1   (a)   Table 1.1 lists some physical quantities. Identify with ticks (✓) which quantities are vectors and which are scalars.

Table 1.1

quantity	scalar	vector
acceleration		
displacement		
gravitational potential energy		
speed		
temperature		

[2]

(b)   A constant resultant force F acts on a car of mass m. The car moves from rest with constant acceleration a along horizontal ground. When the car has displacement s, the speed of the car is v.

(i)   Using the concept of work done on the car, show that the kinetic energy E_K of the car is given by the equation

$$E_K = \frac{1}{2}mv^2.$$

[3]

(ii)   The mass of the car is 920 kg. At time $t = 0$, the car is at rest. At time $t = 5.8$ s, its velocity is 17 m s^{-1}.

Calculate the kinetic energy of the car at time $t = 5.8$ s.

kinetic energy = ... J [1]

(iii) Between time $t = 0$ and time $t = 5.8\,\text{s}$, the work done against resistive forces is $4.7 \times 10^4\,\text{J}$.

Determine the average output power of the car during this time.

power = ... W [3]

(iv) At time $t = 5.8\,\text{s}$, the speed of the car becomes constant.

State and explain whether the output power of the car is greater than, less than or the same as the output power just before $t = 5.8\,\text{s}$.

....

.... [1]

[Total: 10]