2 An object of mass 0.55 kg is launched with velocity v from horizontal ground. It is launched at an angle of 42° above the horizontal. It follows the path shown in Fig. 2.1.
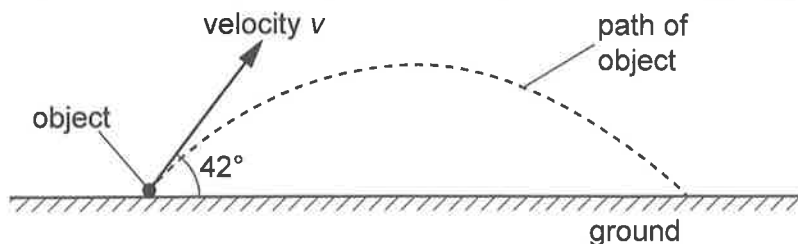

Fig. 2.1 (not to scale)

When moving along the path, the minimum kinetic energy of the object is 65 J. Assume that air resistance is negligible.

(a) Show that the vertical component of v is $14\,\mathrm{m\,s^{-1}}$.

[3]

(b) Determine the horizontal displacement of the object from its launch position to the point where it lands.

displacement = ... m [3]

(c) In practice, air resistance is not negligible.

Suggest, with a reason, how the time taken for the object to reach its maximum height compares with the time taken for the object to return to the ground from its maximum height.

....

....

.... [1]

[Total: 7]