2 **(a)** State what is meant by *simple harmonic motion*.

.....

.....

..... [1]

(b) In a particular video game, players control the movement of characters through obstacle courses. One particular obstacle features a rectangular wall which moves vertically up and down with simple harmonic motion, as shown in Fig. 2.1. The wall is tall such that the character cannot progress with the game by jumping over the wall. The bottom face of the wall touches the ground every 4.0 s, and rises to a maximum height of 1.4 m.

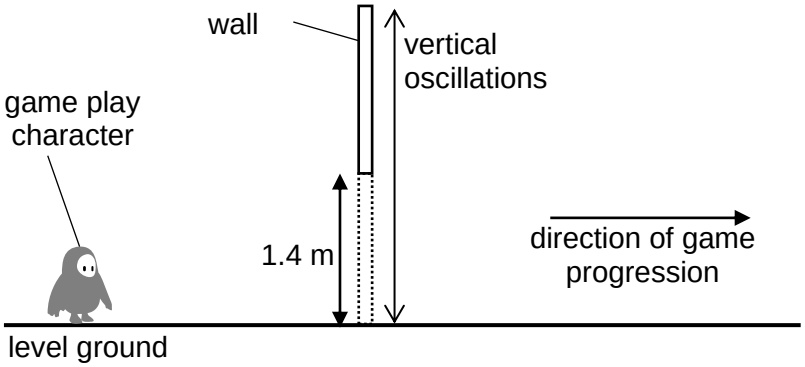

Fig. 2.1 (not to scale)

(i) Find the speed of the wall when the bottom face of the wall is 0.50 m above the ground.

speed = ... m s^{-1} [2]

(ii) The bottom face of the wall needs to be at least 0.55 m above the ground for the character to pass under successfully.

Find the duration of time that the character can pass under, in each cycle of simple harmonic motion.

time = ... s [2]

[Total: 5]