Chapter 5.4 Exam Q Year 11

Question 1

(19 marks)

Several students were carrying out an investigation to determine the resistance of an unknown device. They set up a suitable circuit and measured the current while changing the potential difference. The table below shows their results.

Potential Difference (V)	Current (A)	Calculated resistance (Ω) to three significant figures
1.00	0.0740	
1.50	0.0940	
2.00	0.136	
2.50	0.165	
3.00	0.198	
3.50	0.230	
	Average resistance	

(a) Complete the table above, calculating each resistance value and the average resistance, to **three** significant figures. (3 marks)

(b) Any investigation has a number of variables that can affect the results. For this investigation, name the independent and dependent variables. (2 marks)

Independent variable: _____

Dependent variable: _____

(c) The accuracy of any measurement is affected by the precision of the instrument used. With the ammeter, the students were able to read the current accurately to three decimal places. Complete the reading below to include the absolute error of this reading. (1 mark)

0.250 ± _____ A

(d) Draw a simple circuit that includes the device, power pack, an ammeter and a voltmeter that could be used to conduct this investigation. Label the ammeter 'A' and the voltmeter 'V'. (3 marks)

(e) Use the grid below to graph the potential difference against the current.

Plot the potential difference on the Y-axis and the current on the X-axis. Rule in a line of best fit. (3 marks)

If you wish to make a second attempt at this item, the grid is repeated at the end of this Question/Answer Booklet. Indicate clearly on this page if you have used the second grid and cancel the working on the grid on this page.

(f) Determine the gradient of the line of best fit and include the correct units in your answer. (3 marks)

(g) Resistors can be ohmic or non-ohmic.

(i) Is the unknown device ohmic or non-ohmic? Circle the correct answer. (1 mark)

ohmic non-ohmic

(ii) Justify your choice by explaining the difference between an ohmic and a non-ohmic resistor. (3 marks)