3 A cyclist travels up an inclined road of constant slope. The cyclist takes 8.0 s to ascend the road. The variation with time t of the speed v of the cyclist is shown in Fig. 3.1.

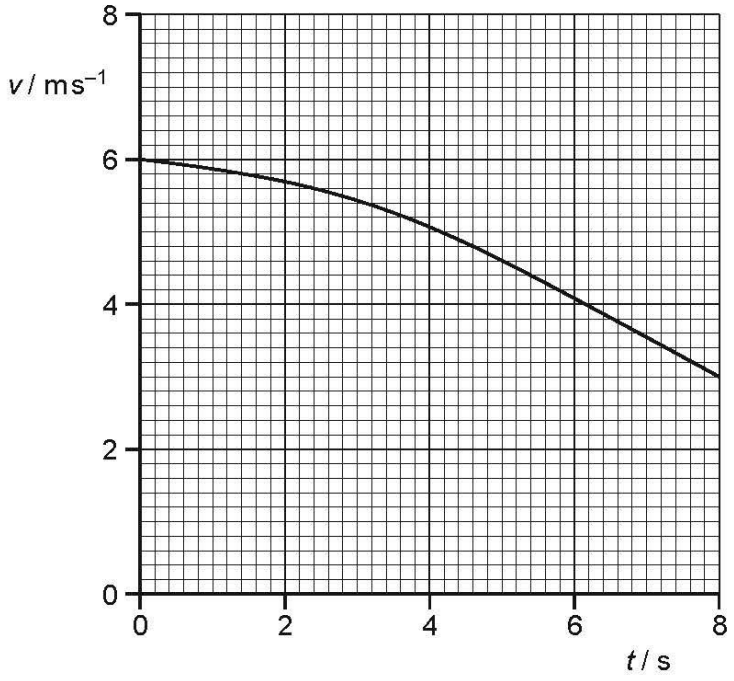

Fig. 3.1

(a) Use Fig. 3.1 to determine the total distance travelled up the inclined road.

total distance = _____. m [2]

(b) The bicycle and cyclist have a combined mass of 95 kg and the slope of the inclined road is such that the cyclist rises 1 m for every 30 m he travels along the road.

For the movement of the bicycle and cyclist between $t = 0$ s and $t = 8.0$ s,

(i) use Fig. 3.1 to calculate the change in kinetic energy.

change in kinetic energy = _____. J [1]

(ii) calculate the change in gravitational potential energy.

change in gravitational potential energy = _____. J [2]

(c) The cyclist pedals continuously so that the average power delivered to the bicycle is 75 W in 8.0 s. Assume energy is lost in overcoming the resistive forces.

Calculate the work done in overcoming the resistive forces.

work done = _____. J [2]

(d) **(i)** Use Fig. 3.1 to describe how the acceleration of the cyclist varies with time as he travels up the inclined road.

._____.

._____.

._____.[1]

(ii) The resistive force acting on the cyclist and bicycle is predominantly air resistance.

By reference to the forces acting on the cyclist and bicycle, and your answer in **(d)(i)**, state and explain the changes in the driving force by the cyclist in moving up along the inclined road.

._____.

._____.

._____.

._____.
[2]

[Total: 10]