2 A 70.0 kg man standing on a platform makes a leap upwards with an initial speed of 2.00 m s^{-1} before falling towards a diving board that is located 1.50 m below the platform as shown in Fig. 2.1.

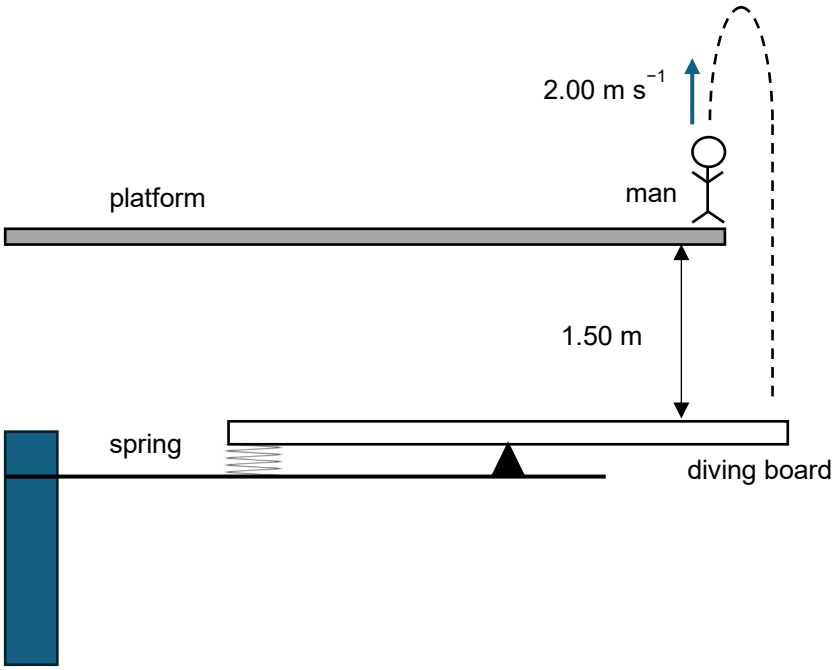

Fig. 2.1

(a) Calculate the loss in gravitational potential energy as the man falls from the platform to a point just before he hits the diving board.

loss in gravitational potential energy = ... J [1]

(b) Calculate the initial kinetic energy possessed by the man at the start of his jump.

initial kinetic energy = ... J [1]

(c) The uniform rigid diving board has a length 4.80 m and weight 300 N. It is pivoted at a point 2.40 m away from its left end and is attached to an unstretched spring with a force constant of 10.0 kN m^{-1} on one end.

When the man hits the diving board on the opposite end after jumping off the platform, the board rotates and causes the spring to stretch until the man comes to a momentary stop. At the instant that the man is momentarily at rest, the diving board makes an angle θ to the horizontal as shown in Fig. 2.2.

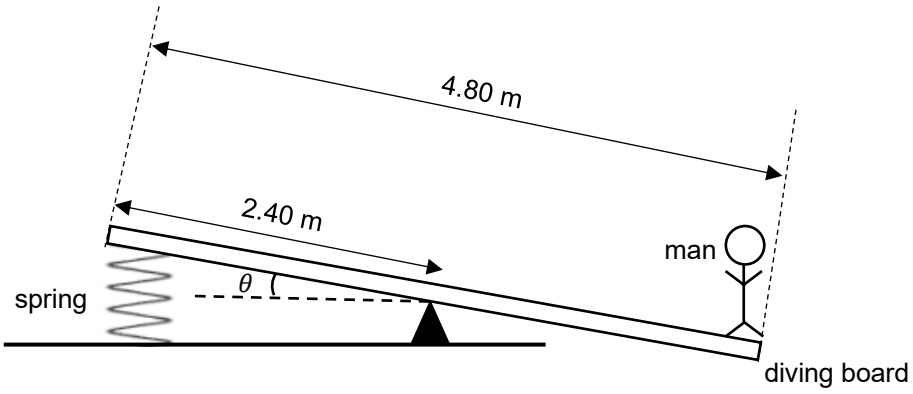

Fig. 2.2

(i) Explain why the weight of the diving board does not produce any moments at the pivot.

……..
.....

……..
.....

……..
[1]

(ii) Show that the angle of tilt θ is 13.4°. Explain your workings and state any assumptions made. [4]

(iii) Assuming that the spring only exerts a force vertically on the diving board, calculate the force exerted by the spring on the diving board.

force = ... N [1]

(iv) Calculate the magnitude of the normal contact force exerted by the pivot on the diving board.

magnitude of normal contact force = ... N [2]

[Total: 10]