3 **(a)** Define *power*.

.....

..... [1]

(b) A cyclist travels along a horizontal road. The variation with time t of speed v is shown in Fig. 3.1.

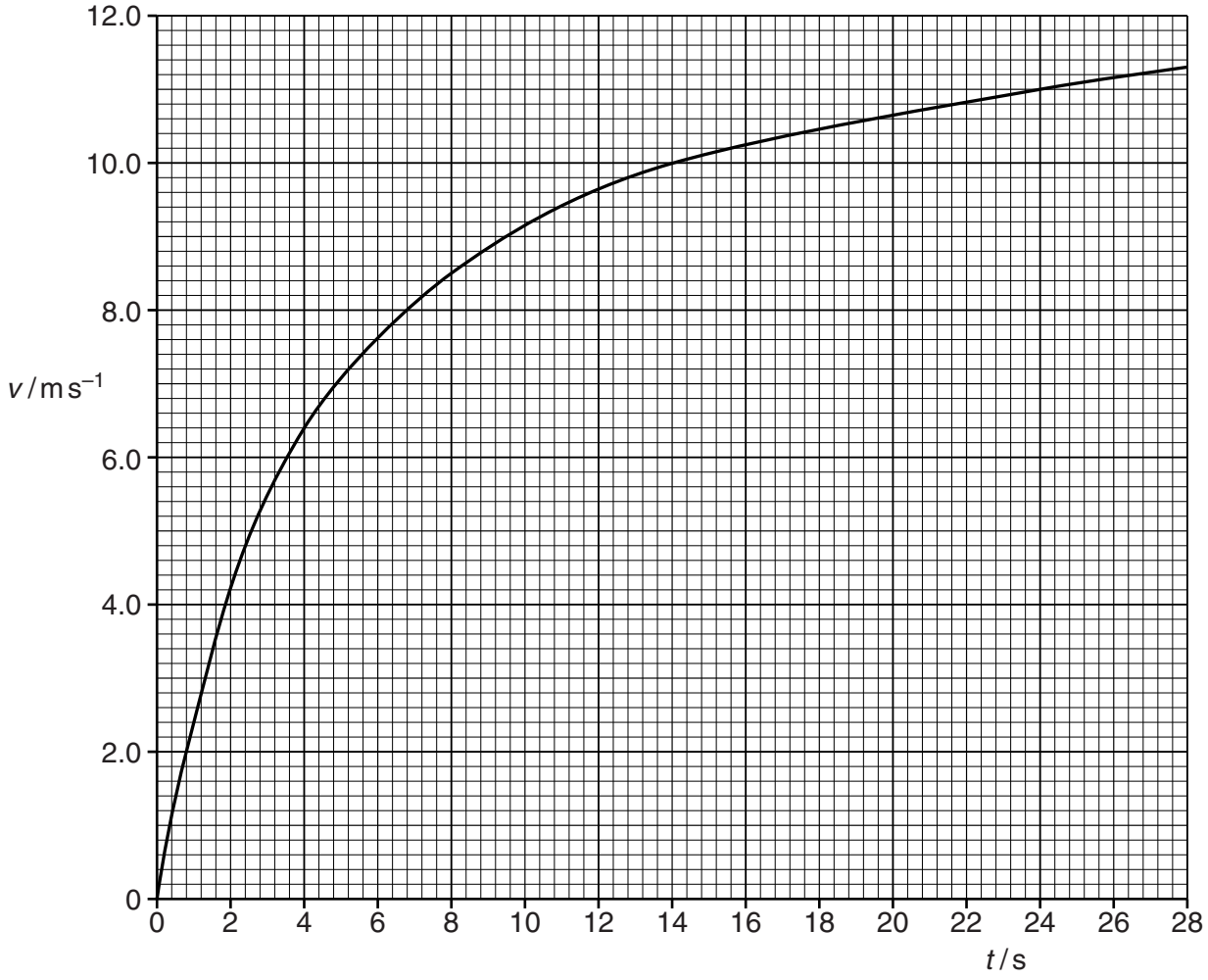

Fig. 3.1

The cyclist maintains a constant power and after some time reaches a constant speed of $12\,m\,s^{-1}$.

(i) Describe and explain the motion of the cyclist.

.....

.....

.....

.....

..... [3]

(ii) When the cyclist is moving at a constant speed of $12\,m\,s^{-1}$ the resistive force is 48 N. Show that the power of the cyclist is about 600 W. Explain your working.

[2]

(iii) Fig. 3.1 to show that the acceleration of the cyclist when his speed is $8.0\,m\,s^{-1}$ is about $0.5\,m\,s^{-2}$.

[2]

(iv) The total mass of the cyclist and bicycle is 80 kg. Calculate the resistive force R acting on the cyclist when his speed is $8.0\,m\,s^{-1}$. the value for the acceleration given in **(iii)**.

R = ... N [3]

(v) the information given in **(ii)** and your answer to **(iv)** to show that, in this situation, the resistive force R is proportional to the speed v of the cyclist.

[1]