

Practical Skills Questions

Name: _____

Class: _____

Date: _____

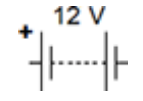




Time: **43 minutes**

Marks: **42 marks**

Comments:

Q1. A student wants to investigate how the current through a filament lamp affects its resistance.

(a) Use the circuit symbols in the boxes to draw a circuit diagram that she could use.

12 V battery	variable resistor	filament lamp	voltmeter	ammeter
				

(2)

(b) Describe how the student could use her circuit to investigate how the current through a filament lamp affects its resistance.

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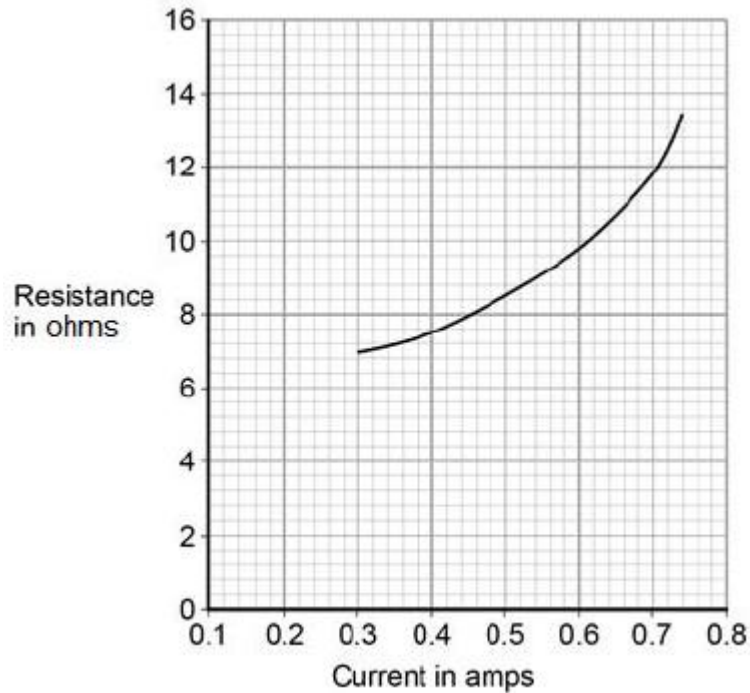
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(4)

(c) The student's results are shown in **Figure 1**.

Figure 1



Describe how the resistance of the filament lamp changes as the current through it increases.

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(1)

- (d) Use **Figure 1** to estimate the resistance of the filament lamp when a current of 0.10 A passes through the lamp.

Resistance = Ω

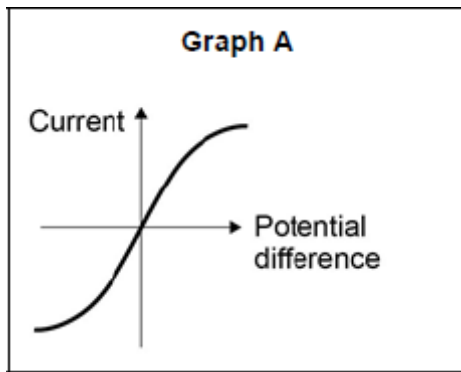
(1)

- (e) The current- potential difference graphs of three components are shown in **Figure 2**.

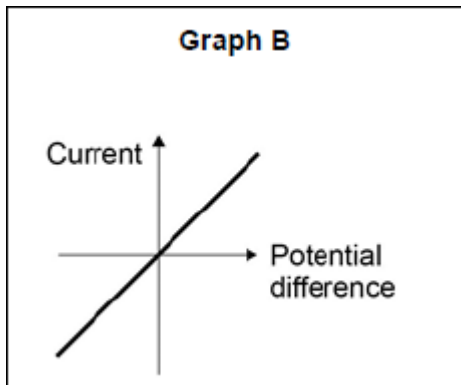
Use answers from the box to identify each component.

diode	filament lamp	light dependent resistor
resistor at constant temperature	thermistor	

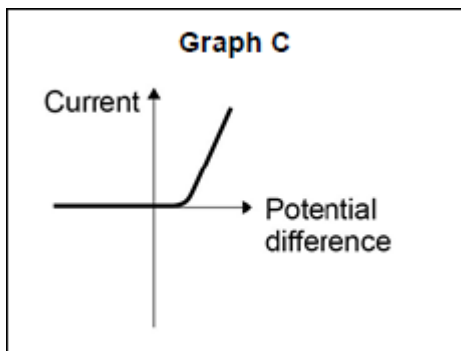
Figure 2



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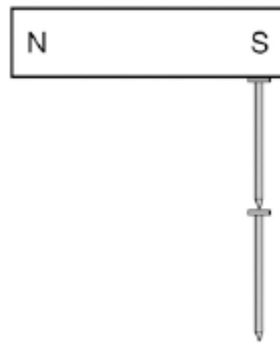
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(3)
(Total 11 marks)

Q2.Figure 1 shows two iron nails hanging from a bar magnet.

The iron nails which were unmagnetised are now magnetised.

Figure 1



(a) Complete the sentence.

Use a word from the box.

forced	induced	permanent
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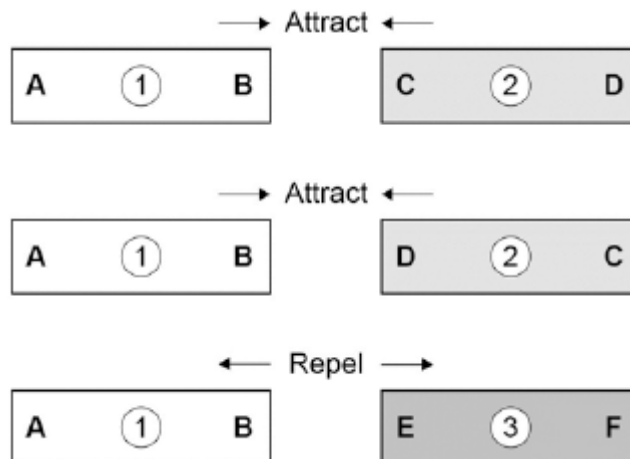
The iron nails have become magnets.

(1)

(b) Each of the three metal bars in **Figure 2** is either a bar magnet or a piece of unmagnetised iron.

The forces that act between the bars when different ends are placed close together are shown by the arrows.

Figure 2



Which **one** of the metal bars is a piece of unmagnetised iron?

Tick **one** box.

Bar 1

Bar 2

Bar 3



Give the reason for your answer.

.....

(2)

- (c) A student investigated the strength of different fridge magnets by putting small sheets of paper between each magnet and the fridge door.

The student measured the maximum number of sheets of paper that each magnet was able to hold in place.

Why was it important that each small sheet of paper had the same thickness?

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(1)

- (d) Before starting the investigation the student wrote the following hypothesis:

'The bigger the area of a fridge magnet the stronger the magnet will be.'

The student's results are given in the table below.

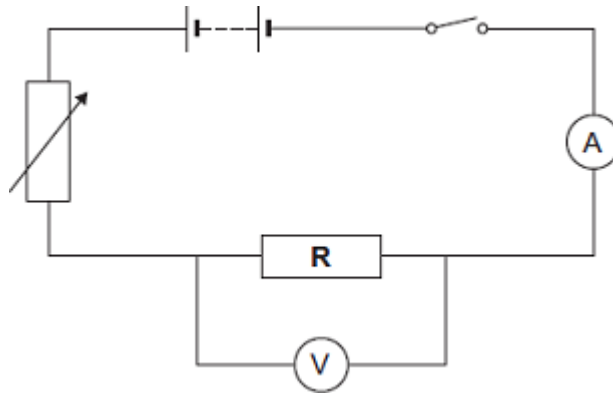
Fridge magnet	Area of magnet in mm ²	Number of sheets of paper held
A	40	20
B	110	16
C	250	6
D	340	8
E	1350	4

Give **one** reason why the results from the investigation **do not** support the student's hypothesis.

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(1)
(Total 5 marks)

Q3.(a) A resistor is a component that is used in an electric circuit.



(i) Describe how a student would use the circuit to take the readings necessary to determine the resistance of resistor **R**.

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(6)

(ii) Explain why the student should open the switch after each reading.

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.....
.....

(2)

(iii) In an experiment using this circuit, an ammeter reading was 0.75 A.
The calculated value of the resistance of resistor **R** was 16 Ω.

What is the voltmeter reading?

.....
.....

Voltmeter reading = V

(2)

(iv) The student told his teacher that the resistance of resistor **R** was 16 Ω.

The teacher explained that the resistors used could only have one of the following values of resistance.

- 10 Ω 12 Ω 15 Ω 18 Ω 22 Ω**

Suggest which of these resistors the student had used in his experiment.

Give a reason for your answer.

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(2)

(b) The diagram shows a fuse.



Describe the action of the fuse in a circuit.

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(3)
(Total 15 marks)

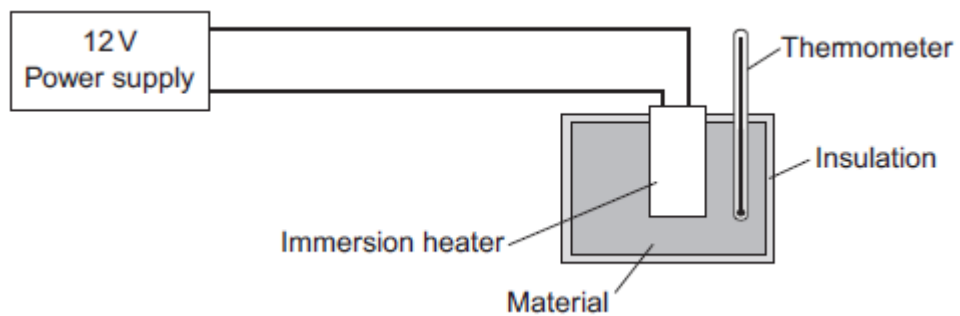
Q4.A student used the apparatus in **Figure 1** to compare the energy needed to heat blocks of different materials.

Each block had the same mass.

Each block had holes for the thermometer and the immersion heater.

Each block had a starting temperature of 20 °C.

Figure 1



The student measured the time taken to increase the temperature of each material by 5 °C.

(a) (i) State **two** variables the student controlled.

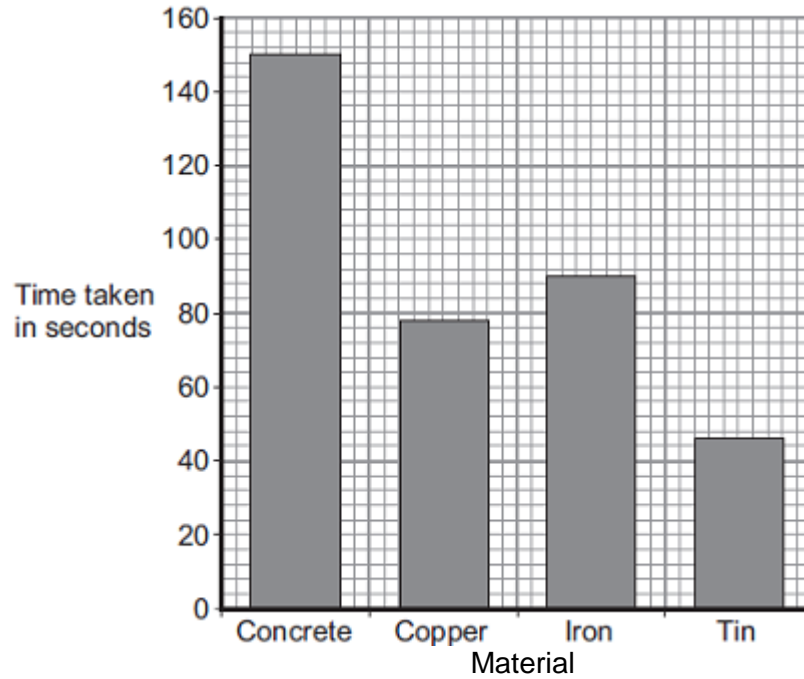
1

2

(2)

Figure 2 shows the student's results.

Figure 2



(ii) Why was a bar chart drawn rather than a line graph?

.....

(1)

(iii) Which material was supplied with the most energy?

.....

Give the reason for your answer.

.....

(2)

(iv) The iron block had a mass of 2 kg.

Calculate the energy transferred by the heater to increase the temperature of the iron block by 5 °C.

The specific heat capacity of iron is 450 J / kg °C.

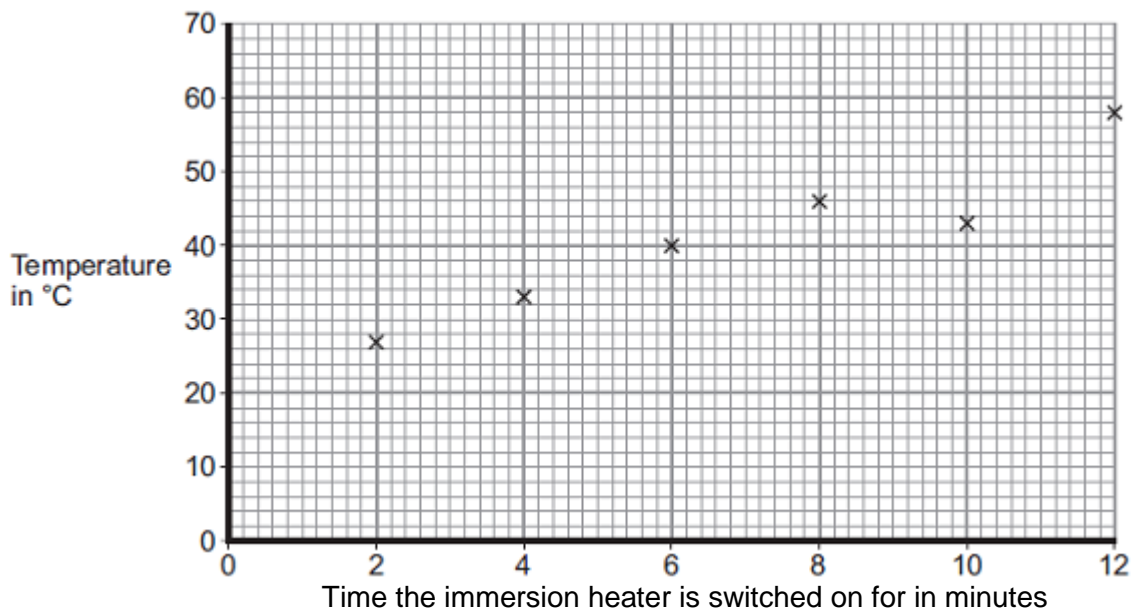
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Energy transferred = J

(2)

- (b) The student used the same apparatus to heat a 1 kg block of aluminium.
 He recorded the temperature of the block as it was heated from room temperature.
 The results are shown in **Figure 3**.

Figure 3



- (i) One of the student's results is anomalous.
 Draw a ring around the anomalous result. (1)
- (ii) Draw the line of best fit for the points plotted in **Figure 3**. (1)
- (iii) What was the temperature of the room?
 Temperature = °C (1)
- (iv) What was the interval of the time values used by the student?

Interval = minutes

(1)
(Total 11 marks)

M1.(a)	battery, lamp and ammeter connected in series with variable resistor	1
	voltmeter in parallel with (filament) lamp	1
(b)	<p>Level 2 (3–4 marks): A detailed and coherent description of a plan covering all the major steps is provided. The steps are set out in a logical manner that could be followed by another person to obtain valid results.</p> <p>Level 1 (1–2 marks): Simple statements relating to relevant apparatus or steps are made but they may not be in a logical order. The plan would not allow another person to obtain valid results.</p> <p>0 marks: No relevant content</p> <p>Indicative content</p> <ul style="list-style-type: none"> • ammeter used to measure current • voltmeter used to measure potential difference • resistance of variable resistor altered to change current in circuit or change potential difference (across filament lamp) • resistance (of filament lamp) calculated or $R=V / I$ statement • resistance calculated for a large enough range of different currents that would allow a valid conclusion about the relationship to be made 	4
(c)	(as current increases) resistance increases (at an increasing rate)	1
(d)	any value between 6.3 and 6.9 (Ω)	1
(e)	A: Filament lamp	1

B: Resistor at constant temperature

1

C: Diode

1

[11]

M2.(a) induced

1

(b) bar 2

1

(the same end) of bar 1 attracts both ends of bar 2

or

only two magnets can repel so cannot be bar 1 or bar 3

1

(c) so the results for each magnet can be compared

or

so there is only one independent variable

fair test is insufficient

allow different thickness of paper would affect number of sheets each magnet could hold

accept it is a control variable

1

(d) because the magnet with the biggest area was not the strongest

accept any correct reason that confirms the hypothesis is wrong eg smallest magnet holds more sheets than the largest

1

[5]

- M3.(a)** (i) any **six** from:
- switch on
 - read both ammeter and voltmeter
allow read the meters
 - adjust variable resistor to change the current
 - take further readings
 - draw graph
 - (of) V against I
allow take mean
 - $R = V / I$
allow take the gradient of the graph
- 6**
- (ii) resistor would get hot if current left on
- 1**
- so its resistance would increase
- 1**
- (iii) 12 (V)
0.75 × 16 gains 1 mark
- 2**
- (iv) 15 (Ω)
- 1**
- 16 is nearer to that value than any other
- 1**
- (b) if current is above 5 A / value of fuse
- 1**
- fuse melts
allow blows / breaks
*do **not** accept exploded*
- 1**

breaks circuit

1
[15]M4.(a) (i) any **two** from:

- mass (of block)
accept weight for mass
- starting temperature
- final / increase in temperature
temperature is insufficient
- voltage / p.d.
same power supply insufficient
- power (supplied to each block)
- type / thickness of insulation
same insulation insufficient

2

- (ii) one of variables is categoric
or
(type of) material is categoric
accept the data is categoric
accept a description of categoric
*do **not** accept temp rise is categoric*

1

- (iii) concrete
reason only scores if concrete chosen

1

- (heater on for) longest / longer time
a long time or quoting a time is insufficient
*do **not** accept it is the highest bar*

1

- (iv) 4500 (J)
allow 1 mark for correct substitution ie
 $2 \times 450 \times 5$ provided no subsequent step shown

2

- (b) (i) point at 10 minutes identified 1
- (ii) line through all points except anomalous
line must go from at least first to last point 1
- (iii) 20 (°C)
if 20°C is given, award the mark.
If an answer other than 20°C is given, look at the graph. If the graph shows a correct extrapolation of the candidate's best-fit line and the intercept value has been correctly stated, allow 1 mark. 1
- (iv) 2 (minutes) 1
- [11]**