Read Serway & Beichner (S&B): chap. 8

Problems

1. The world pole vault record is about 6 m or (20 ft). Could the record be raised to something like 8 m by using a long enough pole? If not, why not? Estimate how high an athlete might get.

2. Consider a block moving up a frictionless inclined plane with an applied force parallel to the incline as shown. For parts a, b, and c state whether the following are positive, negative, or zero (i) the work done by the applied force, (ii) the work done by gravity, and (iii) the net work. Use the definition of work and the work-kinetic energy theorem to explain your answers.

![Diagram of inclined plane with block and force F]  
(a) The block is speeding up.  
(b) The block is moving with constant speed.  
(c) The block is slowing down.

3. S&B 7.6

4. A particle experiences a force \( \mathbf{F} = (-3.50 \mathbf{i} + 4.20 \mathbf{j}) \) N during a displacement \( \mathbf{d} = (5.15 \mathbf{i} + 1.25 \mathbf{j}) \) m. Find (a) the work done by \( \mathbf{F} \) and (b) the angle between \( \mathbf{F} \) and \( \mathbf{d} \).

5. S&B 7.32

6. A mass \( m \) is hung vertically from two springs with spring constants \( k_1 \) and \( k_2 \) respectively in two different configurations. In the first configuration the springs are connected side by side (parallel) and in the second configuration the springs are connected end to end (series). Consider the two separate springs as one spring with spring constant \( k \). Derive an expression for \( k \) in terms of \( k_1 \) and \( k_2 \) for the parallel and series configurations. Note: this problem is analogous to series and parallel capacitor configurations in electronic circuits. Capacitors store energy in the form of the electric field.

7. S&B 7.36 To clarify the wording in this problem, 3.00 m is the total distance the block traveled from release to resting against the compressed spring.

8. S&B 7.39

9. S&B 7.44

10. S&B 7.47