4 A block is pulled on a horizontal surface by a force *P* as shown in Fig. 4.1.

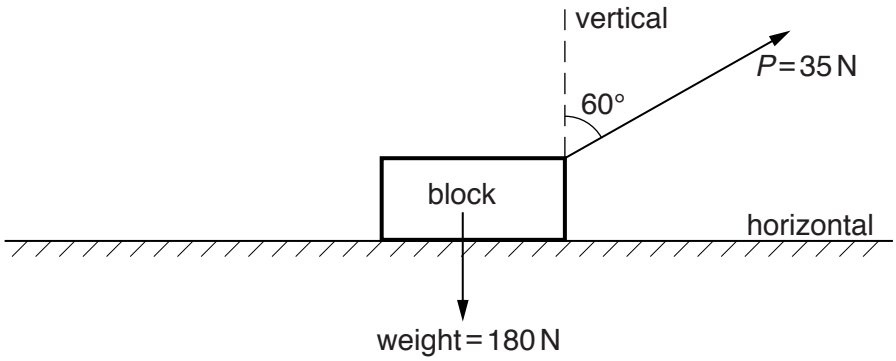

Fig. 4.1

The weight of the block is 180 N. The force *P* is 35 N at 60° to the vertical.
The block moves a distance of 20 m at constant velocity.

(a) Calculate

(i) the vertical force that the surface applies to the block (normal reaction force),

force = ... N [2]

(ii) the work done by force *P*.

work done = ...J [2]

(b) (i) Explain why the block continues to move at constant velocity although work is done on the block by force *P*.

.....

.....

.....[1]

(ii) Explain, in terms of the forces acting, why the block remains in equilibrium.

.....

.....

.....

.....[2]

7 A steel wire of cross-sectional area 15 mm^2 has an ultimate tensile stress of 4.5×10^8 N m^{-2}.

(a) Calculate the maximum tension that can be applied to the wire.

tension = ... N [2]

(b) The steel of the wire has density 7800 kg m^{-3}. The wire is hung vertically.

Calculate the maximum length of the steel wire that could be hung vertically before the wire breaks under its own weight.

length = ... m [3]

Please turn over for Question 8.