

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

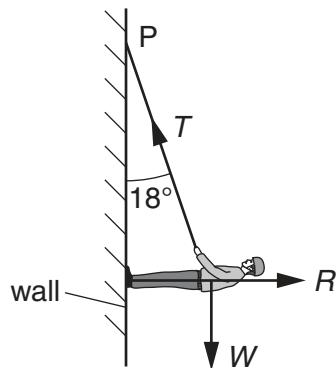


Fig. 2.1

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  $18^\circ$  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.

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[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,

$$T = \dots \text{ N} [2]$$

(ii) the reaction force  $R$ .

$$R = \dots \text{ N} [1]$$

(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.

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..... [1]