1

(a)

Explain what is meant by the *moment of a force*.

…………………………………………………………………………………………………..

…………………………………………………………………………………………………..

……………………………………………………………………………………………………..

……………………………………………………………………………………………..…

[2]

(b)

A ladder of length 5.0 m rests in equilibrium on rough ground against a smooth wall as shown in Fig. 1.1. The base of the ladder is 3.0 m from the wall.

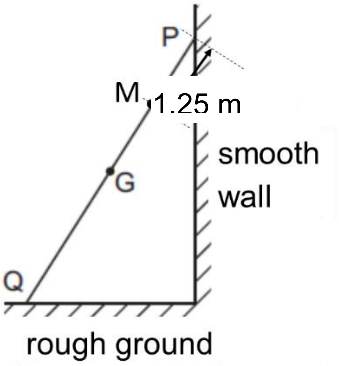

Fig. 1.1

Its weight W acts through the centre of gravity G. Forces also act on the ladder at P and at Q. These forces are P and Q respectively. A painter of weight M stands on the ladder, 1.25 m from the top of the ladder.

(i)

Show that Q is given by the expression $\sqrt{P^2 + (W + M)^2}$.

[3]

(ii)

Hence, using the principle of moments, determine the value of *Q* if the maximum friction provided by the rough ground is 920 N and the weight of the ladder is 500 N.

[3]