# Suggested problems
## Chapter 07

The quiz questions will be same or very similar to the following text-book problems.
Refer to the course website for the latest version of this document.
You are encouraged to seek the help of your instructor during his office hours.

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12. A can of bolts and nuts is pushed 2.00 m along an x axis by a broom along the greasy (frictionless) floor of a car repair shop in a version of shuffleboard. Figure 7-25 gives the work W done on the can by the constant horizontal force from the broom, versus the can's position x. The scale of the figure's vertical axis is set by $W_s$ = 6.0 J. (a) What is the magnitude of that force? (b) If the can had an initial kinetic energy of 3.00 J, moving in the positive direction of the x axis, what is its kinetic energy at the end of the 2.00 m?
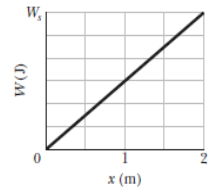

Fig. 7-25  Problem 12.

**Answer:** (a) 3.00 N ; (b) 9.00 J

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17. A helicopter lifts a 72 kg astronaut 15 m vertically from the ocean by means of a cable. The acceleration of the astronaut is g/10. How much work is done on the astronaut by (a) the force from the helicopter and (b) the gravitational force on her? Just before she reaches the helicopter, what are her (c) kinetic energy and (d) speed?

**Answer:** (a) 12 kJ; (b) −11kJ; (c) 1.1 kJ; (d) 5.4 m/s

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29. In the arrangement of Fig. 7-9, we gradually pull the block from x = 0 to x = +3.0 cm, where it is stationary. Figure 7-34 gives the work that our force does on the block. The scale of the figure's vertical axis is set by $W_s$ = 1.0 J. We then pull the block out to x = + 5.0 cm and release it from rest. How much work does the spring do on the block when the block moves from $x_i$= +5.0 cm to (a) x = 4.0 cm, (b) x= − 2.0 cm, and (c) x= −5.0 cm?
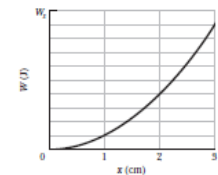

Fig. 7-34  Problem 29.

**Answer:** (a) 0.9 J; (b) 2.1 J  (c) 0

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37. Figure 7-39 gives the acceleration of a 2.00 kg particle as an applied force $\vec{F}_a$ moves it from rest along an x axis from x = 0 to x= 9.0 m. The scale of the figure's vertical axis is set by $a_s$ = 6.0 m/s². How much work has the force done on the particle when the particle reaches (a) x = 4.0 m, (b) x= 7.0 m, and (c) x = 9.0 m? What is the particle's speed and direction of travel when it reaches (d) x = 4.0 m, (e) x = 7.0 m, and (f) x = 9.0 m?
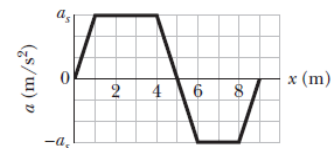

Fig. 7-39  Problem 37.

**Answer:** (a) 42 J; (b) 30 J (c) 12 J (d) 6.5 m/s, +x axis (e) 5.5 m/s, +x axis (f) 3.5 m/s, + x axis

47. A machine carries a 4.0 kg package from an initial position of $\vec{d}_i = (0.50 \text{ m})\hat{\imath} + (0.75 \text{ m})\hat{\jmath} + (0.20 \text{ m})\hat{k}$ at t = 0 to a final position of $\vec{d}_f = (7.50 \text{ m})\hat{\imath} + (12.0 \text{ m})\hat{\jmath} + (7.20 \text{ m})\hat{k}$ at t = 12 s. The constant force applied by the machine on the package is $\vec{F} = (2.00 \text{ N})\hat{\imath} + (4.00 \text{ N})\hat{\jmath} + (6.00 \text{ N})\hat{k}$. For that displacement, find (a) the work done on the package by the machine's force and (b) the average power of the machine's force on the package?

**Answer:** (a) $1.0 \times 10^2$ J (b) 8.4 W