2 **(a)** Define:

(i) *displacement*

.....

.....[1]

(ii) *acceleration*.

.....

.....[1]

(b) A man wearing a wingsuit glides through the air with a constant velocity of $47\,m\,s^{-1}$ at an angle of 24° to the horizontal. The path of the man is shown in Fig. 2.1.

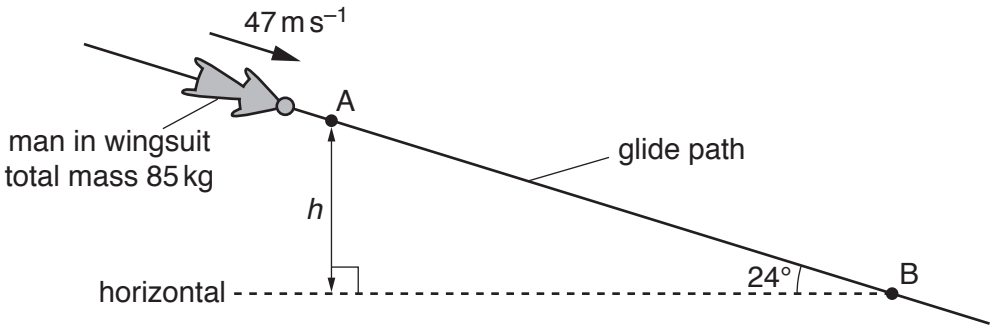

Fig. 2.1 (not to scale)

The total mass of the man and the wingsuit is 85 kg. The man takes a time of 2.8 minutes to glide from point A to point B.

(i) With reference to the motion of the man, state and explain whether he is in equilibrium.

.....

.....

.....

.....[2]

(ii) Show that the difference in height *h* between points A and B is 3200 m.

[1]

(iii) For the movement of the man from A to B, determine:

1. the decrease in gravitational potential energy

decrease in gravitational potential energy = ... J [2]

2. the magnitude of the force on the man due to air resistance.

force = ... N [2]

(iv) The pressure of the still air at A is 63 kPa and at B is 92 kPa. Assume the density of the air is constant between A and B.

Determine the density of the air between A and B.

density = ... $kg\,m^{-3}$ [2]

[Total: 11]