1 An explorer walks 6 km due north from his camp and then 6 km due west.

What is the magnitude, in km, of the total displacement of the explorer?

☒ **A** 12

☒ **B** $\sqrt{12}$

☒ **C** 72

☒ **D** $\sqrt{72}$

(Total for Question = 1 mark)

2 A sample of material has charge carrier density n and cross-sectional area A. When the current through the sample is I the drift velocity is v.

Another sample of the same material has double the cross-sectional area and the current through it is $2I$. What is the drift velocity?

☒ **A** $v / 2$

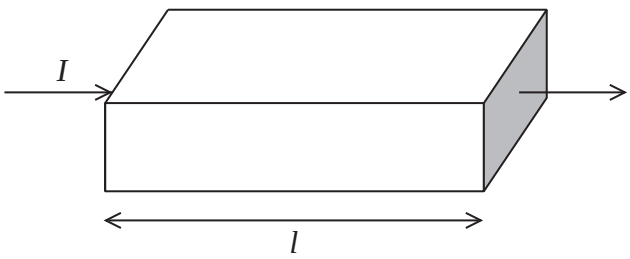
☒ **B** v

☒ **C** $2v$

☒ **D** $4v$

(Total for Question = 1 mark)

3 The diagram shows a current *I* flowing through a sample of material of length *l* and cross-sectional area *A*.



The drift velocity of the free electrons is *v*.

If the area and length are both doubled, but the current remains the same, the drift velocity will be

☒ **A** $v / 4$

☒ **B** $v / 2$

☒ **C** $2v$

☒ **D** $4v$

(Total for Question = 1 mark)

4 Two wires of the same material are connected in series with a potential difference across them. Wire A has twice the cross-sectional area of wire B.

The ratio $\frac{\text{drift speed of electrons in A}}{\text{drift speed of electrons in B}}$ equals

☒ **A** ¼

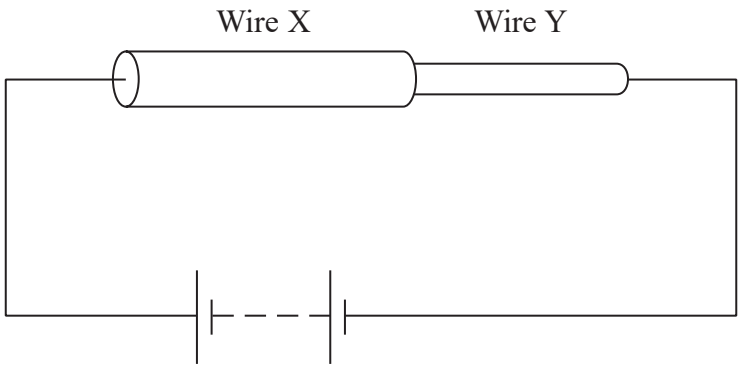
☒ **B** ½

☒ **C** 2

☒ **D** 4

(Total for Question =1 mark)

5 Two wires of the same material are connected in series in the circuit shown.



The cross-sectional area of wire X is twice the cross-sectional area of wire Y.

The drift velocities of the electrons in these two wires are v_X and v_Y.

The value of $\frac{v_X}{v_Y}$ is

☒ **A** ½

☒ **B** 1

☒ **C** 2

☒ **D** 4

(Total for Question = 1 mark)

6 Two wires of the same material are connected in series with each other. Wire A has twice the diameter of wire B. In which of the following rows are both statements correct?

		$\frac{\text{current in wire A}}{\text{current in wire B}}$	$\frac{\text{drift speed in wire A}}{\text{drift speed in wire B}}$
☒	**A**	1	$\frac{1}{4}$
☒	**B**	1	4
☒	**C**	2	4
☒	**D**	2	$\frac{1}{4}$

(Total for Question = 1 mark)

7 The drift velocity v of electrons in a conductor is directly proportional to

☒ **A** electron charge.

☒ **B** charge carrier density.

☒ **C** cross-sectional area.

☒ **D** current.

(Total for Question 1 mark)

8 The resistance of a length of copper wire is 6 Ω. A second piece of copper wire has twice the length and twice the cross-sectional area. The resistance of the second piece of copper wire is

☒ **A** 3 Ω

☒ **B** 6 Ω

☒ **C** 12 Ω

☒ **D** 24 Ω

(Total for Question = 1 mark)

9 The heating element for an electric fire is made from a wire of resistance R. It is replaced with a wire of the same material which has the same length but is twice the diameter. The resistance of this second wire is

☒ **A** $\frac{1}{4}R$

☒ **B** $\frac{1}{2}R$

☒ **C** $2R$

☒ **D** $4R$

(Total for Question = 1 mark)

10 The current through a wire of cross-sectional area A is I when the drift velocity of the electrons in the wire is v and the charge carrier density is n.

The wire is replaced with a wire of a different metal with half the charge carrier density but the same cross-sectional area A.

If the current in the new wire is $2I$, the drift velocity is

☒ **A** $v/2$

☒ **B** v

☒ **C** $2v$

☒ **D** $4v$

(Total for Question = 1 mark)

11 A copper wire of length 2.5 m and cross-sectional area 2.4×10^{-7} m^2 has a resistivity of 1.7×10^{-8} Ω m.

What is the resistance of the wire?

☒ **A** 1.6×10^{-15} Ω

☒ **B** 1.0×10^{-14} Ω

☒ **C** 0.18 Ω

☒ **D** 5.6 Ω

(Total for Question = 1 mark)