52. (a) Before the cord is cut, each spring (which might be described as being "in series" in this case) is stretched by the force $F = 100$ N. Thus, each spring is stretched by $x = 100/500 = 0.20\,$m in the initial configuration. Since the relaxed length of each spring is 0.50 m, then the full length of each spring in the initial configuration is $0.20 + 0.50 = 0.70$ m. Therefore (including that 0.10 m length of string) the distance from the box to the ceiling is $2(0.70) + 0.10 = 1.50$ m, before the string is cut. In the moments after the short string is cut, there is some "transient motion" that is difficult to analyze, but after it has settled down again (in its new equilibrium position) the springs (which now might be described as being "in parallel") are sharing half the weight, so the force stretching each one is $F/2 = 50$ N. This means the elongation of each is $x/2 = 0.10$ m. The total distance (recalling that the longer cords are each of length 0.85 m) of the box to the ceiling is now $0.85 + 0.10 + 0.50 = 1.45$ m. Thus, the box is closer to the ceiling now than it was before. It has moved up.

(b) The distance moved up by the box is $d = 1.50 - 1.45 = 0.05$ m.

(c) To avoid worrying about friction-related (dissipative) processes which are involved in making the "transient motion" ultimately disappear, we consider that the person who cut the cord (and has predicted the new equilibrium position) very carefully and gradually moves it up to that new position, in which case the work being done on the system is due to the person. In this variation of the problem, it is easy to see that the work done by the person *against gravity* is $-W_g = mgd = 5.0$ J (though this is not the full work done by the person, since Eq. 7-25 hasn't been used). Returning to the problem in its original form, we can say that the work done on the block in raising it the distance d is 5.0 J, regardless of the agent doing the work (and in its original form, that agent is the pair of springs, and this represents part of the full work they do).