

25. • To stretch a certain spring by 2.5 cm from its equilibrium position requires 8.0 J of work. (a) What is the force constant of this spring? (b) What was the maximum force required to stretch it by that distance?

30. • A 575 N woman climbs a staircase that rises at 53° above the horizontal and is 4.75 m long. Her speed is a constant 45 cm/s. (a) Is the given weight a reasonable one for an adult woman? (b) How much has the gravitational potential energy increased by her climbing the stairs? (c) How much work has gravity done on her as she climbed the stairs?

31. • **How high can we jump?** The maximum height a typical human can jump from a crouched start is about 60 cm. By how much does the gravitational potential energy increase for a 72 kg person in such a jump? Where does this energy come from?

35. • **Tendons.** Tendons are strong elastic fibers that attach muscles to bones. To a reasonable approximation, they obey Hooke's law. In laboratory tests on a particular tendon, it was found that, when a 250 g object was hung from it, the tendon stretched 1.23 cm. (a) Find the force constant of this tendon in N/m. (b) Because of its thickness, the maximum tension this tendon can support without rupturing is 138 N. By how much can the tendon stretch without rupturing, and how much energy is stored in it at that point?