2 A climber is supported by a rope on a vertical wall, as shown in Fig. 2.1.
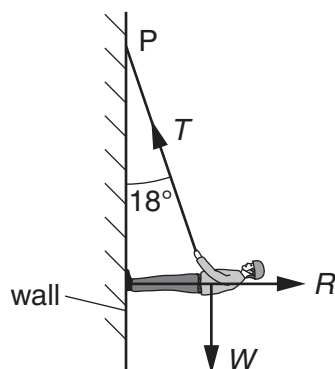

Fig. 2.1

The weight W of the climber is 520 N. The rope, of negligible weight, is attached to the climber and to a fixed point P where it makes an angle of 18° to the vertical. The reaction force R acts at right-angles to the wall.
The climber is in equilibrium.

(a) State the conditions necessary for the climber to be in equilibrium.

....

....

....[2]

(b) Complete Fig. 2.2 by drawing a labelled vector triangle to represent the forces acting on the climber.

Fig. 2.2

[2]

(c) Resolve forces or use your vector triangle to calculate

   (i) the tension T in the rope,

   $T =$ .... N [2]

   (ii) the reaction force R.

   $R =$ .... N [1]

(d) The climber moves up the wall and the angle the rope makes with the vertical increases. Explain why the magnitude of the tension in the rope increases.

   ....

   ....

   ....[1]