in the middle.

**a** A father, who weighs 900N and a mother, who weighs 700N sit on the opposite ends and then Dad moves towards the centre until the see-saw balances.

Use a horizontal line 10 cm long to represent the plank and arrows to show where the weights of the people act on the plank. (2)

How far from the centre does he finish?

Show your calculation. (5)

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**b** Father moves back to the end and then Jenny their daughter (weight 300N) climbs on to the plank at the pivot. How far and in which direction does she have to move to get the see-saw to balance? (3)

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