

Answer **all** the questions in the spaces provided.

- 1 (a)** The current in a wire is I . Charge Q passes one point in the wire in time t . State

- (i) the relation between I , Q and t ,

..... [1]

- (ii) which of the quantities I , Q and t are base quantities.

..... [2]

- (b)** The current in the wire is due to electrons, each with charge q , that move with speed v along the wire. There are n of these electrons per unit volume.

For a wire having a cross-sectional area S , the current I is given by the equation

$$I = nSqv^k,$$

where k is a constant.

- (i) State the units of I , n , S , q and v in terms of the base units.

I

n

S

q

v

[3]

- (ii) By considering the homogeneity of the equation, determine the value of k .

$k = \dots$ [2]