Write your name here

Surname	Other names

Pearson Edexcel
International
Advanced Level

Centre Number | | | | | |

Candidate Number | | | | |

Physics

International Advanced Subsidiary/Advanced Level
Unit 3: Practical Skills in Physics I

Sample Assessment Materials for first teaching September 2018

Time: 1 hour 20 minutes

Paper Reference **WPH13/01**

You must have:
Scientific calculator, Ruler

Total Marks

Instructions

- Use **black** ink or **black** ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Show all your working in calculations** with **your answer clearly identified** at the **end of your solution**.

Information

- The total mark for this paper is 50.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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Answer ALL questions.

1 A student uses a graphical method to determine the resistivity of a material in the form of a wire.

(a) State three advantages of using a graphical method.

(3)

(b) The student measures the diameter of the wire using a micrometer screw gauge.

Explain a technique that the student should use to make this measurement as accurate as possible.

(3)

(Total for Question 1 = 6 marks)

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2 A student determines the density of a metal in the form of a cylinder.

(a) The student uses Vernier calipers to measure the diameter of the cylinder. The reading she obtains is 24.0 mm.

Calculate the percentage uncertainty in the measurement of the diameter.

(2)

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.....

.....

Percentage uncertainty in measurement of diameter = ...

(b) The length of the cylinder is approximately 160 mm.

(i) State a suitable instrument for measuring the length.

(1)

.....

(ii) The student records the following readings for the length.

158 mm 159 mm 161 mm 162 mm

Calculate the percentage uncertainty in the measurement of the length.

(2)

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Percentage uncertainty in measurement of length = ...

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(c) The mass of the cylinder is 0.616 kg.

Calculate the density of the metal.

(4)

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Density = ...

(Total for Question 2 = 9 marks)

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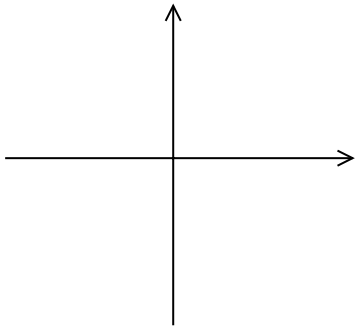
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3 A student is investigating diodes.

(a) Sketch a current-potential difference graph for a diode on the axes below.

(2)



(b) Describe the experimental procedure the student should use to obtain measurements to plot the graph in (a). The student has access to a fixed 12 V power supply, digital meters and other circuit components. Your answer should include a circuit diagram.

(6)

(c) Identify the main sources of uncertainty in this experiment.

(2)

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(d) Comment on any safety issues associated with this experiment.

(1)

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(e) Explain how you would use the graph to determine the resistance of the diode at a given potential difference.

(2)

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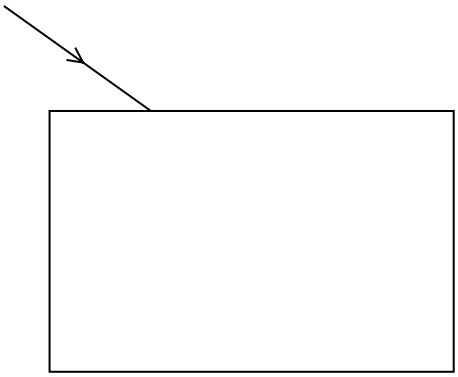
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(Total for Question 3 = 13 marks)

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4 A student determined the refractive index of glass by shining a ray of light on to a rectangular glass block as shown.



(a) The ray is refracted and emerges from the opposite side of the glass block.

Add to the diagram to show how the ray of light will pass through the glass block and emerge from the opposite side.

(2)

(b) Describe how the student should accurately determine the path of the ray through the glass block.

(2)

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(c) The student measured the angle of incidence i and the corresponding angle of refraction r for the ray. He repeated the procedure several times for different values of i. His measurements and his values of $\sin i$ are recorded in the table below.

i / °	r / °	sin i	sin r
10	5	0.17	
20	12	0.34	
30	18	0.50	
35	21	0.57	

(i) Criticise these measurements.

(2)

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(ii) Use the data in the table to plot a graph of $\sin i$ on the y-axis against $\sin r$ on the x-axis on the grid provided. Use the right-hand column for your processed data.

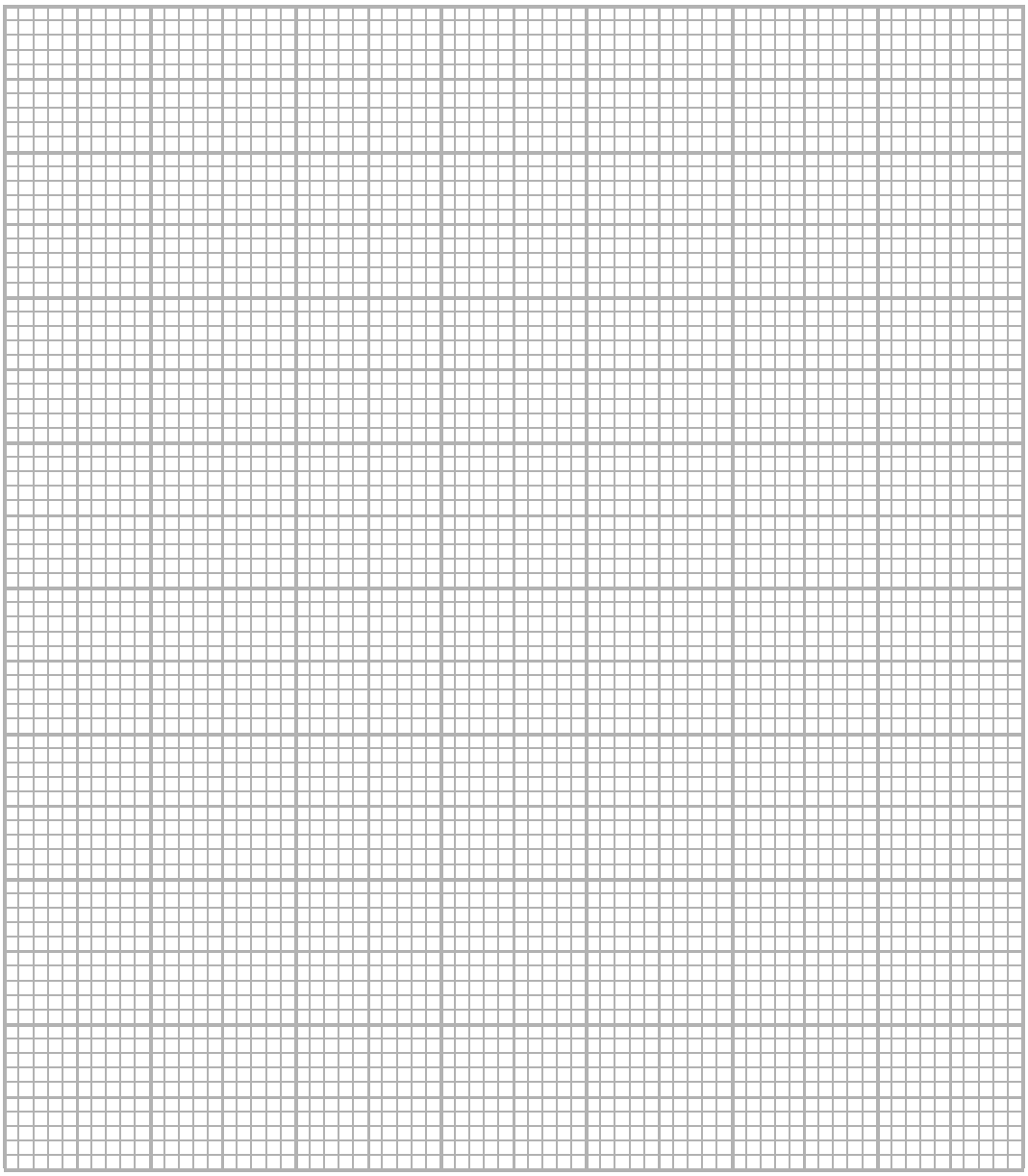
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(iii) Use your graph to determine the refractive index of the glass.

(3)

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Refractive index of glass = ...

(Total for Question 4 = 15 marks)

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5 A student carried out an experiment to determine the viscosity η of a liquid. She dropped a sphere through a column of liquid and obtained the following results.

Diameter of sphere d	3.1 mm
Density of sphere ρ_s	8500 kg m^{-3}
Density of liquid ρ_l	1260 kg m^{-3}
Terminal velocity v of sphere	0.038 m s^{-1}

(a) Use the equation given below to calculate η, where r is the radius of the sphere.

$$v = \frac{2r^2(\rho_s - p_l)g}{9\eta}$$

(4)

η = ...

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(b) Suggest three experimental techniques the student could have used to obtain accurate results.

(3)

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(Total for Question 5 = 7 marks)

TOTAL FOR PAPER = 50 MARKS

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