



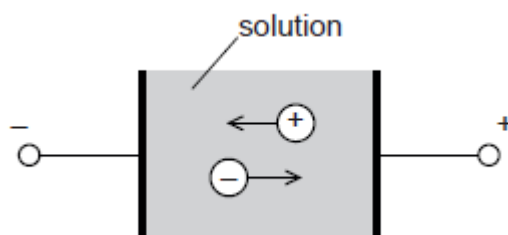
A Level Physics A

H556/02 Exploring physics

Question Set 1

Multiple Choice Questions

- 1 The diagram below shows the motion of positive and negative particles in a conducting solution.



Which statement is correct?

- A The current in the solution is zero.
- B The conventional current is to the left.
- C The positive particles are always protons.
- D The negative particles are always electrons.

[1]

- 2 One million electrons travel between two points in a circuit. The **total** energy gained by the electrons is 1.6×10^{-10} J.

What is the potential difference between the two points?

- A 1.6×10^{-16} V
- B 1.6×10^{-4} V
- C 1.0×10^3 V
- D 1.0×10^9 V

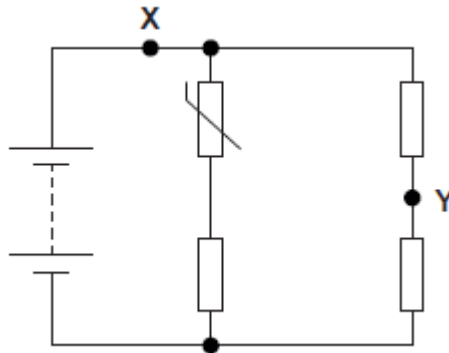
[1]

- 3 Which is **not** a unit of energy?

- A kWh
- B eV
- C J
- D W

[1]

4 A circuit is shown below.



The battery has negligible internal resistance. The temperature of the NTC thermistor is **decreased**.

Which of the following statements is/are correct?

- 1 The current at **X** increases.
- 2 The current at **Y** remains the same.
- 3 The potential difference across the thermistor increases.

- A** 1, 2 and 3
B Only 2 and 3
C Only 3
D Only 2

[1]

5 A progressive wave of amplitude a has intensity I . This wave combines with another wave of amplitude $0.6a$ at a point in space. The phase difference between the waves is 180° .

What is the resultant intensity of the combined waves in terms of I ?

- A** $0.16I$
B $0.4I$
C $1.6I$
D $2.6I$

[1]

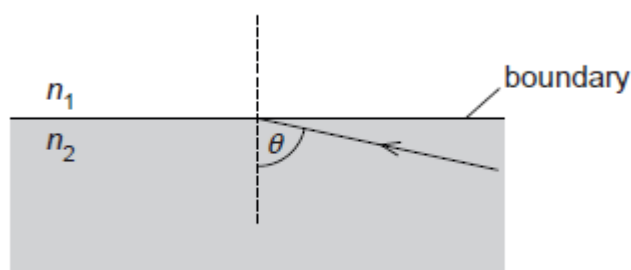
- 6 Stationary waves are produced in a tube closed at one end and open at the other end. The fundamental frequency is 120 Hz.

What is a possible frequency of a harmonic for this tube?

- A 60 Hz
- B 240 Hz
- C 360 Hz
- D 480 Hz

[1]

- 7 A ray of monochromatic light is incident at the boundary between two transparent materials of refractive index n_1 and n_2 . The critical angle θ is equal to 80° .



What is the ratio $\frac{n_1}{n_2}$?

- A 0.17
- B 0.98
- C 1.02
- D 5.76

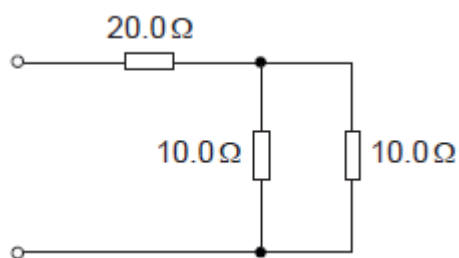
[1]

- 8 Which electrical quantity has S.I. units ampere-second (As)?

- A charge
- B current
- C resistance
- D potential difference

[1]

9 Three resistors are connected in a circuit.



The resistance of each resistor is shown in the circuit diagram.

What is the total resistance of this circuit?

- A $10.0\ \Omega$
- B $20.2\ \Omega$
- C $25.0\ \Omega$
- D $40.0\ \Omega$

Your answer

[1]

10 An electron has a de Broglie wavelength equal to the wavelength of X-rays.

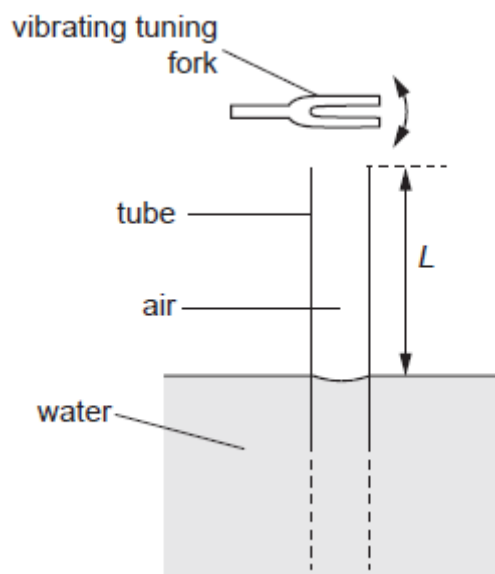
What is the **best** estimate of the momentum of this electron?

- A $10^{-30}\ \text{kg m s}^{-1}$
- B $10^{-27}\ \text{kg m s}^{-1}$
- C $10^{-23}\ \text{kg m s}^{-1}$
- D $10^{-18}\ \text{kg m s}^{-1}$

Your answer

[1]

- 11 A vibrating tuning fork is held above the open end of a long vertical tube. The other end of the tube, which is also open, is immersed in a tank of water. The length L of the air column within the tube is changed by raising or lowering the tube.



The wavelength of sound from the vibrating tuning fork is 150.0 cm.

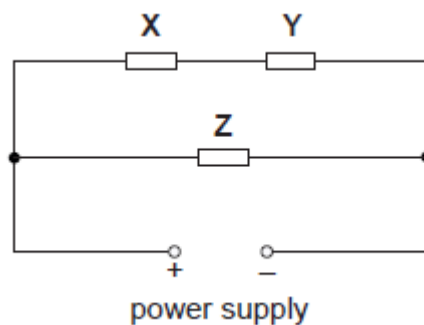
What length L of air column will **not** produce a stationary wave within the tube?

- A 37.5 cm
- B 75.0 cm
- C 112.5 cm
- D 187.5 cm

Your answer

[1]

12 Three identical resistors **X**, **Y** and **Z** are connected to a power supply.



The power dissipated in the resistor **Z** is 24 W.

What is the power dissipated in the resistor **Y**?

- A 6.0W
- B 12W
- C 24W
- D 48W

Your answer

[1]

13 A small loudspeaker emits sound uniformly in all directions.
The amplitude of the sound is $12\ \mu\text{m}$ at a distance of 1.5 m from the loudspeaker.

What is the amplitude of the sound at a distance of 4.5 m from the loudspeaker?

- A $1.3\ \mu\text{m}$
- B $4.0\ \mu\text{m}$
- C $6.9\ \mu\text{m}$
- D $12\ \mu\text{m}$

Your answer

[1]

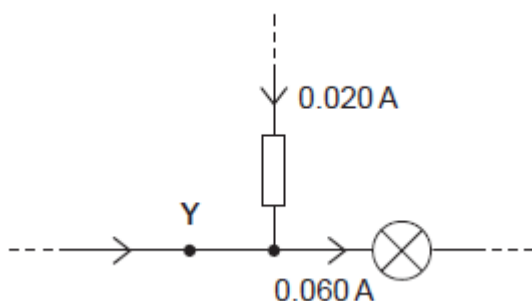
14 Which law indicates that charge is conserved?

- A Lenz's law
- B Coulomb's law
- C Kirchhoff's first law
- D Faraday's law of electromagnetic induction

Your answer

[1]

15 Part of an electric circuit is shown below.



The direction of all the currents and the magnitude of two currents are shown.

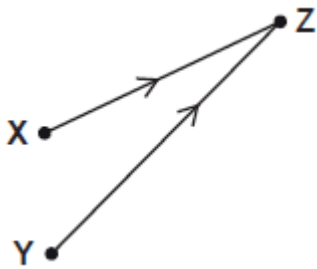
How many electrons pass through the point Y in 10 s?

- A 1.25×10^{18}
- B 2.50×10^{18}
- C 3.75×10^{18}
- D 5.00×10^{18}

Your answer

[1]

- 16 Coherent radio waves from transmitters **X** and **Y** are emitted in phase. The waves interfere **constructively** at point **Z**.



The distance **XZ** is 16.0m and the distance **YZ** is 20.0m.
The radio waves have wavelength λ .

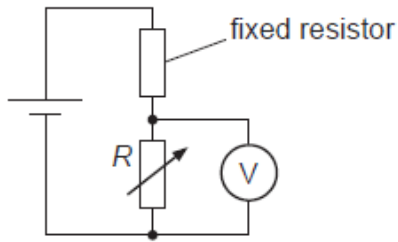
Which value of λ is **not** possible?

- A 1.0m
- B 2.0m
- C 3.0m
- D 4.0m

Your answer

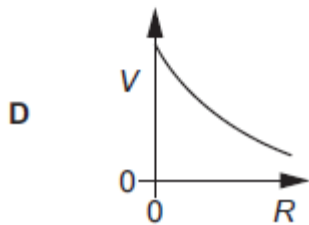
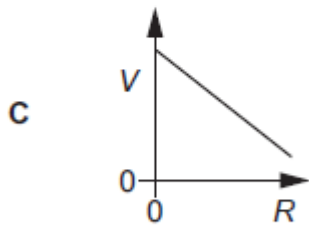
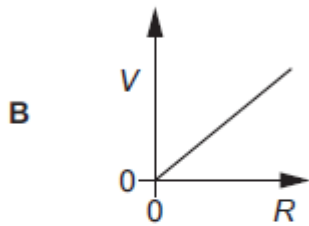
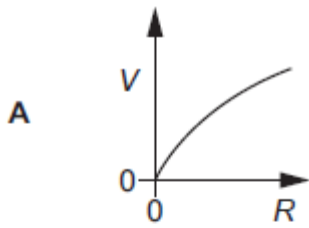
[1]

17 A potential divider circuit is shown below.



The resistance of the variable resistor is R . The potential difference across the variable resistor is V .

Which graph shows the correct variation with R of V ?



Your answer

[1]

18 Wires **P** and **Q**, made from the same metal, are connected in **parallel** across a cell of negligible internal resistance.

The table shows some data.

Wire	Length of wire	Diameter of wire	Mean drift velocity of electrons in the wire/ mms^{-1}
P	L	d	0.60
Q	$3L$	$2d$	v

What is the mean drift velocity v of the electrons in wire **Q**?

- A 0.15mms^{-1}
- B 0.20mms^{-1}
- C 0.30mms^{-1}
- D 0.60mms^{-1}

Your answer

[1]

19 Which of the following statements is/are correct about electromagnetic waves?

- 1 They can be plane polarised.
- 2 They can be refracted and diffracted.
- 3 They have the same speed in a vacuum and in glass.

- A Only 1
- B Only 3
- C Only 1 and 2
- D 1, 2 and 3

Your answer

[1]

Total Marks for Question Set 1: 19

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