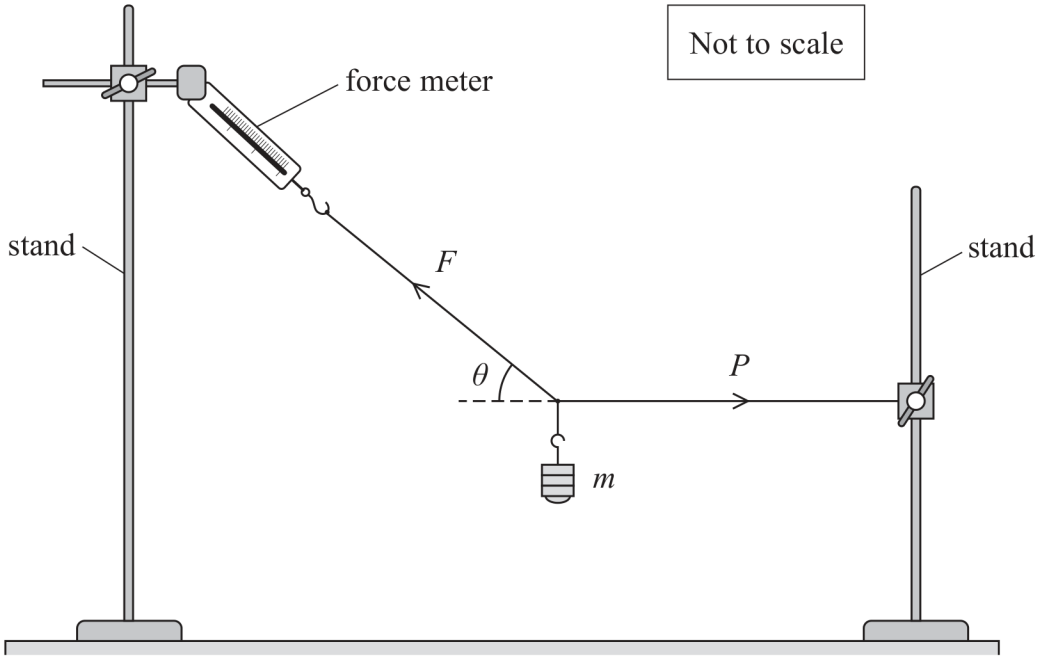
17 A mass m is held in equilibrium by strings attached to two clamp stands. The force meter records the force F in the upper string. The force in the horizontal string is P. The angle made by the upper string to the horizontal is θ, as shown.



(a) The force meter allows force to be measured by means of Hooke's law.

The extension of the spring inside the force meter allows the stretching force to be read from a scale.

When the force applied to stretch the spring is 15 N the extension of the spring is 8.0 cm.

Show that the stiffness of the spring is about 2 N cm^{-1}.

(2)

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(b) When m is equal to 0.55 kg, the value of P is 8.5 N.

Calculate the value of θ, and the extension of the spring in the force meter.

(6)

θ = ...

Extension of the spring = ...

(Total for Question 17 = 8 marks)