Assignment 6

PHY1001

NO LATE SUBMISSION IS ACCEPTED

14 Figure 7-20 shows an overhead view of three horizontal forces acting on a cargo canister that was initially stationary but now moves across a frictionless floor. The force magnitudes are $F_1 = 3.00\,\text{N}$, $F_2 = 4.00\,\text{N}$, and $F_3 = 9.00\,\text{N}$, and the indicated angles are $\theta_2 = 50.0°$ and $\theta_3 = 35.0°$. What is the net work done on the canister by the three forces during the first 4.00 m of displacement?

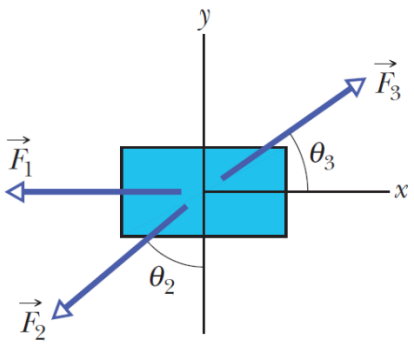

Figure 7-20 Problem 14.

24 In Fig. 7-26, a horizontal force $\vec{F}_a$ of magnitude 23.0 N is applied to a 3.00 kg psychology book as the book slides a distance $d = 0.580\,\text{m}$ up a frictionless ramp at angle $\theta = 30.0°$. (a) During the displacement, what is the net work done on the book by $\vec{F}_a$, the gravitational force on the book, and the normal force on the book? (b) If the book has zero kinetic energy at the start of the displacement, what is its speed at the end of the displacement?

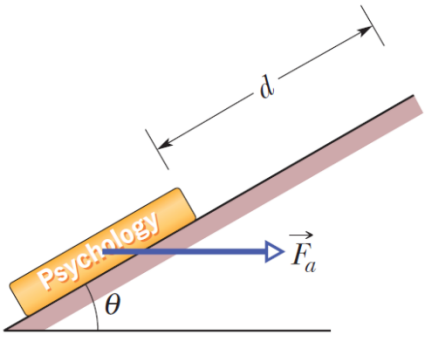

Figure 7-26 Problem 24.

27 A spring and block are in the arrangement of Fig. 7-10. When the block is pulled out to $x = +4.0\,\text{cm}$, we must apply a force of magnitude 360 N to hold it there. We pull the block to $x = 11\,\text{cm}$ and then release it. How much work does the spring do on the block as the block moves from $x_i = +5.0\,\text{cm}$ to (a) $x = +3.0\,\text{cm}$, (b) $x = -3.0\,\text{cm}$, (c) $x = -5.0\,\text{cm}$, and (d) $x = -9.0\,\text{cm}$?

30 In Fig. 7-10*a*, a block of mass m lies on a horizontal frictionless surface and is attached to one end of a horizontal spring (spring constant k) whose other end is fixed. The block is initially at rest at the position where the spring is unstretched ($x = 0$) when a constant horizontal force $\vec{F}$ in the positive direction of the x axis is applied to it. A plot of the resulting kinetic energy of the block versus its position x is shown in Fig. 7-29. The scale of the vertical axis is set by $K_s = 6.0$ J. (a) What is the magnitude of $\vec{F}$? (b) What is the value of k?

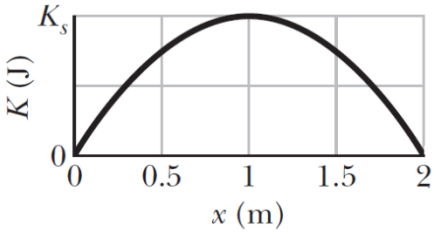

Figure 7-29 Problem 30.

46 The loaded cab of an elevator has a mass of 5.0×10^3 kg and moves 210 m up the shaft in 23 s at constant speed. At what average rate does the force from the cable do work on the cab?

48 A 0.35 kg ladle sliding on a horizontal frictionless surface is attached to one end of a horizontal spring ($k = 450$ N/m) whose other end is fixed. The ladle has a kinetic energy of 10 J as it passes through its equilibrium position (the point at which the spring force is zero). (a) At what rate is the spring doing work on the ladle as the ladle passes through its equilibrium position? (b) At what rate is the spring doing work on the ladle when the spring is compressed 0.10 m and the ladle is moving away from the equilibrium position?