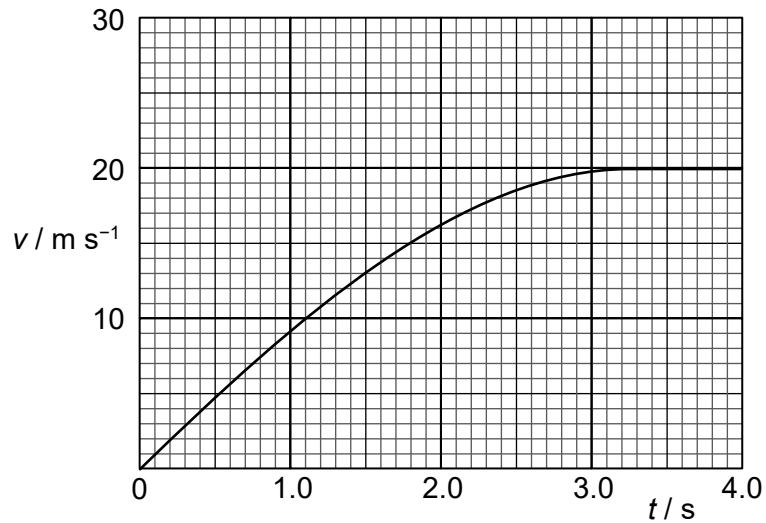**2** In housing estates, it is common for washed laundry to be dried on bamboo poles outside the kitchen windows. A towel falls from rest when a plastic peg holding the towel snapped due to long-term exposure to sunlight.

Fig. 2.1 shows the variation with time of the vertical velocity of the towel as it falls from a height.

Fig. 2.1

(a) Explain why the towel reaches terminal velocity.

....

....

....[3]

(b) **(i)** Using Fig. 2.1, estimate the acceleration at $t = 2.0$ s.

acceleration = ... m s^{-2} [2]

(ii) Using Fig. 2.1, estimate the height fallen by the towel in the first 4.0 s of its descent.

height = ... m [2]

(c) When the clothes peg snapped, it was projected at a speed of 8.4 m s^{-1} away from its original position 29 m above the ground. The initial angle of projection was 40° above the horizontal. Air resistance can be ignored.

(i) Calculate the time taken for the clothes peg to hit the ground.

time = ... s [2]

(ii) Calculate the horizontal distance travelled by the clothes peg before it hits the ground.

distance = ... m [1]