

- 2 (a) State the two conditions for a system to be in equilibrium.

1.

 2.

[2]

- (b) A paraglider P of mass 95 kg is pulled by a wire attached to a boat, as shown in Fig. 2.1.

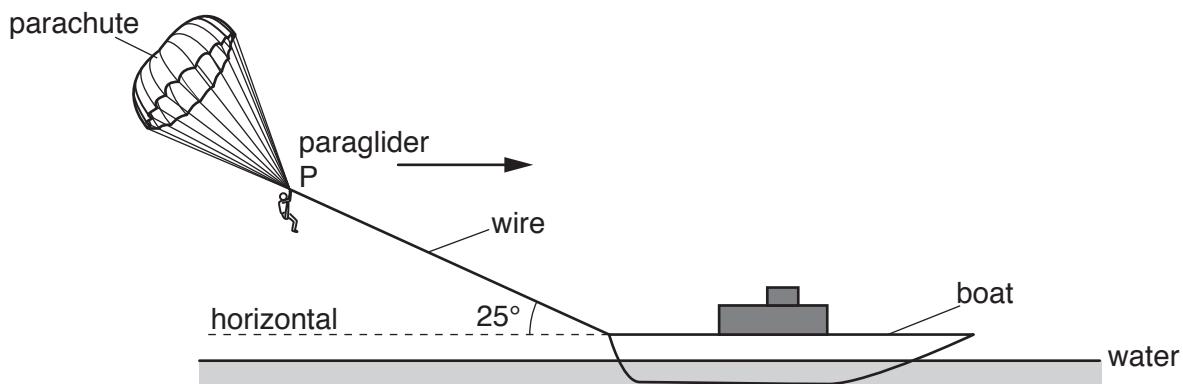


Fig. 2.1

The wire makes an angle of 25° with the horizontal water surface. P moves in a straight line parallel to the surface of the water.

The variation with time t of the velocity v of P is shown in Fig. 2.2.

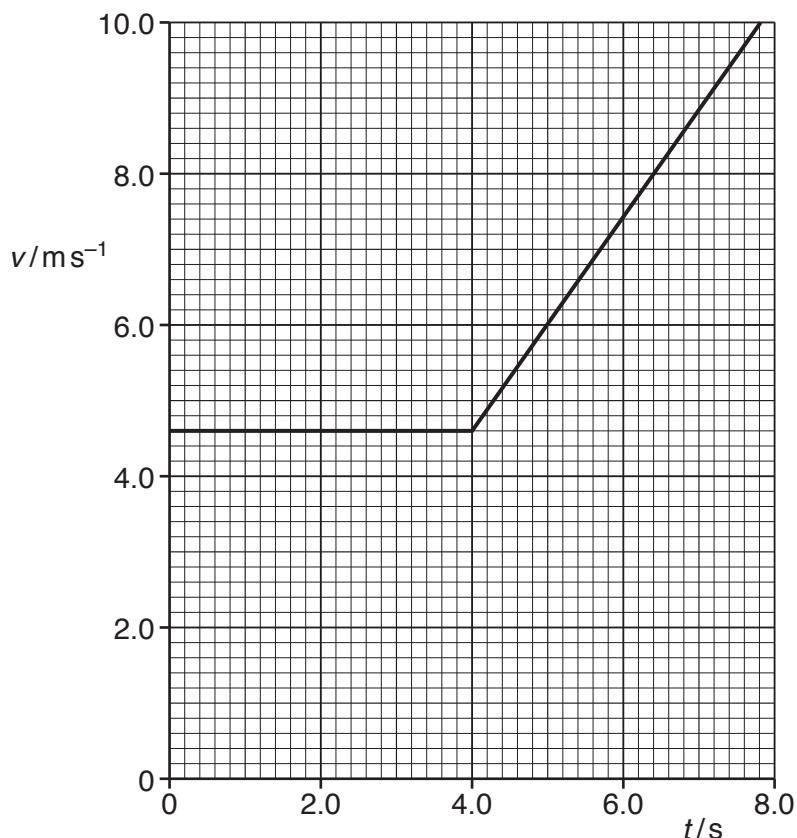


Fig. 2.2

- (i) Show that the acceleration of P is 1.4 ms^{-2} at time $t = 5.0 \text{ s}$.

[2]

- (ii) Calculate the total distance moved by P from time $t = 0$ to $t = 7.0 \text{ s}$.

distance = m [2]

- (iii) Calculate the change in kinetic energy of P from time $t = 0$ to $t = 7.0 \text{ s}$.

change in kinetic energy = J [2]

- (iv) The tension in the wire at time $t = 5.0 \text{ s}$ is 280 N .

Calculate, for the horizontal motion,

1. the vertical lift force F supporting P,

$F =$ N [3]

2. the force R due to air resistance acting on P in the horizontal direction.

$R =$ N [3]

[Total: 14]