

Electrical Quantities and Components (MCQ Only)

Q1.

A hair dryer is used for 3 minutes. The operating current is 6 A.

What charge flows in this time?

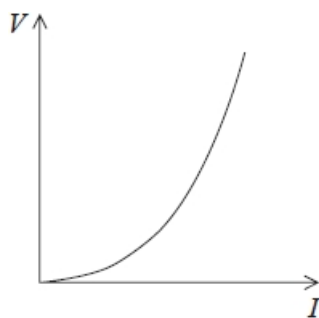
(1)

- A** 0.03 C
- B** 2 C
- C** 18 C
- D** 1080 C

(Total for question = 1 mark)

Q2.

The graph shows how the potential difference V varies with the current I for a circuit component.



Which of the following could be the circuit component?

- A** diode
- B** filament bulb
- C** ohmic resistor
- D** thermistor

(Total for question = 1 mark)

Q3.

A light dependent resistor and a negative temperature coefficient thermistor are connected in series.

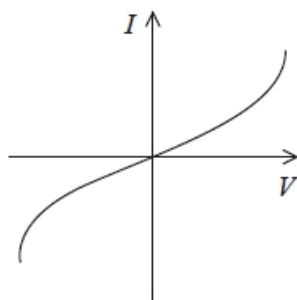
Which of the following combinations of illumination and temperature will result in the highest combined resistance?

(1)

- A** dark and cold
- B** dark and hot
- C** light and cold
- D** light and hot

(Total for question = 1 mark)**Q4.**

The diagram shows a graph of current I against potential difference V for an electrical component.



Which of the following components would produce a graph of this shape?

- A** filament bulb
- B** metallic conductor
- C** negative temperature coefficient thermistor
- D** ohmic conductor

(Total for question = 1 mark)

Q5.

A cell is connected across a resistor. After a while the internal resistance of the cell increases.

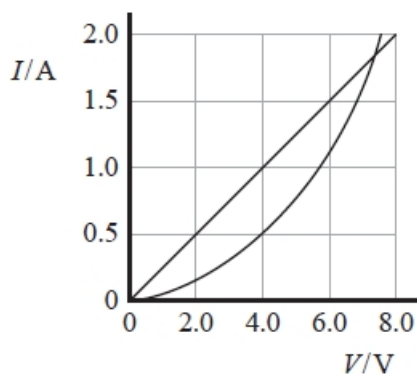
Which row of the table correctly shows the change in the current in the circuit and the change in the terminal potential difference across the cell?

	Current	Terminal potential difference
<input type="checkbox"/> A	decreases	decreases
<input type="checkbox"/> B	decreases	increases
<input type="checkbox"/> C	increases	decreases
<input type="checkbox"/> D	increases	increases

(Total for question = 1 mark)

Q6.

The current-potential difference graphs for a resistor and a thermistor are shown.



The resistor and thermistor are connected in series to a 6 V battery.

What is the current, in amps, in the resistor?

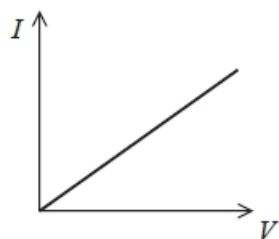
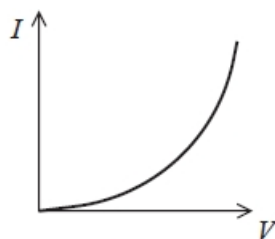
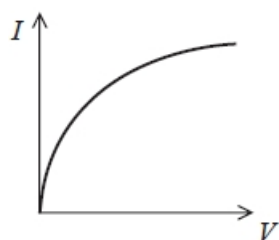
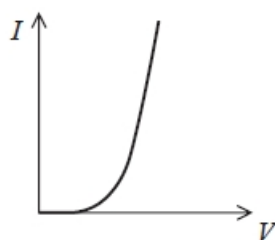
(1)

- A 0.5
- B 1.0
- C 1.5
- D 2.0

(Total for question = 1 mark)

Q7.

Which of the following graphs shows how the current I through a thermistor varies with the potential difference V across the thermistor?

**A****B****C****D**

- A**
- B**
- C**
- D**

(Total for question = 1 mark)

Q8.

A volt can be defined as a

(1)

- A** coulomb per joule.
- B** coulomb per second.
- C** joule per coulomb.
- D** joule per second.

(Total for question = 1 mark)

Q9.

Resistivity can be described correctly as

- A** resistance of a unit length.
- B** resistance per unit area.
- C** resistance per unit volume.
- D** resistance of a unit cube.

(Total for question = 1 mark)**Q10.**

The intensity of light incident on a light dependent resistor (LDR) can vary both its electrical resistance R and the number of charge carriers per unit volume n . The light intensity on an LDR is increased.

Which row of the table describes the effect on R and n ?

	R	n
<input type="checkbox"/> A	decreases	decreases
<input type="checkbox"/> B	decreases	increases
<input type="checkbox"/> C	increases	decreases
<input type="checkbox"/> D	increases	increases

(Total for question = 1 mark)**Q11.**

A constant current maintained in a copper wire causes the temperature of the wire to increase.

Which of the following does **not** increase?

- A** amplitude of vibration of the lattice ions
- B** number of conduction electrons per unit volume
- C** rate of collision of conduction electrons with lattice ions
- D** rate of energy transfer from conduction electrons to lattice ions

(Total for question = 1 mark)

Q12.

A light dependent resistor is connected across a cell of negligible internal resistance. The light intensity is increased.

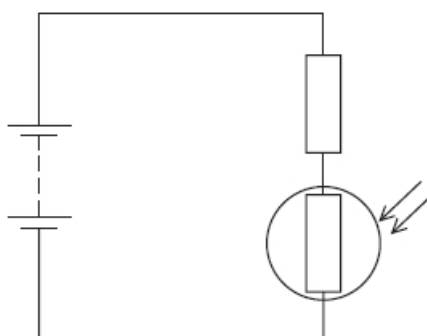
Which of the following statements about the current is correct?

- A** It decreases because there is an increase in the number of conduction electrons.
- B** It increases because there is an increase in the number of conduction electrons.
- C** It decreases because the amplitude of lattice vibrations decreases.
- D** It increases because the amplitude of lattice vibrations increases.

(Total for question = 1 mark)

Q13.

A light dependent resistor (LDR) and a resistor are connected to a battery, as shown.



The intensity of light incident on the LDR increases.

Which row of the table describes the change in the resistance of the LDR and the change in the potential difference across the resistor?

	Resistance of LDR	Potential difference across the resistor
<input type="checkbox"/> A	decreases	decreases
<input type="checkbox"/> B	decreases	increases
<input type="checkbox"/> C	increases	decreases
<input type="checkbox"/> D	increases	increases

(Total for question = 1 mark)

Q14.

A series circuit consists of two resistors with resistances R_1 and R_2 and a battery of potential difference V .

Which of the following gives the potential difference across the resistor with resistance R_2 ?

(1)

A $\frac{R_1}{R_2} V$

B $\frac{R_2}{R_1} V$

C $\frac{R_1}{R_1 + R_2} V$

D $\frac{R_2}{R_1 + R_2} V$

(Total for question = 1 mark)

Q15.

A torch is switched on for 5 minutes. The current in the torch bulb is 6 mA.

Which of the following gives the charge, in coulombs, that flows in this time?

A $6 \times 10^{-3} \times 5$

B $\frac{6 \times 10^{-3}}{5}$

C $\frac{6}{300}$

D $6 \times 10^{-3} \times 300$

(Total for question = 1 mark)

Q16.

A potential difference V is applied across the ends of a conductor. The drift velocity of the charge carriers in the conductor is v .

Which of the following expressions gives the relationship between drift velocity and potential difference?

A $v \propto \frac{1}{V}$

B $v \propto \frac{1}{V^2}$

C $v \propto V$

D $v \propto V^2$

(Total for question = 1 mark)

Q17.

Which of the following is the SI base unit for resistance?

A Ω

B $V A^{-1}$

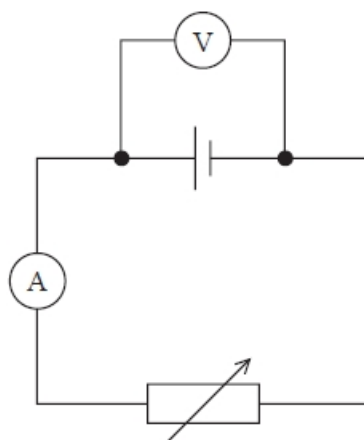
C $kg m^2 s^{-3} A^{-2}$

D $kg m^2 s^{-1} C^{-2}$

(Total for question = 1 mark)

Q18.

A variable resistor is connected in a circuit as shown. The cell has internal resistance.



The resistance of the variable resistor is increased.

Which row of the table is correct?

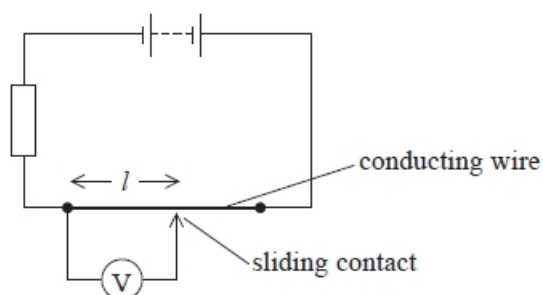
	Ammeter reading	Voltmeter reading
<input type="checkbox"/> A	increases	increases
<input type="checkbox"/> B	increases	decreases
<input type="checkbox"/> C	decreases	increases
<input type="checkbox"/> D	decreases	decreases

(Total for question = 1 mark)

Q19.

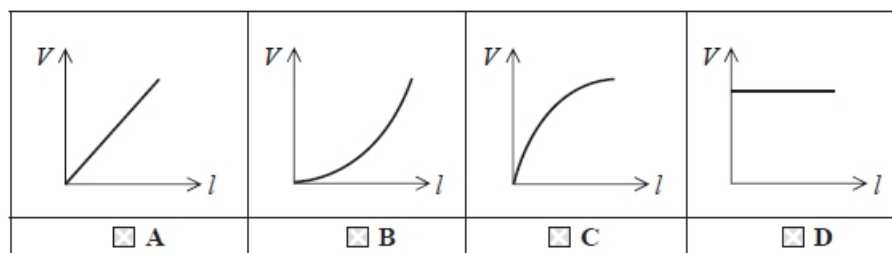
A student set up the circuit below and moved a sliding contact along a uniform conducting wire.

The student recorded the potential difference V across each length of wire l under test.



Which graph correctly shows how V varies with I ?

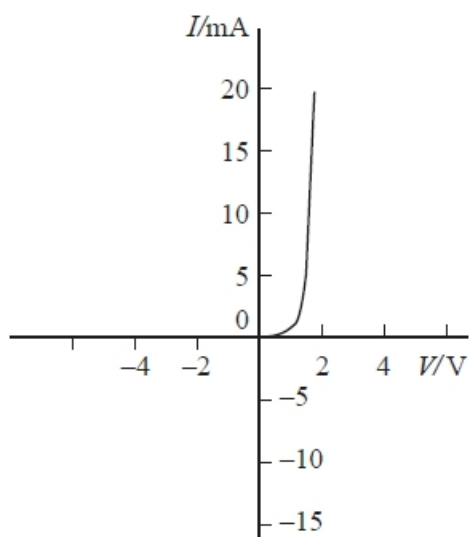
(1)



(Total for question = 1 mark)

Q20.

The graph shows the variation of current I with potential difference V for a diode.



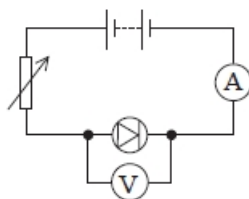
Which of the following statements is correct?

- A** The diode has zero resistance when connected in the forward direction.
- B** The diode has zero resistance when connected in the reverse direction.
- C** The diode starts to conduct when the potential difference is about 0.7 V.
- D** The diode stops conducting when the potential difference is about -0.7 V.

(Total for question = 1 mark)

Q21.

A student carried out an experiment to investigate the current-potential difference characteristics of a diode using the circuit below.



He plotted the graph of potential difference V on the y -axis against the corresponding current I on the x -axis.

Which graph would be obtained by the student?

(1)

<input type="checkbox"/> A	
<input type="checkbox"/> B	
<input type="checkbox"/> C	
<input type="checkbox"/> D	

(Total for question = 1 mark)

Mark Scheme – Electrical Quantities and Components

Q1.

Question Number	Answer	Mark
	D 1080 C	1
	Incorrect Answers: A – current divided by time, with the time in seconds B – current divided by time, with the time in minutes C – correct formula of current \times time but the time is in minutes and not seconds	

Q2.

Question Number	Answer	Mark
	B filament bulb	1
	Incorrect Answers: A – this is not the graph for a diode C – this is not the graph for an ohmic resistor D – this is not the graph for a thermistor	

Q3.

Question Number	Answer	Mark
	A dark and cold	1
	Incorrect Answers: B – correct description for LDR but incorrect for thermistor C – incorrect description for LDR but correct for thermistor D – incorrect description for LDR and incorrect for thermistor	

Q4.

Question Number	Acceptable answers	Additional guidance	Mark
	C		1

Q5.

Question Number	Acceptable answers	Additional guidance	Mark
	<p>The only correct answer is A</p> <p><i>B is not correct because V decreases as I decreases</i></p> <p><i>C is not correct because I decreases as R increases</i></p> <p><i>D is not correct because I decreases as R increases</i></p>	decreases decreases	1

Q6.

Question Number	Acceptable answers	Additional guidance	Mark
	A The p.d. across the resistor added to the p.d. across the thermistor must equal 6 V. This occurs when the current is 0.5 A.	0.5	1
	<p>B assumes all the p.d. is across the thermistor</p> <p>C assumes that resistor and thermistor connected in parallel</p> <p>D assumes that the p.d. across the resistor and thermistor is more than 6 V</p>		

Q7.

Question Number	Answer	Mark
	B thermistor graph	1
	<p>Incorrect Answers:</p> <p>A – ohmic conductor graph</p> <p>C – filament lamp graph</p> <p>D – diode graph</p>	

Q8.

Question Number	Acceptable answers	Additional guidance	Mark
	C	joule per coulomb.	1
	<p>Incorrect Answers:</p> <p>A is reciprocal of volt</p> <p>B is definition of amp</p> <p>D is definition of watt</p>		

Q9.

Question number	Acceptable answers	Additional guidance	Mark
	D		1

Q10.

Question Number	Acceptable answers	Additional guidance	Mark		
	The only correct answer is B <table border="1" style="margin-left: 20px;"> <tr> <td>decreases</td> <td>increases</td> </tr> </table>	decreases	increases	C and D are incorrect as the resistance decreases A is incorrect as n increases	1
decreases	increases				

Q11.

Question Number	Answer	Additional Guidance	Mark
	B is the only correct answer	A is incorrect because amplitude does increase C is incorrect because rate of collision does increase D is incorrect because rate of energy transfer does increase	1

Q12.

Question Number	Acceptable answers	Additional guidance	Mark
	The only correct answer is B <i>A is not correct because R decreases as more conduction electrons</i> <i>C is not correct because lattice vibrations not affected</i> <i>D is not correct because lattice vibrations not affected</i>	It increases because there is an increase in the number of conduction electrons.	1

Q13.

Question Number	Acceptable answers	Additional guidance	Mark
	<p>The only correct answer is B</p> <p>A is not correct as the p.d. across the resistor will increase</p> <p>C is not correct as the resistance of the LDR will decrease</p> <p>D is not correct as the resistance of the LDR will decrease</p>		1

Q14.

Question Number	Answer	Mark
	<p>D $\frac{R_2}{R_1+R_2}V$</p> <p>Incorrect Answers:</p> <p>A – this looks similar to the correct formula but has an incorrect resistance as the numerator and does not have the total resistance as the denominator</p> <p>B – this looks similar to the correct formula with the correct resistance as the numerator but does not have the total resistance as the denominator</p> <p>C – This would give the PD across resistor R_1 and not R_2</p>	1

Q15.

Question Number	Answer	Additional Guidance	Mark
	D is the only correct answer	<p>A is incorrect because the time has not been converted to seconds</p> <p>B is incorrect because $Q = It$ and time has not been converted to seconds</p> <p>C is incorrect because $Q = It$</p>	1

Q16.

Question Number	Acceptable answers	Additional guidance	Mark
	C		1


Q17.

Question Number	Answer	Mark
	C $\text{kg m}^2 \text{s}^{-3} \text{A}^{-2}$	1
	Incorrect Answers: A – Ω is not a base unit B – V is not a base unit D – C is not a base unit	

Q18.

Question Number	Answer	Mark
	C ammeter reading decreases, voltmeter reading increases	1
	A – the ammeter reading does not increase B – neither occurs D – the voltmeter reading does not decrease	

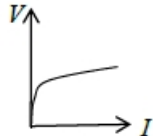
Q19.

Question Number	Acceptable Answer	Additional Guidance	Mark
	A 		1

Q20.

Question Number	Answer	Mark
	C The diode starts to conduct when the potential difference is about 0.7 V.	1
	Incorrect Answers: A – The diode has zero resistance when connected in the forward direction B – The diode has zero resistance when connected in the reverse direction. D – The diode stops conducting when the potential difference is about -0.7 V .	

Q21.

Question Number	Acceptable Answer	Additional Guidance	Mark
	C 		1